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## REVISION OF *SOLANUM* SECTION *ETUBEROSUM* (SUBGENUS *POTATOE*)

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### Abstract

*Solanum* section *Etuberosum* contains morphologically very similar diploid ( $2n = 2X = 24$ ), self-compatible species, distributed in Masatierra Island (Juan Fernández Archipelago) and adjacent mainland Chile and Argentina, from 40 m to 2500 m. This study is based on comparative morphological studies of field collections from throughout the range of the section, study of later plantings of our collections in field plots, and other herbarium material including all types. We recognize *S. etuberosum*, *S. fernandezianum*, and *S. palustre*.

### Introduction

*Solanum* L. sect. *Etuberosum* (Bukasov & Kameraz) A. Child contains diploid ( $2n = 2x = 24$ ), self-compatible, rhizomatous perennials, distributed in Masatierra Island and adjacent mainland Chile and Argentina (Fig. 1). They grow from 40 m to 2500 m elevation, in moist deciduous forests to upland dry scrub forests along the margins of streams or near waterfalls. All three species are morphologically very similar and are sometimes difficult to distinguish, especially from herbarium material. Previous treatments (Correll 1962; Hawkes 1990; Montaldo & Sanz 1962; Fig. 2) have recognized five species.

The present study of *Solanum* sect. *Etuberosum* is based on considerably more data than was available to previous workers. We collected from throughout the range of the section (Contreras-M. 1987; Spooner et al. 1991; Spooner & Clausen 1993), and obtained herbarium specimens, including all types, from 18 herbaria. Our study is based on comparative morphological studies of these specimens, and 81 later plantings at Sturgeon Bay, Wisconsin, U.S.A. We recognize *S. etuberosum* Lindl., *S. fernandezianum* Phil., and *S. palustre* Poepp.

### Taxonomic History and Intrageneric Relationships

The genus *Solanum* is the largest genus in the Solanaceae, with 1,000–1,100 species (D'Arcy 1991). D'Arcy (1972) divided *Solanum* into seven subgenera, including subgenus *Potatoe* (G. Don) D'Arcy, which contains the domesticated potato (*S. tuberosum* L.) and pepino (*S. muricatum* Aiton).

The taxonomic history of *Solanum* sect. *Etuberosum* begins with the publication of *S. etuberosum* by Lindley (1835), described from plants grown in Scotland from seed

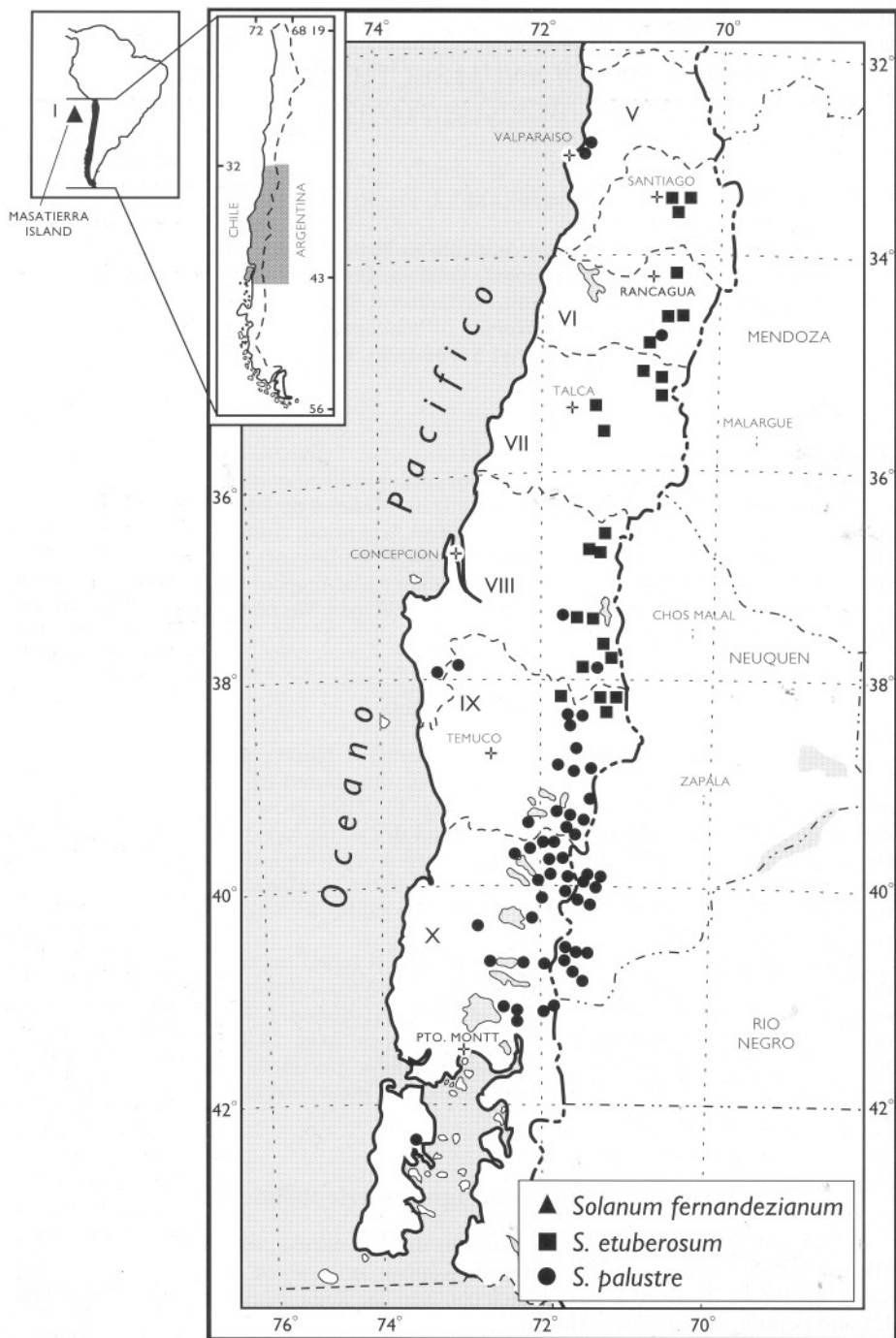


FIG. 1. Distribution of *Solanum fernandezianum*, *S. etuberosum*, and *S. palustre*.

## Hypotheses of Species Boundaries in *Solanum* sect. *Etuberosum*

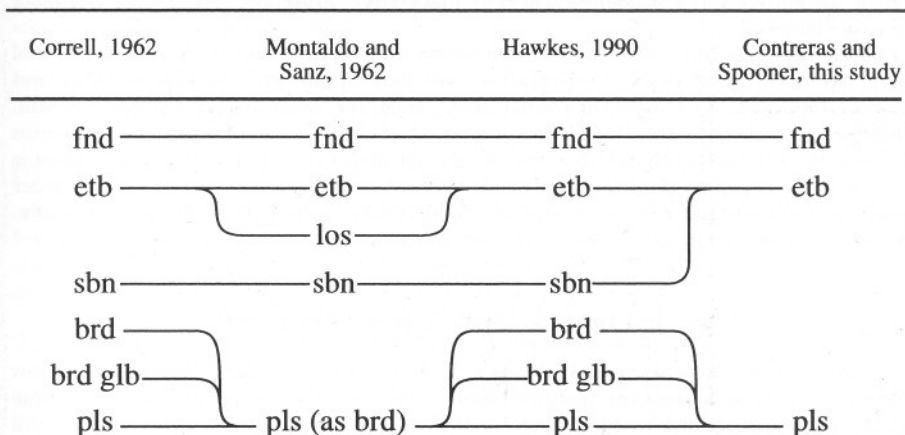


FIG. 2. Flow chart of hypotheses of species and variety boundaries of the constituent taxa of *Solanum* sect. *Etuberosum* accepted by Correll (1962), Montaldo & Sanz (1962), Hawkes (1990), and this study. The following standardized abbreviations follow Hawkes (1990) and Huamán & Ross (1985): brd, *Solanum brevidens*; brd glb, *S. brevidens* var. *glabrescens*; etb, *S. etuberosum*; fnd, *S. fernandezianum*; los, *S. looseri*; pls, *S. palustre*; sbn, *S. subandinum*.

sent from Chile to the Horticultural Society of Scotland. All subsequent new species and varieties now placed in sect. *Etuberosum* were also described in the genus *Solanum*, and there has never been any controversy regarding generic placement.

The similarity of members of sect. *Etuberosum* to sect. *Petota* Dumort. (tuber-bearing potatoes and wild relatives) was evident from the description of *S. etuberosum* (Lindley 1835, t. 1712) "There can be no doubt that this is a species essentially distinct from the potatoe, and yet it is impossible to point out any character by which it is to be positively distinguished [from potatoe] except the want of tubers, and the smoothness of the calyx and flower stalks; these latter having a shining, nearly downless surface, instead of the rough dull appearance which we meet with those parts in the common potatoe." Variability currently documented within sect. *Petota* (Hawkes 1990; this study) shows that the character states of the pedicels and calyx mentioned by Lindley (1835) are insufficient to distinguish sect. *Etuberosum* from sect. *Petota*. Some members of both sections are extremely similar morphologically, and the only morphological characters we know that distinguish these sections is the presence of thickened rhizomes and the basal to near-basal pedicel articulation in sect. *Etuberosum*, and presence of tubers and pedicels articulated noticeably above the base in sect. *Petota* (Spooner et al. 1993).

Intragenetic relationships of sect. *Etuberosum* have been the subject of debate. Juzepczuk & Bukasov (1929) were the first to group species informally in "ser. *Etuberosa*", which they placed within sect. *Petota* [then referred to as sect. *Tuberarium* (Dunal) Bitter]. Bukasov & Kameraz (1959) validated ser. *Etuberosa* Bukasov & Kameraz. Correll (1962), D'Arcy (1991), and Hawkes (1990) also placed ser. *Etuberosa* in sect. *Petota*.

Bukasov (1939) informally grouped ser. *Etuberosa* in "*Estolonifera*", and the remaining tuber-bearing species in "*Stolonifera*". Hawkes (1989) validated subsection *Estolonifera* Hawkes and subsection *Stolonifera* Hawkes and placed both under sect. *Petota*. In subsection *Estolonifera*, Hawkes placed ser. *Etuberosa* and ser. *Juglandifolia* (Rydb.) Hawkes.

Child (1990) removed ser. *Etuberosa* from sect. *Petota* and transferred it to sectional rank based on basal pedicel articulation and lack of tubers. Chloroplast DNA and morphological data of sect. *Etuberosum*, sect. *Petota*, ser. *Juglandifolia*, *Lycopersicon* Mill. (tomatoes), other near relatives in subgenus *Potatoe*, and appropriate outgroups support sect. *Etuberosum* and sect. *Petota* as separate clades. Subsection *Estolonifera* is shown to be paraphyletic (Spooner et al. 1993), with sect. *Etuberosum* to be the sister taxon to potatoes and tomatoes, and ser. *Juglandifolia* to be part of the tomato clade. We follow Child's treatment relative to sect. *Etuberosum*.

### Intra- and Intersectional Crossing Relationships

Artificial hybrids between *S. etuberosum*, *S. fernandezianum*, and *S. palustre* have low fertility, and these species are hypothesized to differ from each other by chromosome structural rearrangements (Matsubayashi 1991; Ramanna & Hermsen 1979, 1981). All species in sect. *Etuberosum* exhibit crossing barriers to members of sect. *Petota*, but sterile intersectional hybrids can be made between them (Hermsen & Taylor 1979), and fertility can be restored by artificial allopolyploidization of the hybrids (Ramanna & Hermsen 1979; Hermsen et al. 1981). Despite these crossing barriers, sexual gene transfer between both *S. etuberosum* and *S. palustre* to cultivated tuber-bearing species has been accomplished with the aid of bridging species and somatic fusion hybrids, and valuable disease resistances can be transferred from sect. *Etuberosum* to the cultivated potatoes (see Spooner et al. 1991, for a review).

### Concepts of Species and Morphology

The species concept adopted here is based on morphology. Despite the similarity of species, especially as herbarium specimens, and occasional overlap of diagnostic character states, the taxa are generally easily distinguished in living condition.

Prior taxonomic treatments (Correll 1962; Hawkes 1990; Montaldo & Sanz 1962) relied on pedicel articulation to distinguish *S. fernandezianum* (with basal pedicel articulation) from *S. etuberosum* and *S. palustre* (pedicels articulate 1–4 mm from the base). While all collections of *S. fernandezianum* we observed had basal pedicel articulation, so did some collections of *S. etuberosum* (e.g., Spooner & Contreras 4324, 4330, 4350, 4489A), and *S. palustre* (e.g., Spooner & Clausen 4521, 4537; Spooner & Contreras 4391, 4407, 4456, 4458, 4467). Montaldo & Sanz (1962) distinguished *S. subandinum* F. Meigen (with pedicel articulation 3–4 mm from the base) from *S. etuberosum* and *S. looseri* Juz. (with pedicel articulation 1–2.2 mm from the base). We observed continuous variation of pedicel articulation from 0 mm–12 mm from the base for *S. etuberosum* and *S. palustre*.

Prior taxonomic treatments relied on pubescence to separate these species. Our study showed pubescence to be taxonomically useful only to distinguish *Solanum fernandezianum* (usually glabrous, sometimes sparsely puberulent) from *S. etuberosum* and *S. palustre* (usually moderately puberulent to densely pubescent, sometimes sparsely puberulent). *Solanum etuberosum* and *S. palustre* show much variability for length and density of non-glandular hairs, and both species have eglandular to densely glandular phenotypes, with two distinct glandular trichomes, Type A and Type B, morphologically identical to some members of *S. sect. Petota* (Gibson 1976; Spooner

and van den Berg 1992). Type A glandular trichomes are 120–210 $\mu$  in length, with tetralobulate heads 50–70 $\mu$  in diameter, in which the glandular material is entirely membrane-bound. Type B glandular trichomes are 600–950 $\mu$  in length, with an ovoid gland at the tip, 20–60 $\mu$  in diameter, which continuously discharges a clear viscous exudate not bound by a membrane.

Our examination of germplasm accessions of *S. etuberosum* and *S. palustre* showed some populations of both species to have only Type A or Type B trichomes, or both. *Solanum etuberosum*, Spooner & Contreras 4388, showed no Type A or Type B trichomes, and Spooner & Contreras 4330 showed a dense indument of Type B trichomes; *S. palustre*, Spooner & Clausen 4538, showed no Type A or Type B trichomes, and Spooner & Clausen 4533 showed a dense indument of Type A trichomes. As with pedicel articulation, we found continuous variation within *S. etuberosum* and *S. palustre* for hair length, hair density, and glandularity. These pubescence characters are not useful, therefore, to separate taxa we synonymize under *S. etuberosum* and *S. palustre*, as was done by some other taxonomic treatments.

Correll (1962) and Hawkes (1990) distinguished *S. subandinum* by its small stature (<2 dm tall) and lack of interstitial leaflets. Our collection at the type locality of *S. subandinum* (Spooner & Contreras 4335) showed plants over 0.5 m tall, and with leaves in the upper internodes occasionally lacking interstitial leaflets (like the type), but with lower leaves possessing them. Such variation is common throughout the range of *S. etuberosum*, and *S. subandinum* was based on a dwarf plant and inadequate population samples to document this variation. We therefore designate it as a synonym of *S. etuberosum*.

### Taxonomy

The distinguishing characters of sizes, colors and pubescence are much easier to discern in living material, and dried specimens can be difficult to identify. *Solanum fernandezianum* and *S. palustre* always have a conspicuous purple dot on fresh mature seeds that is always absent on *S. etuberosum*; but this character is not evident from dried seeds, and seeds are rarely present on herbarium material. Corolla colors mentioned below are from the R.H.S. color charts (Royal Horticultural Society 1986). A hand lens or stereoscopic microscope is needed to distinguish the glabrous to sometimes sparsely puberulent leaves of *S. fernandezianum* from the usually moderately to more densely pubescent leaves of *S. etuberosum* and *S. palustre*. The small anthers and included styles distinguish *S. fernandezianum* from *S. etuberosum* and *S. palustre*, and the length of the calyx acumens usually distinguishes *S. etuberosum* and *S. palustre*.

### Taxonomic Treatment

*Solanum* L. sect. *Etuberosum* (Bukasov & Kameraz) A. Child, Feddes Repert. 101: 218. 1990.—TYPE: *Solanum etuberosum* Lindl.

*Solanum* ser. *Etuberosa* Bukasov & Kameraz, Osnovy Seleksii Kartofelia [Bases of Potato Breeding, in Russian], Gosudarstvennoe Izdatel'sto Sel'skokhozyaistrennoi Literatury, Moscow. 18. 1959.

Stems erect to ascending, up to 1 m long (one anomalous plant with a trailing stem to 4 m long collected), branched, terete to angular, up to 2 cm wide at base, green to purple, glabrous to densely pubescent, glandular with Type A and Type B glands (see above) or eglandular, with branched or unbranched rhizomes up to 1 cm in diameter and 10 cm long; leaves odd-pinnate, 4–7-jugate, up to 35 cm long and 20 cm wide, with 1–8 interjected leaflets between sets of leaflet pairs, the

interjected leaflets to 2 cm long and 2 cm wide; the leaflets plane or undulate, gray-green to dark green to purple, glabrous to sparsely puberulent to densely pubescent, glandular or eglandular; lateral leaflets subequal to decreasing in size from the middle to the apex and base, the basal pair usually more reduced, sessile to petiolate, with petiolules 0–10 cm long, the leaflets elliptic to lanceolate to narrowly ovate, acute to acuminate at the apex, cuneate to obliquely rounded to obliquely cordate at the base, the middle pair 4–10 cm long, 1.5–4 cm wide, the margins entire; terminal leaflet nearly the same size and shape as the middle lateral leaflets or slightly wider and more ovate; pseudostipular leaves ovate to elliptical to obovate, up to 2.8 cm long and 1.5 cm wide, clasping the stem; inflorescence pseudoterminal, a cymose panicle, with 12–65 flowers; peduncles 1–8 cm long, glabrous to puberulent to glandular, simple to 3-branched; pedicels 9–20 mm long, glabrous to puberulent, articulate 0–13 mm from the base; calyx 2.5–4.2 mm long, glabrous to puberulent, lobed at about the middle, symmetrical with five lobes, the acumens rounded to acuminate, 0.2–2.5 mm long; corolla rotate to rotate-pentagonal, 17–30 mm in diameter, violet to violet-blue, homogeneous in color or with a white “star” (white color radiating from center of corolla to tips of corolla lobes), or darker in center; anthers lanceolate, 4–7 mm long; styles 3–11 mm long; ovary globular; fruits green to deep purple, globular, 13–23 mm in diameter; fresh mature seeds all white or white and with a purple spot formed by the purple embryo visible through the seed coat. Chromosome number (all three species counted):  $2n = 24$  (Bamberg & Martin 1993).

### Key to Species of *Solanum* sect. *Etuberosum*

1. Leaves glabrous except for occasional puberulent hairs along veins, rarely between the veins; anthers 4–5 mm long; styles 3.5–5 mm long, included or slightly exceeding the stamens; endemic to Masatierra Island, Chile . . . . . 1. *S. fernandezianum*
1. Leaves sparsely puberulent to densely pubescent on veins and between veins, sometimes moderately to densely glandular-pubescent; anthers 5–7 mm long; styles 8–11 mm long, exceeding the stamens; endemic to continental Chile and Argentina.
  2. Calyx acumens (0.5) 1–1.2 (2.8) mm long; corollas usually violet (R.H.S. colors 83 A to 83 B) and usually uniformly so; fresh mature seeds white; stems and leaves typically light yellowish-green to grey-green, occasionally tinged or mottled with purple . . . . . 2. *S. etuberosum*
  2. Calyx acumens (0.2) 0.5–1.3 (1.7) mm long; corollas usually light violet-blue in center (R.H.S. color 92A), darker violet-blue beyond (color 92C), with or without white “star” (white color radiating from center of corolla to tips of corolla lobes); fresh mature seeds white with a purple spot formed by the purple embryo visible through the seed coat; stems and leaves typically medium to dark green and deeply tinged or mottled purple . . . . . 3. *S. palustre*
1. *Solanum fernandezianum* Phil., Linnaea 29: 23. Feb–Mar 1858 [fide Stafleu & Cowan 1985, entry 10.744]. *Solanum tuberosum* var. *fernandezianum* (Phil.) Reiche, Anales Univ. Chile 124: 737. 1909. (reprinted in K. F. Reiche, Fl. Chile 5 [10]: 353. 1910 [fide Stafleu & Cowan, 1983, entry 8853]; this reprint is mentioned here and below because it is cited incorrectly as an original publication by other authors.).—TYPE: Chile. Juan Fernández Islands [Masatierra Island]: Oct 1854, *P. Germain s.n.* (holotype: SGO! [photos: PTIS!, Montaldo and Sanz, 1962, p. 76!]). *Solanum brevistylum* Wittm., in P. Berthault, Ann. Sci. Agron. Franc. Étrangere ser. 3: 6(2). 185. 1911. nomen nudum, pro syn.

Stems deep green, sometimes tinged purple, glabrous or with occasional puberulent hairs; leaves up to 35 cm long and 20 cm wide, 4–6-jugate, the leaflets plane, dark green, sometimes tinged with purple, glabrous except for occasional puberulent hairs along the veins, rarely between the veins; middle lateral leaflets 5–10 cm long, 1.5–4 cm wide; pseudostipular leaflets up to 20 mm long and 15 mm wide; flowers 14–30 per inflorescence; peduncles 1–10 cm long; pedicels 6–15 mm long, articulate at the very base; calyx 5–6 mm long, the acumens 0.2–0.9 mm long; corolla 20–30 mm in diameter, usually light violet-blue in center, darker violet-blue beyond, with or without white star; anthers 4–5 mm long; styles 3.5–5 mm long; fruits 10–13 mm in diameter; fresh mature seeds white and with a purple spot formed by the purple embryo visible through the seed coat.

Phenology. Flowering from January through March.

Distribution (Fig. 1). Restricted to Masatierra Island, Chile; in mesic habitats at edge of woods, shaded rock walls, valley bottoms; 100–610 m.

Additional specimens examined. Note: Collections by *Andrea Clausen* are abbreviated as "Cl.", *Andres Contreras M.* as "Co.", and *David M. Spooner* as "S.". Collections by S. & Cl. are accompanied by map numbers from the Argentinian Instituto Geográfico Militar 1:250,000-scale, and those by S. & Co. by the Chilean Instituto Geográfico Militar Carta Regular 1:250,000-scale; only the map number is given (e.g., 4172-2 for Argentina, or SJ-19-13 for Chile). The herbarium acronym PTIS refers to the Potato Introduction Station Herbarium at Sturgeon Bay, Wisconsin (Bamberg and Spooner 1994), to appear in Edition 9 of *Index Herbariorum* (ed. 8, Holmgren et al. 1990).

**CHILE. Juan Fernández Archipelago. Masatierra Island:** Plazoleta del Yunque, 18 Feb 1935, *H. Behn s.n.* (CONC); Apr 1830, *Bertero 1515* (G, K); Mirador de Selkirk, 700 m, 3 Mar 1967, *T. Cechalovsk s.n.* (CONC); Quebrada del Mastuerzo, growing in dry river bed surrounded with *Aristotelia chilensis*, 100 m, 33°37'S, 78°50'W, 22 Dec 1978, *Co. 293* (VALD); La Vaquería, up quebrada to the right (N) from the waterfall with *Gunnera peltata*, 150 m, 19 Jan 1991, *D. Crawford et al. 11862* (OS), La Vaquería, up quebrada to the right (N) from the waterfall, edge of *Myrceugenia* forest, 230 m, 19 Jan 1981, *11864* (OS); on the W side ca. 40 m below the cordon running from El Yunque (the Anvil) to La Damajuana, sheer rock walls, partial shade, 600 m, 1 Mar 1939, *J. L. Morrison 17337* (G, K); Challenger Expedition, Nov 1875, *Moseley s.n.* (BM [2], K); *Philippi s.n.* (W [2], [photo: BM]); 1904, *F. Philippi s.n.* (BM); 1876, *Philippi 755* (G, G, [photo of specimen at B]); Portezuelo Villagra, 570 m, 3 Dec 1916, *C. & I. Skottsberg 12 p.p.* (C, K, S, [photo: BM]), Portezuelo, 570 m, 24 Dec 1916, *12 p.p.* (GB, [photo: BM], K), Portezuelo, 550 m, 3 Dec 1917, *12 p.p.* (LL, [photo: BM]); Cerro Agudo, third quebrada, vegetation tree ferns, *Drimys*, *Coprosma*, one plant seen, 610 m, 21 Jan 1991, *T. Stuessy et al. 11890* (OS); on patch in small clearing on steep hillside in *Myrceugenia fernandeziana* forest, no tubers or seeds yet formed, 340 m, 11 Feb 1980, *T. F. Stuessy & R. W. Sanders 5178* (CONC, OS); Quebrada Piedra Agujereada, bosque de *Drimys*, *Myrceugenia* y *Fragaria*, 400 m, Feb 9, 1980, *E. Ugarte & O. Parra 9164* (OS).

2. *Solanum etuberosum* Lindl., *Edward's Bot. Reg.* 20, t. 1712. 1835.—TYPE: Chile. Prov. Unknown: Grown in Scotland from seed sent from Chile to the Horticultural Society of Scotland (holotype: CGE [photos: F! G!]). *Solanum tuberosum* var. *polemoniifolium* Hook. f., *Fl. Antarct.* 2: 330. 1846.—TYPE: Chile. In Andes of Chile and Mendoza, *J. Gillies s.n.* (holotype: K! [photo: PTIS!]). Mendoza, Argentina, is located on the eastern side of the Andes mountains northeast of Santiago, Chile. *Solanum etuberosum* is not known from Mendoza, and it is likely that the type was collected in the Andes Mountains of Chile, southwest of Mendoza. No collection date is provided on the type, but J[ohn] Gillies collected in Argentina and Chile from 1823–1834 (Lanjouw and Stafleu 1957).

*Solanum bustillosii* Phil., *Linnaea* 29: 24. Feb–Mar 1858 [fide Stafleu & Cowan 1985, entry 10.744]. *Solanum etuberosum* var. *bustillosii* (Phil.) Witasek, *Anales Univ. Chile* 5: 738. 1909 (reprinted in R. F. Reiche, *Fl. Chile* 5 [10]: 354. 1910 [fide Stafleu & Cowan 1983, entry 8853]).—TYPE: Chile. Región VI: Cordillera de San Fernando, Feb 1843, *Bustillos s.n.* (holotype: SGO! [photos: F!, PTIS!, Montaldo S Sanz, 1962, p. 80!]).

*Solanum subandinum* F. Meigen, *Bot. Jahrb. Syst.* 17: 293. 1893.—TYPE: Chile. Región V: Cordillera de Santiago, Quebrada San Ramón, 2100 m, ca. 1889, *C. Reiche s.n.* (holotype: W! [photos: BM!, F [2]!, PTIS!, Montaldo and Sanz, 1962, p. 103!]). Non *S. subandinum* Phil., *Anales Univ. Chile* 91: 6. 1895.

*Solanum kunzei* Phil., *Anales Univ. Chile* 91; 6. 1895.—TYPE: Chile. Región Metropolitana: Valley of Río Colorado, 1700 m, El Alfalfar [Alfalfal or El Alfalfal, 1400 m, 45 km E of Santiago, 33°30'5, 70°11'W, fide Instituto Geográfico Militar, Chile, undated] Dec 1887, *L. Kunze s.n.* (holotype: SGO! [photo: PTIS!]; isotype: W! [photos: BM! F!], [drawing: W!]).az2

*Solanum etuberosum* var. *antucense* Bitter, *Repert. Spec. Nov. Regni Veg.* 11: 376. 1912.—TYPE: Chile. Región VIII: Río Aconcagua in Andes of Antuco, Rucue, Truvun Leuvu, Dec 1828, *E. F. Poeppig Coll. pl. Chil. III 62 (Diar. 715) (780) p.p.* (lectotype, here chosen: W! [photo: PTIS!]; isolectotype: G [photo: F!], W!, W! [a mixed collection the type of this taxon and *Solanum palustre* var. *glabrescens* Walp.]).

There is confusion regarding numbers on the type. The number “62” appears in the original description, and “62” and “*Diar. 715*” appear on printed herbarium labels. The number “780” also appears on handwritten labels. Poeppig’s (1834, 1836) personal itineraries do not clarify these numbers. Urban (1896) mentions Poeppig’s Chile collections labelled as “*E. F. Poeppig Coll. pl. Chil. III*”, and *Diar.* is an abbreviation for the German word *Diarien* (diaries). It is possible that the number “715” is Poeppig’s original collection number of the approximately 900 collections Poeppig made in Chile. Other numbers may have been placed on his collections by another person.

There also is confusion regarding the locality of “Río Aconcagua”. This river is near Viña del Mar and is listed on the type collection of another of Poeppig’s collections that is the type of *S. palustre* (*E. F. Poeppig 73 (Diar. 184)*), and *S. etuberosum* likely never grew at the low altitude of Viña del Mar. Truvun Leuvu is another name for Trubunleo (*C. Marticorena, pers. comm.*). Trubunleo is a name for a river (located at 37°23'S, 71°28'W) and a waterfall (located at 37°22'S, 71°30'W [United States Department of Interior 1967]). It is likely that *E. F. Poeppig Coll. pl. Chil. III 62 (Diar. 715) (780)* was collected in the Andes Mountains near Antuco (located at 37°20'S, 71°41'W [United States Department of Interior 1967]). Antuco is an area where the two species co-occur (Fig. 1, middle of Región VIII), as documented in our collections (*S. etuberosum*, *S. & Co. 4489, 4490*; *S. palustre*, *S. & Co. 4488*).

*E. F. Poeppig Coll. pl. Chil. III 62 (Diar. 715) (780)* are mixed collections of *S. palustre* and *S. etuberosum*. The *S. palustre* part originally was named as *Solanum palustre* var. *glabrescens* Walp. (see below).

*Solanum etuberosum* var. *chillanense* Bitter, *Repert. Spec. Nov. Regni Veg.* 11: 376. 1912.—TYPE: Chile. Región VIII: Baños de Chillán, Feb 1892, *R. A. Philippi s.n.* (holotype: W! [photos: BM!, F [2]!, G!, PTIS!]).

*Solanum looseri* Juz., *Izv. Akad. Nauk SSSR, Ser. Biol.* 2: 301. 1937.—TYPE: Chile. Región Metropolitana: Peñalolén, 1800 m, Jan 10, 1929, *G. Looser 876* (holotype: LE [photo: Montaldo & Sanz 1962, p. 98!]).

Stems light yellowish-green to gray-green, occasionally tinged or mottled with purple, sparsely puberulent to more commonly moderately to densely glandular-pubescent, sometimes with both Type A and Type B glands; leaves up to 25 cm long and 15 cm wide,



4–6-jugate, the leaflets plane or undulate, light yellowish-green to gray-green, glabrescent to more commonly moderately to densely glandular-pubescent, sometimes with both Type A and Type B glands; middle lateral leaflets 5–10 cm long, 1.5–4 cm wide; pseudostipular leaflets up to 20 mm long and 15 mm wide; flowers 12–35 per inflorescence; peduncles 1–8 cm long; pedicels 6–20 mm long, the articulation 0–13 mm above the base; calyx 5–8 mm long, the acumens (0.5) 1–1.2 (2.8) mm long; corolla 22–35 mm in diameter, usually homogeneously violet; anthers 5–7 mm long; styles 8–11 mm long; fruits 14–23 mm in diameter; fresh mature seeds all white.

**Phenology.** Flowering from December through March.

**Distribution** (Fig. 1). Central Chile, from Región V–IX, in the foothills and mid to upper slopes of the Andes mountains; in areas of low, dry scrub forest, along streams or in the mists of waterfalls, always in full sun and usually in rocky soils: 430–2500 m.

Additional specimens examined. **CHILE. Región V:** Prov. Santiago, Casa Piedra, Peñalolén, at the end of a quebrada, 26 Feb 1942, A. Montaldo 282 (SGO); Lagunillas, Jan 1887, C. Sage s.n. (SGO); Prov. Santiago, in mountains ca. 5 km SSW (by air) from San José del Maipo, in Yerba Buena, sector El Toyo, SI-19-6, 33°40'S, 70°25'W, 1530 m, Mar 1983, Co. 507, 509 (VALD), 33°41'S, 70°24'W, 1500 m, 29 Jan 1989, S. & Co. 4323 (PTIS, VALD, WIS); Prov. Santiago, ca. 6 km SSW (by air) of San José del Maipo, in Quebrada Los Lunes, SI-19-6, 33°41'S, 70°26'W, 1500 m, Mar 1983, Co. 508 (VALD), 33°42'S, 70°23'W, 1500 m, 29 Jan 1989, S. & Co. 4324 (PTIS, VALD, WISC); Prov. Santiago, sector Agua del Minero, Quebrada de Macul, Cerros de Peñalolén, SI-19-5, 33°30'S, 70°28'W, 1850 m, 30 Jan 1989, S. & Co. 4325 (PTIS, VALD, WIS), Prov. Cachapoal, on W bank of Río Cipreses, Reserva Nacional Río de los Cipreses, growing alone among rocks next to stream, SI-19-10, 34°21'S, 70°25'W, 2200 m, 1 Feb 1989, 4326 (PTIS, VALD). **Región VI:** Cordillera de Colchagua, 5000–7000 ft, Dec 1860, L. Landbeck s.n. (W [2], [photo: F]); Cordillera de Colchagua, 1802, R. A. Philippi s.n. (G [2]), Cordillera de Colchagua, 1862, s.n. (G), Cordillera de Colchagua, 1876, s.n. (G), Cordillera de Colchagua, s.n. (W); Prov. Colchagua, ca. 3 km (by air) SSE of Sierras de Bellavista, by streamside, in Quebrada Las Aletillas, SI-19-9, 34°50'S, 70°44'W, 1540 m, 1 Feb 1989, S. & Co. 4328 (PTIS, VALD), Prov. Cachapoal, in Sierra de los Punzones, Minas del Rosario, 100 m W of W end of tunnel, 1.3 km W of W end of Laguna los Cristales, SI-19-9, 34°34'S, 70°31'W, 2110 m, 19 Mar 1989, 4473 (PTIS, VALD), Prov. Cachapoal, Sierra de los Punzones, S side of Laguna los Cristales, ca. 3 km (by air) NE of Laguna Negra, SI-19-9, 34°34'S, 70°30'W, 2245 m, 17 Mar 1989, 4474 (PTIS, VALD), Prov. Cachapoal, where stream flowing north out of Laguna Negra crosses road to Minas del Rosario, SI-19-9, 34°34'S, 70°32'W, 1800 m, 17 Mar 1989, 4479 (PTIS, VALD), Prov. Cachapoal, 0.5 km upstream (S), of Minas del Rosario road (through Las Nieves), 6.1 km W of gate at mine station, 15.4 km E of Las Nieves at gate on E edge of town, SI-19-9, 34°33'S, 70°36'W, 1150 m, 17 Mar 1989, 4480 (PTIS, VALD). **Región VII:** Cordillera de Maule, 1856 and 1857, P. Germain s.n. (G [2], K, W, [photo: F]); Cordillera Linares, Jan 1856, Philippi s.n. (W), Talca, s.n. (G, [photo: of specimen at B]); Quebrada La Leona, N of Río Claro, ca. 60 km SE of Molina, Parque Inglés, SI-19-13-14, 35°28'S, 70°56'W, 820 m, 3 Feb 1989, S. & Co. 4330 (PTIS, VALD, WIS), Prov. Talca, Quebrada La Leona, N of Río Claro, ca. 60 km SE of Molina, in Parque Inglés, ca. 1.5 km upstream of 4330, leaves not noticeably glandular, SI-19-13-14, 35°27'S, 70°56'W, 1400 m, 3 Feb 1989, [missing no.!] (PTIS, VALD, WIS), Prov. Talca, in bed of small stream flowing from the S into Río Maule, ESE of Talca, ca. 3 km W of turnoff past army post to Laguna La Invernada, 33 km E of Cipreses, ca. 1.5 km downstream of 4330, leaves densely glandular, SI-19-13-14, 35°48'S, 70°53'W, 830 m, 5 Feb 1989, 4333 (PTIS, VALD), Prov. Curicó, in valley ca. 300 m S of Río Teno, off the now abandoned Curicó-Vergara Pass road to border with Argentina, ca. 15 km E of Los Queñes, ca. 12 km (by air) W of Los Cipreses, SI-19-13-14, 35°03'S, 70°40'W, 1040 m, 18 Mar 1989, 4481 (PTIS), Prov. Curicó, ca. 3 km S of Río Teno, off now

abandoned Curicó-Vergara pass road to border with Argentina, ca. 15 km E of Los Queñes, small valley adjoining Río Teno, ca. S km W of Los Cipresses, SI-19-13-14, 35°05'S, 70°36'W, 1240 m, 18 Mar 1989, 4482 (PTIS, VALD); Volcán Peteroa, Prov. Talca, Curicó, 2500 m, Jan 1925, *E. Werdermann* 615 (F, G, K, [photos: F, M]). **Región VIII:** Chillán, Las Trancas, 1240 m, 8 Jan 1978, *Co. 210* (VALD), Chillán, Las Cascadas, 1265 m, 1265 m, 8 Jan 1978, 211 (VALD), Chillán, Gruta de los Pangues, 1300 m, 8 Jan 1978, 212 (VALD), Chillán, Termas de Chillán, 1750 m, 9 Jan 1978, 213 (VALD), between Ñuble and Biobio, Estero Ponce, 615 m, 9 Jan 1978, 214 (VALD), Biobio, Estero Quillailebu, 785 m, 11 Jan 1978, 215, 216, 217 (all VALD), Biobio, Cajón del Pino, 1780 m, 21 Jan 1978, 218 (VALD), Biobio, Refugio Antuco, 1220 m, 22 Jan 1978, 219 (VALD); Prov. Ñuble, common in large mats among rocks on seepage slopes and along stream above Termas de Chillán, 6 Feb 1958, *D. S. Correll* C143 (K); below Baños de Chillán, 5000 ft, 24 Dec 1907, *H. J. Elwes* s.n. (K [2], [photos: F, W]); Andes of Antuco, Jan 1839, *C. Gay* 1184 (K, [photos: F, W]); Termas de Chillán, 6 Feb 1942, *A. Montaldo* 244 (SGO, [photo: Montaldo and Sanz, 1962, p. 81]); Copahue, 1893-1897, *F. W. Neger* (M); Baños de Chillán, Feb 1892, *Philippi* 21 (W); Antuco, *Reynolds* 78 (K); Caracoles, Trafún, *H. Smith* s.n. (VALD); Prov. Ñuble, Gruta de los Pangues, 4 mile below the hotel on the road to the Termas de Chillán, 4200 ft, 16 Jan 1961, *E. E. Smith & B. Sparre* 136-HT (459 S&S) (G, K); Prov. Ñuble, Dept. San Carlos, bank of Los Sauces River, Los Sauces, SJ-19-1-2, 36°39'S, 71°16'W, 710 m, 7 Feb 1989, *S. & Co. 4336* (PTIS, VALD), Prov. Ñuble, at base of waterfall at Las Trancas, on N side of road to Termas de Chillán, ca. 10 km W of Termas de Chillán, SJ-19-1-2, 36°53'S, 71°29'W, 1250 m, 8 Feb 1989, 4337 (PTIS, VALD, WIS), Prov. Ñuble, in small valley on S side of road, ca. 4 km W of Termas de Chillán, at Gruta los Pangues, SJ-19-1-2, 36°54'S, 71°25'W, 1460 m, 8 Feb 1989, 4338 (PTIS, VALD), Prov. Ñuble, by stream above hotel at Termas de Chillán, SJ-19-1-2, 36°53'S, 71°23'W, 1700 m, 8 Feb 1989, 4340 (PTIS, VALD, WIS), Prov. Biobio, in dry volcanic cinders just N of road on S side of a W-diverting spur of Laguna de la Laja, at sector Puerto, SJ-19-5, 37°22'S, 71°23'W, 1380 m, 9 Feb 1989, 4341 (PTIS, VALD, WIS), Prov. Biobio, ca. 3 km SE of Alto Biobio, on N side of Río Pangue, 300 m upstream of Puente Pangue, SJ-19-5, 37°53'S, 71°36'W, 440 m, 10 Feb 1989, 4349 (PTIS, VALD, WIS), Prov. Biobio, ca. 3 km SE of Alto Biobio, ca. 400 m downstream of Puente Pangue, SJ-19-5, 37°54'S, 71°36'W, 430 m, 10 Feb 1989, 4350 (PTIS, VALD), Prov. Biobio, on rocks in Río Rucue, a large population growing for ca. a 4 km stretch, centered 2 km ESE of Mileo (where dirt road meets Río Rucue), 7 km (by air) SW of Antuco, SJ-19-5, 37°22'S, 71°43'W, 500 m, 23 Mar 1989, 4485 (PTIS, VALD), Prov. Biobio, in stream flowing from the N into Río Queuco, ca. 50 m W of Puente Nitrao, by Baños Nitrao, 48 km NE of Alto Biobio, SJ-19-5, 37°41'S, 71°20'W, 820 m, 24 Mar 1989, 4489 (PTIS, VALD), Prov. Biobio, 70 km NE of Alto Biobio on road to Hito Paso de Copahue (at border with Argentina), 5 km E of border with Argentina, by hot sulphur springs, where a small stream crosses the jeep road near the headwaters of Río Queuco, SJ-19-5, 37°49'S, 71°10'W, 1810 m, 24 Mar 1989, 4490 (PTIS, VALD); Antuco, Capulhue, *H. Volkman* 31 (W[2], [photo: F]). **Región IX:** Prov. Malleco, 7 km E of jct. of road at E end of Laguna Malleco, in stream flowing W into this lake, ca. 1 km E of bridge over this stream, SJ-19-9, 38°12'S, 71°46'W, 1005 m, 11 Feb 1989, *S. & Co. 4352* (PTIS), Prov. Malleco, on E side of road leading W from Caracoles, where Río Nancero joins Río Biobio, at Puente Nancero, SJ-19-9, 38°20'S, 71°20'W, 810 m, 16 Feb 1989, 4387 (PTIS), Prov. Malleco, Sector Cierre Viejo, along jeep trail starting just S of Troyo and leading NW along Río Ranquil, SJ-19-9, 38°14'S, 71°15'W, 1080 m, 16 Feb 1989, 4388 (PTIS, VALD), Prov. Cautín, 16 km W of police post in Icalma on N side of road, SJ-19-9, 38°51'S, 71°26'W, 900 m, 16 Feb 1989, *S. & Co. 4491* (PTIS, VALD).

**Indefinite:** seeds from Mexico [apparently an error or from cultivated plants], ex herb. *B. Lambert* s.n. (W). ARGENTINA. Prov. Mendoza, Cordillera del Atuel, *Kurtz* 10081 (CORD); This possibly is mislabelled from a Chilean locality [Hawkes and

Hjerting, 1969, Appendix III; Spooner and Clausen, 1993). CHILE. Cordillera del Manquehue, banks and thickets, 8 Jan 1905, *R. M. Middleton s.n.* (BM, K); Cypress Valley, subalpine region, near Cauquenes hot springs, *E. Reid s.n.* (K); Las Damas, Dec 1872, *E. C. Reed s.n.* (K, [photo: F]); Juan Fernández Islands [Masatierra Island]: Portezuelo de Villagra, 580 m, 3 Dec 1916, C. & I. Skottsberg 12 *p.p.* (BM, [photo: F]); this is the only specimen of *S. etuberosum* from the Juan Fernández Islands, has the same number as other collections from there, and possibly is mislabelled).

3. *Solanum palustre* Schltld., Hort. Hal. 1: 6. 1841. TYPE: Chile. Región V: Río Aconcagua and Vina del Mar, "raris in paludosis maritimus inter ostia", Aug 1827, *E. F. Poeppig 73 (Diar. 184)* (lectotype, here chosen: W! [photos: F!, PTIS!], [drawing: Correll, 1962, p. 122!]); isolectotypes: B [2], destroyed [photos: 1 each at F! G!, Montaldo and Sanz, 1962, p. 88!], F [2!] [photo: F!], P [2] [photo: 1 each at F! G!], W! [photos: F! G!].

Schlechtendal worked at Berlin (B) until 1833, then at HAL. Material from his herbarium is at B (mainly destroyed), W, and other herbaria (Stafleu & Cowan 1985). It is likely he had access to both B and W specimens.

The number "73" appears in the original description, and "73" and "Diar. 184" appear on printed herbarium labels. The origin of these numbers is unclear, as in other Poeppig collections from Chile (see *S. etuberosum* var. *antucense*, above). Poeppig (1834) shows an itinerary map and mentions collections in "Viña del Mar" in 1827.

*Solanum palustre* var. *glabrescens* Walp., Repert. Bot. Syst. 3: 39. 1844. *Solanum caldasii* Dunal var. *glabrescens* (Walp.) DC., Prodr. 13 (1): 37. 1852. *Solanum brevidens* Phil. var. *glabrescens* (Walp.) Hawkes, The Potato: Evolution, Biodiversity and Genetic Resources, Belhaven Press, London, 70. 1990.—TYPE: Chile. Región VIII: Río Aconcagua in Andes of Antuco, Rucue, Truvun Leuvu, Dec 1828, *E. F. Poeppig Coll. pl. Chil. III 62 (Diar. 715) (780) p.p.* (lectotype, here chosen: W! [photos: F!, PTIS!]; isolectotypes: BM [photo: F!], P [photo: F!], W [2!], W! [a mixed sheet of this taxon and *Solanum etuberosum* var. *antucense*].

Schlechtendal published the name "*Solanum palustre* var. *parviflora glabrescens?* Poepp." in Hort. Hal. 1: 6. 1841, based on *E. F. Poeppig Coll. pl. Chil. III 62 (Diar. 715) (780) p.p.* His use of the question mark and trinomial (he elsewhere used binomials) makes his acceptance of this name and application of Articles 23.1 and 34.1 of the International Code of Botanical Nomenclature unclear. We reject the Schlechtendal trinomial and attribute the first publication of "var. *glabrescens*" to Walpers. Hawkes (1990) published the new combination *Solanum brevidens* Phil. var. *glabrescens* (Poepp. ex Schltld.) Hawkes, which we change as listed above for this reason.

*Solanum brevidens* Phil., Anales Univ. Chile 43: 521. 1873.—TYPE: Chile. Región X: Lago Llanquihue, in woods, 1865, *Fr. Fonck s.n.* (holotype: SGO! [photos: F!, PTIS!, Montaldo and Sanz, 1962, p. 87!]; isotype: W! [photo: F!], [drawing: Correll, 1962, p. 119!]).

*Solanum bridgesii* A. DC., Arch. Sci. Phys. Nat., Sér. 3, 15: 437. 1886.—TYPE: Chile. Región X: Prov. Valdivia, in los Andes, near rivers, Sep 1860, *T. Bridges 719* (holotype: K! [fragment: G!]) [photos: F!, PTIS!]). Non *Solanum bridgesii* Phil., Linnaea 33: 203. Aug 1864 [fide Stafleu & Cowan 1985, entry 10.744].

*Solanum pearcei* Phil., Anales Univ. Chile 91: 5. Jul 1895, [fide Stafleu and Cowan, 1983, entry 7857]. *Solanum tuberosum* var. *pearcei* (Phil.) Reiche, Anales Univ. Chile 124: 737. 1909 (reprinted in K. F. Reiche, Fl. Chile 5 [10]: 353. 1910 [fide Stafleu & Cowan 1983, entry 8853]).—TYPE: Chile. Región X: Cordillera of Ranco, Arquihue [also known as Arquihue, at 41°11'S, 72°09'W, ca. 25 km E of E end of Lago Ranco, United States Department of Interior, 1967], *R. W. Pearce s.n.* (holotype: W! [photo: PTIS!]). Non *Solanum pearcei* Rusby, Mem. Torrey Bot. Club 4: 227. 1895 (Apr).

Stems medium to dark green and usually tinged or mottled purple, sparsely puberulent to more commonly moderately to densely glandular-pubescent, sometimes with both Type A and Type B glands; leaves up to 35 cm long and 21 cm wide, 4–7-jugate, the leaflets plane, typically medium to dark green and deeply tinged or mottled purple, glabrescent to more commonly moderately to densely glandular-pubescent, sometimes with both Type A and Type B glands; middle lateral leaflets 5–10 cm long, 1.5–4 cm wide; pseudostipular leaflets up to 28 mm long and 15 mm wide; flowers 20–65 per inflorescence; peduncles 1–10 cm long; pedicels 9–18 mm long, the articulation 0–13 mm above the base; calyx 3.5–4.2 mm long, the acumens (0.2) 0.5–1.3 (1.7) mm long; corolla 20–30 mm in diameter, usually light violet-blue in center, darker violet-blue beyond, with or without white star; anthers 5–7 mm long; styles 8–11 mm long; fruits 13–19 mm in diameter; fresh mature seeds white and with a purple spot formed by the purple embryo visible through the seed coat.

Phenology. Flowering from December through May.

Distribution (Fig. 1). Central Chile, Región V–X (but mostly from Región VIII–X, because the coastal populations originally collected in Región V near Concón and Viña del Mar likely extirpated, the single population from Región VI an apparent disjunct, and not known from Región VII), mostly found in the lower to mid slopes of the Andes mountains, but also in the coastal range, in mesic habitats, often in areas of recent fires, in full sun or partial shade, in organic soils; 40–1170 m.

Additional specimens examined. **ARGENTINA. Neuquén:** Parque Nacional Nahuel Huapi, Hotel Correntoso, *R. de Barba 1319* (B, LIL), Parque Nacional Nahuel Huapi, Desfiladero Huemul, 17 Dec 1946, *1329* (W), between Espejo and Correntoso, Parque Nacional Nahuel Huapi, 16 Jan 1947, *1498* (G); Hotel Ruca Melén, 15 Dec 1955, *T. W. Böcher et al. 1711* (C); Parque Lanin, Jan 1974, *E. H. Brücher 5003* (M [2]), Lago Paimum, Jan 1974, *5004* (M [2]), Lago Huechulafquen, Jan 1976, *5004* (M [2]); Andes Expedition, 38°–41°, N. Lago Huechulafquen, 3500 ft., 31 Dec 1926, *Comber 942* (K [2]); Nahuel Huapi National Park, *J. Diem* s.n. (PTIS); border of Lake at Puerto Manzano, near Casa Diem, 10 Jan 1970, *U. Eskuche 0.1326* (G); Llao-Llao, Lago Nahuel Huapi, 770 m, Dec 25, 1933, *E. Ljungner 591* (GB, [photo: F]); Dept. Los Lagos, near Villa La Angostura, 15 Feb 1952, *T. M. Petersen 1516* [Pedersen on the other sheet] (C [2]); Peninsula Quetrihué, Lago Nahuel Huapi, 16 Jan 1951, *H. Sleumer 1520* (G, W [2]); Dept. Huiliches, on both sides of dirt road, on N side of Lago Huechulafquen, 12.7 km E of police post at W end of lake, 3972-4, 39°45'S, 71°20'W, 1020 m, 19 Feb 1990, *S. & Cl. 4517* (BAL, PTIS), Dept. Huiliches, on S side of road, on N side of Lago Huechulafquen, 22.3 km E of police post on W end of lake, 3972-4, 39°45'S, 71°16'W, 1020 m, 19 Feb 1990, *4518* (BAL, PTIS), Dept. Huiliches, roadside, on N side of Lago Lácar, on way to Hua-Hum, 24.5 km W of Rt 234, just N of San Martín de los Andes, 4172-2, 40°08'S, 71°31'W, 915 m, 20 Feb 1990, *4519* (BAL, PTIS), on dirt road on N side of Lago Lácar, on way to Hua-Hum, 28.2 km W of Rt. 234, just N of San Martín de los Lagos, 4172-2, 40°08'S, 71°33'W, 790 m, 20 Feb 1990, *4520* (BAL, PTIS), on N side of dirt road on NE side of Lago Nonthué, 42 km W of Rt. 234, 7.9 km W of Arroyo Quechequina, on Rt. 234 just N of San Martín de los Andes, 2.7 km E of police post, 4172-2, 40°07'S, 71°38'W, 700 m, 20 Feb 1990, *4521* (BAL, PTIS), in stream just above waterfall at Quila Quina, on S side of Lago Lácar, SW of San Martín de los Andes, 4172-2, 40°11'S, 71°27'W, 730 m, 20 Feb 1990, *4522* (BAL, PTIS), on S side of Lago Curruhue, 29.5 km W of jct. of road on S side of this lake to Chile border at Puerto Carirriñe and road to San Martín de los Andes, 3972-4, 39°51'S, 71°29'W, 1100 m, 21 Feb 1990, *4524* (BAL, PTIS), on S side of Lago Curruhue, 27.0 km W of jct. of road on S side of this lake to Chile border at Puerto Carirriñe, and road to San Martín de los Andes, 3972-4, 39°51'S, 71°30'W, 1070 m, 21 Feb 1990, *4525* (BAL, PTIS), on S side of road to Lago Curruhue, 30.7 km W of jct. of road on S side of this lake to Chile border at Puerto Carirriñe, and road to San Martín de los Andes, 3972-4, 39°51'S, 71°33'W, 1060 m, 21 Feb 1990,

4526 (BAL, PTIS), on N side of Laguna Verde, on road to Puerto de Carirriñe at Chile border, 1.8 km past road on W end of Lago Curruhue that divides to a campground and to the Chile border, 3972-4, 39°50'S, 71°34'W, 1040 m, Feb 21 1990, 4527 (BAL, PTIS), on S side of Lago Epulafquen, on road to Puerto Carirriñe at Chile border, 11.6 km past road on the W end of Lago Curruhue that divides to a campground and to the Chile border, 3972-4, 39°49'S, 71°37'W, 950 m, 21 Feb 1990, 4528 (BAL, PTIS), along Rt. 65, 2.5 km E of Rt. 234, 4172-2, 40°37'S, 71°37'W, 840 m, 22 Feb 1990, 4529 (BAL, PTIS), along Rt. 65, S of Lago Traful, 24.8 km E of Rt. 234, 0.4 km W of Villa Trafal, 4172-2, 40°39'S, 71°24'W, 780 m, Feb 22 1990, 4530 (BAL, PTIS), along an abandoned road just W of Rt. 231, 2.5 km S of Ruca Malén, 4172-2, 72°37'S, 40°70'W, 770 m, 23 Feb 1990, 4531 (BAL, PTIS), on road to Chile border at Puyehue, 4172-2, 40°47'S, 71°47'W, 720 m, 23 Feb 1990, 4532 (BAL, PTIS), Dept. Los Lagos, on SE side of Rt. 231, 4.7 km SE of jct. of road to Chile to Puerto Puyehue, 4172-2, 40°43'S, 71°42'W, 675 m, 23 Feb 1990, 4533 (BAL, PTIS), Dept. Los Lagos, on N side of Peninsula Quetrihué, just S of Villa La Angostura, ca. 1 km S of entrance into park, along old road, 4172-2, 40°47'S, 71°40'W, 750 m, 23 Feb 1990, 4534 (BAL, PTIS), Dept. Los Lagos, along Rt. 231, 8.2 km NW of Arroyo de la Estacada, just NW of Puerto Manzano, SE of Villa La Angostura, 4172-2, 40°48'S, 71°37'W, 730 m, 23 Feb 1990, 4535 (BAL, PTIS), Dept. Los Lagos, along Rt. 231, 5.7 km NW of Arroyo de la Estacada, just SE of Puerto Manzano, SE of Villa La Angostura, 4172-2, 40°49'S, 71°35'W, 670 m, 23 Feb 1990, 4536 (BAL, PTIS), Dept. Los Lagos, along Rt. 231, 7.1 km NW of Arroyo de la Estacada, by Puerto Manzano, SE of Villa La Angostura, 4172-2, 40°48'S, 71°37'W, 685 m, 23 Feb 1990, 4537 (BAL, PTIS), Dept. Los Lagos, on NE side of Rt. 231, 1.6 km SE of Arroyo de la Estacada, SE of Villa La Angostura, 4172-2, 40°51'S, 71°33'W, 700 m, 24 Feb 1990, 4538 (BAL, PTIS), on NE side of Rt. 231, 1.4 km SE of Arroyo de la Estacada, SE of Villa La Angostura, 4172-2, 40°51'S, 71°33'W, 710 m, 24 Feb 1990, 4539 (BAL, PTIS), Dept. Los Lagos, on NE side of Rt. 231, 3.9 km SE of Arroyo de la Estacada, SE of Villa La Angostura, 4172-2, 40°51'S, 71°32'W, 680 m, 24 Feb 1990, 4540 (BAL, PTIS), on NE side of Rt. 231, 8.1 km SE of Arroyo de la Estacada, SE of Villa La Angostura, 4172-2, 40°52'S, 71°30'W, 680 m, 24 Feb 1990, 4541 (BAL, PTIS).

**CHILE. Región V:** Concon, 3 Jun 1923, *D. K. Behn s.n.* (F [2], [photo: F]), Viña del Mar, 3 Jun 1923, *s.n.* (F). **Región VI:** Prov. Colchagua, 5.7 km E of the intersection of the road to Bellavista and the road to Termas del Flaco, in shaded canyon on S side of road, SI-19-9, 34°45'S, 70°34'W, 820 m, 1 Feb 1989, *S. & Co. 4329* (PTIS, VALD, WIS). **Región VIII:** Contulmo, 29 Dec 1919, *D. K. Behn s.n.* (F [2]), Contulmo, 25 Jan 1919, *s.n.* (N); Andes of Antuco, 1878, *Poeppig s.n.* (M); Traga trapa [= Trapatrapa] Jarman, 1887, *C. F. Rahmer s.n.* (W); Prov. Biobío, ca. 3 km SE of Alto Biobío, on N side of Río Pangué, 200 m downstream of bridge (Puente Pangué), SI-19-5, 37°54'S, 71°36'W, 430 m, 10 Feb 1989, *S. & Co. 4351* (PTIS, VALD), among rocks in Río Rucue, 2 km ESE of Mileo (where the dirt road meets Río Rucue), 7 km (by air) SW of Antuco, SJ-19-5, 37°22'S, 71°34'W, 500 m, 23 Mar 1989, 4486 (PTIS), along N side of Río Rucue where floodplain meets slope, 4 km ESE of Mileo (where dirt road meets Río Rucue), 6 km SSW of Antuco, SJ-19-5, 37°22'S, 71°42'W, 510 m, 23 Mar 1989, 4487 (PTIS, VALD), Prov. Biobío, at Puente Boquiamargo, 3.2 km N of police post, Alto Biobío, along N side of road to Los Chenques (frontier road to Argentina), SJ-19-5, 37°51'S, 71°39'W, 490 m, 24 Mar 1989, 4488 (PTIS, VALD). **Región IX:** Prov. Cautín, Lautaro, 20 Dec 1913, *V. M. Baesa s.n.* (M); Temuco, Fundo Venecia, 38°41'S, 71°50'W, 850 m, 6 Jan 1978, *Co. 207, 208, 209* (all VALD), Lago Caburga, Paillaco, 39°10'S, 71°45'W, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337 (all VALD); Prov. Cautín, on seepage slope among bamboo along road from Cherquenco to Refugio Llaima, 16 Jan 1958, *D. S. Correll C14* (K); Prov. Cautín, Conguillío, Jan 1985, *A. Delgado s.n.* (VALD); Pucón 1000 ft., Jan 1928, *C. Elliott 199* (K [2]); Villarrica, 1897, *F. W. Neger s.n.* (M [2]); [Prov. Cautín], Temuco Palguín, Salto Chino, 7 Feb 1958, *H. Smith s.n.* (VALD [2]);

Prov. Malleco, below falls at Salto Indio (where Río Indio joins Río Cautín), E of Caracautín, SJ-19-9, 38°27'S, 71°45'W, 700 m, 14 Feb 1989, *S. & Co. 4353* (PTIS), Prov. Malleco, on N side of road from Caracautín to Manzanar, 4 km E of Salto Indio (where Río Indio intersects Río Cautín), SJ-19-9, 38°28'S, 71°54'W, 720 m, 14 Feb 1989, *4354* (PTIS, VALD), Prov. Malleco, just up river of bridge crossing over this river, 5.5 km S of Caracautín, SJ-19-9, 38°27'S, 71°51'W, 480 m, 15 Feb 1989, *4355* (PTIS), Prov. Malleco, in stream bank ca. 0.5 km upstream of Puente Blanco, where Caracautín-Lonquimay road crosses Río Callico, ca. 5 km E of Caracautín, SJ-19-9, 38°27'S, 71°50'W, 630 m, 15 Feb 1989, *4356* (PTIS), Prov. Malleco, 13 km W of police post in Icalma, SJ-19-9, 38°51'S, 71°24'W, 1170 m, 16 Feb 1989, *4390* (PTIS, VALD, WIS), Prov. Cautín, 16 km W of police post in Icalma along streamside on N side of road, SJ-19-9, 38°51'S, 71°26'W, 900 m, 16 Feb 1989, *4391* (PTIS, VALD), Prov. Cautín, sector Trafun, at Las Vertientes in front of park superintendent's house, on footpath to waterfall, in Parque Nacional Conguillío, SJ-19-9, 38°47'S, 71°39'W, 680 m, 17 Feb 1989, *4392* (PTIS, VALD), 1.2 km S of south end of Laguna Arco Iris, 13 km W of guard superintendent's house, just S of Laguna Verde, SJ-19-9, 38°42'S, 71°38'W, 990 m, 17 Feb 1989, *4393* (PTIS, VALD), Prov. Malleco, at S-facing base of large escarpment, just N of Volcán Llaima, valley of Río Captren, ca. 5 km W of W end of Laguna Conguillío, SJ-19-9, 38°38'S, 71°44'W, 980 m, 17 Feb 1989, *4395* (PTIS, VALD), Prov. Cautín, sector Ballica Fundo Venezia, on hill 10 km SW of Cherquenco, on road to Lococura, on Cordillera de Melo, SJ-19-9, 38°47'S, 71°55'W, 780 m, 17 Feb 1989, *4396* (PTIS, VALD), Prov. Cautín, at Huife Alto, 20 km NW of stream on NW side of road, 8.2 km NE of Termas de Huife, SJ-19-13, 39°11'S, 71°35'W, 850 m, 9 Mar 1989, *4461* (PTIS, VALD), Prov. Cautín, on E side of road from Villa San Pedro to Papal (this road not on any road or topographic maps), in a small stream in a small valley, NE of San Pedro, ca. 17 km (by air) ENE of Pucón, SJ-19-13, 39°15'S, 71°45'W, 590 m, 9 Mar 1989, *4462* (PTIS), Prov. Cautín, ca. 100 km downstream of Salto El León, ca. 1 km (by air) E of Termas Palguín, SJ-19-13, 39°25'S, 71°45'W, 750 m, 10 Mar 1989, *4463* (PTIS, VALD, WIS), Prov. Cautín, frequent along baths and wells at Termas Palguín, SJ-19-13, 39°25'S, 71°46'W, 760 m, 10 Mar 1989, *4464* (PTIS, VALD), Prov. Cautín, ca. 100 m downstream (N) of Salto Chino, ca. 0.5 km NE of jct. of road to Termas Palguín and Salto El León, SJ-19-13, 39°24'S, 71°45'W, 680 m, 10 Mar 1989, *4465* (PTIS, VALD), Prov. Cautín, by edge of potato field on jeep road from Huililco to Caren, ca. 1 km (by air) on NW side of top of hill, SJ-19-13, 39°25'S, 71°36'W, 920 m, 10 Mar 1989, *4466* (PTIS, VALD), Prov. Cautín, on SE side of road, SW of Termas de Pangui, SJ-19-13, 39°15'S, 71°31'W, 930 m, 11 Mar 1989, *4467* (PTIS, VALD), Prov. Cautín, 2.2 km N of Curarrehue-Termas Palguín road along the road to Los Chilcos and Reclira Alto, on E side of Río Pangui, in wet slippage bank by river, SJ-19-13, 39°18'S, 71°34'W, 780 m, 11 Mar 1989, *4468* (PTIS, VALD, WIS), Prov. Cautín, 5.2 km along the road to Paso de Huirinlin (crossing at Argentina border), from jct. of this road and road just outside of Curarrehue to Reigolil, 1.5 km W from W end of small lake by W end of Huincapilhue, SJ-19-13, 39°21'S, 71°29'W, 790 m, 11 Mar 1989, *4469* (PTIS, VALD), Prov. Cautín, on W bank of Río Trancura, ca. 50 m S of bridge crossing over this river in town of Curarrehue, in back of house number 1016, SJ-19-13, 39°16'S, 71°35'W, 400 m, 12 Mar 1989, *4470* (PTIS, VALD), Prov. Cautín, ca. 1 km E of valley N of police post at Reigolil, on road diverging to the E, 6.1 km N of this post, SJ-19-13, 39°05'S, 71°27'W, 1010 m, 12 Feb 1989, *4471* (PTIS, VALD), Prov. Cautín, along streamlet flowing from the E into Río Blanco, ca. 100 m N of where a hot spring enters Río Blanco, SJ-19-13, 39°06'S, 71°36'W, 740 m, 12 Feb 1989, *4472* (PTIS, VALD), sector Chanleo, Parque Nacional Nahuelbuta, at end of dirt road, ca. 5 km (by air) W of La Paz, ca. 22 km (by air), W of center of Angol, by home of park guard, SJ-18-8, 37°47'S, 72°57'W, 750 m, 22 Mar 1989, *4484* (PTIS, VALD). **Región X:** Valdivia, Cordillera Pelada, localidad Roblental, 600 m, 40°12'S, 73°23'W, 660 m, 22 Apr 1978, *Co. 236* (VALD), Valdivia, Paillaco Nuevo Caburga, 750 m, 28 Jan 1979, *301* (VALD), Valdivia, Termas de Palguín, 750 m, *305, 306* (both VALD), Valdivia, Gol-Gol, 400 m,

313, 314 (both VALD); on edge of thicket along road from Termas de Puyehue to Argentina, 20 Jan 1958, *D. S. Correll C24* (LL, [photo: F]); Cordillera de Ranco, Mar 1852, *W. R. F. Hohenwauer 826* (G [2], W); Panguipulli, 200 m, Nov 1927, *P. A. Hollermayer 338* (M, [photo: F]), Payahuente, 160 m, Dec 1924, 351 (BM, [photos: F, F, G]); Cordillera de Ranco, Mar 1852, *W. Lechler 826* (G, [photo: F]); Chiloé Island, Ancud, Dalcahue, 9 km north of Capilla Quetalco, 26-27 Feb 1941, *A. Montaldo 53* (listed by Correll, 1962 for LL, SGO, specimens not seen), Chiloé Island, Ancud, Astillero, 6 km south of Delcahue, 26 Nov 1941, 54 (listed by Correll, 1962 for LL, SGO, specimens not seen); near Lago Ranco, Jan 1887, *C. F. Rahmer s.n.* (W, [photo: F]); Valdivia, camino a Coñaripe, 5 Dec 1964, *C. Ramírez s.n.* (VALD [2]); Osorno, Salto del Pilmaiquén, 22 Apr 1939, *C. Rudolph 5575, 5596* (both VALD), Osorno, Río Bueno, 26 Dec 1948, 5589, 5591 (both VALD), 19 Feb 1942, 5595 (VALD), Osorno, Gol Gol inferior, 6 Mar 1948, 5592, 5593, 5606, 5607 (all VALD), 8 Dec 1943, 5597, 5598 (both VALD), Osorno, Pilmaiquén, 22 Apr 1939, 5599, 5601 (both VALD), Osorno, Peulla, 27 Dec 1932, 5600, 5604 (both VALD), 26 Apr 1937, 5603 (VALD); Pilmaiquén Falls, 200 ft., Dec 1939, *C. Sandeman 401* (K); Prov. Valdivia, ca. 100 m downstream of bridge over stream at W end of Laguna Pullinque (a small lake on the S side of Laguna Calafquen), SJ-18-16, 39°34'S, 72°10'W, 170 m, 21 Feb 1989, *S. & Co. 4397* (PTIS, VALD), Prov. Valdivia, on N side of road at Nomeco, on S side of Laguna Calafquen, ca. 150 m E of Puente Nomeco, SJ-18-16, 39°34'S, 72°06'W, 250 m, 21 Feb 1989, 4398 (PTIS, VALD), Prov. Valdivia, at base of large hill, just N of intersection of roads on E end of Lago Calafquen, ca. 1 km (by air) E from E end of Lago Calafquen, SJ-18-16, 39°34'S, 71°59'W, 250 m, 21 Feb 1989, 4399 (PTIS, VALD), Prov. Valdivia, 18 km NW of Termas de Liquiñe, SJ-19-13, 39°36'S, 72°55'W, 390 m, 21 Feb 1989, 4400 (PTIS, VALD), Prov. Valdivia, in streambed adjacent to Termas de Liquiñe, SJ-19-13, 39°44'S, 71°52'W, 270 m, 21 Feb 1989, 4401 (PTIS, VALD), Prov. Valdivia, 8.1 km S of crossing of road to Liquiñe-Los Antiques road and road to Choshuenco, just N of Pasas, just NW of Lago Neltume in valley at bridge crossing, SJ-19-13, 39°44'S, 71°52'W, 400 m, 22 Feb 1989, 4402 (PTIS, VALD), Prov. Valdivia, 14.6 km S of road jct. of Liquiñe-Los Añiques road and road to Choshuenco, on SE side of Lago Neltume, SJ-19-13, 39°43'S, 71°58'W, 260 m, 22 Feb 1989, 4403 (PTIS, VALD), Prov. Valdivia, 100 m NE of corner of road crossing of road to Volcán El Mocho and road to Choshenco, SJ-18-16, 39°54'S, 72°08'W, 130 m, 22 Feb 1989, 4405 (PTIS, VALD), Prov. Valdivia, 32.7 km S of Puente Puerto Fuy, over Río Fuy, on W side of private road, SK-18-3-19-1, 40°02'S, 71°58'W, 550 m, 22 Feb 1989, 4406 (PTIS, VALD, WIS), Prov. Valdivia, just upstream of entrance to Petroglypho Cachillagua, on S side of Río Bueno, ca. 5 km (by air) E of center of town of Río Bueno, SK-18-3-19-1, 40°20'S, 72°52'W, 920 m, 23 Feb 1989, 4407 (PTIS, VALD, WIS), Prov. Osorno, on N side of road CH 215, E of Osorno, ca. 50 m N of road by fence, 1.7 km W of Puente Gol Gol #1 (over Río Gol Gol), 8 km (by air) E of E end of Lago Puyehue, SK-18-3-19-1, 40°39'S, 72°14'W, 170 m, 24 Feb 1989, 4408 (PTIS, VALD), Prov. Osorno, 6 km from Argentina-Chile customs station Pajaritos, ditch on S side of road CH 215, E of Osorno, 13.9 km W of border with Argentina, SK-18-3-19-1, 40°40'S, 72°04'W, 710 m, 24 Feb 1989, 4409 (PTIS, VALD), Prov. Llanquihue, at Puente Peulla, wet shaded slope by boat landing, SK-18-6-19-4, 41°06'S, 72°02'W, 155 m, 2 Mar 1989, 4450 (PTIS, VALD), Prov. Llanquihue, on road from Peulla (in Chile) to San Carlos de Bariloche (in Argentina), ca. 3 km W of Argentina-Chile border, SK-18-6-19-4, 41°04'S, 71°51'W, 800 m, 2 Mar 1989, 4451 (PTIS, VALD), Prov. Llanquihue, at base of Salto Los Novios, along trail S of hotels in Peulla, ca. 0.5 km S of border crossing road, SK-18-6-19-4, 41°06'S, 72°01'W, 170 m, 2 Mar 1989, 4452 (PTIS, VALD), Prov. Llanquihue, on S side of Lago Todos Los Santos, just across lake from hotel and marina at Petrohué, ca. 300 m S of lake, SK-18-6-19-4, 41°08'S, 72°24'W, 160 m, 3 Mar 1989, 4453 (PTIS, VALD), Prov. Llanquihue, just N of Ralún, 5.3 km E and then N from Puente Petrohué (the bridge crossing over Río Petrohué on N end of Bahía Ralún), SK-18-6-19-4, 41°22'S, 72°16'W, 40 m, 4 Mar 1989, 4554 (PTIS, VALD), Prov. Llanquihue, ca. 8 km (by air) N

of town of Ralun, ca. 3 km E (by air) SSW of S end of Lago Galletué, SK-18-6-19-4, 41°18'S, 72°16'W, 480 m, 4 Mar 1989, 4455 (PTIS, VALD), Prov. Valdivia, next to logging road on W side of valley of Río Hua-Hum, ca. 2 km W of border crossing with Argentina, ca. 1 km S of border crossing road CH 203, S of Piriñueico, SK-18-3-19-1, 40°06'S, 71°41'W, 680 m, 7 Mar 1989, 4456 (PTIS, VALD), Prov. Valdivia, 4.2 km S of loading dock at Piriñueico, on E side of road, SK-18-3-19-1, 40°03'S, 71°43'W, 640 m, 7 Mar 1989, 4457 (PTIS, VALD), Prov. Valdivia, E of E end of Lago Piriñueico, 2.3 km N of jct. of road diverting 1 km S of border crossing road CH 203, beginning 1 km S of S end of Lago Pirehuenco, SK-18-3-19-1, 41°01'S, 71°42'W, 650 m, 7 Mar 1989, 4458 (PTIS, VALD), Prov. Valdivia, E of Lago Piriñueico, on road diverting 1 km S of border crossing road CH 203, beginning 1 km S of S end of Lago Piriñueico, SJ-19-13, 39°56'S, 71°42'W, 665 m, 7 Mar 1989, 4459 (PTIS, VALD).

**Indefinite:** Arquihue, collector unknown (W).

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## INDEX TO COLLECTIONS EXAMINED

*Solanum fernandezianum* fnd

*S. etuberosum* etb

*S. palustre* pls

The abbreviations in parentheses refer to the corresponding names in the text; an asterisk refers to a type specimen.

Behn D. K. s.n. (fnd, pls).

Bertero 1515 fnd.

Böcher et al. 1711 pls.

Bridges T. 719 (pls\*).

Brücher, E. F. 5005 pls.

Bustillos s.n. (etb\*).

Celalovsk s.n. fnd.

Contreras-M, A. 207, 208, 209, all pls; 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, all etb; 236, pls; 293 fnd; 301, 305, 306, 313, 314, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, all pls; 507, 508, 509, all etb.

Correll, D. S. C14, C24, both pls; C143 etb.

Crawford, D. et al. 11862, 11864, both fnd.

de Barba, R. 1319, 1329, 1498, all pls.

Delgado A. s.n. pls.

Diem, J. s.n. pls.

Germain, P. s.n. (fnd\*, etb).

Elliott C. 199 pls.

Elwes H. J. s.n. etb.

Eskuche, U. 0.1326 pls.

Fonck, Fr. s.n. (pls\*).

Gay C. 1184 etb\*).

Gillies, J. s.n. (etb\*).

Hohenrauer W. R. F. 826 pls.

Hollermayer, P. A. 351, 388, both pls.

Landbeck, L. s.n. etb.

Lechler, W. 826 pls.

Kunze, L. s.n. (etb\*).

Looser G. 876 (etb\*).

Middleton R. M. s.n. etb.

Montaldo, A. 53, 54, both pls; 244, 282, both etb.

Morrison, J. L. 11337 fnd.

Neger F. W. s.n. etb;

Pearce, R. W. s.n. (pls\*).

Petersen T. M. [Pedersen] 1516 pls.

Poeppig, E. F. s.n. pls; 60, Diar. 715, 780 p.p. (etb\*, pls\*); 73, Diar. 184 (pls\*).

- Philippi F. s.n. fnd; 755 fnd.  
Philippi, R. A. s.n. (etb\*<sup>\*</sup>).  
Philippi, unknown first initials 21 etb.  
Rahmer, C. F. s.n. pls.  
Ramírez C. s.n. pls.  
Reed, E. C. s.n. etb  
Reid E. s.n. etb.  
Reiche, C. s.n. (etb\*<sup>\*</sup>).  
Reynolds 78 etb.  
Rudolph C. 5589, 5591, 5592, 5593, 5595, 5597, 5598, 5599, 5600, 5601, 5603, 5604, 5606, 5607, all pls.  
Sandeman 401 pls.  
Skottsberg, C. and I. 12 p.p. (1, 2).  
Sleumer H. 1520 pls.  
Smith E. E., and B. Sparre 136-H-T, 459 S&S etb  
Smith H. pls.  
Spooner, D. M. and A. Clausen 4517, 4518, 4519, 4520, 4521, 4522, 4524, 4525, 4526, 4527, 4528, 4529, 4530, 4531, 4532, 4533, 4534, 4535, 4536, 4537, 4538, 4539, 4540, 4541, all pls.  
Spooner, D. M. and A. Contreras M. 4323, 4324, 4325, 4326, 4328, all etb; 4329 pls; 4330, 4331, 4333, 4336, 4337, 4338, 4340, 4341, 4349, 4350, all etb; 4351 pls; 4352 etb; 4353, 4354, 4355, 4356, all pls; 4387, 4388, both etb; 4390, 4391, 4392, 4393, 4395, 4396, 4397, 4398, 4399, 4400, 4401, 4402, 4403, 4405, 4406, 4407, 4408, 4409, 4450, 4451, 4453, 4454, 4455, 4456, 4457, 4458, 4459, 4461, 4462, 4463, 4464, 4465, 4466, 4467, 4468, 4469, 4470, 4471, 4472, all pls; 4473, 4474, 4479, 4480, 4481, 4482, all etb; 4483 pls; 4485 etb; 4486, 4487, 4488, all pls; 4489, 4490, both etb.  
Stuessy, T. et al. 11890 fnd.  
Stuessy, T. F. and R. W. Sanders 5178 fnd.  
Ugarte, E. and Parra O. 9164 fnd.  
Werdermann, E. 615 etb.