

REPORT OF EXPEDITION  
TO COLLECT WILD SPECIES OF POTATO

February 1 - April 15, 1993  
and  
January 1 - February 26, 1994

Collectors and Authors of Report:

David M. Spooner, USDA, ARS  
Department of Horticulture  
University of Wisconsin-Madison  
1575 Linden Drive  
Madison, WI, 53706, USA  
Tel: (608) 262-0159; FAX: (608) 262-4743  
email: d.spooner@macc.wisc.edu

Ronald G. van den Berg  
Department of Plant Taxonomy  
Wageningen Agricultural University  
Generaal Foulksweg 37  
P.O. Box 8010/6700 ED Wageningen  
The Netherlands  
Tel: (31) 837083160; FAX: (31) 837084917  
email: ronald.vandenberg@algem.pt.wau.nl

Willman García Fernández  
and Maria Luisa Ugarte  
PROINPA (Programa de Investigacion de la Papa)<sup>1</sup>  
IBTA (Instituto de Boliviano Tecnología Agropecuaria)  
Calle Man Cesped 923  
Casilla 4285, Cochabamba, Bolivia  
Tel: (591-42) 49506/49103; FAX: (591-42) 45708  
email: proinpa@papa.bo

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Seed and tuber collections from the expedition deposited at: PROINPA; the United States National Research Support Project-6 (NRSP-6, formerly called the Inter-Regional Potato Introduction Project, IR-1) at Sturgeon Bay, Wisconsin; and the Dutch/German genebank in Braunschweig, Germany. Herbarium specimens deposited at the Herbario Nacional Forestal Dr. Martín Cárdenas, Casilla 538, Cochabamba, Bolivia (BOLV); NRSP-6; the Herbarium Vadense, Department of Plant Taxonomy, Agricultural University, Postbus 8010, 6700 ED Wageningen, The Netherlands (WAG); and the herbarium of the Department of Botany, University of Wisconsin, Madison, Wisconsin, USA (WIS). During this expedition various non-potato collections also were made. A complete set of these duplicates are deposited at the Herbario Nacional de Bolivia, Correo Central Cajon Postal 10077, La Paz, Bolivia (LPB). See Appendices 5, 6, 9, 10 for further information relative to distribution of germplasm and herbarium material.

<sup>1</sup>PROINPA is an international cooperative research program carried out by the Bolivian Agricultural Research Institute (IBTA) and the International Potato Center (CIP), with financing by the Swiss Government through the Swiss Technical Cooperation (COTESU).

## CONTENTS

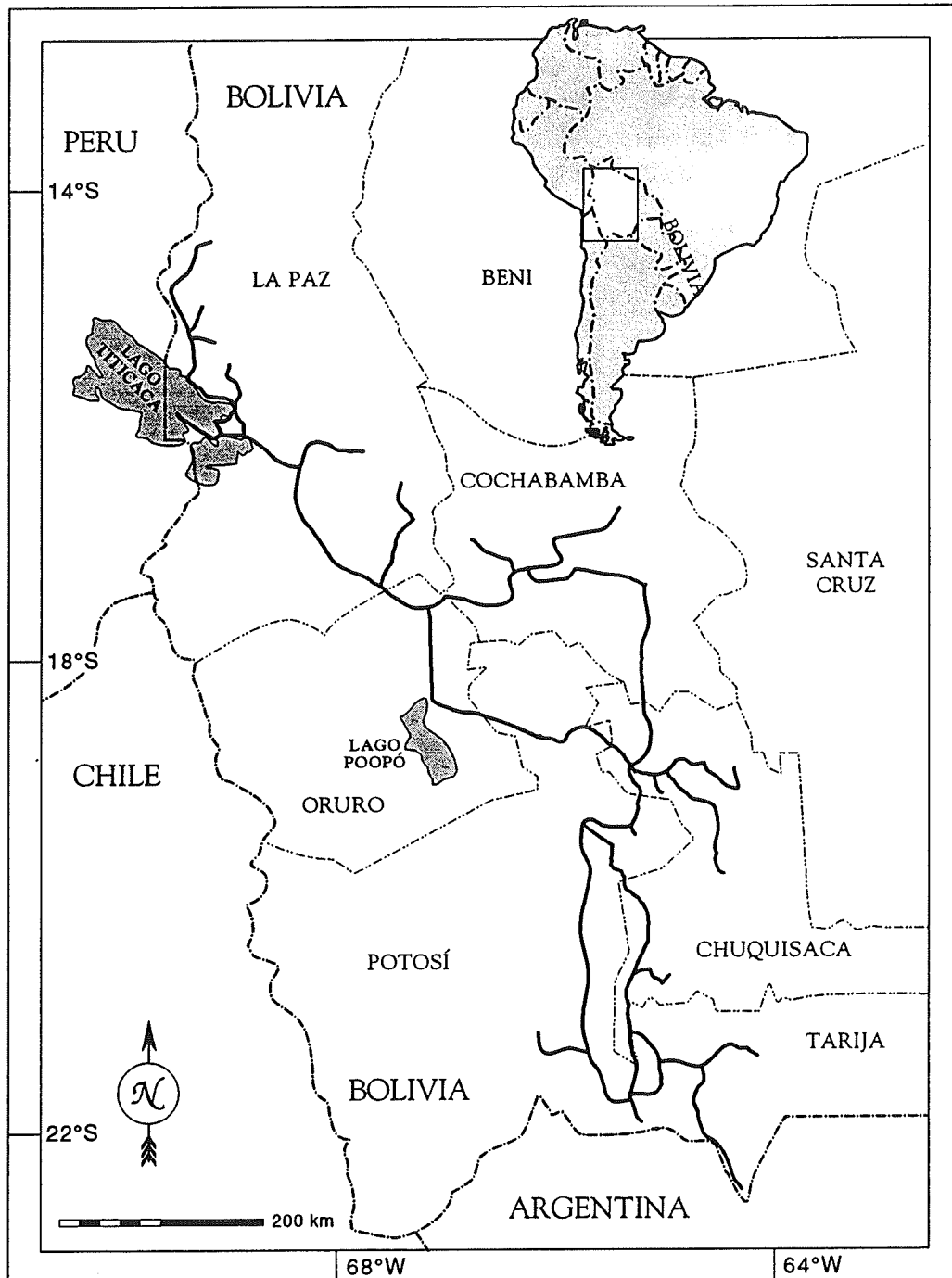
Cover	1
Table of contents	2
Acknowledgments	4
Route of the 1993 expedition	5
Route of the 1994 expedition	6
Combined map of routes, 1993, 1994 expeditions, with generalized collecting sites	7
Taxonomy	8
Detailed itinerary, 1993 expedition	16
Detailed itinerary, 1994 expedition	33
Passport data, 1993	44
Passport data, 1994	78
References	90
Recommendations for future collecting in Bolivia	92
Appendix 1. Herbarium holdings at the Herbario Nacional de Bolivia (LPB)	93
Appendix 2. Herbarium holdings at the Herbario Nacional Forestal Dr. Martín Cárdenas (BOLV)	97
Appendix 3. Herbarium holdings in the Departamento de Fitotecnia, Facultad de Ciencias Agrícolas y Pecuarias, Universidad de San Simón, Cochabamba, Bolivia (no formal herbarium code assigned in <u>Index Herbariorum</u> ).	102
Appendix 4. Priority for collections at the start of the expedition.	103
Appendix 5. Disposition of germplasm and herbarium collections, 1993 expedition.	105
Appendix 6. Disposition of germplasm and herbarium collections, 1994 expedition.	113
Appendix 7. Summary of collections, 1993, 1994	115
Appendix 8. A comparison of the differing hypotheses of species boundaries and series affiliations of the Bolivian wild species of <u>Solanum</u> sect. <u>Petota</u> of Hawkes and Hjerting (1989) and Hawkes (1990); to those of Ochoa (1990; from Spooner and van den Berg, 1992b).	118

- Appendix 9. Program for the First Bolivian Meeting of Genetic Resources of Potatoes, Roots, and Andean Tubers, February 7-10, 1994. 120
- Appendix 10. Letter of agreement (in Spanish) between NRSP-6 and PROINPA concerning disposition of germplasm and herbarium specimens, 1993. The agreements are: 1. to equally divide all seed, or for NRSP-6 to take all seeds if the seed collection is lower than 300, in order to insure sufficient seed for U.S. quarantine and subsequent seed increase, with the understanding that NRSP-6 later send 2000 seed to PROINPA of the first increase. 2. to leave duplicate herbarium specimens in Bolivia at BOLV, see cover of report. 124
- Appendix 11. Letter of agreement (in Spanish) between NRSP-6, BGRC, and PROINPA concerning disposition of germplasm and herbarium specimens, 1994. The agreements are: 1. all the tubers from the 1994 expedition and all the tubers multiplied at PROINPA last year from the 1993 expedition will be transferred to the Dutch/German genebank, to be multiplied as soon as possible. Preferentially, the tubers of one accession will be grown and the resulting plants will be intercrossed within the accession to produce seeds. 2. All seeds will be transferred to the Dutch/German genebank and increased. All attempts will be made to increase seeds and tubers within two years. 3. Germplasm from this first increase will be divided equally between PROINPA, CIP, BGRC, and NRSP-6. 4. Herbarium specimens will be divided between the herbaria of BOLV (Cochabamba), PTIS (Sturgeon Bay), and WAG (Wageningen). 5. A full report will be written and distributed within one month of the completion of the expedition. 6. A paper concerning the expedition will be co-authored by Spooner, van den Berg, Ugarte, and García, and submitted to a peer-reviewed scientific journal for consideration for publication. 7. Spooner will write a grant proposal to the USDA, OICD to attempt to secure funds to bring María Luisa Ugarte and Willman García to the United States for four to six weeks to work collaboratively with Spooner and van den Berg on a scientific project. 8. van den Berg will seek funds through the University of Wageningen for graduate studies (Masters or Ph.D.) for Ugarte or García. 126
- Appendix 12. Letter from Ing. Rafael Vera V., Director General of IBTA, signifying agreement with the terms outlined above (Appendix 11). 128
- Appendix 13. Distribution of this report 129

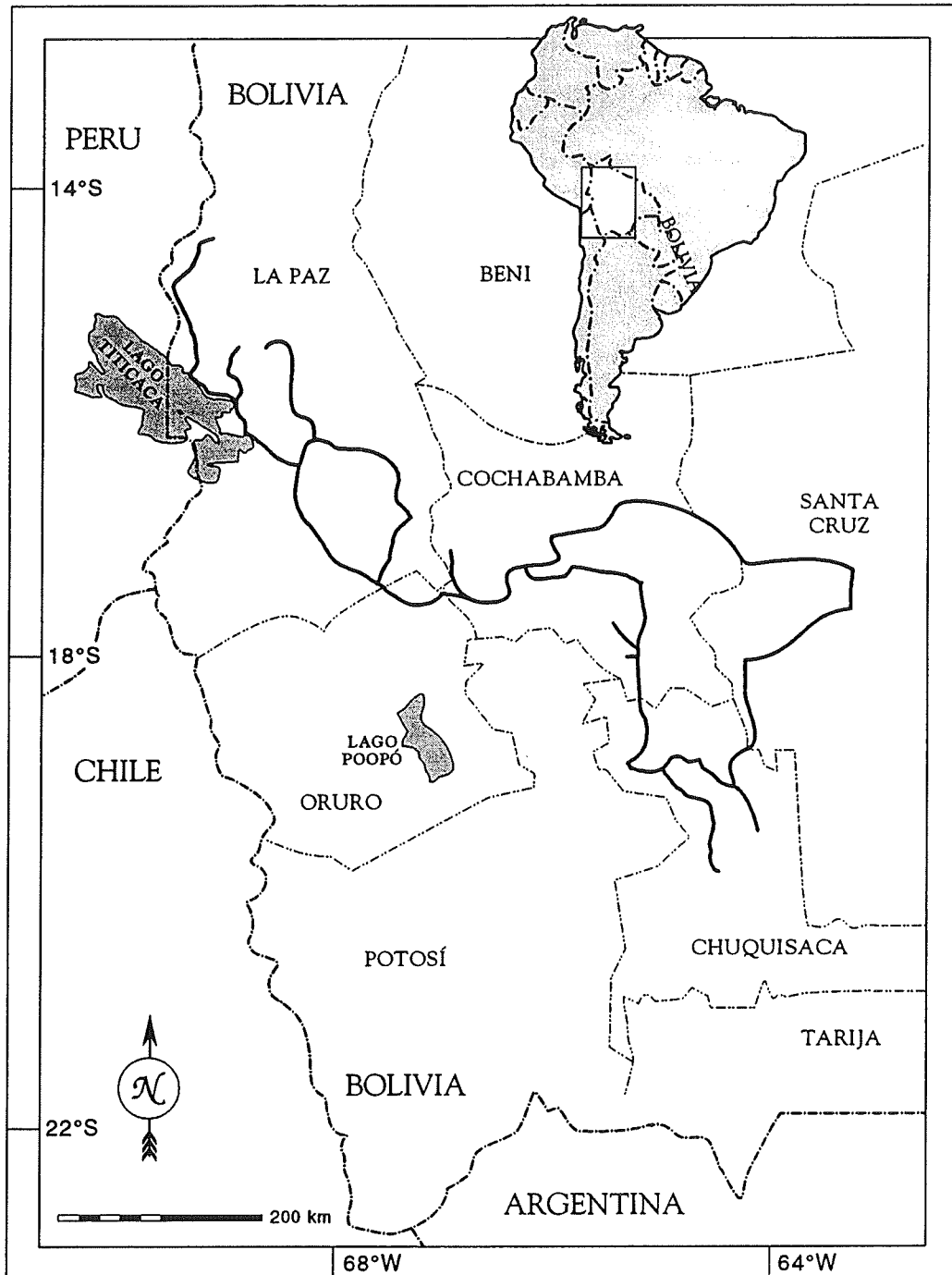
## ACKNOWLEDGMENTS

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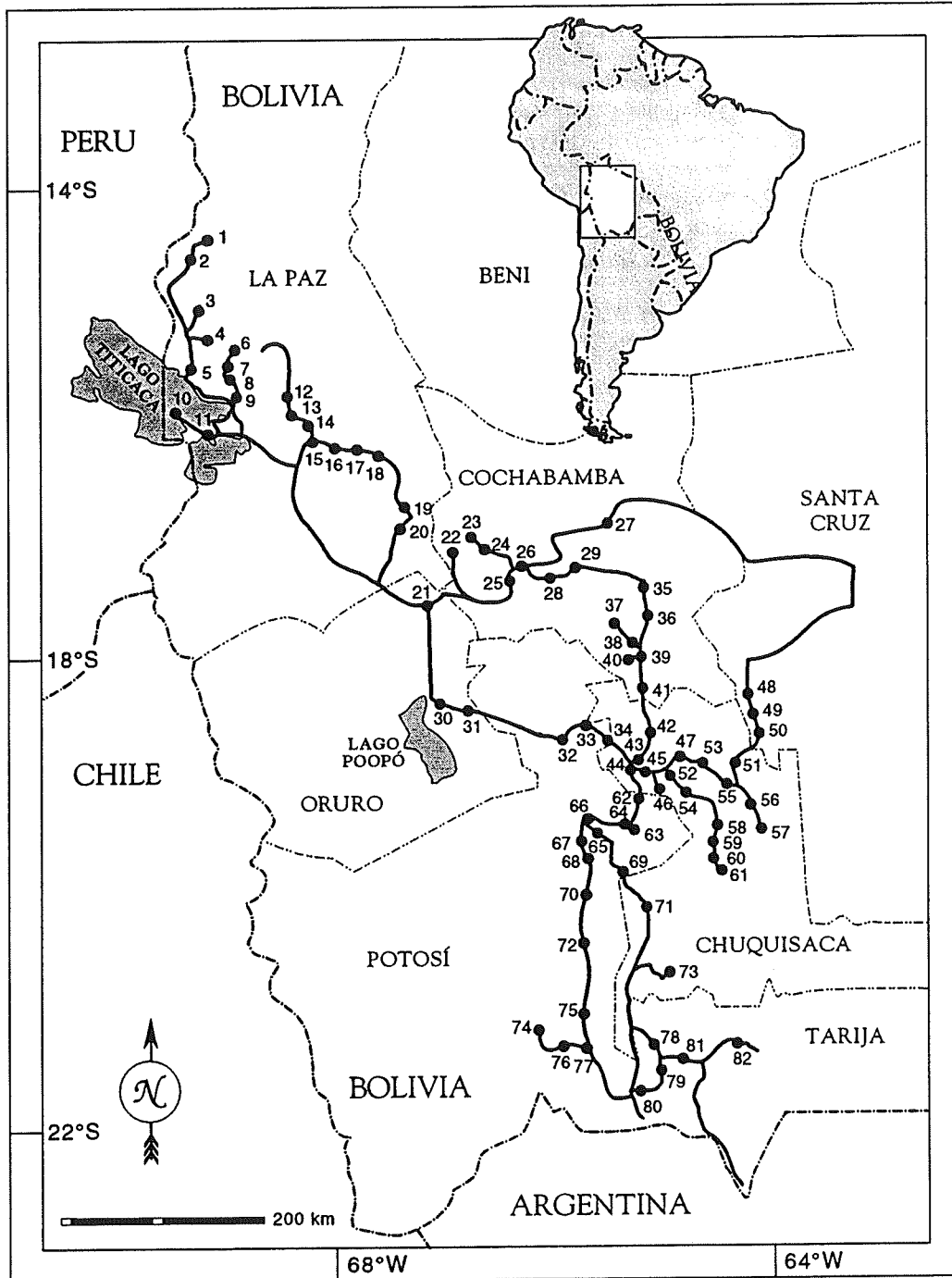
Route of the 1993 potato collecting expedition to Bolivia.



Route of the 1994 potato collecting expedition to Bolivia.



Combined map of routes, 1993, 1994 expeditions to Bolivia, with generalized collecting sites. (see Appendices 5, 6, 7)



## TAXONOMY

This report summarizes results of our germplasm collections and taxonomic field data of a three-month (February 1 - April 15, 1993) and a two-month (January 1-February 26, 1994) potato (*Solanum* sect. *Petota*) germplasm collecting expedition to Bolivia. *Solanum* sect. *Petota* is widely distributed from the southwestern United States to south-central Chile, and consists of seven cultivated and 225 wild species, according to the latest taxonomic interpretation (Hawkes, 1990). Bolivia is the second most species-rich country (after Peru) for wild and cultivated potatoes, and harbors all seven of these cultivated species and approximately 43 wild taxa (species, subspecies, varieties; Appendix 4).

Correll (1962), Hawkes & Hjerting (1989), and Ochoa (1990) provide thorough summaries of collections made in Bolivia for taxonomic studies and germplasm collections. Prior to our expedition there were good germplasm collections for some species from most their Bolivian range, such as *S. acaule*, *S. berthaultii*, *S. megistacrolobum*, *S. sparsipilum*, *S. sucrense*. Others, however, had no or few collections, such as *S. achacachense*, *S. astleyi*, *S. bombycinum*, *S. chacoense*, *S. flavoviridens*, *S. gourlavi* ssp. *vidaurrei*, *S. litusinum*, *S. neocardenasii*, *S. neovavilovii*, *S. soestii*, *S. virgultorum*, *S. yungasense* (Appendix 4). PROINPA, the Dutch/German genebank, and the Technical Advisory Committee of the United States National Research Program-6 (NRSP-6; formerly known as the Inter-Regional Potato Project, IR-1) targeted Bolivia as a high priority area for field work. The goals of the expedition were to collect wild species germplasm (the cultivated species are well-represented at PROINPA and the International Potato Center) of under-represented species, to increase them quickly to make them freely available internationally, and to study their species boundaries and interrelationships.

Prior to the expedition, we mapped available NRSP-6 Bolivian germplasm accessions (Bamberg & Martin, 1993) onto 1:3,000,000-scale base maps, and compared these to species distributions as mapped in Hawkes & Hjerting (1989) and Ochoa (1990). We also obtained distributions from the herbarium specimens at the Herbario Nacional Forestal Dr. Martín Cárdenas in Cochabamba (BOLV), the Herbario Nacional de Bolivia, La Paz (LPB), the NRSP-6 herbarium (PTIS), and the University of Wisconsin-Madison Department of Botany (WIS). Herbarium codes follow Holmgren et al. (1990, the new PTIS acronym will be published in the forthcoming edition 9).

We found localities with the following geographic references: 1) Paynter (1992); 2) Gonzales-Moscoso (1984); 3) United States Department of Interior (1955); 4) the 1:250,000-scale topographic maps from the Bolivia Instituto Geográfico Militar (the maps of Andean Bolivia currently available commercially from the Instituto Geográfico Militar are SD 19-14, SE 19-2, SE 19-3, SE 19-6, SE 19-7, SE 19-8, SE 19-10, SE 19-11, SE 19-12, SE 19-15, SE 19-16, SE 20-5, SE 20-9, SE 20-13, SE 20-14, SF 19-3, SF 19-4, SF 19-7, SF 19-8, SF 19-11, SF 19-12, SF 20-1, SF 20-2, SF 20-5, SF 20-6, SF 20-9, SF 20-10; see Parry & Perkins [1987] for coverage); 5) 1:500,000-scale aerial photos covering part of La Paz Province (from the Instituto Geográfico Militar); 6) a nine-sheet set of 1:100,000-scale "Mapa Hidrográfico de Bolivia" (Instituto Geográfico Militar); and 7) a 1:3,000,000-scale "Mapa Político de Bolivia" (Instituto Geográfico Militar). We purchased and bound these maps in a book, and they are available for study, along with our base maps with germplasm localities, at NRSP-6.

We collected on many passable roads by jeep, or in other areas on foot, with the aid of pack animals. We were aided by local residents who led us to sites of wild potatoes. Bolivian type localities were visited to the precision of the locality data. We obtained precise latitude and longitude data (to a precision of 300 m) by a Global Positioning System "Trans-Pak II<sup>TM</sup>", (Trimble Navigation, Sunnydale, California, USA), and altitudes with an altimeter.

Herbarium vouchers were dried in the field, and a complete set of duplicates was deposited at BOLV, with duplicates distributed to the International Potato Center, Lima, Peru (not in Holmgren et al., but cited in Ochoa's publications as CIP), the Department of Plant Taxonomy, Wageningen Agricultural University (WAG), and PTIS. We extracted seed



and cleaned tubers at PROINPA. By written agreement with PROINPA, true seeds and tubers of all collections with fewer than 200 seeds or 5 tubers from the 1993 expedition were imported into the United States for increase at NRSP-6, and those from the 1994 expedition to the Dutch/German genebank. Germplasm from the first increase will be shared between PROINPA, CIP, NRSP-6, and the Dutch/German genebank.

A full report with complete localities, daily itineraries, inventories of Bolivian herbaria, details of germplasm and herbarium specimen distribution, and letters of agreement between countries is deposited at PROINPA, CIP, NRSP-6, the United States Germplasm Services Laboratory in Beltsville, Maryland, and the International Plant Genetic Resources Institute Offices in Cali, Colombia and Rome, Italy. All locality data are available on-line from the United States, USDA GRIN (Germplasm Resources Information Network) system. Collections from the 1993 expedition are D. M. Spooner, Ronald G. van den Berg, Willman García and Maria Luisa Ugarte 6500-6773; those of the 1994 expedition are Ronald G. van den Berg, D. M. Spooner, Willman García, and Maria Luisa Ugarte 600-656.

**Taxonomy.** This expedition was greatly aided by the recent floristic treatments of the Bolivian wild potatoes (Hawkes & Hjerting, 1989; Ochoa, 1990). These works provide an invaluable summary of locality data, distribution maps, hypotheses of species boundaries and interrelationships, crossability and evaluation data, and taxonomic keys. However, they differ regarding species boundaries, rank of infraspecific taxa, hypotheses of hybridization, and affiliation of species to series (Spooner & van den Berg, 1992a). These disagreements are caused by the following four problems:

1) **Inconsistencies Between Treatments.** Hawkes & Hjerting (1989) base their study on 1610 Bolivian collections, Ochoa (1990) on 853. Of these 2463 collections, 350 are in common between these treatments, resulting in a total data base of 2113 collection numbers, of which Hawkes and Hjerting (1989) used 76% and Ochoa (1990) 40%. Thus, only 16% was examined in common between treatments. An analysis of the identifications of these 350 numbers examined in common illustrates a critical point about potato taxonomy. Not counting type specimens, identifications differ 20% of the cases. Some distinct taxa, such as S. acaule, S. boliviense, S. gandarillasii, S. infundibuliforme, S. neocardenasii, and S. okadae usually were identified the same, but others frequently differed. For example, identifications differed 38% of the time among the similar species S. brevicaule, S. gourlayi, S. hondelmannii, S. leptophyes, S. oplocense, S. pachytrichum, S. sucrense, S. sparsipilum, and S. vidaurrei.

These conflicting identifications could result from various causes: 1) Species may be characterized by minor characters that are not easily discerned, and one taxonomist misidentified a collection. 2) Species may be characterized by a combination of character states, some of which may be variable between individual herbarium sheets of a collection. 3) There are some poorly defined species in sect. Petota. 4) Interspecific hybridization blurs species boundaries.

Taxonomic studies are needed to examine these alternatives in sect. Petota. A recent study of the Bolivian species S. berthaultii Hawkes and S. tarijense Hawkes (Spooner & van den Berg, 1992b) showed extensive overlap of morphological characters used to distinguish them, and this may result from causes 1-4. Combined morphological and molecular data for S. megistacrolobum and S. toralapanum (Giannattasio & Spooner, 1994a,b) supported the interpretation of Ochoa (1990), in recognizing these taxa as varieties or subspecies (cause 2), not as species (Hawkes & Hjerting, 1989). Data supporting cause 3 has been advanced for the Colombian and Ecuadorian species S. andreanum Baker and its synonyms (Spooner et al., 1993), and varieties within the Bolivian and Argentinian species S. microdontum (van den Berg & Spooner, 1992).

2) **Inconsistencies Within Treatments.** Hawkes & Hjerting (1989) and Ochoa (1990) take very different approaches in keying out the Bolivian species, especially in the taxonomically difficult ser. Tuberosa. Hawkes & Hjerting (1989) mainly use pubescence, whereas Ochoa (1990) mainly uses height, dividing ser. Tuberosa into two groups (less than 40 cm tall, greater than 50 cm tall). However, heights used in Ochoa's keys do not match

natural variability of these plants as outlined in Ochoa's same publication in the descriptions or list of species for S. avilesii, S. brevicaule, S. okadae, S. microdontum, S. oplocense, and S. vidaurrei.

3) Imprecise Terminology to Distinguish Taxa. Hawkes & Hjerting (1989)

frequently use subjective terms for habit and pubescence within the ser. Tuberosa key that hinders its use. Height terms include "plant of medium vigor" compared to "plant delicate". Pubescence terms include "pubescence medium-lengthed," vs. "pubescence variable." Precise measurements or use of standard terms (such as those provided in Harrington & Durrell, 1957) are needed.

4) Variability that exceeds species boundaries. We consider the

under-documentation of natural variability within and between populations to be the greatest problem hindering the objective evaluation of species boundaries in sect. Petota (Spooner & van den Berg, 1992a). For example, Hawkes & Hjerting (1989) distinguish S. hondelmannii from S. sparsipilum and S. sucrose in part by "leaflets apically acuminate," vs. "leaflets acute to acuminate." Our topotype collections of S. hondelmannii (6663), and of collections from localities cited as representative material by Hawkes and Hjerting (1989) (6660) show that both character states are present within populations and even on individual plants. Both Hawkes & Hjerting (1989) and Ochoa (1990) distinguish S. avilesii from S. brevicaule by the erect habit and 1-3 pairs of lateral leaflets of the former and rosette habit and 3-5 pairs of lateral leaflets of the latter. Our collections (6632, 6634) document plants growing in the sun of more upright habit and smaller numbers of lateral leaflets, while plants growing in the shade to be smaller, and with larger numbers of lateral leaflets.

Wild potatoes are weedy species and may have formed hybrid populations that complicate the interpretation of species boundaries (Hawkes & Hjerting, 1989). This variability has presented potato taxonomists with inherent difficulties. Although the keys of Hawkes & Hjerting (1989) and Ochoa (1990) do not work in all instances, they may have intuitively interpreted species boundaries well, and our problems with identification may result from inexperience. However, we need to give identifications now to best organize our genebank collections and provide information to breeders and other users. Outlined below are our field and literature observations that explain our identifications, some of which are likely to change with future study. We group these collections into the following related groups (without providing formal synonymy) to outline taxonomic problems and assist users to choose collections based on their needs.

Solanum chacoense, S. arnezii, S. doddsii, S. flavoviridens, S. yungasense. We informally group here the following phenetically similar species: S. arnezii, S. chacoense, S. doddsii, S. flavoviridens, and S. yungasense. We informally call this the "S. chacoense" group because this is the earliest name, but identified all our collections to individual species based on morphology and expectations from distributions in Hawkes & Hjerting (1989) and Ochoa (1990). In Bolivia, these species occur from 600 - 2300 m, on the eastern slopes of the Andes mountains, and, except S. gandarillasii and S. neocardenasii, occupy the lowest elevations of wild potato species in Bolivia (see Fig. 5 of Hawkes & Hjerting, 1989).

Much taxonomic disagreement within the Bolivian potato flora occurs among the S. chacoense group (Spooner & van den Berg, 1992a). For example, Hawkes & Hjerting (1989) distinguish S. chacoense from S. yungasense by the narrower stem wings of the former, but Ochoa (1990) describes S. chacoense and S. yungasense as having wings of equal width (but generally more sinuous in S. yungasense). Hawkes & Hjerting (1989) distinguish S. chacoense from S. yungasense by the white corollas of the former and the yellow corollas of the latter, but Ochoa (1990) states S. yungasense can have white or yellow-white corollas. Hawkes & Hjerting (1989) accept both S. arnezii and S. chacoense as distinct species and distinguish S. arnezii with yellow corollas, S. chacoense with white. Ochoa (1990) synonymizes S. arnezii under S. chacoense, without mentioning the yellow corollas. Hawkes & Hjerting (1989) use corolla color to help identify populations as natural interspecific hybrids with S. chacoense. For example, they use corolla color variation to help designate S. doddsii as a natural hybrid between S. alandiae and S. chacoense, and a

population at the Valle Grande airport in Santa Cruz Province as a hybrid between S. chacoense and S. berthaultii. Ochoa (1990) accepts S. doddsii as a species, and makes no mention of corolla color variability.

Our collections within the S. chacoense group document broad dentate stem wings on collections from the Yungas Region of La Paz Province, which we provisionally identify as S. yungasense (600, 601, 602, 603, 604, 606, 607, 6732, 6735, 6738, 6739), and on plants from the border of or to the southeast of this region which we provisionally identify as S. arnezii (624, 634, 636, 637, 6692). We provisionally identify plants with narrow wings and pure white corollas as S. chacoense (608, 621, 633, 645), plants similar to S. chacoense but with corollas white tinged with blue or light blue as S. doddsii (609, 614, 615, 617, 630, 631, 641, 644, 6649, 6651, 6701), and plants in the area of the type locality of S. litusinum as S. litusinum (642, 643).

Solanum yungasense occurs on the eastern slopes of the Andes from southern Peru (Puno Province) to adjacent east-central Bolivia (La Paz Province), at elevations of 1100-1900 m (Hawkes & Hjerting, 1989; Ochoa, 1990). An earlier report of S. yungasense from Argentina Correll (1962) was reidentified as S. chacoense by Hawkes & Hjerting (1969), showing the difficulty of distinguishing these species. Our 11 germplasm collections of S. yungasense cover the entire Bolivian range of the species, except the northernmost Bolivian population in Larecaja Province; we searched for this latter population unsuccessfully.

Ochoa (1984, 1990) reports both diploid and triploid populations of S. yungasense but cites no vouchers and therefore we cannot tell how these cytotypes are distributed within populations or geographically. Hawkes & Hjerting (1989) report two diploid counts from collections near the type locality in La Paz Province, Department of Sud Yungas. Despite Ochoa's (1984) report of triploids, Hawkes & Hjerting (1989) state "we very much doubt that any triploid forms of this species have been found." Our collections provide additional germplasm that will provide new chromosome counts to help answer these questions of ploidy level in S. yungasense.

Hawkes introduced two germplasm samples of S. yungasense to England in the 1940's, but they soon died (Hawkes & Hjerting, 1989). Our collections of this species are all from tubers and currently are being grown at BGRC and United States quarantine, with the attempt to produce seeds and/or tuber increases. If the collections survive, they will be the first germplasm collections available for distribution.

Solanum astleyi/S. boliviense. Hawkes & Hjerting (1989) distinguish S. astleyi from S. boliviense by the former having simple leaves, or if lateral leaf lobes are present, these with broad wings decurrent on the leaf rachis, and the latter having simple leaves, or if lateral leaf lobes are present, these having distinct leaflets. Our topotype collections of S. astleyi (6531) and our other collections of S. boliviense (6524, 6532, 6535, 6612, 6619) are variable for these characters. Because of the similarity of these sympatric species, and variability within populations, we question Hawkes and Hjerting's (1989) designation of natural interspecific hybrid populations between these two, and suspect that they fail to document natural variability in S. boliviense. Our field data suggest to us that Ochoa (1990) may be correct in designating the two taxa as conspecific. Until we can complete further studies of this problem, we will identify all of our collections (including the topotype collection of S. astleyi) as S. boliviense.

Solanum berthaultii/S. tarijense. Recent studies (Spooner & van den Berg, 1992b) demonstrated extensive morphological variability within and between 84 germplasm accessions of these two species. One of the characters used to distinguish the species (corolla shape) showed no statistically significant difference between them, and other characters, while statistically significant between species, showed much overlap between species. As in our prior study, we noted on this expedition variability of "species-specific" characters (e.g., S. berthaultii 6503 had corollas on different plants in the same population pure white to deep blue). Also, we observed plants at the type locality of S. berthaultii (at

the base of Cerro San Pedro in Cochabamba) that had white corollas, intermixed within the more common plants there with blue corollas like the description of S. berthaultii. We also found an area of possible co-occurrence of species (S. tariense 6529, and S. berthaultii 6530), in an area hypothesized by Hawkes & Hjerting (1989) to be an area of hybridization (Dept. Potosí, Prov. Saavedra, 70 km south of Sucre). Despite this apparent variability within populations, we generally were able to identify our collections to species on a complex of species-specific characters, providing support from our intuitive field observations for the interpretation of these as species. Molecular studies complementing the morphological study are in progress.

Solanum capsicibaccatum/S. circaeifolium. These species, and S. soestii, are the sole members of ser. Circaeifolia. All are distributed in Bolivia. Hawkes & Hjerting (1989) and Ochoa (1990) both treat S. soestii as a good species, and we have no problem identifying it. Hawkes & Hjerting (1989) recognize S. capsicibaccatum and S. circaeifolium, with the latter divided into subsp. circaeifolium and subsp. quimense. Ochoa (1990), however, distinguishes a single species, S. circaeifolium with two varieties, var. circaeifolium and var. capsicibaccatum.

The key in Hawkes & Hjerting (1989) uses pubescence to distinguish S. capsicibaccatum and S. circaeifolium, and leaf dissection and pubescence to distinguish the subspecies of S. circaeifolium. Ochoa (1990) uses leaf dissection to key out varieties of S. circaeifolium. Two of our collections (6767, 650) from the area of the type collection of S. circaeifolium subsp. circaeifolium show the typical simple leaves of this subspecies, suggesting this is a good taxon, but we observed much variation for pubescence and leaf dissection in S. circaeifolium making identification of its subspecies unclear. We here conservatively identify all our collections of these two species as S. circaeifolium.

Solanum megistacrolobum/S. toralapanum. These species are morphologically very similar, and have been the subject of continuing taxonomic debate. They were recognized as distinct species by Brücher (1959), Correll (1962) and Hawkes & Hjerting (1989). Ochoa (1984) originally synonymized the two, but later (1990) recognized them at the varietal level (as S. megistacrolobum Bitter var. megistacrolobum and S. megistacrolobum var. toralapanum [Cárdenas and Hawkes] Ochoa). The difficulty in distinguishing these taxa is evident from a comparison of the identifications of identical herbarium material by Hawkes & Hjerting (1989) and Ochoa (1990) where, excluding types, identifications differ in 26% of the cases.

Morphological and molecular studies (Giannattasio & Spooner (1994 a,b) showed extensive overlap of characters from both data sets, but the taxa were weakly supported by multivariate techniques. These results, combined with the distributional data (with S. megistacrolobum growing more to the east of S. megistacrolobum) support Ochoa's (1990) treatment of the taxa as varieties.

However, because the taxonomic treatments of Hawkes & Hjerting (1989) use subspecies, and Ochoa (1990) varieties, identical taxa in sect. Petota are provided separate names. This situation is common in flowering plants, and recent recommendations (Hamilton & Reichard, 1992) have suggested the use of subspecies over varieties when only one infraspecific taxon is used. Therefore, Giannattasio & Spooner (1994b) made the new combination S. megistacrolobum ssp. toralapanum to begin to solve this problem of unequal use of infraspecific categories in potatoes.

Series Tuberosa. The greatest disagreement in contemporary treatments of Bolivian wild potatoes is in the series Tuberosa (Spooner & van den Berg, 1992). This group includes the 38% disagreement relating to independent identifications mentioned above for S. brevicaulis, S. gourlayi, S. hondelmannii, S. leptophyes, S. oplocense, S. pachytrichum, S. sucrensis, S. sparsipilum, and S. vidaurrei. Because of inconsistencies between treatments reported above, and other problems we report below, we are unsure of the identity of many of our collections. We tentatively divide these species into three widely overlapping groups, but are unsure of species limits within or between any of them. We subjectively

divide them based on size, with Group 1 generally including lower-growing plants under about 20 cm, Group 2 of taller plants over about 20 cm, and Group 3 similar to Group 2 but with smaller stigmas.

Tuberosa Group 1, *Solanum achacachense*/*S. avilesii*/*S. brevicaule*/*S. gourlayi*/*S. leptophyes*. Hawkes & Hjerting (1989) say that after studying herbarium specimens and living material they "firmly believe that we have reached the right conclusions" concerning the species boundaries of *S. gourlayi* and *S. leptophyes*. Yet Correll (1962) reduced *S. gourlayi* to a form of *S. leptophyes*, and Ochoa (1990) synonymized *S. gourlayi* to *S. leptophyes*. Correll (1962) treated *S. achacachense* as a synonym of *S. brevicaule*. Ugent (1966) united the species mentioned above (with the exception of *S. avilesii*), and other taxa from Argentina and Peru, under *S. brevicaule*. Hawkes & Hjerting (1989) did not accept this reduction.

Our collections show similar problems. For example, 6632 and 6634 include variability within populations of broad-leaved plants, conforming to the description of *S. avilesii*, and narrower-leaved plants, conforming to the description of *S. brevicaule*. We refer all these collections to the oldest species name, *S. brevicaule*.

Tuberosa Group 2, *Solanum candolleianum*/*S. hoopesii*/*S. sparsipilum*/*S. sucrense*/*S. ugentii*/*S. virgultorum*/*S. tuberosum* "weedy" populations. *Solanum sucrense* illustrates the morphological similarity of part of this group and the tenuous data maintaining them as separate. Ochoa (1979) designated *S. sucrense* as synonymous with *S. sparsipilum*, but later (Ochoa, 1990) recognized both as species, but without any reference to his earlier synonymy. Ochoa (1990) keys out *S. sparsipilum* from *S. sucrense* from numbers of interjected and lateral leaflets that do not match his illustration of representative material of *S. sparsipilum*. Our examination of these characters in the field in Bolivia and plantings at Sturgeon Bay showed these characters, and the additional characters provided in Hawkes & Hjerting (1989) of stigma morphology and shininess of leaves to vary extensively within accessions and even on individual plants. Astley & Hawkes (1979) state that *S. sucrense* is of natural origin from *S. tuberosum* ssp. *andigena* and *S. oplocense*. They support this hypothesis by artificial reconstruction of the hybrid, and comparison of seed and fruit set of these to putative parents. Their study, however, assumes the species are distinct and provides no data to distinguish them.

We also found it hard to distinguish other weedy wild potato species from certain forms of the cultivated potato classified as *S. tuberosum* subsp. *andigena*. The morphological similarity of most wild species to the cultivars is striking, leaving only characters like smaller tubers and longer stolons to identify the "wildness" of the species. Wild species like *S. sparsipilum* are considered as potential parental species to cultivars, but could as well be interpreted as escapes from cultivation. We have used the species name *S. sparsipilum* (the earliest name in the group) for the group of weedy species of robust stature, resembling the cultivars of subsp. *andigena*. However, collections *S. hoopesii* (6679, 6680) and *S. ugentii* (6687) collected at or near the type locality have been denoted with their species names, although we are not able to distinguish these species from *S. sparsipilum* and the similar forms of *S. tuberosum* subsp. *andigena*.

Tuberosa Group 3, *S. hondelmannii*/*S. oplocense*. Hawkes & Hjerting (1989) recognize both *S. hondelmannii* and *S. oplocense*, but Ochoa (1990) considers *S. hondelmannii* "a hybrid variant" of *S. oplocense*. The characters used by Hawkes & Hjerting (1989) to distinguish *S. hondelmannii* from *S. oplocense* are: larger number of lateral leaflets (4-5 vs. [2] 3-4 [5]); larger number of interjected leaflets (2-3 [11] pairs vs. 0-1 [5] pairs); longer petiolules (5-10 [20] mm vs. 1-2 [13] mm); shorter style exertion (2 [5] mm vs. 5-6 [8] mm); larger stigma (broader than the style against minute, not exceeding the thickness of the style); and "constant diploid chromosome number" (*S. oplocense* comprises diploid, tetraploid, and hexaploid cytotypes). In our collections, the leaf characters vary greatly, precluding our reliable identifications now. The collection made at the type locality of *S. hondelmannii* (6663) lacked flowers, but we observed the minute stigma often (6557, 6559, 6575). We have used the species name *S. oplocense* for these and similar accessions with minute to smaller stigmas.

Solanum bombycinum, S. neovavilovii, S. violaceimarmoratum. Hawkes & Hjerting (1989) and Ochoa (1990) place these species as the sole Bolivian representatives of ser.

Conicibaccata, a series of 40 species, distributed from southern Mexico to central Bolivia, partly characterized by conical fruits. Hawkes & Hjerting (1989) discussed, but did not formally treat S. bombycinum and S. neovavilovii, while Ochoa (1990) treated all three.

The species boundaries and interrelationships of these taxa are unresolved. When Ochoa (1983a) described S. bombycinum, he reported its tetraploid chromosome number ( $2n = 48$ ) and placed it in ser. Conicibaccata. He stated (Ochoa 1983a, 1990) it had affinities with S. villuspetalum Vargas, a southern Peruvian diploid member of the series. Hawkes & Hjerting (1989, in text) initially suggested S. bombycinum was conspecific with S. villuspetalum, but stated later (Hawkes & Hjerting, 1989, in postscript) "it is likely that S. bombycinum could be a distinct species."

When Ochoa (1983b) described S. neovavilovii he reported its diploid chromosome number ( $2n = 24$ ) and placed it in ser. Conicibaccata. However, he stated it could have affinity with S. bukasovii and S. leptophyes, two species he placed in ser. Tuberosa (Ochoa 1962, 1990), and S. limbaniese Ochoa, a species he placed in ser. Conicibaccata (Ochoa, 1974). Later (Ochoa, 1990) he rejected his hypothesis of relationships to S. bukasovii and S. leptophyes and related S. neovavilovii solely to S. limbaniese. Hawkes & Hjerting (1989), however, rejected Ochoa's (1990) hypothesis of relationship to S. limbaniese, and state the species in conspecific with S. violaceimarmoratum (also diploid). These changing hypotheses of species boundaries and interrelationships show the extreme similarity of these wild potato species and the need for their reevaluation.

Our expedition collected S. bombycinum and S. neovavilovii at their type localities, in La Paz Province, near the Peruvian border. Both localities are separated by about 5 km, and the plants grow alongside the horse trail from Pelehuco to Mojos. From Bolivia, the only access to these sites is from the town of Pelehuco, then hiking 12-15 hours north, through the town of Queara, on the horse trail to Mojos. This route crosses a 4700 m snow-covered mountain crest, and pack animals, a guide, and camping gear are required.

The type locality of S. neovavilovii, "Moyapampa" (not "Mayupampa" as in publications), is about 3 km north of Queara. Moyapampa is a flat clearing, bordered by wooded hills on either side, descending from Queara in the valley of Río Queara. We found S. neovavilovii there, in organic soil along the trail and on moss-covered rocks next to the trail at Moyapampa. We were unable to find the species there on our visit on March 28, 1993, and found immature conical fruits on our visit on February 19, 1994. We were able to collect tubers, however.

The type of S. bombycinum is "Dept. La Paz: Prov. Franz Tamayo, between Cheke-Chekeni and Chullumayo, 2000 m, on the horse trail to Mojos, February, 1983". Our guides told us that "Cheke-Chekeni" was an area name (uninhabited) approximately a one hour hike south of Moyapampa on the trail to Mojos, and that "Chullumayo" referred to the general area of Río Chullumayo, a tributary flowing from the east into Río Queara. We found S. bombycinum next to the horse trail 5 m south of the bridge crossing of Río Chullumayo, at 2850 m. Because the horse trail ascends for many kilometers on either side of the bridge crossing, the 2000 m elevation provided in the type description is in error. The population consisted of about 25 plants, some with flowers and immature conical fruits. We could find no tubers, and therefore have no germplasm of this rare species.

**Phenology.** Timing is one of the most important aspects of planning a collecting expedition. In Bolivia, wild potatoes occur in seasonal wet-dry climates, with flowering generally occurring during or after the rainy season that generally falls during December-February. We planned our expeditions based on dates of collections of herbarium material in Ochoa (1990; Hawkes & Hjerting [1989] do not provide collecting dates) or in unpublished collecting reports and verbal recommendations by Robert Hoopes (who led collaborative Bolivian/NRSP-6 expeditions to Bolivia in 1986, 1987). Most collecting dates mentioned in Ochoa (1990) are in the months of February and March, with many fewer reports in December, January, and April.

Most of our fruit collections were from early February - late March. We planned the 1994 expedition in January to search for members of the S. chacoense group that we thought flowered and fruited earlier than other potato species. This is because in 1993, we collected S. arnezii and S. chacoense in early March. Two of these collections had mature flowering and fruiting plants, and two had withering plants with very mature fruits. In 1994, we revisited these and other populations of S. arnezii and S. chacoense in mid-January, where we collected mature fruits from some, but not all of them. Because late 1993/1994 was much drier than late 1992/1993, it is hard to compare phenology between years. Also, we collected S. yungasense in mid-March, 1993, and early January and mid-February, 1994. We never found fruits of S. yungasense, although some populations of this species had flowering and even aging plants at both times. Local people who were familiar with the various populations provided various reports of when fruits were produced, covering months throughout the year, and we do not know when these populations produce fruits in nature. Hawkes & Hjerting (1989), and Ochoa (1990) both describe round fruits for S. yungasense, but these may have been from greenhouse grown plants originally collected as tubers.

Based on these data, we would recommend most germplasm collections in Bolivia to be made from mid-February to late March. Success in finding fruits will vary greatly from year to year, depending on rainfall in the proceeding months. An additional complication is presented by the very poor roads in much of Bolivia. Hawkes & Hjerting (1989) mention the compromise between a dry year where roads are passible but few fruits are present, and a wet year where roads are closed by floods and landslides but the populations produce fruits. We experienced these problems in the wet year of 1993 and the dry year of 1994.

## DETAILED ITINERARY, 1993 EXPEDITION

Note 1: As mentioned in the Taxonomy section of this report, we had problems identifying many of our accessions. The names of the taxa as mentioned in this itinerary were those first provided to our collections, based on our initial identifications, sometimes based on expectations from our locations. Some of these identifications were later changed after a reexamination of herbarium collections or by our informal lumping of groups of difficult taxa (see Taxonomy). The original determinations are retained here, however, to preserve these original determinations, some of which may later prove to be correct.

Note 2: For the first time on an NRSP-6 expedition, precise latitude and longitude data (to a precision of a 300 m radius, when the machine listed below is used on automatic mode) were obtained by a Global Positioning System "Trans-Pak II<sup>TM</sup>", (Trimble Navigation, Sunnydale, California, USA). This extremely valuable tool saved much time and increased accuracy of our localities. It reverses the old process of going to the map to obtain longitudes and latitudes, as these data are used to more accurately obtain positions on maps.

### January 30, 1993

I left Madison, Wisconsin at 1:00 P.M., and flew through Chicago to Miami, Florida. I boarded a plane to La Paz, Bolivia at 11:00 P.M.

### January 31

I arrived in La Paz at 7:00 A.M., and was met at the airport by Dr. Beto (Robert) Brun, a University of Wisconsin employee and an administrator of the cooperative program between UW and the Instituto Boliviano de Tecnología Agropecuaria (IBTA). Beto helped me get a hotel and hosted me at his home that day.

### February 1 (Monday)

Beto picked me up at the hotel and took me to the PROINPA headquarters at the Plaza España in La Paz. He let me use the office of Dr. Thomas Yuill, an Associate Dean at the University of Wisconsin, and the University of Wisconsin representative of the cooperative program with IBTA. Dr. Yuill had just returned to Wisconsin the day before, and his position as UW representative of this program was to be filled by another person. I made an appointment to visit the American Embassy and the Herbario Nacional de Bolivia (LPB). Beto gave me use of an IBTA jeep and driver, and I went to the Instituto Geográfico Militar (IGM, address: Gran Cuartel General, Avenida Saavedra final, Casilla Postal 7641). I purchased all available 1:250,000 scale maps covering the Bolivian Andes (numbers SD 19-10, SD 19-11, SD 19-14, SD 19-15, SD 19-16, SE 19-2, SE 19-4 (not available), SE 19-6, SE 19-7, SE 19-8, SE 19-10 (not available), SE 19-11 (not available), SE 19-12, SE 19-15 (not available), SE 19-16 (not available), SE 20-5, SE 20-9, SE 20-13, SE 20-14, SF 19-3, SF 19-4, SF 19-7, SF 19-8, SF 19-11, SF 19-12, SF 20-1, SF 20-2, SF 20-5, SF 20-6, SF 20-9, SF 20-10; see Parry and Perkins [1987] for coverage of these sheets). I also purchased three 1:500,000-scale aerial photos covering part of La Paz Province, a nine-sheet set of 1:100,000-scale "Mapa Hidrográfico de Bolivia," showing all major rivers and swamps), a 1:3,000,000-scale "Mapa Político de Bolivia," and eight 1:3,000,000-scale "Mapa de Comunicaciones de la República de Bolivia," the latter purchased for mapping localities.

Because the order took a while to fill, I left and went to a bookstore and bought eight 1:3,000,000-scale "Republica de Bolivia, Red de Caminos," a simple blue-on-white road map also purchased for mapping localities. I changed money at 4.10 Bolivianos/dollar. After lunch, I returned to the IGM to pick up the maps, and then drove to a book binding company to have the maps bound in logical order. I then went to the American Embassy and met Mr. Michael Shelton, the Economic Counselor, and his assistant, Dr. Fernando



Urquidi Barrau (Tel. for both 591-2-350102; FAX: 359875). Dr. Urquidi was my designated control officer in Bolivia. I told them of my mission in Bolivia, and they directed me to return at 2:00 P.M. the next day for a security briefing, and to go up the street that day to register with the American Consulate. I then went to a bookstore and purchased Diccionario Geográfico Boliviano, González Moscoso (1984). This is a 250 page paperback book giving general localities and altitudes of Bolivian place names.

#### February 2

I went to IBTA and had a meeting with Dr. Luis Iñiguez, a coordinator, with Dr. Brun, of the University of Wisconsin/IBTA Project, and with Ing. José Sambrana, another IBTA official. We discussed my plans to work with IBTA in Cochabamba, and they told me about the administrative structure of IBTA. They also gave me names of many IBTA and non-IBTA contacts throughout Bolivia that I may wish to contact later. After the meeting, I purchased an airline ticket to leave for Cochabamba at 8:00 AM. the next day. I then went to the Herbario Nacional de Bolivia (LPB), a one-half hour drive out of the center of town in a place called Cota-Cota, located at the Instituto de Ecología, Museo Nacional de Historia Natural, Campus Universitario. I met Drs. Stephen Beck (curator) and Marko Lewis, associate curator. Dr. Beck told me that Carlos Ochoa recently sent duplicate Bolivian herbarium collections to LPB. See Appendix 1 for our inventory of the LPB herbarium.

#### February 3

I took the 8:00 A.M. La Paz-Cochabamba flight, and was met in Cochabamba by Ing. Willman García Fernández, a technician at the IBTA PROINPA (Proyecto de Investigación de la Papa). Willman and I would work together on much of this trip. We began by mapping germplasm localities on the 1:3,000,000-scale base maps (see February 1), and drawing "bubble distributions" around total distributions, as determined from Hawkes and Hjerting (1989) and Ochoa (1990). In addition to the geographic references purchased above, we used Paynter (1992). In the afternoon, we drove to the Herbario Nacional Forestal Dr. Martín Cárdenas (BOLV, located in the Jardín Botánico Martín Cárdenas, in Cochabamba). The herbarium was open, but about to close, and the curator was gone, so we decided to return the next morning.

Willman and I then walked to the lower slopes of Cerro San Pedro, outside of the Jardín Botánico, and he showed me populations of S. berthaultii. This is the type locality for this species. There were hundreds of flowering plants that although just beginning to fruit had many maturing fruits that indicated to us that our trip might be starting just on time. Bolivia had an over-abundance of rains this year (after a drought last year) that bodes very well for finding populations this year, if we can get to them. The road system is generally poor in Bolivia, especially on the side roads, and there are reports of many wash-outs in the countryside. We returned to PROINPA to continue mapping.

#### February 4

I met Willman at the Herbario Nacional Forestal Dr. Martín Cárdenas (BOLV) and met the curator, Dr. Susana Arrazola Rivero. This herbarium is rich in types for sect. Petota. While at the herbarium, Dr. Arrazola told me that there were more specimens and types at the Facultad de Ciencias Agrícolas y Pecuarias, Universidad de San Simón, Cochabamba, Bolivia. This herbarium is not listed in Holmgren et al., (1990). I will check into this later. After finishing this account, I went back to PROINPA and continued mapping localities with Willman. See Appendix 2 for our inventory of the BOLV herbarium.

#### Feb 5

Willman and I completed mapping all germplasm records, and prioritized our collecting (see Appendix 4). Based on recommendations from Dr. Nelson Estrada and Dr. Andre DeVaux, we decided to collect in southern Bolivia first, due to expected earlier flowering and fruiting dates there relative to northern Bolivia. We had 200 cardboards cut to size at

a local factory. We surveyed our collecting equipment and saw that we lacked a plant drier. We decided to go to the Toralapa PROINPA station on Monday to have one made by one of the workers there.

#### February 6

I typed up the report up to this point. I contacted Dr. Andre Devaux, international coordinator of the PROINPA project, and made an appointment to meet him the next day to discuss our collecting.

#### February 7

Dr. Andre Devaux picked me up at my hotel and we drove to a restaurant to discuss our collaborative collections. We reviewed the wild species known for Bolivia, the known germplasm collections, and our collection priorities. We agreed that I would go to PROINPA the next morning to put the Bolivian per-diem expenses for the trip into an PROINPA account. We discussed possible long-term collaboration between IBTA, the USDA, and the University of Wisconsin.

#### February 8 (Monday)

I went to the PROINPA station and went with Sra. Marpha Ríos A., a PROINPA administrator, to deposit my contribution of Bolivian per-diem expenses in an PROINPA account. I then drove with Willman and other PROINPA workers to the Toralapa Research Station, east of Cochabamba on the old road to Santa Cruz. We collected S. sparsipilum (6500) in the PROINPA experimental plots along the way. At the Toralapa Experimental Station we collected S. megistacrolobum var. toralapanum (6501) and S. acaule (6502). I met Ing. Maria Luisa Ugarte, who recently completed her undergraduate thesis on a morphological characterization of the 1007 Bolivian accessions of cultivated potatoes. This collection includes 30 collections of S. ajanhuiri Juz. and Buk., 28 accessions of S. curtilobum Juz. and Buk., 68 accessions of S. juzepczukii Buk., 164 accessions of S. stenotomum Juz. and Buk., 664 accessions of S. tuberosum L. ssp. andigena Hawkes, and a small number of imported accessions of S. tuberosum ssp. tuberosum. She showed us the variability within and between accessions and reviewed the morphological features distinguishing accessions. We obtained a stand to be used in the field as part of a plant drying apparatus. We reviewed our collecting priorities and decided to work in the south of Bolivia first, partly on the recommendation of Dr. Nelson Estrada, who suggested that the phenology would be most advanced there relative to the north. We returned to Cochabamba, and I called Ronald van den Berg in The Netherlands to have him meet us in Cochabamba, rather than in La Paz as originally planned (he is to arrive on Feb 28).

#### February 9

I met Willman at PROINPA and we met Sr. José Rosales, a driver hired by PROINPA with part of the per-diem funds. We drove along the road to Oruro, and collected S. berthaultii (6503), S. sparsipilum (6505), and S. megistacrolobum var. megistacrolobum (6507). Much of this road was being converted from a road covered with stones to a paved road. We slept in Oruro.

#### February 10

We drove south from Oruro, to Machacamarca Arquita, then east to Uncia, Cala Cala, Pocoata, and Macha, where we spent the night. The road is a stone-covered road after Machacamarca Arquita. We collected S. acaule (6510, 6512), S. juzepczukii (6509), S. leptophyes (6514, 6515, 6518), S. megistacrolobum (6514), and S. sparsipilum (6511).

#### February 11

We left Macha and drove east to Sucre, where we spent the night. We collected S. acaule (6521, 6523), S. boliviense (6524), S. leptophyes (6519), and S. megistacrolobum (6520, 6522) along the route.

### February 12

Willman and I spent the morning entering our records and trip itinerary on the computer, and José took the car to a mechanic to have the car tuned. I also filled out accounting forms and sent them to the USA. After lunch, we drove south along the road to Potosí and collected S. sucrense (6526) and S. tarijense (6525). We returned to Sucre where we spent the night.

### February 13

We left Sucre and drove south and west to Betanzos, where we spent the night. We collected S. tarijense (6527, 6529, 6530), S. oplocense (6528), and S. astleyi (6531) at its type locality. We noted extensive variability in this toptype locality population that suggested to us that S. astleyi may be synonymous with S. boliviense, and collected the relevant variants. I decided to call John Bamberg and ask him to plant our germplasm accessions of both species (including previously collected germplasm at the type locality) so we could check the variability of both species for our publication on this trip. I also drafted letters to herbaria to borrow type material of these and other Bolivian species.

### February 14

We left Betanzos and drove back east to the road to Esquiri, without leaving the main road. We also drove south to the IBTA Estación Experimental Chinoli, not far from the road to Esquiri. We then drove back west, past Betanzos, to Potosí, where we spent the night. We collected S. boliviense (6532, 6535), S. oplocense (6533, 6536), and S. megistacrolobum (6537) this day. We were running out of press space, so we assembled our plant drier that night.

### February 15 (Monday)

We got up and checked our plant presses, and found that they needed more time to dry, so we decided to take care of other business until the early afternoon. I changed money and made phone calls to home and work. José had repairs done on the truck, and Willman and I emptied the plant drier. We left Potosí at about 2:30 PM, and drove south on the road to Villazón (near the border with Argentina), reaching Vitichi, where we spent the night. We collected S. gourlayi (6545), S. infundibuliforme (6539, 6546), S. megistacrolobum (6543), and S. sucrense (6544) along the way.

### February 16

We left Vitichi and drove south to Tupiza, where we spent the night. We collected S. infundibuliforme (6547, 6556) and S. sucrense (6548, 6552, 6554) along the way. This was the first day that we had problems collecting germplasm because of being in a place too early. Solanum infundibuliforme was one of our goals of this trip because of relatively low numbers of germplasm collections (seven). We were able to collect fruits at one of these localities (6547), but saw many other populations along the road from Potosí to Tupiza that had not yet started to flower or had just begun to flower. We had many problems identifying S. gourlayi/S. hondelmannii/S. oplocense/S. sparsipilum/S. sucrense, and these from cultivated populations of S. tuberosum ssp. andigena with which they often grow as agricultural weeds. Our problem arose from extensive variability within populations of characters that Hawkes and Hjerting (1989) and Ochoa (1990) use as key characters to distinguish them. These include the shape of the stem (straight/zigzag); form of the stem wings (straight/undulate); pubescence and shiny/not shiny nature of leaves; number of lateral and interjected leaflets; and shape of the terminal leaflet. These characters often vary not only within populations, but sometimes even on single plants. We documented this variation on herbarium collections and in photographs.

### February 17

We spent the morning typing up notes while the truck's brakes were repaired. We then drove north, back up the road to Potosí, and collected S. infundibuliforme (6558) and S. oplocense (6557) on this road. Both plants were common at the collection site, but we

could not find mature fruits in either population. We returned to Tupiza where we spent the night.

#### February 18

We drove east, along the road past La Colorada, and to the mine at Chilcobija, and a little beyond to the west, along the road to Challapampa. We collected S. acaule (6573), S. infundibuliforme (6561, 6564, 6569), S. megistacrolobum (6562, 6563, 6566, 6568), and S. oplocense (6559). We could not find fruits of S. oplocense nor from all of the populations of S. megistacrolobum and S. infundibuliforme. We returned to Tupiza where we spent the night.

#### February 19

We drove south from Tupiza to Cruce Mojo, and then took the road west to Iscayachi, and then south to Tarija. The road from Tupiza to Cruce Mojo goes through flat, very dry land, and the only potatoes we could find were "weed potatoes" (S. sucreense?) in an irrigated corn field, but we could find no fruits and did not make a collection. The road from Cruce Mojo traverses a deep canyon. We found S. infundibuliforme (6574) to be common here, but again did not find fruits, and collected S. gourlayi (6575) with very young fruits. We found "weed potatoes" (again, S. sucreense?) in a corn field at the base of the valley, but again without fruits and did not make a collection. We made another collection of S. infundibuliforme (6576, without fruits), and S. megistacrolobum var. megistacrolobum (6577, with fruits) at the other side of the valley. We drove to Tarija where we spent the night.

#### February 20

We drove south from Tarija towards Bermejo to look for the record of S. chacoense north of Bermejo (see Hawkes and Hjerting, 1989). This road descends into lowland jungle, and we went as low as about 700 m. All the local residents told us of a white-flowered wild potato growing as an agricultural weed, but flowering in August-October, and gone now. We suspect it is S. chacoense. We suspect that the failure of prior collectors to get germplasm of this species, and S. yungasense (another lowland species possibly related to S. chacoense) is due to this different phenology relative to most other Bolivian wild potatoes.

#### February 21

We drove east from Tarija along the road towards Entre Ríos, almost reaching that town, and then returned to Tarija where we spent the night. We collected S. microdontum (6599, 6602, 6603) and S. tarijense at or near its type locality (6587, also 6590).

#### February 22 (Monday)

We drove north from Tarija to San Pedro, where we spent the night. We collected S. gourlayi (6606, no fruits, and S. microdontum (6603, no fruits) along the way.

#### February 23

We drove south from Camargo, back to San Pedro, and then east to Culpina, continuing towards Santa Elena. We collected S. boliviense (6612) about 20 km east of the record in the area mentioned by Hawkes and Hjerting (1989), S. oplocense (cornfield weeds, 6607, 6608, 6611), and S. vidaurrei? (6613, no fruits found). This collection of S. vidaurrei was interesting, in that although plants in the sun had the narrow leaflets characteristic of the species, adjacent collections in the shade of bushes had wider leaves. This is a common phenomenon in wild potatoes, and makes us wonder about the significance of these narrow leaves to distinguish it from other subspecies of S. gourlayi. (Hawkes and Hjerting [1989] place S. vidaurrei as a subspecies of S. gourlayi) The collection of S. boliviense is a significant germplasm record, because it is the first in this southernmost distribution of the species. We returned to Camargo where we spent the night.

February 24

We drove north from Camargo, past Padcoyo, Tortora Palca, Una, Chaqui, and then took the left fork of the road to the Potosí-Sucre road, where we then drove to Sucre. We looked for S. vidaurrei at its type locality at km 150, Potosí-Camargo, 2200 m., at Quebrada Honda, and later recollected there by Ochoa (1990). The elevational data given by Cárdenas at the type locality is in error, because the lowest elevation in this area at the base of Quebrada Honda is about 3300 m. We found it at or near the type locality (6612b), but without flowers or fruits, and could not find it anywhere else in the area. We continued north and located a fruiting population of S. vidaurrei (6613), to our knowledge the first in the germplasm system. We also located S. oplocense (6615) and S. megistacrolobum (6616) in the area. We drove farther north and located S. sucreense? (6618). We then continued more to the north and then diverted northwest along the road past Otavi, Totor Palca, Tuna, and Chaqui, with the goal of then taking the road northeast out of the latter town to reach the Potosí-Sucre road and continuing to Sucre. The road from Tuna to Chaqui passes a volcanic rock field and is very bumpy, windy, and takes about two hours to traverse, even though it looks short on the map. By a lucky mistake, we took the road northwest, not northeast, out of Chaqui, and found S. acaule (6621), S. boliviense (6619), and S. vidaurrei (6620, no fruits) along this road. We continued a very long drive that day and eventually arrived in Sucre where we spent the night.

February 25

We left Sucre and drove north on the road past Aiquile, past Totorá, then east past the Toralapa Station and into Cochabamba. We arrived at midnight, and we spent the night. Along the way, we collected S. gandarillasii (6624) and S. tariense (6622, 6623, 6626). Solanum gandarillasii is a very distinctive plant with its glabrous leaves and calyces lacking acumens. Solanum tariense (6622, 6623), while still having flowers, was apparently near the end of its flowering cycle; 6626 had no flowers left and all fruits were mature and falling off the plant. Much of the road from Sucre to Aiquile and beyond is very low and hot, and according to local residents was very dry in the last few months with little rain, unlike other parts of Bolivia we visited that had abundant rain this year. The S. gandarillasii collection was found in a moist side valley and is a new site locality. We could not find the documented localities about Quiroga, and attributed it to the dry conditions. Hawkes and Hjerting (1989) mention this problem regarding sterile populations of S. gandarillasii due to dry conditions.

February 26-28

I worked in Cochabamba typing up records, writing part of the collection paper, drying plants (after buying two electric heaters), writing for Bolivian type specimens, and planning for the next phase of the trip. I worked with José to get our other jeep ready for the trip (a two-seat vehicle, needed with our additional passenger). We had it cleaned, had the engine repaired, and bought a new tire. I picked up Ronald van den Berg at the Cochabamba airport on the 28th. We went to Cerro San Pedro in Cochabamba, where Willman and I earlier collected S. berthaultii at its type locality when it was in full flower and just beginning to fruit. On this second visit, the leaves of all plants were aging, we could see no flowers, all of the fruits were mature, and many of them had fallen from the plant. This demonstrated just how seasonal this plant was, and conformed to patterns I saw in other seasonal climates such as in México and Argentina. I made me wonder how much more effective collecting time we would have in Bolivia, especially with these more lowland species.

March 1 (Monday)

I went to PROINPA and met Dr. Andre Devaux. We discussed our collecting plans for the next trip and I agreed to give a talk on my research to PROINPA personnel and researchers faculty of the Universidad San Simón de Cochabamba at the Toralapa Research Station on March 11th. Willman, Ronald, José and I then drove east to Aguirre

and then north on the old road to Incachaca, with the goal of locating S. violaceimarmoratum. The road was blocked by a landslide some distance up the road, and we were unable to find any potatoes this day. We returned to Cochabamba where we spent the night.

### March 2

We drove northeast on the road to Santa Cruz and collected S. berthaultii (6629), S. sparsipilum (6630), S. toralapanum (6631), and two populations that keyed out to S. avilesii or S. brevicaule (6632, 6634), depending on whether the plants were collected in the shade (wide-leaved S. avilesii?) or sun (more narrow-leaved S. brevicaule?). Hawkes and Hjerting (1989) and/or Ochoa (1990) list both species from this area. We drove to Epizana with the goal of spending the night, but the hotels were either closed or very dirty with dirt floors. We drove south to Totora where we spent the night.

### March 3

We drove north to near Epizana and then south back past Totora to Aiquile where we spent the night. Aiquile is a center of high infestation of Chagas disease and the bugs that spread it, so we took care to select a good hotel and check the room for bugs before sleeping. We collected S. alandiae (6644, 6645, the same population, but differing only in corolla color; 6647, 6650), S. capsicibaccatum (6646), and S. doddsii (6649, 6651). The identity of collection 6649 as S. doddsii is tentative because the plant lacked flowers, and the only way we could distinguish this plant from S. chacoense (a putative parent of S. doddsii, along with S. alandiae, according to Hawkes and Hjerting [1989]) was by corolla color and shape.

### March 4

We drove south to Sucre where we spent the night. We collected S. gandarillasii (6652, 6656) and S. tarijense (6654).

### March 5

We drove from Sucre, east towards Zudañez, soon departing on a dirt road south to Sotomayor, and continuing a little beyond on a road that is on the rocky floodplain of Rio Tiahucana. Our main goal the day was to collect S. hondelmannii at its type locality, which we did (6663), as well as at two other localities we tentatively identify to this species as they are similar and nearby (6660, 6665). We documented much variation of these collections of S. hondelmannii which made us question whether they should be recognized as good species, with special problems in distinguishing them from S. gourlayi and S. leptophyes, which we also have problems distinguishing. We drove back north to the Sucre-Zudañez road, and then drove east to Tarabuco, and then south to Icla, where we spent the night. We also collected S. tarijense (6659, 6661) and another collection (6667) that was probably S. sparsipilum, but also keyed out to S. virgultorum.

### March 6

We drove south to Azurduy. The road is very bad, and it rained much of the day, sometimes severely. Because the road had poor drainage, and traversed many cliff-faces, the road deteriorated with the rain, and was dangerous to drive on. We had to drive very slowly, and only reached Cruz Kasa, north of San Pedro, before night set in. It took three more hours of night driving to reach Azurduy, which was the only place to get housing after Icla. We got housing at Azurduy at the Estación Experimental Santa Bárbara. The Icla-Azurduy road was very important to collect on because it has records of S. arnezii, represented at Sturgeon Bay by only four accessions, all clustered on this road north of Azurduy (although there are literature records elsewhere). In addition, there are records of Hawkes and Okada's (1988) new species S. hoopesii (4x) and S. ugentii (4x), represented at Sturgeon Bay by three germplasm accessions each, but each species with collections clustered very closely together. In the beginning of the day, we collected S. gourlayi (6674, herbarium only) S. megistacrolobum (6669, 6673) and S. capsicibaccatum? (6671).

This latter collection is significant as being the first collection of a member of ser. Circaeifolia along this road. We could not find fruits of it, but made tuber collections. Near the end of the day, we found S. hoopesii (6679, 6680) at its type locality. We made two collections here, collection 6679 found at the base of a rock wall, as in the type description, and collection 6680 being found in a potato just inside the wall. This latter collection, like our other collections of "wild" potatoes made in agricultural fields, could be distinguished from cultivated potatoes by its generally smaller stature and lack of large tubers. Both collections were similar, but collection 6680 seemed to be more robust, perhaps as a result of growth in a fertilized field, and we wanted to make sure we had S. hoopesii. Ronald van den Berg and I have particular interest in this taxon because when we observed it growing at Sturgeon Bay in 1990, we could not distinguish it from S. tuberosum ssp. andigena growing there, and questioned Hawkes and Okada (1988) for describing new species without a comparison to other taxa, including both wild and cultivated ones (see Spooner and van den Berg, 1992a).

### March 7

We found what is possibly S. hoopesii (6683) growing in the sandy soil of the nursery at the Estación Experimental Santa Bárbara, in front of the house where we spent the night. The plants there were mostly dead and withered (although we could find a few non-flowering plants), but we easily found fruits on the ground in the nursery. The station manager showed us this population and told us that we were about a month late for flowering plants. We were concerned that these were cultivated potatoes, but the manager told us that potatoes were not cultivated here and that these were wild populations with deep purple corollas. When we showed him herbarium specimens of our collections of S. hoopesii collected the day before, he told us that they were like those plants. We drove on the road back north to Icla and searched in fields and roadsides, and found one berry in a field (6684) that the owner of the field told us had purple corollas, and another population (6685) with purple corollas and fruits. We tentatively identified both populations as S. hoopesii.

We were unable to find any plants of S. arnezii (with cream-white flowers) in the areas documented for this species north of Azurduy, but were told that wild potatoes with white corollas were common weeds in the area, but flowered and fruited in January-February. Farther north, we collected S. ugentii (6687) at its type locality. We wondered if we would find any fruits of wild potatoes here at this time, because fruits were collected on other expeditions in April (see Hawkes and Okada, 1988). Most plants at the type locality had flowers (some with only young fruits), but we were able to locate some plants with fully mature fruits. As with S. hoopesii, we documented much variation in S. ugentii, apparently crossing other species boundaries, that made us question whether it was a good species. Hawkes and Okada (1988) had described these new species from material later grown from true seed at Sturgeon Bay, not from material collected in the field. They focus on the tetraploid chromosome number of both species, but tetraploid chromosome numbers are known from other similar Bolivian species such as S. gourlayi, S. oplocense, S. sucrense, and S. tuberosum ssp. andigena. Although the latter is a cultivated species, we earlier noted the extreme similarity of S. ugentii to S. tuberosum ssp. andigena in fields at Sturgeon Bay, are beginning to realize the difficulty or impossibility of consistently distinguishing morphologically some cultivated and "weed" species, except by tuber size and stolon length. Hawkes and Okada (1988) distinguished S. hoopesii and S. ugentii from each other, but not from other Bolivian species (except S. sucrense), so it is hard to place this variability in the context of other Bolivian and extra-Bolivian species and really know how to distinguish them. It was nightfall when we finished collections at this locality, but there are many other similar habitats like this one in the area with wet cliffs that should be explored in the future. We returned to Icla where we spent the night.

March 8 (Monday)

We drove from Icla to Padilla, then east to Tomina, where we spent the night. We collected S. arnezii (6692) and possibly S. chacoense (6701) along the Zudañez-Padilla road. Most plants were dying, and it was apparent that we were at the end of the cycle for both. Collection 6692 had the cream-yellow corollas characteristic of S. arnezii, but collection 6701 had no corollas at all. The leaves were similar to both S. arnezii and S. chacoense, and the owner of the field at the edge of which this collection was made told us that these plants had white, not cream-yellow corollas, so it is only tentatively identified as S. chacoense. He seemed to have a very clear idea of both corolla color types, and told us that there were populations at the base of mountains about 10 km to the north (walking) where he could collect fruits of the cream-yellow plants. We paid him to make collections for us and made arrangements to have him send the fruits to an IBTA station in Sucre, with written instructions to the IBTA personnel there to send the fruits to Toralapa. Collection number 6703 is reserved for this possible collection.

March 9

We left Padilla with the goal of reaching the general area of Valle Grande and Mataral, where there were very important records of S. capsicibaccatum, S. circaeifolium, S. gandarillasii, and S. neocardenasii. Upon reaching Villa Serrano, however, we learned that the road to the north was cut by flooding of the Rio Grande. Our options were to reach these areas by the long (two-day) detours of Monteagudo-Santa Cruz-Mataral, or Sucre-Epizana-Mataral. There was no time to do either of these and still give my scheduled talk in Cochabamba. Because we were very tired and wished to avoid the difficult drive back to Cochabamba over bumpy roads, we decided to return to Sucre, by having José drive back to Cochabamba while Ronald, Willman and I flew back. We reached Sucre at 5:15 PM, missing the Sucre-Cochabamba plane by 15 minutes. José continued on to Cochabamba and we remained in Sucre.

March 10

We rested in Sucre.

March 11

Ronald, Willman and I flew from Sucre to Cochabamba. That evening, I gave a talk on my research to investigators of PROINPA and to members of the Agronomy Department of the Universidad Cochabamba de San Simón.

March 12

Ronald and I dried plants, typed notes, cleaned clothes, and I worked on financial accounting. Dr. and Mrs. Nelson Estrada entertained Ronald, Willman, and Willman's wife and I that evening at their home.

March 13

Our goal this day was to drive northwest to Independencia, and continue the next day to Inquisivi, in the general area of which were important records of S. capsicibaccatum, S. circaeifolium, S. okadae, S. soestii, and S. virgultorum. Our departure from town was delayed two and one-half hours by our search for gasoline. There was a country-wide strike by the gasoline vendors of the major stations, and the only gasoline available was on the black market where it sold at greatly inflated prices. Because we were headed into remote areas away from big cities, we filled our tank and bought two large containers and filled them with gasoline and put them in the back of the truck. We left Cochabamba and drove west to Quillacollo, and then northwest towards Independencia, but only reached Morochata. The road was cut a little beyond Morochata by heavy rains, and we had to return to Cochabamba where we spent the night. Our new plan was to reach Inquisivi the next two days from the south via the Cochabamba-La Paz road, departing just to the east on Belén, passing Puchini. Despite this forced detour, the day was very successful, however, as we collected S. circaeifolium (6709), S. megistacrolobum var. megistacrolobum



(6710), and *S. sparsipilum* (6704, 6706, 6708, 6709, 6711). The *S. sparsipilum* populations 6708, 6709 differed from each-other by round fruits of the former and ovoid fruits of the latter. We think this is just variation within this highly variable species, but decided to make two collections and see what happens in the increase generation. We had a hard time identifying *S. circaeifolium*, because the distinction between this and *S. capsicibaccatum* in both Hawkes and Hjerting (1989) and Ochoa (1990) relies on minor and apparently overlapping pubescence characters that are not clear to us. The identity of the *S. sparsipilum* was also difficult, as it is difficult to key this out from many other similar species in ser. *Tuberosa*.

#### March 14

We left Cochabamba and drove west to just to the east on Belén, then north on the road to Quime, where we spent the night. The trip took us all day, because there was road construction along the Cochabamba-La Paz Road, and because we had to take more time to find gasoline, still scarce on the market. Much of our drive this day was in high puna vegetation that would likely only have *S. acaule* or *S. megistacrolobum*, and we decided to drive straight to an area south of Quime to search for *S. circaeifolium* ssp. *quimense* at its type locality, 4-10 km south of Quime. About 20 km south of Quime, the road descends from high puna at about 4500 m, into the Río Quime valley, a spectacular narrow valley with high cliffs and many streams rapidly descending into the river. We had about two hours of light left at the end of the day to search for this taxon there, and we found it 8 km south of the town square of Quime. The species was in full flower, but had not yet started to produce fruits. We found a wide range of morphotypes within the population (6713), including the "Circaea-like" leaf typical of *S. circaeifolium* ssp. *quimense*, as well as morphotypes typical of ssp. *circaeifolium*, and *S. capsicibaccatum*. The keys do not work well in Hawkes and Hjerting (1989) and Ochoa (1990) between these two species because of the similarity among these taxa and because of the minor characters separating them, and we are investigating the possibility that these taxa may all be synonymous.

#### March 15 (Monday)

We drove 4 km south back towards Belén, and then north towards Inquisivi, in search of *S. circaeifolium* var. *quimense*, *S. okadae*, *S. soestii*, and *S. virgultorum*, all important germplasm goals, with records along this road. The type locality of *S. circaeifolium* var. *quimense* is 4-10 km south of Quime, and we collected it the day before (6713), within the area of the type locality, but without fruits. Our new collection this day (6714) was at 4 km south of Quime, also within the area of the type locality, and we found fruits this time. The four of us spread out and searched the area, and all of us found plants, but only one of us found fruits, suggesting that we were a little early for collections of fruits at this locality, or that fruiting was just sparse here. The fruiting population was found down slope of the road, towards Río Quime, adjacent to a footpath paralleling and to the west of the road. We spent the rest of the day searching along the road and on the high slopes on the eastern side of Río Quime valley, from 3-6 km north of the town square of Quime. We found *S. okadae* (6715, no fruits; 6716, 6718, 6720, 6721), *S. soestii* (6717, only tubers; 6719, two very young fruits; 6722, two very young fruits), and *S. virgultorum* (6723, herbarium only). *Solanum okadae*, in agreement with Hawkes and Hjerting (1989) and Ochoa (1990) had a striking resemblance to *S. microdontum*, but was distinguished by its rotate, not pentagonal flowers as in the latter species. Also, most populations, unlike *S. microdontum* I have seen before, were small, not more than 20 cm tall (*S. microdontum* 0-5-1 m tall), and were found on relatively dry roadsides, where the *S. microdontum* I have collected in Argentina and Bolivia were found in much wetter situations. *Solanum soestii* collection 6719 had a range of morphotypes suggesting to us that this taxon was recognized by an extreme narrow-leaved variant, but collections 6717 and 6722 were more uniform in the narrow lateral leaflets typical of the species description. Our identity of collection 6723 as *S. virgultorum* is tentative, and based on the expectation of this species found in this area (from Hawkes and Hjerting [1989] and Ochoa [1990]), because it was

difficult to distinguish in their keys from a range of other wild species in ser. Tuberosa, such as S. sparsipilum. We returned to Quime, where we spent the night.

#### March 16

We visited Marko Lewis, a botanist associated with the Herbario Nacional in La Paz (LPB), and with the Missouri Botanical Garden in Saint Louis, Missouri, USA (MO). He is working on a moss flora of Bolivia. He lives on the hill on the southern part of Quime. I met him at the herbarium in La Paz, and he told me that he had transplanted two wild potato species on his farm from the surrounding area, and invited me to visit him when in Quime. When we visited, one of the potatoes had died and withered to the ground, and the other was about 2 m tall but had no flowers or fruits. It was possibly S. virgultorum, a species we have trouble distinguishing from many other similar species, even with flowers and fruits. It has survived the Phytophthora blight that had destroyed his small plot of potatoes nearby. After our visit, we drove north, with the goal of continuing to the Yungas lowlands at Chulumani to search for S. yungasense. Unfortunately, intense rains the night before washed out the road about 10 km north of Quime, and we decided to drive back there for lunch while the road was being repaired. On the way back, we found a fruiting population of S. soestii (6724). On our way back after lunch the road was repaired, and we searched without success for wild potatoes until after passing Inquisivi, when local residents led us to a wild potato growing in a corn field. These potatoes were common in the area, and were said to have both purple and white flowers. Although the population we collected lacked flowers, the farmer told us that the ones in his field had purple flowers. These potatoes looked to us like the many other populations of "weed potatoes", similar to cultivated potatoes we had found in similar agricultural situations on this trip (as S. gourlavi, S. hoopesii, S. sparsipilum). We drove to Licoma where we spent the night.

#### March 17

We drove from Licoma to La Paz. Because I needed to get to the United States Embassy before 4:30 PM. to get correspondence from work and to pick up Chief of Field Party replacement checks to continue the expedition, we had little time to collect plants. We decided to quickly search an area south (uphill) of Quime for a record of S. virgultorum. We were unable to find the species there, but located one possibly mature fruit of S. circaefolium ssp. quimense at the locality of this taxon (6713) found three days earlier, and made it part of this collection. We reached La Paz where we spent the night.

#### March 18

I took part of the morning to respond to correspondence I received from work, and sent replies back to Madison via overnight mail. We spent about an hour trying to buy gasoline, and were delayed by closed stations, or long lines at the open station we located. Much of this delay was caused by people filling gasoline containers for the black market. We drove on the La Paz-Cotapata road, ascending to about 4500 m before descending into the Yungas lowlands. We searched unsuccessfully for potatoes in a valley beginning at about 3500 m. We reached Unduavi (at about 3000 m) with the goal of finding S. violaceimarmoratum, documented at various places at and beyond this town. We split into two parties, walking and "leapfrogging" one in front of the other and intensively searched along the road for about 10 km. We eventually found the species, not along the roadside (as was documented in one record), but in a recently cleared and burned field, in deep organic soil. The plant was located just before dark, and we had little time to intensively search the area. All we could find were large tubers, but no fruits, and we decided to return the next day to search for fruits. We thought that we would have to drive one or two hours to Puente Villa or Chulumani to find a hotel, but were pleasantly surprised to find a luxurious tourist hotel (El Castillo) in El Chaco, just down the road, a convenient stop as well because it was the first documented place on our trip in the Yungas for S. yungasense, first collected on December 1, 1920. The records of this species span

1100-1900 m., and it was unclear to us if the low success of previous expeditions to find this species was due to collections at the wrong times, or by general rarity of the species.

### March 19

We searched the roadside and stream margins at El Chaco for S. yungasense without success. We then drove approximately 10 km west (uphill), back to the collection of S. violaceimarmoratum the day before, with the goal of collection fruits. We had to walk the last three km because heavy rains the night before had washed out the road. We collected about eight young fruits that may or may not mature, and during this time it began to rain. We then walked about one-half km down the road to look in another clearing. While in this field, the rains increased to a torrent, and we had to go back to the car. We drove back downhill, and about three km before reaching El Chaco, a river of rock came down a stream just before our car. It was interesting to see the force of this process that has been causing us so many delays. There was so much water flowing down the streams that some of it diverted to an adjacent channel, and tons of mud and boulders were loosened and just slowly flowed downstream like putty. Fortunately, the flow stopped about one-half car's width before the edge of the cliff forming one edge of the road, and we were only delayed about two hours as the many people stopped by this landslide worked to clear a path. Landslides are such a common occurrence in this area that everyone carries shovels and pickaxes to clear roads. It rained heavily until about 2:00 PM, and we drove slowly downhill and searched roadsides from the car or stopped frequently to ask local residents about wild potatoes. During this time, we could see rocks loosened from the exposed hillsides and rolling down hills, presumably initiating landslides. We were stopped another time by a landslide that covered a road, but fortunately there was a bulldozer cleaning the road, and we were only delayed for a short time. Unlike in other areas where we had to turn back because of road closures, there were many bulldozers kept along this road to keep it clear, as this was a very busy road for export of agricultural products out of the lowlands and a busy road for the tourist hotels in the Yungas area.

We continued to Puente Villa, where there were records of S. yungasense, a major goal of our expedition, because there are no germplasm samples at NRSP-6. We talked to many people at Puente Villa, and met two people who said they knew where two populations were, and would take us there in an hour when they finished a job they were doing. One of them was Freddy Campusano Telleria, a man who runs a small restaurant on the road passing through Puente Villa. His mailing address is Flota Transporte San Bartolome, Puente Villa, Prov. Sud Yungas, Bolivia. In the meantime, we searched among the bushes and grass in the Río Unduavi River valley, at a place just before its entry into Río Taquesi, before a hanging bridge, and illustrated as the type locality of S. yungasense in Hawkes and Hjerting (1989, plate 3). We did not find the plant here. We went with our two guides who walked with us up an old roadbed upstream of Río Taquesi, and found S. yungasense (6732) in an orchard, about a rich hacienda, on the left side of the river, about 2 km from this river's junction with Río Unduavi. Unfortunately, the plants were young and had no flowers or fruits, but we were able to collect tubers. Our guides told us that the plants flowered earlier in the year, possibly from September to January. We walked back downstream, drove over Río Unduavi, uphill towards the tourist hotel, and diverted to the left to a hacienda where there was a banana plantation. We found very young plants of S. yungasense there, too young for tuber or herbarium collections. Our guides told us that they knew of yet another hacienda where S. yungasense grew, a two and one-half hour walk uphill. Because it was 5:00 PM, it was too late to go and return that day before dark. We decided to continue on to Chulumani (an area of other literature records for S. yungasense) and to pay the guides to collect the plant for us the next morning, and made arrangements to meet them on our return back through Puente Villa. The road from Puente Villa to Chulumani is an area of legal coca cultivation in Bolivia, and there are many coca farms on the slopes along this road. We asked many farmers about wild potatoes, and it seemed that everyone knew of the white-flowered potato, but growing in coffee plantations in the Chulumani area. We slept in Chulumani.

March 20

The truck developed carburetor or fuel line problems because of the bad gasoline we were forced to buy on the black market, and José took the morning to get these problems repaired. We then searched for S. yungasense in the area of Chulumani, and located non-flowering and non-fruiting populations to the west (6735) and southeast (6738) of the town. We found only one plant in the former locality and could not find tubers, and found many plants with tubers at the second locality. We were told by various people that the plants were abundant at both sites but that we were too late (or too early) to find flowers and fruits. The suggested dates to return for flowering and fruiting plants varied widely, however, from September to May. We continued back to Puente Villa and met Freddy Villa, who had searched for plants for us that morning and found a large flowering (but non-fruiting) population (6739) in a coffee plantation along left bank (going downstream) of Río Tamampaya, in the space between the road and the river. These plants exhibited the deeply stellate and cream-yellow corollas described for this species. Our original plan was to continue north to Coroico, then to Tipuani to search for other documented records of S. yungasense. We decided, however, to return to La Paz and use our remaining time to continue with the remaining goals of our trip. We did this for the following reasons: 1. We already had tubers from three populations of S. yungasense (6732, 6735, 6739), and the searches to Coroico, Tipuani, and a return to La Paz would take three more days. 2. It was possible that additional searches would not produce fruits, based on our collecting experience and the fact that most documented records of S. yungasense were from December to February. There was one collection from March (see Ochoa, 1990), but it was unclear from this record if fruits were collected. 3. We had many more goals to accomplish, most in La Paz Province more to the north, and we decided to better use our time to collect there. 4. We decided to try for a return trip to the Yungas next January when we might have better success in collecting fruits of this species. We continued to La Paz where we spent the night.

March 21-22 (Monday)

Willman flew back to Cochabamba, and Maria Luisa Ugarte would arrive in two days (Tuesday) to continue collections with us. Maria completed her undergraduate degree under the direction of Dr. Nelson Estrada on the characterization of the PROINPA collection of cultivated potatoes. Ronald and I dried plants and worked on this report, especially concentrating on the taxonomy section. We went to the Herbario Nacional de Bolivia to continue work I initiated there on February 2, and planned for the rest of the trip.

March 23

We met Maria Luise Ugarte at the La Paz airport. Her flight was scheduled to arrive at 7:00 AM, but was delayed until noon because of work stoppages caused by the national strike. We had trouble leaving La Paz because of road blockages caused by people standing in the road as part of the national strike. We eventually found a detour around the blockages, and drove north past the southeastern shore of Lake Titicaca, to Escoma, where we tried to get housing, but all of the housing was occupied. We drove the 13 km south back to Carabuco where we spent the night.

March 24

We drove north of Escoma where we were led by a local person to withered potatoes of what we think is S. candolleianum (6741). The plant was withered, but had abundant fruits, and we tentatively identified it to this species because of other records of it in this area and a general similarity of its withered leaves to illustrations in Hawkes and Hjerting (1989) and Ochoa (1990). We drove farther north and were led by another local person to another cliff face. There were no flowers or fruits, but we made collections of tubers (6743) that were 8 1/2 cm long. These may have been S. candolleianum, but the person who led us to the population told us that these potatoes had blue corollas, and S. candolleianum is characterized by white corollas. We also collected fruits of S. acaule (6742)

nearby. We then met someone who told us of aggressive weed potatoes that were common in and adjacent to gardens in the area. In the local Aymara language these are known as "taiwa" potatoes, and are distinguished from the locally-grown cultivars by much longer stolons, tubers deep in the ground, and tuber colors and shapes different from the cultivars. He told us that there were four distinctive types of these weed potatoes. We made four collections in two areas (6745, 6746, 6747, 6748). We then drove to Moco Moco and got housing in a dormitory of a local internationally-funded hospital project. We met Hans and Elizabeth, two Germans running the project, and Victoria, a Bolivian nurse on the project.

#### March 25

We went to the town square of Moco Moco to get breakfast at a small stand and met people who told us that "taiwa" potatoes were common in the area, some in a backyard garden only a few doors away. We made one such collection (6749) in the backyard garden of Yasick Fernández. The plants were all withered to the ground, but he was able to locate tubers and told us that there were three kinds of "taiwa" potatoes in his garden, flowering in January and February, and all were common aggressive weeds there, as well as throughout the area. We then drove with Victoria and a student nurse of hers to the base of the mountain near and to the east of Moco Moco. We split into two groups, and walked uphill in the valleys and mountain faces of this mountain. Both groups were unsuccessful in finding potatoes, but a guide of one of our groups took us to the base of a cliff face where he knew wild potatoes to grow. We could not find potatoes there, and he suggested that we were too late, and that we should return in February. We returned to Moco Moco where it took us three hours to get permission to purchase 50 liters of gasoline from the hospital project. We drove north and then east to Charazani where we spent the night.

#### March 26

We searched about the road uphill of Charazani, driving towards the small community of Chari and found "weed potatoes" growing in two locations (6750, 6751). We then drove downhill back towards Charazani, and continued to Pelechuco, where we spent the night. Our main target species in this area were S. bombycinum and S. neovavilovii, located to the north and east of Pelechuco. All of these collections were made by Carlos Ochoa and Alberto Salas in February, 1983, and we realized that we may have arrived too late for herbarium or germplasm collections, but we were busy collecting other species in February. Ochoa (1990) places both of these species in series Conicibaccata, a group that from my collecting experience in Ecuador, Colombia and Venezuela can have a protracted flowering and fruiting cycle, so we decided to try collections here at this late date. It was unclear from our maps how to get to the localities of these species from Pelechuco, but when we arrived in town we were told that these sites could only be reached by walking. There was a regular pack horse traffic in these areas, but none of the horses were strong enough to carry people. We contracted a guide and a pack horse for the next day for a planned two-four day expedition.

#### March 27

We waited until 2:30 PM for our guide, who came at regular intervals, starting at 7:00 AM, to tell us that our horse was just about to arrive and that we would be underway. At 2:30 PM he started to renegotiate a higher price for his services and the horse, and we realized that it was too late to try to reach Quiara that day. We agreed to his higher price for departure the next morning, and spent the rest of the day searching for potatoes locally. We found non-flowering and non-fruiting populations of S. acaule in the uplands adjacent to the stream running downhill from Pelechuco, but made no herbarium collection, and also found fruiting populations of S. sparsipilum (6753) near town.

#### March 28

We finally were able to secure a pack horse and a guide and left Pelechuco at 7:00 AM on the horse trail north towards Quiara. Pelechuco is located about 3500 m, and the trail to

Quiara crosses Cerro Sánchez, reaching 4700 m, then descending to Quiara at 3300 m. It began raining early in the day and the rain turned to sleet at the top of the mountain. We reached Quiara at about 5:00 PM. Our guide told us that many of the homes in the area (all small mud homes; no electricity in the area) were frequently occupied by the workers of the regular pack horse traffic taking out agricultural products from the area, as far away as Apolo to the east. The only housing we could get was a small mud storage shed with parallel cane sticks to sleep on. Unfortunately, the shed was also used to store cow hides, some still fresh and bloody. The guide unfortunately failed to properly secure the plastic covering over our goods on the horse that day, and most of our goods, including our sleeping bags and blankets, got wet. The cold, cane beds, and strong smell in the shed kept us awake for most of the night.

#### March 29 (Monday)

We started at 7:00 AM. and hiked 3-4 km east from Quiara to Moyapampa, and an additional 3 km east to Chimpainioc to search for the records of S. neovavilovii documented in Ochoa (1990). Moyapampa is a flat cleared plain next to a stream and clearly visible below from Quiara, and is bounded by steep slopes covered with forests and moss-covered rocks, similar to habitats in Chimpainioc. As these are rather specific records, our plan was to intensively search these areas for this species, and to return to Pelechuco by the way we came the day before if we could not find potatoes there, reasoning that we were too late. We split into two groups to search both localities, but were unable to find potatoes. We left Quiara at 11:00 AM. and reached Pelechuco at about 7:30 PM where we spent the night.

#### March 30

We spent the entire day driving from Pelechuco south to Huarina, then east to Tiquina, where we took a ferry across the Estrecho de Tiquina, then drove northeast to Copacabana where we intended to search for S. leptophyes, documented for the area by literature but not germplasm records. This drive took 11 hours.

#### March 31

We rented a boat in the harbor of Copacabana and took the one and one-half hour ride to Isla del Sol in Lago Titicaca, where there are literature records of S. leptophyes. We found it growing out of the rock walls of the Temple of the Sun (6759), and nowhere else in the surrounding fields. There were cultivated potato fields surrounding the temple, but these were obviously different from our wild species collection. It was very difficult for us to key this species out from S. sparsipilum and other similar species. We returned to Copacabana where we spent the rest of the day drying plants and entering data on the computer. We spent the night at Copacabana.

#### April 1

We drove back to Tiquina where we collected S. leptophyes (6762, 6763). We identified these collections to this species because, as in other species of identity confusing to us, they were documented from the area, but they were difficult to key out from other similar species. We continued east and then drove north, to north of Achacachi, to the type locality of S. achacachense. Ochoa (1990, pg. 184) gives an excellent clarification of the type locality of this species. We found very old plants, without flowers or fruits, of what may be this species, but we were able to collect tubers (6765). We also collected fruits of S. acaule in the same area (6766). We continued north to Sorata, with the goal of collecting S. candolleianum and S. circaeifolium, documented by many literature records from the area. We found one very mature population of S. circaeifolium in the area with no flowers, but with fruits (6767). We slept in Sorata.

#### April 2

We began the day by looking for S. circaeifolium about the grounds and area of Hotel Prefectural in Sorata, documented here by a literature record. The area about the hotel is

now very modified and we were not able to locate this species. We drove north on the road to Tacacoma and located two populations of young, non-flowering plants of what we think is S. candolleanum, and collected tubers from each population (6768, 6769). We intended to continue north to Mina Gran Poder, and slightly more north to the town of Tacacoma, areas with records of S. candolleanum, S. circaeifolium, and S. virgultorum. This road was one of the worst we have travelled in Bolivia, as it was very windy and had been recently damaged by heavy rains in the area. About a three hour drive north of Sorata, we unfortunately encountered a part of the road that just that morning had been opened by bulldozers after having been closed by landslides. We met a family just crossing the opened portion who had been trapped south of the area for the entire month. After the bulldozer cleared the road it left, and water continued rushing over the road and was rapidly deteriorating it. It appeared that we might be trapped ourselves if we tried to pass. We decided not to go any farther but to search the area. We found one plant of young, non-flowering S. candolleanum, but could not locate any tubers. We returned to Sorata where we spent the night.

#### April 3

We drove to La Paz where we spent the night.

#### April 4

We drove to Cochabamba, where we spent the night. We collected S. acaule along the way (6770). We had a three-hour wait in Caracollo, where the road was closed for road construction.

#### April 5 (Monday)

We drove east and north along the road to Villa Tunari to search for S. violaceimarmoratum, documented in many places from Colomi and beyond. Although it appeared from our recent collections that April was getting late to collect wild potatoes, there are records documented of S. violaceimarmoratum in April. We located a small population of young, non-flowering potatoes in a valley a few km east of Llanta Aduana, along a stream paralleled and reached by a new path cut through the jungle by a water line project. These plants had no tubers, and vegetatively looked like S. yungasense, but were said by our guide (Victor Sánchez Santa Cruz, lives along the main road by km 88.2, see posted road marker painted on a building on the north side of the road) to have blue corollas, round fruits, and to flower and fruit in January. Hawkes and Hjerting (1989, pgs. 158, 159) hypothesize the occurrence of natural S. yungasense X S. violaceimarmoratum hybrids farther to the north in the La Paz Department, Provinces of Nor Yungas and Sud Yungas. We plan to return in January, meet Mr. Sánchez, and search again for germplasm of these plants. We drove back west, crossing the two main roads leaving east out of Cochabamba along the short connecting road that passes Tiraque. This important connecting road has recently been improved by five new bridges traversing streams along the route. Maria Luisa led us to two fruiting populations of S. sparsipilum at the fifth bridge (Puente Millumayu, 6772), and in the town of Tiraque nearby (6773). We drove to the Toralapa Research Station where Ronald and Maria spent the night. Ronald was to work there with Maria for two days to learn the taxonomic characters of the cultivated species from the planted out germplasm collection there, and to select tuber germplasm samples of five accessions each of five of the seven cultivated species (all except S. tuberosum ssp. andigena and ssp. tuberosum), for shipment to the NRSP-6 and Dutch/German genebanks when harvested in May. José and I drove back to Cochabamba, where we spent the night.

#### April 6

José worked the day to get the jeep tuned, repaired, and cleaned. I met Andre Devaux to report on the last accomplishments of our expedition, the disposition of herbarium and germplasm samples, formal reporting of the expedition, and return to me of unused per-diem expenses held by PROINPA. We made an appointment to meet together with

Nelson Estrada, Ronald van den Berg, and Willman and Maria Luis on Thursday. Andre gave me a letter of agreement to be used by Ronald and I for a grant application for renewed collections next year (see Recommendations for future collecting, below). I spent the rest of the day entering locality data on the computer.

#### April 7

I spent the day entering locality data on DBASE. Ronald got back in the evening after having spent two days at the Toralapa station extracting seeds and inventorying the seed collection.

#### April 8

Ronald, Maria and I went to the Herbario Nacional Forestal Dr. Martín Cárdenas (BOLV) and met the curator, Dr. Susana Arrazola Rivero, to photograph the types I laid aside on February 4. When this was done we went to the PROINPA office to meet with Andre Devaux, Nelson Estrada, and Gino Aguirre to discuss issues relating to the termination of our trip. Some of the important agreements we made were: 1. if there were under 300 seeds collected from the expedition I would take all of them back with me to insure a good passage through USDA quarantine and subsequent increase at Sturgeon Bay. 2. the first set of herbarium specimens would be deposited at the Herbario Nacional Forestal Dr. Martín Cárdenas (see Appendices 5 and 8). We then went to the Departamento de Fitotecnia, Facultad de Ciencias Agrícolas y Pecuarias, Universidad de San Simón, Cochabamba, Bolivia, and met Rosario Torrico and Ing. Agr. Juan Villarroel Solis, in charge of de la taxonomy department. He showed us the eight types of Cárdenas names held there (Appendix 3), as well as two other specimens. We inventoried these specimens and took photographs of the types. Ronald and I then went back to our hotel, where I finished entering in the locality records in DBASE and Ronald began sorting out the herbarium specimens.

#### April 9-12 (Monday on 12)

Ronald and I worked together to extract seeds, organize, divide, and identify the herbarium samples, and write the report. We were hosted once at the home of Dr. Nelson Estrada and his wife, and once at the home of Willman Garcia and his wife. I met with Drs. Devaux and Estrada to discuss the success of the trip, the possible hosting at the University of Wisconsin and NRSP-6 of Maria Luisa Ugarte, the disposition of germplasm and herbarium samples, my plans to finish and distribute the report, and our possible plans to collect in Bolivia in 1994

#### April 13-14

Ronald and I flew from Cochabamba to La Paz. I met with officials at IBTA to discuss the success of the trip, the possible hosting at the University of Wisconsin and NRSP-6 of Maria Luisa Ugarte, the disposition of germplasm and herbarium samples, my plans to finish and distribute the report, and our possible plans to collect in Bolivia in 1994. Ronald and I continued to write the taxonomy section of this report. I gave a talk to IBTA personnel on April 14.

#### April 15-16

I flew from La Paz to Madison, Wisconsin, getting home at 2:00 AM on April 16. Ronald also left Bolivia on April 15.



## DETAILED ITINERARY, 1994 EXPEDITION

### January 1, 1994 (Saturday)

David Spooner left Madison for Chicago at 1:24 PM on American Flight 4020. Spooner left Chicago for Miami at 4:14 PM on American Flight 434. Spooner left Miami for La Paz at 11:00 PM on American Flight 923.

### January 2

Spooner arrived in La Paz at 6:28 AM, and took a taxi to the Sucre Palace Hotel. Ronald van den Berg arrived in La Paz at 1:30 PM on Varig Flight RG880, and arrived at the hotel at 2:20 PM. We met María Luisa Ugarte and José Rosales at 6:00 PM. We made plans for the next day. We left some of our collecting equipment needed for the hike north of Pelechuco (La Paz Province), to be conducted at the end of the trip, in storage at the hotel to make more room for the four of us in the jeep.

### January 3

Spooner went to the American Embassy and met Timothy L. Forsyth, and Economic and Commercial Officer in the Agricultural Section, for a security briefing. Mr. Forsyth works under Michael Shelton who Spooner met last year but was not available at the time of this meeting. Spooner tried to call Dr. André Devaux of PROINPA in Cochabamba, but he was not available. At the request of Dr. Devaux and Gino Aguirre, Spooner earlier wrote to Ing. Ocampo, Director General of IBTA, to request a meeting before the trip to introduce ourselves and outline the purpose of the trip, financial arrangements, and agreements relative to the collection, division, foreign introduction, increase, and subsequent distribution of germplasm. Spooner learned from Maria that Ing. Ocampo was no longer Director General of IBTA and that a new individual was being sought for the post. We decided to delay our visit to the IBTA national headquarters until later when the new IBTA General Director was chosen. We left La Paz for El Chaco (see report of March 18) to search for Solanum yungasense.

Our immediate goal was to search for S. yungasense. We planned our collections earlier this year than last year for four reasons: 1) Some (but not all) early collection dates of S. yungasense mentioned in Ochoa (1990) are from December and January. Although Hawkes and Hjerting (1989) and Ochoa (1990) often list identical collections, only Ochoa lists collection dates. 2) A recommendation of earlier collections from Robert Hoopes who led expeditions to Bolivia in 1986 and 1987, but could not find S. yungasense when he visited documented localities in February and March and suspected that he was too late. 3) Advice from some local people who were familiar with S. yungasense who we met in 1993, who told us that S. yungasense flowered and fruited in December and January. 4) Populations we located in 1993 that were dead and dying to the ground, suggesting we arrived too late in 1993. Separately, we thought that this would be a good time to collect flowering and fruiting populations of S. chacoense, interspecific hybrids with S. chacoense, and S. arnezii for reasons 3 and 4 above.

On the way to El Chaco, we stopped at the site of S. violaceimarmoratum 6631 where last year we found flowering plants. We found the same species at a slightly different locality in the same field, at the same stage of development, despite the difference in more than two months of our earlier visit. At the site, we also found non-flowering plants with dentate winged stems that could be S. yungasense, but could find no tubers there.

We learned that some areas of Bolivia had experienced severe drought this year, in the three months preceding our visit, unlike the abundant rains in Bolivia in 1993. These dry sites included many of the proposed collecting sites for this trip, including the "lowland areas from Aiquile south to Sucre, east to Tarabuco, south to Azurduy, east to Padilla, and north to Mataral. At the time of our visit, however, there were abundant rains in these sites. Slept in El Chaco.

January 4

We continued to search about El Chaco for S. yungasense without success. We drove south towards Puente Villa and stopped before there at Sacahuaya, where we met Rolando Paerro who led us to sites where there were scores of plants of S. yungasense (600) in all stages of development, from emerging plants to mature flowering individuals with old inflorescences with many flower stalks. There were no fruits, however. In one of the scores of flowering plants in the area we found one very small developing fruit.

We continued to Puente Villa where we looked at the site where we found S. yungasense there last year (6739) in full flower, but without fruits, and we found only young, non-flowering populations there. We continued to the site of S. yungasense at 6732 where last year we found young plants, but were told that the larger flowering and fruiting plants died back in January. We found no potatoes there. We left Puente Villa and continued to Chulumani where we visited the site of S. yungasense 6735 where the plants were not yet emergent. The owner of this coffee and banana plantation now told us that the plants were common in his plantation, with many fruits, in September. We continued to the site of S. yungasense 6738 where we found very old dying plants last year, but found only young emerging plants. Slept in Chulumani.

January 5

We drove back to Puente Villa, and then took the road north to Coroico, and beyond to Yolosa, and then back to Coroico, where we spent the night. Along the way, we collected flowering plants of S. yungasense 601, 602, 603, and 604. None of these populations had fruits. The populations were just beginning to flower at the first two sites. Collections 603 and 604 were at the same population, where hundreds of plants grew, ranging in maturity from emergent non-flowering plants to maturing flowering individuals (but lacking fruits). All grew in a low wet area in a banana plantation. We made two collections at this latter site because 604 had normal tan tubers like those found in all prior collections of S. yungasense, but 603 had purple tubers. Ochoa (1990) mentions differences in chromosome numbers (both diploid and triploid populations) and associated differences in size of various plant parts. We wanted to know if there were associated ploidy level and morphological differences that might be associated with these tuber color variants. In both 603 and 604, there was an extreme range of size differences, with larger plants found in the shade.

January 6

We drove north through Caranavi, then northwest to Guanay, a town at the junction of the road going southwest to Tipuani. We collected tubers of an unknown species (605), appearing very similar vegetatively to a cultivated potato. We found old to young plants, but no flowers were seen. Soon after Coroico, all the way to Caranavi, the road quickly descends to 600-700 m, with very dry habitats unlikely to harbor potatoes. Slept in Guanay.

January 7

We took the road south of Guanay towards Tipuani. The road quickly ascends from a low point in Guanay at 600-700 m to a hill that at its highest elevation is at about 1400 m, the elevation recorded for the collection of S. yungasense here (see Ochoa, 1990). It quickly descends, however to much lower elevations to Tipuani. We searched along the road to Tipuani, and a little on the road east out of Guanay on the road to Mapiri without finding potatoes. We left Guanay in the early afternoon and returned to Coroico, where we spent the night.

January 8

We drove southeast out of Coroico, through Puente Villa and Chulumani, to Irupana, where we spent the night. We collected S. yungasense 606 (tubers collected, herbarium

specimens without flowers or fruits), 607 (only sterile herbarium collected, no flowers or fruits collected), and S. chacoense 608 (tubers collected, no flowers or fruits collected).

#### January 9

We drove east from Irupana through La Plazuela, Circuata, to Licoma, situated along the road to Inquisivi. In 1993 we tried to drive this route from the other direction from Inquisivi, but were told at Licoma that the road farther west was blocked by high water and landslides, and we turned back. This was a very hard drive. It rained all day. Soon after Irupana, the road descends to about 1200 m, then crosses a hill with a very slippery road bed of clay soil, and we had to drive very slowly to avoid going off the cliffs.

Beyond this hill, we had to take a very poor road that served as a detour around a landslide. We had to push or dig the jeep out of this detour road many times, at one time hiring local help to free the jeep. Much of this road from Irupana from Licoma is very low, and unlikely to harbor potatoes. We met a farmer at one place in one of the higher elevations along the road who claimed that wild potatoes grow in his field, but when he took us to it they had disappeared, and we could not find tubers there. We slept in Licoma.

#### January 10

We drove from Licoma to Inquisivi to Quime to look for S. soestii. We collected fruits at one locality last year, but they did not produce good seeds, and we were unsure of the condition of our tuber collections of last year. We realized we were early, but we wanted to see the status of plants we collected last year and planned to return in early February. Young, non-flowering plants were coming up in one of the localities (6724). It was raining a lot recently in this part of Bolivia, and we were hopeful that we could find germplasm on our return visit. We continued to Cochabamba where we spent the night.

#### January 11

We went to the PROINPA office and spoke to André Devaux and Gino Aguirre regarding the progress and future plans for the trip. We also discussed our participation in the "Primera Reunion Boliviana de Recursos Geneticos de Papa, Raices, y Tubérculos Andinos," organized by CIP, IBPGR, COTESU, and IBTA, to be held February 7-10 in Cochabamba. We slept in Cochabamba.

#### January 12

We drove from Cochabamba to Epizana, and then south to Aiquile, where we spent the night. We stopped at the collection sites of S. brevicaulis 6632, S. alandiae 6644, S. circaeifolium 6646, and S. doddsii 6649. We wished to check on their maturity and possibility of finding fruits at this time of year. The plants at the site of collection 6632 had mature fruits, 6644 had emergent plants without flowers or fruits, and 6746 and 6649 had flowering plants, without fruits. Population 6649 was important, because we were able to see its light purple corollas, which helped us confirm its identification as S. doddsii, which we suspected, but were unsure of last year because of lack of flowers. We looked at many other sites along this route without finding potatoes. This was our first day to experience the extreme drought affecting this part of Bolivia.

#### January 13

We drove northwest out of Aiquile to Mizque, and beyond on the old road to Cochabamba. We found flowering and fruiting plants (609) before reaching Mizque that appeared very similar to our previous collections of S. doddsii, with a general appearance to S. chacoense, but with light blue corollas. We continued northwest, passed Mizque, and descended into a deep narrow canyon where we collected tubers of S. tarijense (610), tubers and two fruits collected), S. okadae or S. microdontum (611), S. microdontum (612), and S. berthaultii (613). We suspect that we made collections this day, despite the severe drought of the area, because they were in mesic microenvironments (609 was collected along a shaded stream

bank, and 611-613 were collected in the a deep shaded canyon). We returned to Aiquile where we spent the night.

#### January 14

We left Aiquile and drove south to Sucre, where we spent the night. Along the way, we collected tubers at one locality of two types of small non-flowering potatoes. We made two collections at this site, because 614 had duller leaves and 615 had shinier leaves. Collection 614 was found under bushes on a dry slope, and 615 was found in the open in a flat area very near, but across a stream from 614. We collected flowering plants of S. tarijense (616) at the moist edge of a corn field near the base of a hill, but no fruits were present and we did not bother to collect tubers of this more common species.

We continued south, and turned west at the road 17 km south of Aiquile to the community of Pabellon Mayu, where we found flowering plants of S. chacoense (617, tubers collected) at or near the site illustrated for this species in Hawkes and Hjerting, (1989, plate 9). We also collected fruits of S. berthaultii (618) and fruits of S. tarijense (619) at the same locality of 617.

Beyond this point back on the main road south to Sucre, we were delayed for two hours by a gas main break that occurred shortly before we arrived. Gas distribution lines commonly parallel roads in Bolivia, and often are found exposed and unguarded above ground right next to the road. A truck bumped into one of them, pinched the pipe, and an approximately 500 m length of pipe blew away from the pipeline and was hurled across the road, but small vehicles could pass underneath. There was no fire, but gas continued to roar out of the broken ends of the pipeline next to the road. There was the odor of natural gas all over the area, and it was dangerous to drive by the broken end of the pipe because it could be ignited by the automobile exhaust. We were informed by a gas line worker that it could take up to two days to clear the road, and it would take at least this long to arrive to Sucre by alternative routes. We decided to hire other local stranded motorists to help us push the jeep up the hill past the broken gas main, and we arrived in Sucre that evening.

#### January 15

We shopped in Sucre for supplies needed for our camping trip from Tarabuco to Azurduy and back. We drove from Sucre east to Tarabuco, where we topped off our gasoline tank from a private gasoline vendor selling gasoline out of 55 gallon drums. We drove south out of Tarabuco past Icla, and just past Abra Kaza, where we camped for the night.

#### January 16

We drove to Azurduy and returned to our camping spot of the previous night, where we again made camp. We looked for potatoes in many places along this route, and collected S. megistacrolobum (620, with fruits), S. chacoense (621, herbarium and tubers), S. hoopesii (622, herbarium only), 623 (herbarium and fruits), and S. arnezii (624, tubers and herbarium of non-flowering plants). One of our goals this day was to revisit a garden just north of Azurduy where last year the owner told us that we were about two months late for collecting white-flowering and fruiting specimens of a wild potato common there. On our revisit, however, the plants were not common at all where he told us they were last year, but we found a small population of white-flowering potatoes next to his home, of a species we tentatively identify as S. chacoense. We collected herbarium specimens and tubers of this population. We also collected a herbarium specimen of collection 6684 of S. hoopesii where last year we collected fruits, but no flowering herbarium specimen.

#### January 17

We drove north to Tarabuco, and back to Sucre, where we spent the night. Along the way, we collected S. ugentii (625, herbarium and tubers only), 626 (herbarium and tubers only), and 628 (herbarium and fruiting specimens); and S. megistacrolobum (627, herbarium and fruits).

January 18

We spent the day in Sucre, drying plants, getting the truck tuned, keeping up on notes, and we sent the germplasm back to Cochabamba via overnight special delivery mail. It was very hot in our collection areas, and we were concerned that the tubers would rot if not properly stored in a cool dry place.

January 19

We drove from Sucre, east to Padilla, where we spent the night. Along the way, we collected herbarium specimens of an extremely variable population of what we tentatively identify as S. brevicaule (629, herbarium only), and S. chacoense (630, herbarium, two tubers, three small fruits). We also revisited the collection site of S. chacoense 6701 of last year, where we collected many fruits of a population completely out of flower and dying to the ground. On our revisit this year, we collected herbarium specimens (maintaining the same collection number) of plants with white corollas with a slight blue tinge like some other populations of plants we tentatively identify as S. doddsii. Interestingly, this population was early flowering and fruiting, like it was last year.

January 20

We drove southeast on the road to Monteagudo, going to the town of Azero, 77 km south of Padilla, and returned to Padilla, where we spent the night. We collected S. doddsii (631, herbarium specimens of plants with light blue tinged stellate corollas, many mature fruits), S. microdontum (632, herbarium specimens and tubers), and S. chacoense (633, herbarium specimens of plants with white stellate corollas, many tubers). The S. chacoense population was very large with hundreds of apparently mature flowering individuals and younger individuals. No fruits could be found among these hundreds of mature individuals, as in some populations of S. yungasense we collected this year.

January 21

We drove from Padilla, west along the road to Sucre, where we collected S. arnezii (634, non-flowering herbarium specimens, tubers). We returned to Padilla, where we then drove north, past Nuevo Mundo, and continued to the bridge crossing at Río Grande, where we camped for the night. This new bridge was not yet completed, and officially closed to traffic, but we were told in Padilla that some traffic was getting by. This route would save us two days of hard driving back through Sucre, north to the Cochabamba-Santa Cruz Road, and then east to get to our destination around Valle Grande and Mataral. We arrived at the Río Grande bridge near quitting time for the bridge workers, and luckily were able to cross the bridge. The bridge engineer told us that if we arrived the next morning, we would have had a three-day wait because they were to begin pouring concrete footers for bridge support wires. Along this route north of Padilla we collected S. microdontum (635, only herbarium), and S. arnezii (636, yellow-flowering specimens and tubers).

January 22

We drove north to Pucara, where we met the operator of the local telephone station, who told us that he knew of two populations of wild potatoes just south of town. The first population was of S. arnezii (637, non-flowering herbarium specimens, huge tubers to 8 cm across), and the second of S. microdontum (639, herbarium and tubers). We also collected S. microdontum north of town (638, herbarium and tubers). We continued north where we collected S. microdontum (640, herbarium only). We went farther north to Valle Grande where Hawkes and Hjerting (1989, page 143) discuss a S. chacoense X S. berthaultii hybrid population growing at the Valle Grande airport. We collected this population (641, herbarium and tubers). It had the variability in corolla colors from pure white to light blue, and leaf glands like S. berthaultii described by Hawkes and Hjerting (1989). Slept in Valle Grande.

January 23

We drove north to the type locality of S. litusinum, near the base of the valley of Quebrada Ariruma, and continued up this valley to Ariruma. The area was extremely dry and experiencing a drought. We collected what may be S. chacoense or S. litusinum (642, herbarium and tubers), 643 (herbarium only). We returned to Valle Grande where the owner of our hotel (Hotel Ganderia) told us he knew of wild potatoes that grew near his land east of town. His sons led us to this site where we collected plants similar to collections 641 (644, herbarium and tubers). Slept in Valle Grande.

January 24

We drove north of Valle Grande past Trigal, to Mataral, then east to Santa Cruz, where we spent the night. North of Valle Grande, only a few kilometers away from the site of S. litusinum, along the edge of an irrigated cornfield in the valley, we found a huge flowering and fruiting population of S. chacoense (645, herbarium, tubers, fruits). Although this general region was experiencing a severe drought, this irrigated area was ideal for the growth of wild potatoes. We continued north to the type locality of S. neocardenasii, but the area was bone-dry and we could not find any evidence of this species.

January 25

We spent the day in Santa Cruz

January 26

We drove from Santa Cruz to Villa Tunari, where we spent the night. Normally, the trip would take only five hours, but it took us eight hours. We had two major problems along the way. It was raining heavily all day, and the road was damaged by deep ruts and long delays where vehicles were stuck in the mud and had to wait in long lines to pass one-way traffic around the ruts or stuck vehicles. Along the floodplain of Río Chimore, water was so high that it was rushing as a river over a portion of the road for a stretch of about two km. We made an initial attempt to traverse this stretch of road, but turned back when the water reached the tail pipe. We were about to turn back to Santa Cruz when a jeep passed through from the other direction and told us our high jeep could pass. On our second attempt we followed a smaller car which was completely swept off the road and filled one half way with water. Our second problem was at the bridge crossing Río Mamoré, about 45 minutes before reaching Villa Tunari. The high flood waters of this river had eroded the earthen approach to the bridge about the bridge pilings to a single lane by the passage of water beneath it, and the army was blocking the passage of cars from either direction. We walked across the bridge and were told that if we wanted to pass on foot, we should do so quickly, as the single lane was eroding away quickly and about to collapse. We went back to the truck and got our essential things, walked back across the bridge, with the idea of hiring transportation on the other side to Villa Tunari and the next day to Cochabamba, with José waiting until the bridge was repaired, or going back to Cochabamba all the way back through Santa Cruz. For some reason, the army began to let smaller vehicles pass, and José crossed the bridge where we got back in the jeep and continued to Villa Tunari. This lucky break saved us three days delay. It continued to rain hard all that night.

January 27

We drove from Villa Tunari to Cochabamba, where we spent the night. It continued to rain most of the day. Along the way, we visited the site of what we tentatively identified as S. violaceomarmoratum 6771. Our guide last year, Victor Sánchez Santa Cruz, knew much about potatoes along the water line project cut through the virgin jungle where last year he led us to a non-flowering population along a sandy stream bank near the end of the water line project. He told us last year that he had seen many plants along the water line project in January of that year, and we should return in January to find them again. We found him and he told us that unfortunately, he had seen no plants this year. We

walked the water line project, visiting the site of last year's collection, and found no plants.

#### January 28-30

We spent this time in Cochabamba visiting PROINPA and making plans for the following week, drying plants, and typing the report.

#### January 31

We drove from Cochabamba to Quime, where we spent the night.

#### February 1

We recollected populations of *S. circaeifolium* (6713, 6714) south of Quime, and populations of *S. sparsipilum* (6723) and *S. soestii* (6722, 6724) between Quime and Inquisivi. The populations were in full flower (except those of *S. soestii* where we only found one flowering plant) and there were immature fruits on 6714. We collected tubers of all of these populations because we are unsure of our the status of our introductions of last year (germplasm collected as tubers), and we wanted to insure the introductions of these rare species. We intended to proceed on the road beyond Inquisivi, eastward to Independencia, but were told that this road was impassable. We returned to Quime where we spent the night.

#### February 2

We drove south from Quime, back to the Pan American Highway, and then east toward Confital. We then took the road north to Kami and Independencia. This road is in a very bad condition, and continues at an elevation of more than 4000 m until about 20 km south of Independencia, where it descends to an elevation of about 2700 m. It took us more than 5 hours to travel this 100 km. We spent the night in Independencia.

#### February 3

We explored the road from Independencia to the north toward Sivingani, as there were many records of *S. circaeifolium*, *S. okadae* and *S. sparsipilum* there. We found very young plants of *S. sparsipilum* 646 (tubers, no herbarium) and of *S. circaeifolium* 647 (herbarium and tubers). It proved to be impossible to return to Cochabamba by the road eastward toward Morochata, and we had to return to Confital at the Pan American Highway, and drive from there toward Cochabamba.

#### February 4-6

We spent this time in Cochabamba, drying plants and typing the report.

#### February 7-10

We participated in an International Conference held in Cochabamba, sponsored by PROINPA, CIP, COTESU, and IBPGR entitled "First Bolivian Meeting of the Genetic Resources of Potato, Roots, and Andean Tubers". Appendix 9 copies materials distributed at this meeting that outline the participants and topics.

#### February 11

We took the plane from Cochabamba to La Paz where we were met by José, who drove from Cochabamba the previous day. We drove to Yolosa to examine the huge population of *S. yungasense* (604) we collected about five weeks earlier on January 5. We were interested in this population because it contained thousands of plants, in all stages of maturity from young emerging plants to older plants with will-expanded inflorescences. We found no fruits. We thought we might find fruits on this later visit. The plants were still common in the population, with many of them with yellowing plants and long, expanded inflorescences, many with the flowers having dropped off. We found no fruits.

We proceeded on the road south of Yolosa towards San Juan de La Miel, where local residents told us wild potatoes were common. Unfortunately, six km south of Yolosa the road was blocked by a landslide and impassable with the jeep. We walked two km to reach San Juan de la Miel, where we located a few plants of S. yungasense, without flowers or fruits, and made no collection of this. At the same locality we found a number of plants at the side of the road with stems similar to S. yungasense, but with decurrent, densely pubescent leaflets. We collected tubers, and label this plant in our report as S. yungasense (648). We returned to La Paz where we spent the night.

#### February 12

We met Ing. Moises Zavaleta, a Bolivian potato grower who knows much about Bolivian wild potato localities. He is a graduate of the Birmingham, England Genetic Resources Program, and collected in Bolivia with individuals from both the Hawkes and Ochoa expeditions. We met him at the PROINPA conference the prior week and made arrangements to collect with him in the Sorata area in La Paz Province. We drove from La Paz to Sorata, where we spent the night. Along the way, we examined the population of what we tentatively identified as S. achacachense (6765) last year on April 1. The population collected last year was from a highly grazed stony area, and all we could find were withered plants and tubers. We thought that we visited too late last year and collections now would be at a better time. We could find no plants this year, however. We continued a few kilometers more on the road to Sorata, and Moises took us to another population of this species (649). This population was at the base of and higher up among steep rocks, with greater protection from grazing animals than collection 6765. These small plants were similar to those illustrated in Hawkes and Hjerting (1989) and Ochoa (1990). Unfortunately, we could not find any fruits, but we collected two small tubers. Before retiring, the owners of our hotel told us of wild potatoes in their garden that they said were common in the Sorata area in weedy places. We made arrangements to look for them with the hotel owners the next day.

#### February 13

We drove north of Sorata to Laripata, a small village 10 km to the north of the town square of Sorata. About a 0.5 km walk southwest of the town square of Laripata, we found flowering plants of S. circaiefolium (650, no fruits or tubers found). This was confusing to us, because on our visit to the Sorata area last year on April 1, we collected this species as old, yellowing and withering plants and thought that the plants in the area would be fruiting now.

We drove further north and revisited populations of S. candolleianum where we collected tubers last year on April 2 (6768, 6769). These populations likewise were only in vegetative condition. We continued to the town of Tacacoma, where there is a record of S. candolleianum from the cemetery. The road is very poor from Sorata north to Tacacoma, and it took us four hours to drive the 61 km to Tacacoma. Solanum candolleianum is very common within the protected confines of the walled cemetery there. Although most populations were in flower, but not fruit, we were able to find a plant with mature fruit (651).

We returned to Sorata, the last hour in darkness on the very slippery roads descending into town. We heard the next morning that a taxicab slipped off the road over a cliff we passed on this evening and killed a passenger. We met the hotel owners who had collected herbarium specimens and tubers of wild potatoes from their garden, locally known as "taiwa," and that we identified as S. tuberosum. They showed us how common the potatoes were in the area the next morning, and also showed us how these potatoes grew from garden boxes within the confines of the hotel, spontaneously arising from locally-collected soil transferred to the boxes.



#### February 14

We drove from Sorata to Achacachi, where Moises and Ronald boarded a bus to return to La Paz. Ronald stayed in La Paz until the morning of February 18, when he flew back to The Netherlands. He returned with herbarium specimens from our recent collections and dried them and updated notes of our recent collections. He also met with Ing. Rafael Vera, General Director of IBTA regarding progress of this trip and agreements between Bolivia, the Netherlands, and the United States. Ing. Vera gave him the letter duplicated here as Appendix 12.

García, Spooner, and Rosales continued north to Pelechuco. We left Achacachi at about noon, and arrived in Pelechuco at about 10:00 PM where we got a room at the corner of the town square.

#### February 15-16

We sought guides and horses for our planned hike north to Quiara and beyond (see March 28, 29 of last year). This trip was important to seek germplasm of S. bombycinum and S. neovavilovii, two species without any known germplasm collections. There also are records of S. candolleianum from the area. Our expedition last year was near the end of the wild potato growing season, and we thought that we were too late. We planned this visit for the time slightly after the time when these species were collected by Ochoa and Salas, and came prepared for a longer stay, with canned food and a tent. It took us these two days to secure our two guides, Juan and Rolando Paredes, 15 and 18 years old, who live with their mother in a home on the town square of Pelechuco. They own land beyond Quiara on the horse trail to Mojos, where they have approximately 100 cattle. They hike the route from Pelechuco to their land, two days each way, every two weeks to check their cattle. They have an intimate knowledge of the trails and local place names of the area.

#### February 17

We met our guides at 7:00 AM, packed the horses, and were on the trail to Quiara by 8:30 AM, beginning at the altitude of Pelechuco at about 3500 m. We crossed the 4700 m summit of the mountain on the trail to Quiara at about 2:00 PM. It was snowing at the summit like our visit last year (March 28). We reached the stone home of a friend of our guides (Guillermo Quispe and his family), located about 3 km south of Quiara, at 5:00 PM and spent the night there.

#### February 18

We hiked back on the road to Pelechuco for about one mile and collected S. candolleianum at the base of a large waterfall to the west of and visible from the trail. It was very common in moist soil there. We then hiked back past Guillermo Quispe's house, downhill to Quiara, and met local residents who told us of places near town where potatoes grew, but we could not locate any wild potatoes near town. Our guides had access to the largest home in the area, formerly occupied by German settlers of the area, now moved away. After resting there, we continued south to Moyapampa (misspelled "Mayupampa" in the type description of S. neovavilovii Ochoa, and all subsequent publications), about 3 km south of Quiara on the horse trail to Mojos. Moyapampa is a flat clearing, bordered by hills on either side, along the trail to Mojos, descending from Quiara in the valley of Río Quiara. We found S. neovavilovii growing at its type locality along the trail and on rocks next to the trail at Moyapampa. We looked in these exact spots on our visit the previous year on March 28 and it was not present, and planned our visit at this earlier time to try to collect germplasm (the type and all subsequent Bolivian collections were by Ochoa and Salas between February 6-February 9). We found some conical fruits, but they were immature. We were able to collect tubers, however.

We continued downhill on the trail to Mojos to search for the S. bombycinum at its only known locality at the type locality:

"Dept. La Paz: Prov. Franz Tamayo, between Cheke-Chekeni and Chullumayo, 2000 m, on the horse trail to Mojos, February, 1983". Additional habitat information is provided in Ochoa (1990): "It occurs under bushes and trees in the lush, subtropical watershed region of Chullumayu"...[growing with] a woody member of the genus Fuchsia, herbaceous ferns, tree ferns, Oxalis, and several different species of grasses, including the genus Chusquea".

Our guides told us that "Cheke-Chekeni" was an area name (no one lives there) approximately a one hour hike south of Moyapampa on the trail to Mojos, and that "Chullumayo" referred to the general area of Río Chullumayo (a tributary flowing from the east into Río Quiara, Río Quiara being the river in the valley containing the horse trail from Quiara, past Moyapampa, to Río Chullumayo) about 3 km beyond Cheke-Chekeni. However, these areas are all above 2850 m, and we were therefore confused about the true locality of S. bombycinum. Because the additional habitat data in Ochoa (1990) mentioned tree ferns, not seen in the area, we originally thought that the locality was truly at 2000 m, a 1 1/2 day hike further downhill on the horse trail to Mojos, and we proceeded to try to hike to this lower altitude.

A major problem was that the log bridge originally crossing the Río Chullumayo was broken. The bridge crossing is needed because there is a narrow and very deep gorge at the river at this point. Because of the bridge, the horse and foot traffic recently was rerouted along a new path to a point higher up the valley of the Río Chullumayo where it was easier to cross. We took this new path to try to cross. During our two day hike it had been raining almost constantly, and the river was impassible. It was about one hour before nightfall, and we decided to make camp near the river crossing and see if the river would recede during the night so we could cross the next day.

#### February 19

It rained heavily all night, and Río Chullumayo had risen and was too dangerous to cross. We decided to hike to the point of the original bridge crossing of the horse trail over Río Chullumayo. We were very pleased to find S. bombycinum very near the bridge crossing on our side of the river. The vegetation of the valley descending into the Río Chullumayo valley rapidly becomes lush, and we found all of the plants mentioned in the information in Ochoa (1990) except tree ferns. There were large herbaceous ferns that were possibly confused for tree ferns. This locality was at 2870, and is probably the type locality for S. bombycinum. The population consisted of about 25 plants, some with flowers and immature conical fruits, but unfortunately no mature fruits. The plant was just as described and illustrated in Ochoa (1990), with light lilac corollas and distinctively dense pilose leaves, and this clearly is a very distinctive species.

We spent three hours searching about the Río Chullumayo valley and could not find any other plants of this species. We dug on the periphery of one part of the population and could not find tubers, so unfortunately germplasm collections must await another visit. We made herbarium collections of one flowering and two non-flowering branches of a plant. We hiked back to Quiara where we spent the night.

#### February 20

We hiked back to Pelechuco from Quiara.

#### February 21

We drove from Pelechuco to Achacachi. Willman got a hotel room there while José and Spooner drove to La Paz, where he spent the night.

February 22

José returned to Achacachi and drove with Willman to Sorata where they searched for the one of two only known records of S. flavoviridens listed in Ochoa (1990) as:

Dept. La Paz: Prov. Larecaja, Umani-Vilaque, 2250 m, some 10 km (air distance) southwest of Munaypata-Sorata, near Chahuarani River, in thickets, Feb 16, 1984.

The other the type locality in La Paz, Prov. Saavedra. We were unsure of the locality of this record. "Umani" and "Chahuarani River" are not in our maps of gazetteers (there is a "Cerro Umani" in a locality far south of the Sorata area). There is a record of "Manayapata" in the US gazetteer at 15°30'S, 67°68'W, and many separate place names of "Vilaque", the two most probable being 16°25'S, 68°19'W, and 16°52'S, 68°11'W. These records, and the elevational data, suggest that the record was found on the road from Sorata north, and then east, to Caranavi, but this road was in very bad condition and impassible to Caranavi. Willman and José could not find anyone in Sorata (including the town mayor) who heard of any of these places. They drove north of Sorata and took a turnoff on a road to San Pedro to a place called La Grita and met someone who told them where wild potatoes grew, and they made an appointment to return the next day. The people in this area were not aware of the above place names either. They returned to Sorata to spend the night. Spooner spent the day in La Paz writing up the report and preparing for departure to the United States.

February 23

Willman and José returned with the guide they met the previous day and collected S. brevicaulis 656. They continued to ask for the localities mentioned above for S. flavoviridens (February 22) and were not able to learn any more of the locality. They spent the evening in Sorata. Spooner went to the IBTA office and met with the Ing. Rafael Vera, the newly-appointed General Director of IBTA. They discussed the accomplishments of the trip, agreements made with PROINPA, and plans for potential future work in Bolivia.

February 24

Willman and José returned to La Paz and met Spooner to finalize arrangements for the end of the trip.

February 25-26

Willman and José drove back to Cochabamba. Spooner flew from La Paz to Madison, Wisconsin, Miami and Chicago. There was severe weather in both Miami and Chicago that delayed a normally one-day trip. Spooner left germplasm collections 653, 654, and 655 with the Department of Agriculture officials at Miami customs. They were subsequently sent to USDA quarantine in Beltsville, Maryland the following day and sent to the Dutch/German Genebank in Germany on April 11 when they received the German import permits).

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Cochabamba. Punata: along the old road from Cochabamba to Santa Cruz, at km 36, at IBTA Estación Experimental San Benito, 1:250,000-scale map SE 20-5, Lat: 17°31.486'S, Long: 65°54.292'W, 2697 m elev; plants common in area, vigorous, growing up to 0.3 m tall, corolla blue, rotate, fruits round, maturing to mature; growing in disturbed soil under shade of trees or in open sunny plowed fields.

David M. Spooner and Willman García F. 6500  
Feb 8, 1993

Solanum megistacrolobum Bitter ssp. toralapanum (Cárdenas and Hawkes) R. B. Giannattasio and D. M. Spooner

Bolivia. Cochabamba. Tiraque: at Estación Experimental Toralapa, at km 71, along old road from Cochabamba to Santa Cruz, 1:250,000-scale map SE 20-5, Lat: 17°28.621'S, Long: 65°35.210'W, 3578 m elev; plants with very slight odor, fruits round to slightly round-ovoid; common, growing in disturbed and undisturbed soil, with S. acaule.

David M. Spooner and Willman García F. 6501  
Feb 8, 1993

Solanum acaule Bitter subsp. acaule

Bolivia. Cochabamba. Tiraque: at km 71, along old road from Cochabamba to Santa Cruz, at Estación Experimental Toralapa, 1:250,000-scale map SE 20-5, Lat: 17°28.621'S, Long: 65°39.210'W, 3578 m elev; fruits slightly round-ovoid, maturing to mature; common, growing in disturbed or undisturbed soil, with S. megistacrolobum ssp. toralapanum.

David M. Spooner and Willman García F. 6502  
Feb 8, 1993

Solanum berthaultii Hawkes

Bolivia. Cochabamba. Quillacollo: km 29, road from Cochabamba to Oruro, 2 or 3 km W of Suticollo, 1:250,000 scale map SE 19-8, Lat: 17°29.536'S, Long: 66°20.185'W, 2554 m elev; leaves densely glandular, corollas deep purple to light purple, or white, pentagonal, fruits round, maturing to mature; common in area, growing among thorny bushes and cacti, in dry stony soil.

David M. Spooner and Willman García F. 6503  
Feb 9, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Cochabamba. Quillacollo: km 49.5, along the road from Cochabamba to Oruro, 1:250,000 scale map SE 19-8, Lat: 17°37.248'S, Long: 66°21.796'W, 2567 m elev; 2-3 pairs of lateral leaflets, with upper pair decurrent, corolla pentagonal to rotate, fruits round, maturing to mature; plants common in area, growing in stony soil among bushes, or in adjacent corn fields.

David M. Spooner and Willman García F. 6505  
Feb 9, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Cochabamba. Quillacollo: along km 49.5, along the road from Cochabamba to Oruro, 1:250,000-scale map SE 19-8, Lat: 17°42.157'S, Long: 66°25.737'W, 4006 m elev; plants flowering, but fruits not found; plants scattered, growing in stony soil.

David M. Spooner and Willman García F. 6507  
Feb 9, 1993

Solanum juzepczukii Buk.

Bolivia. Oruro. Dalence: ca. 25 km E of Huanuni, on Oruro-Sucre Road, 1:250,000-scale map SE 19-12, Lat: 18°23.052'S, Long: 66°39.560'W, 4149 m elev; cultivated plant, growing in altiplano; fruits not found, growing in altiplano near S. acaule.

David M. Spooner and Willman García F. 6509  
Feb 10, 1993

Solanum acaule Bitter subsp. acaule

Bolivia. Oruro. Dalence: ca 25 km E of Huanuni, on Oruro-Sucre road, 1:250,000-scale map SE 19-12, Lat: 18°23.052'S, Long: 66°39.560'W, 4149 m elev; corollas blue or white, of different sizes, fruits ovoid; growing in and about S. juzepczukii fields.

David M. Spooner and Willman García F. 6510  
Feb 10, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Oruro. Dalence: 32 km E of Huanuni, on Oruro-Sucre road, 1:250,000-scale map SE 19-12, Lat: 18°23.680'S, Long: 66°36.448'W, 3865 m elev; corolla blue, rotate-pentagonal, most plants just emerging, but some populations (in cultivated fields) with fruits round, maturing to mature fruits; growing in valley adjacent to stream, among bushes and in cultivated fields, near S. acaule.

David M. Spooner and Willman García F. 6511  
Feb 10, 1993

Solanum acaule Bitter subsp. acaule

Bolivia. Oruro. Dalence: 32 km E of Huanuni, on Oruro-Sucre road, 1:250,000-scale map SE 19-12, Lat: 18°23.680'S, Long: 66°36.448'W, 3685 m elev; fruits ovoid, maturing to mature; growing in and adjacent to cultivated fields, near S. sparsipilum.

David M. Spooner and Willman García F. 6512  
Feb 10, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Oruro. Bustillos: 16 km SE of Uncia, an Oruro-Sucre road, 1:250,000-scale map SE 19-12, Lat: 18°34.447'S, Long: 66°23.897'W, 3879 m elev; fruits round, maturing to mature; growing in stony soil in sunny areas, with S. brevicaule.

David M. Spooner and Willman García F. 6514  
Feb 10, 1993

Solanum brevicaule Bitter

Bolivia. Potosí. Bustillos: 16 km SE of Uncia, on Oruro-Sucre road, 1:250,000-scale map SE 19-12, Lat: 18°34.447'S, Long: 66°23.897'W, 3879 m elev; plants small, up to 20 cm tall, leaflets narrow (linear) when growing in sun, to wider (when growing in shade) in same population, corolla pentagonal, fruits round to slightly round-ovoid, maturing to mature; growing in thin stony soil among bushes or in sunny areas, with S. megistacrolobum ssp. megistacrolobum.

David M. Spooner and Willman García F. 6515  
Feb 10, 1993

Solanum brevicaule Bitter

Bolivia. Potosí. Bustillos: ca 26 km SE of Uncia, on Oruro-Sucre road, 1:250,000-scale map SE 19-12, Lat: 18°38.105'S, Long: 66°18.229'W, 3430 m elev; plants common in area, corolla purple, pentagonal, fruits round to slightly round-ovoid, maturing to mature; growing in thin stony soil among bushes and cacti.

David M. Spooner and Willman García F. 6518  
Feb 10, 1993

Solanum brevicaule Bitter

Bolivia. Potosí. Chayanta: 4 km E of Macha, on Oruro-Sucre road, 1:250,000-scale map SE 19-12, Lat: 18°50.526'S, Long: 66°00.633'W, 3840 m elev; leaflets narrow (linear) to wider in same population, with the wider being those growing in the shade, corolla blue, pentagonal, fruits not found; growing in thin stony soil among grasses and bushes, with S. acaule ssp. acaule and S. megistacrolobum ssp. megistacrolobum.

David M. Spooner and Willman García F. 6519  
Feb 11, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Potosí. Chayanta: 4 km E of Macha, on Oruro-Sucre road, 1:250,000-scale map SE 19-12, Lat: 18°50.526'S, Long: 66°00.633'W, 3840 m elev; corolla violet, pentagonal, fruits round, just maturing; growing in thin soil among grasses and bushes, with S. acaule ssp. acaule and S. brevicaule.

David M. Spooner and Willman García F. 6520  
Feb 11, 1993

Solanum acaule Bitter subsp. acaule

Bolivia. Potosí. Chayanta: 4 k E of Macha, on Oruro-Sucre road, 1:250,000-scale map SE 19-12, Lat: 18°50.526'S, Long: 66°00.633'W, 3840 m elev; fruits ovoid, just beginning to mature; growing in thin soil among grasses and bushes, with S. brevicaule and S. megistacrolobum ssp. megistacrolobum.

David M. Spooner and Willman García F. 6521  
Feb 11, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Potosí. Chayanta: ca 2 km W of Ocuri, on Oruro-Sucre road, 1:250,000-scale map SE 20-9, Lat: 18°52.403'S, Long: 65°49.360'W, 4270 m elev; fruits round, maturing to mature; plants common in area, growing in moist, thin, rocky soil, in and adjacent to cultivated fields, with S. acaule ssp. acaule. Note: to our knowledge this is the highest recorded elev. for this taxon.

David M. Spooner and Willman García F. 6522  
Feb 11, 1993

Solanum acaule Bitter subsp. acaule

Bolivia. Potosí. Chayanta: ca 2 km W of Ocuri, on Oruro-Sucre road, 1:250,000-scale map SE 20-9, Lat: 18°52.403'S, Long: 65°49.360'W, 4270 m elev; fruits mature; plants common in area, growing in wet soil in and adjacent to cultivated fields, with S. megistacrolobum ssp. megistacrolobum.

David M. Spooner and Willman García F. 6523  
Feb 11, 1993

Solanum boliviense Dunal

Bolivia. Chuquisaca. Oropeza: 5 km SE of Ravelo, on Oruro-Sucre road, 1:250,000-scale map SE 20-9, Lat: 18°49.964'S, Long: 65°28.725'W, 3260 m elev; fruits round to slightly round-ovoid, maturing to mature; growing in very sandy soil of barley plantation.

David M. Spooner and Willman García F. 6524  
Feb 11, 1993

Solanum tarijense Hawkes

Bolivia. Chuquisaca. Oropeza: ca. 4 km W of junction of road from Sucre to Potosí, and road past Yotala, 1:250,000-scale map SE 20-13, Lat: 19°10.389'S, Long: 65°14.883'W, 2594 m elev; corollas white, very stellate, fruits maturing to mature; growing among Prosopis, with S. tarijense.

David M. Spooner and Willman García F. 6525  
Feb 12, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Chuquisaca. Oropeza: ca. 4 km W of junction of road from Sucre to Potosí, and road through Yotala, 1:250,000-scale map SE 20-13, Lat: 19°10.385'S, Long: 65°14.883'W, 2594 m elev; stems no more than 30 cm tall, corolla purple, rotate, fruits round, mature; growing among Prosopis (with S. tarijense), and in corn fields, branches green and purple.

David M. Spooner and Willman García F. 6526  
Feb 12, 1993

Solanum tarijense Hawkes

Bolivia. Chuquisaca. Oropeza: ca. 45 km S of Sucre on road to Potosí, 1:250,000-scale map SE 20-13, Lat: 19°18.553'S, Long: 65°10.226'W, 2614 m elev; leaves densely glandular, corolla white, stellate-pentagonal, fruits round, maturing to mature; growing in loose rocks at roadbed.

David M. Spooner and Willman García F. 6527  
Feb 13, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Potosí. Saavedra: roughly 52 km S of Sucre on road to Potosí, 1:250,000-scale map SE 20-13, Lat: 19°21.277'S, Long: 65°10.035'W, 2242 m elev; plants 0.2 m tall, corolla blue or white, pentagonal, fruits round, maturing to mature; growing under shade of Schinus molle tree at edge of cornfield, on floodplain of river.

David M. Spooner and Willman García F. 6528  
Feb 13, 1993

Solanum tarijense Hawkes

Bolivia. Potosí. Saavedra: 70 km S of Sucre on rd to Potosí, ca 3 km S of Puente Mendez, 1:250,000-scale map SE 20-13, Lat: 19°26.584'S, Long: 65°11.836'W, 2570 m elev; corolla white, pentagonal, fruits round; growing in rocky soil near to S. tarijense 6530, with violet corollas.

David M. Spooner and Willman García F. 6529  
Feb 13, 1993

Solanum berthaultii Hawkes

Bolivia. Potosí. Saavedra: 70 km S of Sucre on road to Potosí, ca. 3 km S of Puente Mendez, 1:250,000-scale map SE 20-13, Lat: 19°26.584'S, Long: 65°11.836'W, 2570 m elev; corolla pentagonal, violet, fruits round; growing in rocky soil near S. tarijense 6529, with white corollas.

David M. Spooner and Willman García F. 6530  
Feb 13, 1993



Solanum boliviense Dunal

Bolivia. Potosí. Saavedra: 11.2 km S of Sucre-Potosí road, on road to Esquiri, 1:250,000-scale map SE 20-13, Lat: 19°38.505'S, Long: 65°14.898'W, 3275 m elev; corolla violet, pentagonal, fruits maturing to mature; growing on a slope in a very rocky pea field. Note: type locality of S. astleyi Hawkes and Hjerting, with which is possibly synonymous with S. boliviense.

David M. Spooner and Willman García F. 6531  
Feb 13, 1993

Solanum boliviense Dunal

Bolivia. Potosí. Saavedra: 7.5 km SE of Betanzos on road to Sucre. 1:250,000-scale map SE 20-13, Lat: 19°35.377'S, Long: 65°24.848'W, 3122 m elev; fruits just beginning to mature; growing in a barley field.

David M. Spooner and Willman García F. 6532  
Feb 14, 1993

Solanum brevicaule Bitter

Bolivia. Potosí. Saavedra: 7.5 km SE of Betanzos on road to Sucre, 1:250,000-scale map SE 20-13, Lat: 19°35.377'S, Long: 65°24.848'W, 3122 m elev; corolla light blue, rotate-pentagonal, fruits maturing to mature; growing as a common cornfield weed.

David M. Spooner and Willman García F. 6533  
Feb 14, 1993

Solanum boliviense Dunal

Bolivia. Potosí. Saavedra: 6.7 km W of Betanzos on road to Potosí, 1:250,000-scale map SE 20-13, Lat: 19°33.979'S, Long: 65°30.272'W, 3404 m elev; corolla violet, pentagonal, fruits maturing to mature; growing in rocky and sandy soil of a corn field.

David M. Spooner and Willman García F. 6535  
Feb 14, 1993

Solanum brevicaule Bitter

Bolivia. Potosí. Saavedra: 6.7 km W of Betanzos on road to Potosí, 1:250,000-scale map SE 20-13, Lat: 19°33.979'S, Long: 65°30.272'W, 3404 m elev; corolla absent, fruits round, mature; growing in rocky soil in a wheat field.

David M. Spooner and Willman García F. 6536  
Feb 14, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Potosí. Tomas Frias: ca 1 km E of guardpost station on the E side of Potosí, 1:250,000-scale map SE 20-13, Lat: 19°34.102'S, Long: 65°44.543'W, 4015 m elev; corolla violet, rotate, fruits maturing to mature; growing in loose exposed soil on steep bank next to road.

David M. Spooner and Willman García F. 6537  
Feb 14, 1993

Solanum infundibuliforme Philippi

Bolivia. Potosí. Linares: 30.3 km S of road toll station on S side of Potosí, on the road to Villazón, 1:250,000-scale map SE 20-13, Lat: 19°50.882'S, Long: 65°42.495'W, 3903 m elev; corolla white to violet, stellate, fruits round to round-ovoid, maturing to mature; growing in thin rocky soils on slope by road, with S. megistacrolobum.

David M. Spooner and Willman García F. 6539  
Feb 15, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Potosí. Linares: 30.3 km S of road toll station on S side of Potosí, on road to Villazón, 1:250,000-scale map SE 20-13, Lat: 19°50.882'S, Long: 65°42.495'W, 3903 m elev; corolla pentagonal, violet, fruits round, maturing to mature; growing in thin rocky soils on slope by road, with S. infundibuliforme.

David M. Spooner and Willman García F. 6543  
Feb 15, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Potosí. Linares: 57.9 km S of road toll post on S side of Potosí, on road to Villazón, 1:250,000-scale map SE 20-13, Lat: 19°59.409'S, Long: 65°34.274'W, 3181 m elev; corolla rotate-pentagonal, purple, fruits round, maturing to mature; growing in corn field.

David M. Spooner and Willman García F. 6544  
Feb 15, 1993

Solanum brevicaule Bitter

Bolivia. Potosí. Linares: 64.1 km S of road toll station on S side of Potosí, on road to Villazón, 25 km N of Vitichi, 1:250,000-scale map SF 20-1, Lat: 20°02.010'S, Long: 65°32.997'W, 3103 m elev; corolla rotate-pentagonal, purple, fruits round, maturing to mature; growing in thin rocky soils under spiny bushes and among cactus, with S. infundibuliforme.

David M. Spooner and Willman García F. 6545  
Feb 15, 1993

Solanum infundibuliforme Philippi

Bolivia. Potosí. Linares: 64.1 km S of road toll station on S side of Potosí, on road to Villazón, 25 km N of Vitichi, 1:250,000-scale map SF 20-1, Lat: 20<sup>0</sup>02.010'S, Long: 65<sup>0</sup>32.997'W, 3103 m elev; corolla white to purple, stellate, fruits round to round-ovoid, maturing to mature; growing in thin rocky soils under spiny bushes and among cacti, with S. brevicaule.

David M. Spooner and Willman García F. 6546  
Feb 15, 1993

Solanum infundibuliforme Philippi

Bolivia. Potosí. Nor Chichas: 26 km S of Vitichi, on road to Villazón, 1:250,000-scale map SF 20-1, Lat: 20<sup>0</sup>24.395'S, Long: 65<sup>0</sup>34.094'W, 3180 m elev; corolla white to purple, stellate, fruits round to round-ovoid, just beginning to mature; growing in thin rocky soils under spiny bushes and among cacti.

David M. Spooner and Willman García F. 6547  
Feb 16, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Potosí. Nor Chichas: 30 km S of Vitichi, on road to Villazón, 8.5 km N of Tumusla, 1:250,000-scale map SF 20-1, Lat: 20<sup>0</sup>25.644'S, Long: 65<sup>0</sup>34.398'W, 2945 m elev; corolla purple, rotate-pentagonal, fruits round, maturing to mature; growing among bushes adjacent to corn field.

David M. Spooner and Willman García F. 6548  
Feb 16, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Potosí. Nor Chichas: 12.4 km S of Cotagaita, in a village called Casun, on road to Villazón, 1:250,000-scale map SF 20-1, Lat: 20<sup>0</sup>55.163'S, Long: 65<sup>0</sup>40.397'W, 2836 m elev; corolla rotate-pentagonal, purple, fruits round, maturing to mature; growing next to irrigation canal adjacent to corn field.

David M. Spooner and Willman García F. 6552  
Feb 16, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Potosí. Nor Chichas: 29 km S of Cotagaita on road to Villazón, 1:250-000-scale map SF 20-5, Lat: 21<sup>0</sup>03.259'S, Long: 65<sup>0</sup>38.609'W, 3092 m elev; corolla rotate-pentagonal, purple, developing ovaries round, no fruits found; growing in area adjacent to corn and potato fields.

David M. Spooner and Willman García F. 6554  
Feb 16, 1993

Solanum infundibuliforme Philippi

Bolivia. Potosí. Sud Chichas: 79 km S of Cotagaita, on road to Villazón, 1:250-000-scale map SF 20-5, Lat: 21<sup>o</sup>19.785'S, Long: 65<sup>o</sup>40.333'W, 3582 m elev; corolla white to purple, stellate, fruits not found; growing in thin rocky soils among bushes and cacti.

David M. Spooner and Willman García F. 6556  
Feb 16, 1993

Solanum oplocense Hawkes

Bolivia. Potosí. Sud Chichas: 3.7 km N of road toll station at N end of Tupiza, on road to Potosí, 1:250,000-scale map SF 20-5, Lat: 21<sup>o</sup>23.772'S, Long: 65<sup>o</sup>41.674'W, 3236 m elev; corolla rotate-pentagonal, fruits not found; growing in organic soil under spiny bushes.

David M. Spooner and Willman García F. 6557  
Feb 17, 1993

Solanum infundibuliforme Philippi

Bolivia. Potosí. Sud Chichas: 3.7 km N of road toll station at N end of Tupiza, on road to Potosí, 1:250,000-scale map SF 20-5, Lat: 21<sup>o</sup>23.772'S, Long: 65<sup>o</sup>41.674'W, 3236 m elev; corolla blue, pentagonal with large acumens, fruits not found; growing in rocky soil in sunny places and under spiny bushes.

David M. Spooner and Willman García F. 6558  
Feb 17, 1993

Solanum oplocense Hawkes

Bolivia. Potosí. Sud Chichas: 9.8 km W of town square of Tupiza on road to La Colorada, 1:250,000-scale map SF 20-5, Lat: 21<sup>o</sup>26.245'S, Long: 65<sup>o</sup>47.385'W, 3462 m elev; corolla blue, fruits not yet forming; growing in rocky sandy soil under thorny bushes.

David M. Spooner and Willman García F. 6559  
Feb 18, 1993

Solanum infundibuliforme Philippi

Bolivia. Potosí. Sud Chichas: 14.5 km W of town square of Tupiza on road to La Colorada, 1:250,000-scale map SF 20-5, Lat: 21<sup>o</sup>27.019'S, Long: 65<sup>o</sup>48.909'W, 3686 m elev; fruits just forming; growing in rocky soil.

David M. Spooner and Willman García F. 6561  
Feb 18, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Potosí. Sud Chichas: 14.5 km W of town square of Tupiza, on rd to La Colorada, 1:250,000-scale map SF 20-5, Lat: 21°27.019'S, Long: 65°48.909'W, 3686 m elev; corolla blue, pentagonal, fruits not found; growing in rocky soil.

David M. Spooner and Willman García F. 6562  
Feb 18, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Potosí. Sud Chichas: 20.2 km W of Tupiza town square, on rd to La Colorada, 1:250,000-scale map SF 20-5, Lat: 21°27.007'S, Long: 65°51.083'W, 4006 m elev; corolla blue, pentagonal, fruits round-ovoid; growing in rocky soil among shrubs, with S. infundibuliforme.

David M. Spooner and Willman García F. 6563  
Feb 18, 1993

Solanum infundibuliforme Philippi

Bolivia. Potosí. Sud Chichas: 20.2 km W of Tupiza town square, on rd to La Colorada, 1:250,000-scale map SF 20-5, Lat: 21°27.007'S, Long: 65°51.083'W, 4006 m elev; corolla pentagonal, fruits round-ovoid; growing in rocky soil among shrubs, with S. megistacrolobum.

David M. Spooner and Willman García F. 6564  
Feb 18, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Potosí. Sud Chichas: 29.8 km W of Tupiza town square, on rd to La Colorada, 1:250,000-scale map SF 20-5, Lat: 21°26.337'S, Long: 65°54.398'W, 4210 m elev; corolla violet, pentagonal, fruits round-ovoid; growing among rocks in humid organic soil.

David M. Spooner and Willman García F. 6566  
Feb 18, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Potosí. Sud Chichas: 7.1 km W of locked gate at the W end of Chilcobija, a private mining town, driving past cemetery, 1:250,000-scale map SF 19-8, Lat: 21°24.749'S, Long: 66°09.375'W, 4040 m elev; corolla violet, pentagonal, fruits round-ovoid; collected in rocky soil near base of cliff face, with S. infundibuliforme.

David M. Spooner and Willman García F. 6568  
Feb 18, 1993

Solanum infundibuliforme Philippi

Bolivia. Potosí. Sud Chichas: 7.1 km W of locked gate at W end of Chilcobija, a private mining town, 1:250,000-scale map SF 19-8, Lat: 21°24.749'S, Long: 66°09.375'W, 4040 m elev; corolla pentagonal, fruits round-ovoid; growing in rocky soil near base of cliff face, with S. megistacrolobum.

David M. Spooner and Willman García F. 6569  
Feb 18, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Potosí. Sud Chichas: about 3 km E of locked gate at E end of Chilcobija, a private mining town, then ca 0.5 km N, to a farmer's field, 1:250,000-scale map SF 19-8, Lat: 21°26.559'S, Long: 66°05.443'W, 3928 m elev; corolla violet, pentagonal, fruits round-ovoid; growing in organic soil near stone wall of farm, with S. acaule.

David M. Spooner and Willman García F. 6572  
Feb 18, 1993

Solanum acaule Bitter ssp. acaule

Bolivia. Potosí. Sud Chichas: about 3 km E of locked gate at E end of Chilcobija, a private mining town, then 0.5 km N, to a farmer's field, 1:250,000-scale map SF 19-8, Lat: 21°26.559'S, Long: 66°05.443'W, 3928 m elev; corolla rotate, fruits round-ovoid; growing in organic soil near stone wall, with S. megistacrolobum.

David M. Spooner and Willman García F. 6573  
Feb 18, 1993

Solanum infundibuliforme Philippi

Bolivia. Tarija. Avilés: 47.5 km past town square of Cruce Mojo, passing Tojo, on the road to Tarija, 7.2 km W of town square of Yanchara, 1:250,000-scale map 20-5, Lat: 21°48.209'S, Long: 65°15.849'W, 4114 m elev; corolla pentagonal, fruits round-ovoid; growing in rocky soil, with S. oplocense.

David M. Spooner and Willman García F. 6574  
Feb 19, 1993

Solanum oplocense Hawkes

Bolivia. Tarija. Avilés: 47.5 km past town square of Cruce Mojo, passing Tojo, 7.2 km W of town square of Yanchara, 1:250,000-scale map 20-5, Lat: 21°48.209'S, Long: 65°15.849'W, 4114 m elev; corolla rotate-pentagonal, fruits round, just forming; growing in rocky soil, with S. infundibuliforme.

David M. Spooner and Willman García F. 6575  
Feb 19, 1993

Solanum acaule Bitter ssp. acaule

Bolivia. Tarija. Avilés: 4.6 km N of town square of Yanchara, on road to Iscayachi, 1:250,000-scale map 20-5, Lat: 21°49.002'S, Long: 65°12.103'W, 3641 m elev; corolla pentagonal, fruits not found; growing in rocky soil by roadside.

David M. Spooner and Willman García F. 6576  
Feb 19, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Tarija. Avilés: 43.5 km N of town square of Yanchara, on rd to Iscayachi, 13.3 km S of town square of Iscayachi, 1:250,000-scale map SF 20-5, Lat: 21°34.902'S, Long: 65°01.973'W, 3820 m elev; corolla violet, pentagonal, fruits round-ovoid; growing in moist organic soil about and out of rock walls, and at cliff face, with Loasa and other Compositae.

David M. Spooner and Willman García F. 6577  
Feb 19, 1993

Solanum tarijense Hawkes

Bolivia. Tarija. Cercado: 13.5 km E of police gate at E end of Tarija, on the road to Entre Ríos, 1:250,000-scale map SF 20-5, Lat: 21°31.217'S, Long: 64°34.284'W, 1978 m elev; corolla white, pentagonal, fruits round-ovoid; growing among cacti and bushes of farm, in grazed area, hundreds of apparently mature plants found, but fruits very rare.

David M. Spooner and Willman García F. 6587  
Feb 21, 1993

Solanum tarijense Hawkes

Bolivia. Tarija. Cercado: 24.6 km E of police gate at E end of Tarija, on road to Entre Ríos, 1:250,000-scale map 20-5, Lat: 21°28.817'S, Long: 64°30.667'W, 2233 m elev; corolla white, pentagonal, fruits not found; growing among cacti.

David M. Spooner and Willman García F. 6588  
Feb 21, 1993

Solanum tarijense Hawkes

Bolivia. Tarija. Cercado: 34.1 km E of police gate at E end of Tarija, on road to Entre Ríos, 1:250,000-scale map SF 20-6, Lat: 21°26.210'S, Long: 64°27.845'W, 2369 m elev; corolla white, pentagonal, fruits round-ovoid; growing among spiny bushes.

David M. Spooner and Willman García F. 6590  
Feb 21, 1993

Solanum microdontum Bitter

Bolivia. Tarija. Oconnor: E end of Canaletas, 1:250,000-scale map 20-6, Lat: 21<sup>0</sup>27.029'S, Long: 64<sup>0</sup>21.081'W, 2100 m elev; corolla white, pentagonal, fruits not found; growing among bushes near roadside.

David M. Spooner and Willman García F. 6599  
Feb 21, 1993

Solanum microdontum Bitter

Bolivia. Tarija. Oconnor: ca 5 km E of town square of Canaletas, on road to Entre Ríos, 1:250,000-scale map 20-6, Lat: 21<sup>0</sup>24.374'S, Long: 64<sup>0</sup>18.033'W, 2018 m elev; corolla white, pentagonal, fruits round; growing in moist soil by stream, in dense herbaceous vegetation.

David M. Spooner and Willman García F. 6602  
Feb 21, 1993

Solanum microdontum Bitter

Bolivia. Tarija. Mendez: ca 20 km N of Tarija, on road to Iscayachi, 1:250,000-scale map 20-5, Lat: 21<sup>0</sup>27.701'S, Long: 64<sup>0</sup>52.244'W, 3047 m elev; corolla white, pentagonal, fruits not found; growing among grasses near stream.

David M. Spooner and Willman García F. 6603  
Feb 22, 1993

Solanum brevicaule Bitter

Bolivia. Tarija. Mendez: 20.1 km N of town square of Iscayachi on road to Camargo, 1:250,000-scale map SF 20-5, Lat: 21<sup>0</sup>22.039'S, Long: 65<sup>0</sup>01.654'W, 2945 m elev; corolla purple, pentagonal, no fruits found; growing in dry rocky soil under cacti and spiny bushes.

David M. Spooner and Willman García F. 6606  
Feb 22, 1993

Solanum brevicaule Bitter

Bolivia. Chuquisaca. Nor Cinti: Uturungo, 27.5 km E of bridge in San Pedro, on road to Culpina, 1:250,000-scale map SF 20-1, Lat: 20<sup>0</sup>44.945'S, Long: 65<sup>0</sup>05.120'W, 2993 m elev; corolla blue, rotate, fruits round; growing by rock wall by corn field.

David M. Spooner and Willman García F. 6607  
Feb 23, 1993



Solanum brevicaule Bitter

Bolivia. Chuquisaca. Sud Cinti: 42 km N of bridge in San Pedro on road to Culpina, 4.8 km S of Culpina town square, 1:250,000-scale map SF 20-1, Lat: 20°48.878'S, Long: 64°59.178'W, 2990 m elev; corolla blue, rotate, fruits round; growing in a corn field.

David M. Spooner and Willman García F. 6608  
Feb 23, 1993

Solanum brevicaule Bitter

Bolivia. Chuquisaca. Sud Cinti: 6.7 km NW of town square of Culpina, on rd to Santa Elena, 1:250,000-scale map SF 20-1, Lat: 20°49.475'S, Long: 64°53.436'W, 2941 m elev; corolla blue, rotate-pentagonal, fruits round, maturing to mature; growing in cornfield.

David M. Spooner and Willman García F. 6611  
Feb 23, 1993

Solanum boliviense Dunal

Bolivia. Chuquisaca. Nor Cinti: 26.4 km NW of town square of Culpina on rd to Santa Elena, 1:250,000-scale map SF 20-1, Lat: 20°40.552'S, Long: 64°51.458'W, 2940 m elev; corolla purple, pentagonal, fruits round, maturing to mature; growing in cultivated field.

David M. Spooner and Willman García F. 6612  
Feb 23, 1993

Solanum viddaurei Cárđ.

Bolivia. Chuquisaca. Nor Cinti: 30.4 km NW of town square of Culpina on rd to Santa Elena, 1:250,000-scale map SF 20-1, Lat: 20°38.756'S, Long: 64°49.973'W, 3145 m elev; plants immature, corolla and fruits absent; growing among bushes by stream.

David M. Spooner and Willman García F. 6613  
Feb 23, 1993

Solanum viddaurei Cárđ.

Bolivia. Chuquisaca. Nor Cinti: 45.3 km N of town square of Camargo on road to Potosí, near km marker 143, 1:250,000-scale map SF 20-1, Lat: 20°22.039'S, Long: 56°07.426'W, 3457 m elev; corolla blue, pentagonal, fruits round, maturing to mature; growing at base of stone wall, outside of garden, next to steep slope, in sunny area (with narrower leaves) and under bushes (with wider leaves), growing near S. viddaurei and S. megistacrolobum.

David M. Spooner and Willman García F. 6614  
Feb 24, 1993

Solanum brevicaule Bitter

Bolivia. Chuquisaca. Nor Cinti: 45.3 km N of town square of Camargo on road to Potosí, near km marker 143, 1:250,000-scale map SF 20-1, Lat: 20°22.039'S, Long: 65°07.426'W, 3457 m elev; corolla blue, rotate pentagonal, fruits round; growing along roadside, near S. viddaurei and S. megistacrolobum.

David M. Spooner and Willman García F. 6615  
Feb 24, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Chuquisaca. Nor Cinti: 45.3 km N of town square of Camargo, on road to Potosí, near km marker 143, 1:250,000-scale map SF 20-1, Lat: 20°22.039'S, Long: 65°07.426'W, 3457 m elev; corolla violet, pentagonal, fruits round-ovoid, maturing to mature; growing in grassy area, near S. oplocense and S. viddaurei.

David M. Spooner and Willman García F. 6616  
Feb 24, 1993

Solanum sparsipilum Bitter

Bolivia. Potosí. Nor Cinti: in town of Pohona, 4.5 km S of rd diverting into Otavi, on rd to Camargo, 1:250,000-scale map SF 20-1, Lat: 20°07.466'S, Long: 65°19.848'W, 3175 m elev; corolla blue, rotate-pentagonal, fruits round, maturing to mature; growing in cornfield enclosure, at base of mud wall.

David M. Spooner and Willman García F. 6618  
Feb 24, 1993

Solanum boliviense Dunal

Bolivia. Potosí. Tomas Frías: 3.9 km S of Potosí-Sucre road, near Río Cerdas, N of Chaqui on road diverging to the NW, 1:250,000-scale map SE 20-13, Lat: 19°32.342'S, Long: 65°35.387'W, 3524 m elev; corolla violet, pentagonal, fruits round, maturing to mature; growing near base of stone walls and in grassy areas, near S. acaule and S. viddaurei.

David M. Spooner and Willman García F. 6619  
Feb 24, 1993

Solanum viddaurei Cárdenas

Bolivia. Potosí. Tomas Frías, 3.9 km S of Sucre-Potosí road, near Río Cerdas, N of Chaqui, on road diverting to the NW, 1:250,000-scale map SE 20-13, Lat: 19°32.324'S, Long: 65°35.387'W, 3524 m elev; corolla blue, rotate-pentagonal, fruits not found; growing under bushes, near S. acaule and S. boliviense.

David M. Spooner and Willman García F. 6620  
Feb 24, 1993

Solanum acaule Bitter ssp. acaule

Bolivia. Potosí. Tomas Frías: 3.9 km S of Potosí-Sucre road, near Río Cerdas, N of Chaqui, on the road diverting to the NW, 1:250,000-scale map SE 20-13, Lat: 19°32.324'S, Long: 65°35.387'W, 3524 m elev; corolla blue, rotate, fruits round, maturing to mature; growing in grassy areas, with S. boliviense and S. viddaurei.

David M. Spooner and Willman García F. 6621  
Feb 24, 1993

Solanum tarijense Hawkes

Bolivia. Chuquisaca. Oropeza: at km 25 marker N of Sucre, on rd to Aiquile, 1:250,000-scale map SE 20-9, Lat: 18°59.698'S, Long: 65°10.212'W, 2364 m elev; corolla white, pentagonal, fruits round, mature; growing among cacti and thorny bushes.

David M. Spooner and Willman García F. 6622  
Feb 25, 1993

Solanum tarijense Hawkes

Bolivia. Chuquisaca. Oropeza: 33.5 km N of Sucre (by posted road markers) on rd to Aiquile, 1:250,000-scale map SE 20-9, Lat: 18°57.122'S, Long: 65°08.385'W, 2339 m elev; corolla white, pentagonal, fruits round, mature; growing in dry stony soil among spiny bushes.

David M. Spooner and Willman García F. 6623  
Feb 25, 1993

Solanum gandarillasii Cárđ.

Bolivia. Chuquisaca. Oropeza: 41 km N of Sucre (by posted road markers), on rd to Aiquile, 1:250,000-scale map SE 20-9, Lat: 18°55.146'S, Long: 65°06.868'W, 2031 m elev; corolla white, rotate, fruits round, just starting to mature; growing among thorny bushes in organic and rocky soil.

David M. Spooner and Willman García F. 6624  
Feb 25, 1993

Solanum tarijense Hawkes

Bolivia. Cochabamba. Campero: in town of Quiroga, in field on E side of road, 1:250,000-scale map SE 20-9, Lat: 18°25.234'S, Long: 65°13.059'W, 1948 m elev; plants wilted, flowers gone, fruits round, all mature; growing at base of mud wall.

David M. Spooner and Willman García F. 6626  
Feb 25, 1993

Solanum berthaultii Hawkes

Bolivia. Cochabamba. Cercado: at base of Cerro San Pedro, near Jardín Botánico Martín Cárdenas, 1:250,000-scale map SE 19-8, Lat: 66°13'S, Long: 17°20'W, m elev; plants wilting, flowers gone, fruits mature; growing on dry rocky soil.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6629  
Feb 28, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Cochabamba. Chapare: 52 km E of Cochabamba on rd to Monte Punco, 1:250,000-scale map SE 20-5, Lat: 17°17.750'S, Long: 65°47.397'W, 3015 m elev; plants wilting, flowers gone, fruits mature; growing in shade of bush by side of road.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6630  
Mar 2, 1993

Solanum megistacrolobum Bitter ssp. toralapanum (Cárdenas and Hawkes) R. B. Giannattasio and D. M. Spooner

Bolivia. Cochabamba. Arani: 75 km E of Cochabamba on rd to Monte Punco, 4 km E of Toralapa Research Station, 1:250,000-scale map SE 20-5, Lat: 17°29.020'S, Long: 65°36.991'W, 3690 m elev; corolla violet, pentagonal, fruits round-ovoid, maturing to mature; growing in Stipa ichu grassland.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6631  
Mar 2, 1993

Solanum brevicaule Bitter

Bolivia. Cochabamba. Arani: 81 km E of Cochabamba on road to Monte Punco, 1:250,000-scale SE 20-5, Lat: 17°29.107'S, Long: 65°33.308'W, 3508 m elev; corolla blue with green star, rotate-pentagonal to rotate, fruits round, maturing to mature; growing under bushes (with wider leaves) and in adjacent sunny areas (with narrower leaves).

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6632  
Mar 2, 1993

Solanum brevicaule Bitter

Bolivia. Cochabamba. Arani: 81.5 km E of Cochabamba on rd to Monte Punco, 1:250,000-scale map SE 20-5, Lat: 17°29.106'S, Long: 65°33.048'W, 774 m elev; corolla blue, rotate-pentagonal, fruits round, maturing to mature; growing on moist slope below rock cliff, with S. megistacrolobum ssp. toralapanum.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6634  
Mar 2, 1993

Solanum megistacrolobum Bitter ssp. toralapanum (Cárdenas and Hawkes) R. B. Giannattasio and D. M. Spooner

Bolivia. Cochabamba. Arani: 81.5 km E of Cochabamba on road to Monte Punco, 1:250,000-scale map SE 20-5, Lat: 17°29.106'S, Long: 65°33.048'W, 3474 m elev; corolla violet, pentagonal, fruits round-ovoid, maturing to mature; growing on slope near cliff face, with S. brevicaule.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6635  
Mar 2, 1993

Solanum alandiae Cárdenas

Bolivia. Cochabamba. Carrasco: 1 km N of center of Tortora on road to Epizana, 1:250,000-scale map SE 20-5, Lat: 17°42.503'S, Long: 65°11.536'W, 2802 m elev; corolla pentagonal, white tinged with blue, fruits round-ovoid, maturing to mature; growing under bushes, in sandy and rocky soil, collected with S. alandiae 6644 that differs only by having corollas pure white.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6644  
Mar 3, 1993

Solanum alandiae Cárdenas

Bolivia. Cochabamba. Carrasco: 1 km N of center of Tortora, on rd to Epizana, 1:250,000-scale map SE 20-5, Lat: 17°42.503'S, Long: 65°11.536'W, 2808 m elev; corolla pentagonal, white, fruits round-ovoid, maturing to mature; growing under bushes in sandy and rocky soil, collected with S. alandiae 6644 that differs only by having corollas white tinged with blue.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6645  
Mar 3, 1993

Solanum circaeifolium Bitter

Bolivia. Cochabamba. Mizque: 4 km S of Tortora on rd to Sucre, 1:250,000-scale map SE 20-5, Lat: 17°44.774'S, Long: 65°12.204'W, 2800 m elev; corolla white, stellate, fruits long-conical, maturing to mature; growing on slope next to road, in sandy and clay soil, in landslide soils in sunny areas (where more common), and under bushes, near S. alandiae.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6646  
Mar 3, 1993

Solanum alandiae Cárdenas

Bolivia. Cochabamba. Mizque: 4 km S of Tortora on rd to Sucre, 1:250,000-scale map SE 20-5, Lat: 17°44.774'S, Long: 65°12.204'W, 2800 m elev; corolla blue, pentagonal, fruits round-ovoid; growing on roadside and on adjacent slope, near S. circaeifolium.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6647  
Mar 3, 1993

Solanum doddsii Correll

Bolivia. Cochabamba. Mizque: 10 km N of Chuquillas, 42 km N of Aiquile, 1:250,000-scale map SE 20-5, Lat: 17°55.100'S, Long: 65°09.713'W, 2498 m elev; flowers gone, fruits round-ovoid, mature; growing in wet valley on steep slope, with S. alandiae.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6649  
Mar 3, 1993

Solanum alandiae Cárdenas

Bolivia. Cochabamba. Mizque: 10 km N of Chuquillas, 42 km N of Aiquile, 1:250,000-scale map SE 20-5, Lat: 17°55.100'S, Long: 65°09.713'W, 2498 m elev; corolla blue, rotate-pentagonal, fruits round-ovoid; growing beneath trees on slope, with S. doddsii.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6650  
Mar 3, 1993

Solanum doddsii Correll

Bolivia. Cochabamba. Mizque: 9 km N of Chuquillas, 41 km N of Aiquile, 1:250,000-scale map SE 20-5, Lat: 17°55.188'S, Long: 65°09.883'W, 2537 m elev; corolla very light blue, stellate, fruits round-ovoid; growing on steep slope in rocky and sandy soil by roadside.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6651  
Mar 3, 1993

Solanum gandarillasii Cárdenas

Bolivia. Cochabamba. Campero: 11 km S of Aiquile on road to Sucre, 1:250,000-scale map SE 20-9, Lat: 18°16.736'S, Long: 65°13.049'W, 2220 m elev; fruits absent; growing in stony organic soils.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6652  
Mar 4, 1993

Solanum tarijense Hawkes

Bolivia. Cochabamba. Campero: 12 km S of Aiquile on rd to Sucre, 1:250,000-scale map SE 20-9, Lat: 18°17.252'S, Long: 65°13.424'W, 2203 m elev; corolla white, pentagonal, fruits round, mature; growing in cornfield.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6654  
Mar 4, 1993

Solanum gandarillasii Cárđ.

Bolivia. Cochabamba. Campero: 29 km S of Aiquile, on road to Sucre, 1:250,000-scale map SE 20-9, Lat: 18°30.771'S, Long: 65°10.685'W, 2241 m elev; corolla white, rotate-pentagonal, fruits mature; growing under bushes in rocky soil.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6656  
Mar 4, 1993

Solanum gandarillasii Cárđ

Bolivia. Chuquisaca. Oropeza: 103 km S of Aiquile on the road to Sucre, ca 42 km N of Sucre (by posted road markers), 1:250,000-scale map SE 20-9, Lat: 18°54'S, Long: 65°06'W, 1900 m elev; corolla white, rotate, fruits not found; growing under shade of bushes in dry rocky soil.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6658  
Mar 4, 1993

Solanum tarijense Hawkes

Bolivia. Chuquisaca. Oropeza: 14 km ESE of Sucre on road to Zudañez, 1:250,000-scale map SE 20-13, Lat: 19°05.519'S, Long: 65°11.893'W, 3021 m elev; corolla white, stellate, fruits ovoid, mature; growing among cacti.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6659  
Mar 5, 1993

Solanum oplocense Hawkes

Bolivia. Chuquisaca. Yanparaez: 6 km S of Sucre-Tarabuco road on road to Sotomayor, 1:250,000-scale map SE 20-13, Lat: 19°13.435'S, Long: 65°02.389'W, 2870 m elev; corolla blue, rotate-pentagonal, fruits round; growing in shade of bushes (plants with wider leaves) or in adjacent sunny areas (plants with much narrower leaves), near S. tarijense.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6660  
Mar 5, 1993

Solanum tarijense Hawkes

Bolivia. Chuquisaca. Yamparaez: 6 km S of Sucre-Sotomayor road, on road to Sotomayor, 1:250,000-scale map SE 20-13, Lat: 19°13.435'S, Long: 65°02.389'W, 2870 m elev; plants mature, no flowers present, fruits round-ovoid, mature; growing among bushes, near S. oplocense.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6661  
Mar 5, 1993

Solanum oplocense Hawkes

Bolivia. Chuquisaca. Yamparaez: growing on both sides of Río Tiahucana, 13 km S of Sucre-Tarabuco road on road to Sotomayor, 2 km S of Cota, 1:250,000-scale map SE 20-13 (type locality), Lat: 19°14.714'S, Long: 65°10.121'W, 2584 m elev; flowers absent, fruits round, mature, hard to locate despite many plants in area; growing about cornfields and gardens. Note: type locality of S. hondelmannii (possibly synonymous with it).

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6663  
Mar 5, 1993

Solanum oplocense Hawkes

Bolivia. Chuquisaca. Yamparaez: 11 km S of Tarabuco, on road to Icla, 1:250,000-scale map SE 20-13, Lat: 19°13.646'S, Long: 64°50.926'W, 3041 m elev; fruits round, maturing to mature, corolla deep purple, rotate; growing at edge of potato field.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6665  
Mar 5, 1993

Solanum oplocense Hawkes

Bolivia. Chuquisaca. Yamparaez: 21 km S of Tarabuco on road to Icla, 1:250,000-scale map SE 20-13, Lat: 19°17.496'S, Long: 64°48.070'W, 3001 m elev; corolla purple, rotate-pentagonal, fruits round; growing along roadside.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6667  
Mar 5, 1993

Solanum megistacrolobum Bitter ssp. toralapanum (Cárdenas and Hawkes) R. B. Giannattasio and D. M. Spooner

Bolivia. Chuquisaca. Tomina: 20 km S of town square of Icla on road to Sibundoy, 1:250,000-scale map SE 20-13, Lat: 19°25.753'S, Long: 64°41.861'W, 3361 m elev; corolla purple, pentagonal, fruits ovoid, maturing to mature; growing in sandy rocky soil among bushes, near S. circaeifolium and S. oplocense.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6669  
Mar 6, 1993

Solanum circaeifolium Bitter

Bolivia. Chuquisaca. Tomina: 20 km S of town square of Icla on road to Sibundoy, 1:250,000-scale map SE 20-13, Lat: 19°25.753'S, Long: 64°41.861'W, 3361 m elev; corolla white, stellate-pentagonal, no fruits found, tubers small; growing in shade of trees, near S. megistacrolobum ssp. toralapanum and S. oplocense.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6671  
Mar 6, 1993



Solanum oplocense Hawkes

Bolivia. Chuquisaca. Tomina: 20 km S of town square of Icla on road to Sibundoy, 1:250,000-scale map SE 20-13, Lat: 19°25.753'S, Long: 64°41.861'W, 3361 m elev; corolla blue, rotate-pentagonal, no fruits or tubers found; growing among bushes in sandy rocky soil, with S. circaeifolium and S. megistacrolobum ssp. toralapanum.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6672  
Mar 6, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Chuquisaca. Tomina: 36 km S of town square of Icla on road to Sibundoy, 1:250,000-scale map SE 20-13, Lat: 19°31.175'S, Long: 64°39.424'W, 3850 m elev; corolla violet, pentagonal, only a few young fruits collected; growing near S. brevicaule.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6673  
Mar 6, 1993

Solanum brevicaule Bitter

Bolivia. Chuquisaca. Tomina: 36 km S of Icla on road to Sibundoy, 1:250,000-scale map SE 20-13, Lat: 19°31.175'S, Long: 64°39.429'W, 3850 m elev; corolla blue, rotate-pentagonal, no fruits found; growing near S. megistacrolobum ssp. megistacrolobum.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6674  
Mar 6, 1993

Solanum hoopesii Hawkes and Okada

Bolivia. Chuquisaca. Azurduy: 5 km N of Cruz Kasa, 26 km N of Abra Kasa, 85 km N of Azurduy, 1:250,000-scale map SE 20-13 (type locality), Lat: 19°53.114'S, Long: 64°34.195'W, 3229 m elev; plants with 1-2 pairs of lateral leaflets, corolla dark purple, rotate, fruits round; growing at edge of potato field, at base of rock wall, near S. hoopesii 6680, growing in the cornfield, distinguished by 2-3 pairs of lateral leaflets.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6679  
Mar 6, 1993

Solanum hoopesii Hawkes and Okada

Bolivia. Chuquisaca. Azurduy: 5 km S of Cruz Kasa, 26 km N of Abra Kasa, 85 km N of Azurduy, 1:250,000-scale map SE 20-13 (type locality), Lat: 19°53.114'S, Long: 64°34.195'W, 3229 m elev; plants with 2-3 pairs of lateral leaflets, corolla dark purple, rotate, fruits round; growing in potato field, with S. hoopesii 6679, which differs from having only 1-2 pairs of lateral leaflets.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6680  
Mar 6, 1993

Solanum hoopesii Hawkes and Okada

Bolivia. Chuquisaca. Azurduy: nursery of Estación Experimental Santa Bárbara, at edge of town of Azurduy, 1:250,000-scale map SE 20-2, Lat: 20°06.514'S, Long: 64°25.184'W, 2513 m elev; plants withered to the ground and only round fruits collected, but said by the station manager to have deep purple rotate corollas; growing in tree seedling nursery.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6683  
Mar 7, 1993

Solanum hoopesii Hawkes and Okada

Bolivia. Chuquisaca. Azurduy: 1 km N of town square of Azurduy, on road to Icla, 1:250,000-scale map SE 20-2, Lat: 20°06.080'S, Long: 64°24.196'W, 2481 m elev; plants mature, flowers gone, but said by local farmer to be deep purple, one fruit collected; growing in cornfield.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6684  
Mar 7, 1993

Solanum hoopesii Hawkes and Okada

Bolivia. Chuquisaca. Azurduy: 7 km N of town square of Azurduy, on road to Icla, 1:250,000-scale map SE 20-2, Lat: 20°01.034'S, Long: 64°25.802'W, 2613 m elev; corolla blue, rotate, fruits round; growing among corn plantation.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6685  
Mar 7, 1993

Solanum ugentii Hawkes and Okada

Bolivia. Chuquisaca. Azurduy: 113 km N of town square of Azurduy, 20 km N of Cruz Kasa, 30 km N of Torre Pampa Junction, 1:250,000-scale map SE 20-13, Lat: 19°44.830'S, Long: 64°35.128'W, 3730 m elev; much vegetative variability, corolla deep purple, rotate, plants just starting to flower, some with fruits maturing to mature, round-ovoid; growing in moist organic soil about the many cliff bases above the road, near S. acaule. Note: type locality of this species.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6687  
Mar 7, 1993

Solanum acaule Bitter ssp. acaule

Bolivia. Chuquisaca. Azurduy: 113 km N of Azurduy, 20 km N of Cruz Caza, 30 km N of Torre Pampa Junction, 1:250,000-scale map SE 20-13, Lat: 19°44.830'S, Long: 64°35.128'W, 3730 m elev; corolla rotate, fruits round-ovoid, maturing to mature; growing in organic soil below cliffs above the road, near S. ugentii.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6689  
Mar 7, 1993

Solanum tarijense Hawkes

Bolivia. Chuquisaca. Zudañez: 3 km E of Zudañez on road to Padilla, 1:250,000-scale map SE 20-13, Lat: 19°07.087'S, Long: 64°40.658'W, 2565 m elev; corolla white, tinged with blue, pentagonal, fruits ovoid, mature; growing in dry rocky sandy soil.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6690  
Mar 8, 1993

Solanum arnezii Cárdenas

Bolivia. Chuquisaca. Zudañez: 10 km E of Zudañez on road to Padilla, 1:250,000-scale map SE 20-13, Lat: 19°07.279'S, Long: 64°37.983'W, 2295 m elev; plants to 1 m tall, corolla cream yellow-white, stellate-pentagonal, fruits round, mature; growing in line of bushes at edge of cornfield.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6692  
Mar 8, 1993

Solanum doddsii Correll

Bolivia. Chuquisaca. Tomina: 7 km E of Tomina on road to Padilla, in Comunidad Arquillos, 1:250,000-scale map SE 20-14, Lat: 19°14.546'S, Long: 64°26.725'W, 2124 m elev; plants withering, flowers gone, but owner of field says all white, not cream-white as in other plants a few km away he has seen, fruits round. Note: Herbarium collections of this population in 1994 showed the corollas to be white, tinged with blue.; growing among bushes at edge of pasture.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6701  
Mar 8, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Cochabamba. Quillacollo: 11 km NW of Quillacollo, from junction of road to Cochabamba and road to Independencia, 1:250,000-scale map SE 19-8, Lat: 17°18.109'S, Long: 66°17.747'W, 2912 m elev; corollas blue, rotate, fruits round, mature; growing in dry rocky soil.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6704  
Mar 13, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Cochabamba. Quillacollo: 14 km NW of Quillacollo, from junction of road to Cochabamba and road to Independencia, 1:250,000-scale map SE 19-8, Lat: 17°17.307'S, Long: 66°18.093'W, 3197 m elev; corolla blue, rotate, fruits round, mature; growing in disturbed organic soil by roadside.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6706  
Mar 13, 1993

Solanum circaeifolium Bitter

Bolivia. Cochabamba. Quillacollo: 16 km NW of Quillacollo, from junction of road to Independencia, on other side of river from road, 1:250,000-scale map SE 19-8, Lat: 17°16.924'S, Long: 66°18.657'W, 3038 m elev; corolla white, stellate-pentagonal, fruits conical, with pointed end, maturing to mature; growing on steep rocky hillside in sunny areas and under bushes, cacti, and trees, with S. sparsipilum.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6707  
Mar 13, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Cochabamba. Quillacollo: 16 km NW of Quillacollo, from junction of road to Independencia, on other side of river from road, 1:250,000-scale map SE 19-8, Lat: 17°16.924'S, Long: 66°18.657'W, 3038 m elev; plants 0.3 m tall, corolla blue, rotate, fruits round, growing with S. sparsipilum (6709) with longer round-ovoid fruits, and with S. circaeifolium; growing among rocks in sunny places and in shade of trees and bushes.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6708  
Mar 13, 1993.

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Cochabamba. Quillacollo: 16 km NW of Quillacollo, from its junction with the road to Independencia, on other side of river from the road, 1:250,000-scale SE 19-8, Lat: 17°16.924'S, Long: 66°18.657'W, 3038 m elev; plants 0.5 m tall, corolla blue, rotate, fruits ovoid, maturing to mature; growing on steep slope among rocks, in shade of trees, with S. sparsipilum (6708) that differs by having round fruits and only being 0.3 m tall, and with S. circaeifolium.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6709  
Mar 13, 1993

Solanum megistacrolobum Bitter ssp. megistacrolobum

Bolivia. Cochabamba. Quillacollo: 29 km NW of Quillacollo, from its junction of the road to Independencia, 1:250,000-scale map SE 19-8, Lat: 17°16.007'S, Long: 66°20.666'W, 3675 m elev; corolla violet, pentagonal, one round-ovoid fruit found; growing in moist soil among grasses.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6710  
Mar 13, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Cochabamba. Ayopaya: 61 km NW of Quillacollo, from its junction of the road to Independencia, in town of Morochata, 1:250,000-scale map SE 19-8, Lat: 17°14.113'S, Long: 66°31.846'W, 2931 m elev; plants 1 m tall, with very thick stem bases (3 cm thick), corolla purple, rotate, fruits round, fasciated inflorescences common on many plants; growing in very organic soil on steep slope down from one of the streets in Morochata above the main road.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6711  
Mar 13, 1993

Solanum circaeifolium Bitter

Bolivia, La Paz. Inquisivi: 8 km S of town square of Quime, 1:250,000-scale map SE 19-4, Lat:  $16^{\circ}59.854'S$ , Long:  $67^{\circ}15.229'W$ , 3892 m elev; corolla white, stellate-pentagonal, no fruits found; growing in moist organic soil among rocks and bushes.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6713  
Mar 14, 1993

Solanum circaeifolium Bitter

Bolivia, La Paz. Inquisivi: 4 km S of town square of Quime, 1:250,000-scale map SE 19-4, Lat:  $16^{\circ}59.163'S$ , Long:  $67^{\circ}14.270'W$ , 3200 m elev; corolla white, stellate-pentagonal, fruits conical with pointed end; growing on steep slope among rocks in open area, where most common and flowering, but also under shade of bushes.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6714  
Mar 15, 1993

Solanum okadae Hawkes and Hjert.

Bolivia, La Paz. Inquisivi: 4 km N of Quime town square, 1:250,000-scale map SE 19-4, Lat:  $16^{\circ}57.321'S$ , Long:  $67^{\circ}11.363'W$ , 2730 m elev; plants 0.2 m tall, pedicel swollen above articulation, corolla white, rotate, fruits round, just maturing; growing under bushes by roadside.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6715  
Mar 15, 1993

Solanum okadae Hawkes and Hjert.

Bolivia, La Paz. Inquisivi: 4.2 km N of Quime town square, 1:250,000-scale map SE 19-4, Lat:  $16^{\circ}57'S$ , Long:  $67^{\circ}11'W$ , 2730 m elev; corolla white, rotate, fruits round; growing by roadside.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6716  
Mar 15, 1993

Solanum soestii Hawkes and Hjert.

Bolivia, La Paz. Inquisivi: 4 km N of town square of Quime, 1:250,000-scale map SE 19-4, Lat:  $16^{\circ}57.211'S$ , Long:  $67^{\circ}11.363'W$ , 2730 m elev; corolla white, stellate-pentagonal, no fruits found, but tubers collected; growing on steep slope above road in rocky soil.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6717  
Mar 15, 1993

Solanum okadae Hawkes and Hjert.

Bolivia. La Paz. Inquisivi: 4.5 km N of town square of Quime, 1:250,000-scale map SE 19-4, Lat:  $16^{\circ}57'S$ , Long:  $67^{\circ}11'W$ , 2730 m elev; plants 0.3 m tall, corolla white, rotate, fruits round, maturing; growing on roadside under shade of trees.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6718  
Mar 15, 1993

Solanum soestii Hawkes and Hjert.

Bolivia. La Paz. Inquisivi: 3 km N of Quime town square, 1:250,000-scale map SE 19-4, Lat:  $16^{\circ}57.379'S$ , Long:  $67^{\circ}11.911'W$ , 2816 m elev; corolla white, stellate-pentagonal, fruits conical, pointed at end, maturing; growing in rocky soil on slope above road.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6719  
Mar 15, 1993

Solanum okadae Hawkes and Hjert.

Bolivia. La Paz. Inquisivi: 6 km N of Quime, then 1 km N along footpath on E side of road, 1:250,000-scale map SE 19-4, Lat:  $16^{\circ}56.804'S$ , Long:  $67^{\circ}11.309'W$ , 2810 m elev; plants 0.3 m tall, corolla white, rotate, fruits round, maturing to mature; growing under shade of bushes, near S. okadae 6721, collected as separate because it is much larger (1 m tall, vs 0.3 m tall for 6721).

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6720  
Mar 15, 1993

Solanum okadae Hawkes and Hjert.

Bolivia. La Paz. Inquisivi: 6 km N of Quime, near road, 1:250,000-scale map SE 19-4, Lat:  $16^{\circ}56.804'S$ , Long:  $67^{\circ}11.309'W$ , 2810 m elev; plants to 0.3 m tall, corolla white, rotate-pentagonal, fruits green, round, growing near S. okadae 6721 that differs by plants 1 m tall, fruits green with white specks, round; growing in shade of bushes near path, near S. okadae 6720 collected as separate because it is much smaller plants (0.3 m tall).

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6721  
Mar 15, 1993

Solanum soestii Hawkes and Hjert.

Bolivia. La Paz. Inquisivi: 6 km N of Quime, 1:250,000-scale map SE 19-4, Lat:  $16^{\circ}56.804'S$ , Long:  $67^{\circ}11.309'W$ , 2819 m elev; corolla white, rotate-pentagonal, 2 young conical fruits collected; growing on slope above road in rocky soil.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6722  
Mar 15, 1993

Solanum sparsipilum Bitter

Bolivia. La Paz. Inquisivi: 6 km N of Quime, then 1 km N along footpath on E side of road, 1:250,000-scale map SE 19-4, Lat: 16°56.804'S, Long: 67°11.309'W, 2810 m elev; corolla light blue, rotate, fruits not found; growing in grassy soil along footpath.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6723  
Mar 15, 1993

Solanum soestii Hawkes and Hjert.

Bolivia. La Paz. Inquisivi: 6.5 km N of Quime, 1:250,000-scale map SE 19-4, Lat: 16°52.376'S, Long: 67°11.171'W, 2896 m elev; corolla white, stellate-pentagonal, fruits long-conical with pointed end; growing near side of road with a precipitous slope, under bushes.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6724  
Mar 16, 1993

Solanum tuberosum L. ssp. andigena (Juz. and Buk.) Hawkes

Bolivia. La Paz. Inquisivi: Sita, a small community S of Licoma, 1:250,000-scale map SE 19-4, Lat: 16°52.525'S, Long: 67°08.114'W, 2450 m elev; flowers gone, but said by owner of field to have blue corollas, fruits abundant, round, tubers deep in the ground on long stolons; growing in a corn field, common.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6727  
Mar 16, 1993

Solanum violaceimarmoratum Bitter

Bolivia. La Paz. Sud Yungas: at Chulumani, starting 15 km from junction of road out of La Paz at road to Caranavi and road to Chuspipata, 1:250,000-scale map SE 19-3, Lat: 16°18.189'S, Long: 67°51.286'W, 2450 m elev; corolla blue, rotate-pentagonal, fruits conical, but too young to extract seeds; growing in deep organic soils, in a recently cleared and burned jungle slope, recently planted in Hydrangea bushes.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6731  
Mar 18, 1993

Solanum yungasense Hawkes

Bolivia. La Paz. Sud Yungas: 2 km upstream of Río Taquesi, from small bridge over river on main road (by the curve) in Puente Villa, in small plantation by house, 1:250,000-scale map SE 19-3, Lat: 16°24'S, Long: 67°38'W, 1300 m elev; plants young, without flowers or fruits, but worker of field said plants much more common earlier in January and February, tubers collected; growing under small trees in plantation, among grasses.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6732  
Mar 19, 1993

Solanum yungasense Hawkes

Bolivia. La Paz. Sud Yungas: 2 km W of W edge (by police gate) of Chulumani, 1:250,000-scale map SE 19-3, Lat: 16°23.569'S, Long: 67°32.123'W, 1807 m elev; plants young, without flowers or fruits, but said by owner of plantation (Victor Gironda) to be plentiful in area in January; growing in coffee and banana plantation.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6735  
Mar 20, 1993

Solanum yungasense Hawkes

Bolivia. La Paz. Sud Yungas: along the road to the village Siquilini, ca 5 km NE from Chulumani, 1:250,000-scale map SE 19-3, Lat: 16°25.211'S, Long: 67°31.870'W, 1715 m elev; either very old partially wilted plants without flowers or fruits found, or very young plants found, tubers collected, said by local people to be common in area and to have flowers or fruits in January (one person said in May); growing as a weed in and at edges of the many cultivated fields in the area.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6738  
Mar 20, 1993

Solanum yungasense Hawkes

Bolivia. La Paz. Sud Yungas: Puente Villa, ca 1.5 km downstream (east) of Río Tamampaya, after hanging bridge in Puente Villa, on floodplain of river, 1:250,000-scale map SE 19-3, Lat: 16°24.017'S, Long: 67°38.307'W, 1243 m elev; most plants young, but one plant found with cream yellow-white stellate corollas, no fruits found; growing in a coffee and banana plantation, among grasses.

David M. Spooner, Ronald G. van den Berg, and Willman García F. 6739  
Mar 20, 1993

Solanum brevicaule Bitter

Bolivia. La Paz. Camacho: 9.3 km N of town square of Escoma, near Río Suchi, 1:250,000-scale map SD 19-15, Lat: 15°36.695'S, Long: 69°03.987'W, 3920 m elev; plants completely wilted and dried to ground, but very mature fruits located; growing in a pocket of black organic soil on a very steep cliff face, reached by climbing some meters up rocks, with Loasa.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6741  
Mar 24, 1993

Solanum acaule Bitter ssp. acaule

Bolivia. La Paz. Camacho: 19 km N of Escoma, on road to Hualipacayo, walking toward cliff faces, but collecting before reaching the cliff about stone walls around houses, 1:250,000-scale map SD 19-14, Lat: 15°32.230'S, Long: 69°03.651'W, 3792 m elev; corolla rotate, fruits round-ovoid, mature; growing in organic soil.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6742  
Mar 24, 1993



Solanum candolleianum Berthault

Bolivia. La Paz. Camacho: from 18 km N of town square in Escoma, turn E and back S to Cariquina (a small village), then 2 km to Chinaya Lijlliji, cross stream to collect plant in small flat place perched up on cliff face, 1:250,000-scale map SD 19-14, Lat: 15°32.350'S, Long: 69°04.955'W, 4080 m elev; plants wilted, no flowers or fruits collected but said by local guide to have white corollas, tubers to 8.5 cm long, with yellow skin and flesh; growing in organic soil on flat place perched on cliff face, among Loasa.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6743  
Mar 24, 1993

Solanum tuberosum L. ssp. andigena (Juz. and Buk.) Hawkes

Bolivia. La Paz. Camacho: from 20 km N of Escoma, go east at Cruce de Cariquina, then 3.5 km to Hachatira, a small village, 1:250,000-scale map SD 19-14, Lat: 15°32.606'S, Long: 69°02.068'W, 3740 m elev; plants wilted to the ground, stolons long, tubers deep in ground, with skin white speckled with pink, white flesh, said by owner of property to be wild and a persistent weed in the area; growing adjacent to and in a vegetable garden.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6745  
Mar 24, 1993

Solanum tuberosum L. ssp. andigena (Juz. and Buk.) Hawkes

Bolivia. La Paz. Camacho: from about 20 km N of Escoma, go east at Cruce de Kariquina about 7 km to Canchi Tamampayu, 1:250,000-scale map SD 19-14, Lat: 15°32.838'S, Long: 69°01.378'W, 3585 m elev; stems wilted, flowers and fruits gone, tubers at end of long stolons, deep in the ground, with white skin and white flesh; growing in backyard garden.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6746  
Mar 24, 1993

Solanum tuberosum L. ssp. andigena (Juz. and Buk.) Hawkes

Bolivia. La Paz. Camacho: from ca 20 km N of Escoma, go east at Cruce de Kariguani, then east ca 7 km to Canchi Tamampayu, 1:250,000-scale map SD 19-14, Lat: 15°32.832'S, Long: 69°01.378'W, 3585 m elev; stems wilted, flowers and fruits gone, tubers at end of long stolons, deep in the ground, with skin and flesh white, speckled with pink; growing in backyard garden.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6747  
Mar 24, 1993

Solanum tuberosum L. ssp. andigena (Juz. and Buk.) Hawkes

Bolivia. La Paz. Camacho: from ca 20 km N of Escoma, go E at Cruce de Kariguina, then ca 7 km to Canchi Tamampayu, 1:250,000-scale map SD 19-14, Lat: 15°32.832'S, Long: 69°01.378'W, 3585 m elev; stems wilted, flowers and fruits gone, tubers at end of long stolons, deep in the ground, with purple skin; growing in backyard garden.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6748  
Mar 24, 1993

Solanum tuberosum L. ssp. andigena (Juz. and Buk.) Hawkes

Bolivia. La Paz. Camacho: growing by town square of Moco Moco, a small town between Italaque and Chuma, in backyard garden of Yasick Fernández, 1:250,000-scale map SD 19-15, Lat: 15°27.401'S, Long: 68°59.900'W, 3361 m elev; stems wilted to the ground, tubers at the end of long stolons, deep in the ground, tubers with purple-brown skin and flesh; growing in backyard garden where it is said by the owner to be a persistent and common weed, flowering and fruiting in January and February.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6749  
Mar 25, 1993

Solanum tuberosum L. ssp. andigena (Juz. and Buk.) Hawkes

Bolivia. La Paz. Saavedra: 3 km uphill towards Chari from Charazani, in Comunidad Lunlay, 1:250,000-scale map SD 19-14, Lat: 15°10.406'S, Long: 69°02.369'W, 3120 m elev; stems wilted to the ground, tubers at the end of long stolons, deep in the ground; growing in cornfield.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6750  
Mar 26, 1993

Solanum tuberosum L. ssp. andigena (Juz. and Buk.) Hawkes

Bolivia. La Paz. Saavedra: 6 km uphill from Charazani towards Chari, in a small community, 1:250,000-scale map SD 19-14, Lat: 15°10.363'S, Long: 69°02.301'W, 3350 m elev; plants young, without flowers or fruits, tubers at the end of long stolons, deep in the ground, skin and flesh white with pink flecks; growing in backyard garden.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6751  
Mar 26, 1993

Solanum sparsipilum (Bitt.) Juz. and Buk.

Bolivia. La Paz. Franz Tamayo: 0.5 km S of town square of Pelechuco, on road to Escoma, 1:250,000-scale map SD 19-10, Lat: 14°49.116'S, Long: 69°04.433'W, 3620 m elev; plants very old, flowers gone, fruits round; growing in garden by side of road.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6753  
Mar 27, 1993

Solanum brevicaule Bitter

Bolivia. La Paz. Manco Kapac: SE end of Isla del Sol, at Templo del Sol, 1:250,000-scale map SE 19-2, Lat: 16°02.909'S, Long: 69°08.661'W, 3817 m elev; corolla purple, pentagonal, fruits round, maturing to mature; growing out of rocks in Temple, where about 20 plants grow, some without flowers or fruits.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6759  
Mar 31, 1993

Solanum brevicaule Bitter

Bolivia. La Paz. Manco Kapac: 4 km N of Tiquina town square, on road to Copacabana, 1:250,000-scale map SE 19-3, Lat: 16°13.145'S, Long: 68°52.083'W, 3919 m elev; corolla purple, rotate-pentagonal, fruits round, maturing to mature; growing in dry rocky and sandy soil by roadside.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6762  
Apr 1, 1993

Solanum brevicaule Bitter

Bolivia. La Paz. Manco Kapac: 1 km from Tiquina on road to Copacabana, 1:250,000-scale map SE 19-3, Lat: 16°13.667'S, Long: 68°51.069'W, 3900 m elev; corolla purple, rotate-pentagonal, fruits round, maturing to mature; growing in dry rocky soil by roadside.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6763  
Apr 1, 1993

Solanum brevicaule Bitter

Bolivia. La Paz. Omasuyos: 7 km N of Huarisata on road to Sorata, just above the small Indian village of Occo Hualata, 1:250,000-scale map SD 19-15, Lat: 15°55.148'S, Long: 68°39.801'W, 4124 m elev; plants old and wilted, flowers and fruits gone, small tubers collected; growing in organic and stony soil among rocks. Note: type locality of S. achacasense Cárdenas (S. achacachense may be a good species, but we have trouble distinguishing these two now).

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6765  
Apr 1, 1993

Solanum acaule Bitter ssp. acaule

Bolivia. La Paz. Omasuyos: 7 km N of Huarisata, on road to Sorata, just above the small Indian village of Occo Hualata, 1:250,000-scale map SD 19-15, Lat: 15°55.148'S, Long: 68°39.801'W, 4124 m elev; corolla rotate, fruits round-ovoid; growing adjacent to rock walls and wheat fields.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6766  
Apr 1, 1993

Solanum circaeifolium Bitter

Bolivia. La Paz. Larecacha: 5 km S of town square of Sorata on road to Achacachi, 1:250,000-scale map SD 19-5, Lat: 15°47.568'S, Long: 68°38.638'W, 2747 m elev; plants old, flowers gone, fruits conical with pointed end, mature and dropping from the plant; growing under spiny bromeliad on steep slope above road.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6767  
Apr 1, 1993

Solanum candolleanum Berthault

Bolivia. La Paz. Larecaja: 17 km N of town square of Sorata on road to Tacacoma, 1:250,000-scale map SD 19-15, Lat: 15°44.115'S, Long: 68°38.404'W, 3690 m elev; plants young, without flowers or fruits, 2 young tubers collected; growing in organic soil by side of road in shade of trees.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6768  
Apr 2, 1993

Solanum candolleanum Berthault

Bolivia. La Paz. Larecaja: 17 km N of town square of Sorata on road to Tacacoma, 1:250,000-scale map SD 19-15, Lat: 15°44.100'S, Long: 68°38.183'W, 3860 m elev; plants young, no flowers or fruits yet present, young tubers collected; growing in pockets of organic soil in crevices of cliff face.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6769  
Apr 2, 1993

Solanum acaule Bitter ssp. acaule

Bolivia. Oruro. Cercado: Caracollo, at junction of main La Paz-Cochabamba road and road to Oruro, 1:250,000-scale map SE 19-8, Lat: 17°39'S, Long: 67°14'W, 3800 m elev; corollas rotate, fruits round-ovoid, maturing to mature; growing in altiplano near cultivated fields.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6770  
Apr 4, 1993

Solanum violaceimoratum Bitter

Bolivia. La Paz. Chapare: Locotal, 88.2 km E and N of Cochabamba (by road marker on side of building), road to Villa Tunari, then ca 2 km W of road, upstream of Río Ronco, along the newly cut path for the water line project, 1:250,000-scale map SE 20-5, Lat: 17°11'S, Long: 65°48'W, 1850 m elev; plants young, without flowers or fruits; growing in sandy soil by side of stream.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6771  
Apr 5, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Cochabamba. Arani: ca 2 km S of Tiraque, by Puente Millumayu, 1:250,000-scale map SE 20-5, Lat: 17°25.102'S, Long: 65°44.396'W, 3290 m elev; plants wilting, flowers gone, said to have blue corollas without white lines radiating from center, fruits mature, round; growing under shade of small bushes.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6772  
Apr 5, 1993

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Cochabamba. Arani: farm in town of Tiraque, managed by Don Ricardo, 1:250,000-scale map SE 20-5, Lat: 17°25.102'S, Long: 65°43.448'W, 3285 m elev; plants wilting, flowers gone, but said to have blue corollas with white lines radiating from the center, fruits mature, round; growing at edge of enclosed potato area, at base of mud wall.

David M. Spooner, Ronald G. van den Berg, and Maria Luisa Ugarte 6773  
Apr 5, 1993

Solanum yungasense Hawkes

Bolivia. La Paz. Sud Yungas: Sakwaia, between Yanacachi and Puente Villa, south of Rio Unduavi, ca 1 km above road, 1:250,000-scale map SE 19-3, Lat: 16°23.344'S, Long: 67°44.485'W, 1700 m elev; corolla white, stellate, plants apparently mature but no fruits found; growing in coffee and banana plantation.

Ronald G. van den Berg, David M. Spooner, and Maria Luisa Ugarte 600  
Jan 6, 1994

Solanum yungasense Hawkes

Bolivia. La Paz. Nor Yungas: 10 km N of Puente Villa on road to Coroico, 1:250,000-scale map SE 19-3, Lat: 16°21.495'S, Long: 67°36.532'W, 1700 m elev; one flowering plant found, corollas stellate, white; growing in rocky clay soil under small trees.

Ronald G. van den Berg, David M. Spooner, and Maria Luisa Ugarte 601  
Jan 5, 1994

Solanum yungasense Hawkes

Bolivia. La Paz. Nor Yungas: 1 km N of Coroico on road to Caranavi, 1:250,000-scale map SE 19-3, Lat: 16°12.010'S, Long: 67°43.815'W, 1680 m elev; corollas cream-yellow, stellate; common about dwellings, among rocks and along roadsides.

Ronald G. van den Berg, David M. Spooner, and Maria Luisa Ugarte 602  
Jan 5, 1994

Solanum yungasense Hawkes

Bolivia. La Paz. Nor Yungas: near Yolosa, ca 8 km south of Coroico, from intersection of roads to Yolosa and Coroico-Caranavi road, go 0.25 km towards Yolosa, then turn left up hill for 1 km, banana plantation on right, 1:250,000-scale map SE 19-3, Lat: 16°14.640'S, Long: 67°44.086'W, 1320 m elev; corolla white, stellate, hundreds of plants, tubers purple; growing in banana plantation.

Ronald G. van den Berg, David M. Spooner, and Maria Luisa Ugarte 603  
Jan 5, 1994

Solanum yungasense Hawkes

Bolivia. La Paz. Nor Yungas: near Yolosa, ca 8 km S of Coroico, from intersection of road to Yolosa and Coroico-Caranavi road, go 0.25 km toward Yolosa, then turn left for 1 km, banana plantation on right, 1:250,000-scale map SE 19-3, Lat: 16°14.640'S, Long: 67°44.086'W, 1320 m elev; corollas white, stellate, hundreds of plants, tubers tan; growing in banana plantation.

Ronald G. van den Berg, David M. Spooner, and Maria Luisa Ugarte 604  
Jan 5, 1994

Solanum tuberosum L. andigena Hawkes

Bolivia. La Paz. Nor Yungas: in Chiriquero, 34 km N of Coroico on road to Caranavi, between Challa and Choro, 1:250,000-scale map SE 19-3, Lat: 16°04.248'S, Long: 67°41.321'W, 1120 m elev; young to old plants seen, but no flowers or fruits found, appears like some cultivated potato vegetatively, owner of land says a long-standing wild population, tubers round to cylindrical; found in backyard banana plantation.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 605  
Jan 6, 1994

Solanum yungasense Hawkes

Bolivia. La Paz. Sud Yungas: 3.5 km south of Chulumani on road to Inquisivi, 1:250,000-scale map SE 19-3, Lat: 16°23.087'S, Long: 67°31.490'W, 1620 m elev; plants young, no flowers or fruits present; growing in banana plantation.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 606  
Jan 8, 1994

Solanum yungasense Hawkes

Bolivia. La Paz. Sud Yungas: 17.4 km east of Chulumani, 1:250,000-scale map SE 19-4, Lat: 16°24.930'S, Long: 67°28.125'W, 1390 m elev; young plants, no flowers or fruits present, stems hairy; growing on sunny slope of burned banana plantation.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 607  
Jan 8, 1994

Solanum chacoense Bitter

Bolivia. La Paz. Sud Yungas: 1 km north of Irupana on road to Inquisivi, 1:250,000-scale map SE 19-4, Lat: 16°28.134'S, Long: 67°26.995'W, 1930 m elev; young plants, no flowers or fruits present; growing in root mat under trees.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 608  
Jan 8, 1994

Solanum doddsii Correll

Bolivia. Chuquisaca. Campero: 10 km northwest of Aiquile on the road to Mizque, 1:250,000-scale map SE 20-9, Lat: 18°08.566'S, Long: 65°13.642'W, 2400 m elev; corolla blue, pentagonal, fruits round to round-ovoid; growing in sandy soil of shaded streambank.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 609  
Jan 13, 1994

Solanum tarijense Hawkes

Bolivia. Chuquisaca. Mizque: 12 km north of Mizque on road to Cochabamba, 1:250,000-scale map SE 20-5, Lat: 17°52.749'S, Long: 65°22.873'W, 2400 m elev; corolla white, stellate, fruits round; growing among rocks in narrow ravine.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 610  
Jan 13, 1994

Solanum microdontum Bitter

Bolivia. Chuquisaca. Mizque: 12 km north of Mizque on the road to Cochabamba, 1:250,000-scale map SE 20-5, Lat: 17°52.749'S, Long: 65°22.873'W, 2400 m elev; corollas and fruits absent; growing among rocks in narrow ravine.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 611  
Jan 13, 1994

Solanum microdontum Bitter

Bolivia. Chuquisaca. Mizque: 11.5 km north of Mizque on road to Cochabamba, 1:250,000-scale map SE 20-5, Lat: 17°52.4'S, Long: 65°22.8'W, 2400 m elev; not yet in flower or fruit; growing in deep narrow ravine in soil on cliff face.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 612  
Jan 13, 1994

Solanum berthaultii Hawkes

Bolivia. Chuquisaca. Mizque: 8 km north of Mizque on road to Cochabamba, 1:250,000-scale map SE 20-5, Lat: 17°53.364'S, Long: 65°21.660'W, 2200 m elev; corolla blue, fruits not yet formed; growing at valley floor leading into narrow ravine.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 613  
Jan 13, 1994

Solanum doddsii Correll

Bolivia. Chuquisaca. Campero: 10.5 km south of town square of Aiquile on road to Sucre, 1:250,000-scale map SE 20-9, Lat: 18°16.067'S, Long: 65°12.933'W, 2180 m elev; plants not yet in flower; growing in dry ground under trees, growing with coll. no. 615, which differs by shinier leaves.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 614  
Jan 14, 1994



Solanum doddsii Correll

Bolivia. Chuquisaca. Campero: 10.5 km south of town square of Aiquile on road to Sucre, 1:250,000-scale map SE 20-9, Lat: 18°16.067'S, Long: 65°12.933'W, 2180 m elev; plants not yet in flower; growing in open sun, growing with coll. no. 614 which differs by duller leaves.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 615  
Jan 14, 1994

Solanum tarijense Hawkes

Bolivia. Chuquisaca. Campero: 14.4 km south of town square of Aiquile on road to Sucre, 1:250,000-scale map SE 20-9, Lat: 18°17.806'S, Long: 65°13.390'W, 2180 m elev; corolla white, stellate; growing at edge of cornfield, at base of hill.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 616  
Jan 14, 1994

Solanum doddsii Correll

Bolivia. Chuquisaca. Campero: from 16 km south of town square of Aiquile, drive 4.5 km west, across river, to town of Pabellón Mayu, then walk south up stream for 0.5 km, 1:250,000-scale map SE 19-9, Lat: 18°17.760'S, Long: 65°15.198'W, 2210 m elev; corollas stellate, white tinged with blue; growing on rocky slope.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 617  
Jan 14, 1994

Solanum berthaultii Hawkes

Bolivia. Chuquisaca. Campero: from 16 km south of town square of Aiquile, drive 4.5 km west, across river, to town of Pabellón Mayu, then walk south, up stream, for 0.5 km, 1:250,000-scale map SE 19-9, Lat: 18°17.760'S, Long: 65°15.198'W, 2210 m elev; corolla blue, fruits round; growing on rocky bank.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 618  
Jan 14, 1994

Solanum tarijense Hawkes

Bolivia. Chuquisaca. Campero: from 16 km south of town square of Aiquile, drive west, across river, to town of Pabellón Mayu, then walk south, up stream, for 0.5 km, 1:250,000-scale map SE 19-9, Lat: 18°17.760'S, Long: 65°15.198'W, 2210 m elev; corolla white, fruits round; growing on steep rocky slope.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 619  
Jan 14, 1994

Solanum megistacrolobum Bitter ssp. toralapanum (Cárdenas and Hawkes) R. B. Giannattasio and D. M. Spooner

Bolivia. Chuquisaca. Azurduy: 85 km north of Azurduy, 1:250,000-scale map SE 20-13, Lat: 19°53'S, Long: 64°34'W, 3200 m elev; corolla violet, pentagonal, fruits round; growing at edge of potato field.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 620  
Jan 16, 1994

Solanum chacoense Bitter

Bolivia. Chuquisaca. Azurduy: about 2 km north on town square of Azurduy on road to Tarabuco, 1:250,000-scale map SE 20-2, Lat: 20°06'S, Long: 64°24'W, 2480 m elev; corolla white, fruits not yet present; growing in back yard of house in organic soil.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 621  
Jan 16, 1994

Solanum hoopesii Hawkes and Okada

Bolivia. Chuquisaca. Azurduy: 18.2 km north of town square of Azurduy on road to Tarabuco, 1:250,000-scale map SE 20-14, Lat: 19°59.691'S, Long: 64°25.931'W, 2690 m elev; corollas blue, fruits not yet present; growing at edge of corn field by rock wall.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 622  
Jan 16, 1994

Solanum hoopesii Hawkes and Okada

Bolivia. Chuquisaca. Azurduy: 24.3 km north of town square of Azurduy on road to Tarabuco, 1:250,000-scale map SE 20-14, Lat: 19°57.603'S, Long: 64°27.470'W, 2860 m elev; corolla blue, fruits round, verrucose; collected at edge of corn field by stream.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 623  
Jan 16, 1994

Solanum arnezii Cárdenas

Bolivia. Chuquisaca. Azurduy: ca 1 km walk east, from Azurduy-Tarabuco road, at edge of garden of resident of town of Abra Kaza, 1:250,000-scale map SE 20-14, Lat: 19°58'S, Long: 64°34'W, 2510 m elev; plants not yet in flower; growing among rocks at edge of garden.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 624  
Jan 16, 1994

Solanum ugentii Hawkes and Okada

Bolivia. Chuquisaca. Azurduy: on east side of road, 88.7 km north of Azurduy, 10.7 km north of Cruz Kaza, 1:250,000-scale map SE 20-13, Lat: 19°47.895'S, Long: 64°34.220'W, 3550 m elev; corollas deep blue, fruits not yet formed; frequent under bushes among stony soil.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 625  
Jan 17, 1994

Solanum ugentii Hawkes and Okada

Bolivia. Azurduy. Azurduy: 103.8 km north of Azurduy on road to Tarabuco, 25.8 km north of Cruz Kaza, 1:250,000-scale map SE 20-13, Lat: 19°42.459'S, Long: 64°34.923'W, 3580 m elev; corollas deep blue, fruits not present; growing at base of rocks up slope on west side of road.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 626  
Jan 17, 1994

Solanum megistacrolobum Bitter ssp. toralapanum (Cárdenas and Hawkes) R. B. Giannattasio and D. M. Spooner

Bolivia. Chuquisaca. Azurduy: 103.8 km north of Azurduy, 25.8 km north of Cruz Kaza, 1:250,000-scale map SE 20-13, Lat: 19°42.459'S, Long: 64°34.923'W, 3580 m elev; corollas purple, fruits round; growing on rocky ground of slope on west side of road.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 627  
Jan 17, 1994

Solanum ugentii Hawkes and Okada

Bolivia. Chuquisaca. Azurduy: 115.2 km north of Azurduy on road to Tarabuco, 37.2 km north of Cruz Kaza, 1:250,000-scale map SE 20-13, Lat: 19°38.523'S, Long: 64°35.433'W, 3440 m elev; corollas deep blue, fruits maturing to mature; growing on steep rocky slope by road.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 628  
Jan 17, 1994

Solanum brevicaule Bitter

Bolivia. Chuquisaca. Yamparaez: 51 km east of center of town of Sucre, 16 km west of center of town of Tarabuco, on road to Zudañez, 1:250,000-scale map SE 20-13, Lat: 19°09.419'S, Long: 65°00.326'W, 2300 m elev; much variation in leaf shape and size, corolla blue, rotate; growing at edge of cornfield.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 629  
Jan 19, 1994

Solanum doddsii Correll

Bolivia. Chuquisaca. Zudañez: 19.6 km east of center of Zudañez, on road to Tomina, 1:250,000-scale map SE 20-13, Lat: 19°08.8'S, Long: 64°34.7'W, 2285 m elev; stems winged, corollas stellate, white tinged with blue; growing among rocks under tree in valley near stream.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 630  
Jan 19, 1994

Solanum doddsii Correll

Bolivia. Chuquisaca. Tomina: 41 km southeast of town square of Padilla town square, then turn left up a steep private jeep road for 1 km, 1:250,000-scale map SE 20-14, Lat: 19°28.007'S, Long: 64°10.541'W, 2380 m elev; corolla light blue, stellate, fruits round; growing among grasses and bushes at edge of small stream between two cultivated fields.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 631  
Jan 20, 1994

Solanum microdontum Bitter

Bolivia. Chuquisaca. Tomina: 41 km southeast of town square of Padilla, then turn left up steep private jeep road for 1 km, 1:250,000-scale map SE 20-14, Lat: 19°28.007'S, Long: 64°10.543'W, 2380 m elev; corolla white, pentagonal, fruits not yet found; growing among grasses and shrubs near small stream between two cultivated fields.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 632  
Jan 20, 1994

Solanum chacoense Bitter

Bolivia. Chuquisaca. Hernando Siles: across Río Azero (east side) from Padilla-Monteaguro road, from 2 km northwest of Azero, a town situated 76 km southeast of Padilla, 1:250,000-scale map SE 20-14, Lat: 19°37.412'S, Long: 64°05.91'W, 1140 m elev; corolla white, stellate, fruits not present despite hundreds of maturing to very mature plants; abundant among grasses and under trees in field and along fencerow at floodplain of river.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 633  
Jan 20, 1994

Solanum arnezii Cárdenas

Bolivia. Chuquisaca. Tomina: 7.9 km west of town square of Padilla, on road to Sucre, 1:250,000-scale map SE 20-14, Lat: 19°17.781'S, Long: 64°20.570'W, 2170 m elev; plants small, no flowers or fruits present; growing among rocks on north side of road in small garden.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 634  
Jan 21, 1994

Solanum microdontum Bitter

Bolivia. Chuquisaca. B. Boeto: 700 m north of town square of Nuevo Mundo on road to Valle Grande, then walk west down hill to cornfield, 1:250,000-scale map SE 20-10, Lat:  $18^{\circ}59.579'S$ , Long:  $64^{\circ}17.246'W$ , 2240 m elev; flowers white, pentagonal, fruits not yet formed; growing in loose organic soil at edges of an in cornfield.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 635  
Jan 21, 1994

Solanum arnezii Cárdenas

Bolivia. Chuquisaca. B. Boeto: 2.6 km north of town square of Nuevo Mundo on road to Valle Grande, then a 1 km walk east, downhill, to a new clearing in the primary forest made for a cornfield, 1:250,000-scale map SE 20-10, Lat:  $18^{\circ}59'S$ , Long:  $64^{\circ}17'W$ , 2120 m elev; plants 1 m tall, corollas stellate, cream-yellow, fruits not yet formed; growing in deep organic soils of primary forest.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 636  
Jan 21, 1994

Solanum arnezii Cárdenas

Bolivia. Santa Cruz. Valle Grande: from a point 0.9 km south of town square of Pucara, on road to Villa Serano, go west downhill through fields for about 700 m to cornfield, 1:250,000-scale map SE 20-10, Lat:  $18^{\circ}43'S$ , Long:  $64^{\circ}11'W$ , 2500 m elev; plants not yet flowering, tubers tan, to 8 cm across; growing among rocks at border of cornfield.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 637  
Jan 22, 1994

Solanum microdontum Bitter

Bolivia. Santa Cruz. Valle Grande: 1.7 km north of town square of Pucara, on road to Valle Grande, on east side of road at margin of cornfield, 1:250,000-scale map SE 20-10, Lat:  $18^{\circ}43.155'S$ , Long:  $64^{\circ}10.525'W$ , 2620 m elev; corolla white, fruits not present; growing in rich soil at border of cultivated field.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 638  
Jan 22, 1994

Solanum microdontum Bitter

Bolivia. Santa Cruz. Valle Grande: 2 km south of Pucara on road to Villa Serano, up hill for ca 1 km, 1:250,000-scale map SE 20-10, Lat:  $18^{\circ}44'S$ , Long:  $64^{\circ}11'W$ , 2600 m elev; ; corolla white, pentagonal.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 639  
Jan 22, 1994

Solanum microdontum Bitter

Bolivia. Santa Cruz. Valle Grande: growing in fencerow among shrubs and rocks by side of road, 23.9 km north of town square of Pucara, 1:250,000-scale map SE 20-10, Lat: 18°36.757'S, Long: 64°07.774'W, 2890 m elev; corolla white, stellate, fruits not yet formed; scattered in protected areas of fencerow.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 640  
Jan 22, 1994

Solanum doddsii Correll

Bolivia. Santa Cruz. Valle Grande: growing along fence rows about buildings of Valle Grande airport, on edge of Valle Grande, 1:250,000-scale map SE 20-10, Lat: 18°29.941'S, Long: 64°06.138'W, 2100 m elev; leaves with glandular pubescence and odor like *Solanum berthaultii*, perhaps a hybrid with it according to Hawkes and Hjerting (1989), corolla stellate-pentagonal, varying in color from white to light blue, fruits not yet formed; growing in deep organic soil, protected by thorn bush fencerow.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 641  
Jan 22, 1994

Solanum litusinum Ochoa

Bolivia. Santa Cruz. Valle Grande: 22.1 km north of large statue of Christ on north side of Valle Grande on road to Matarral, then 11 km west on road to Ariruma, 1:250,000-scale map SE 20-10, Lat: 18°19.668'S, Long: 64°13.889'W, 1960 m elev; plants not yet in flower; growing in rocky soil among bushes by roadside.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 642  
Jan 23, 1994

Solanum litusinum Ochoa

Bolivia. Santa Cruz. Valle Grande: 22.1 km north of statue of Christ on north side of Valle Grande on road to Matarral, then 10 km west on road to Ariruma, 1:250,000-scale map SE 20-10, Lat: 18°19.923'S, Long: 64°13.641'W, 1950 m elev; corolla white, stellate, fruits not yet present; growing in organic soil along pipeline on south side of road.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 643  
Jan 23, 1994

Solanum doddsii Correll

Bolivia. Santa Cruz. Valle Grande: 3.9 km east of town square of Valle Grande on road to Canton Poster Valle, on Cañada de Arteaga, then 300 m south across field to area near small artificial pond, 1:250,000-scale map SE 20-10, Lat: 18°28.803'S, Long: 64°04.662'W, 2100 m elev; corollas varying in color from white to light blue, fruits not yet formed; growing in organic soil in shade of trees by clearing.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 644  
Jan 23, 1994

Solanum chacoense Bitter

Bolivia. Santa Cruz. Valle Grande: 19.1 km north of large statue of Christ on north side of Valle Grande on road to Matarral (3 km south of road to Ariruma), then 300 m east along fencerow, 1:250,000-scale map SE 20-10, Lat: 18°20.822'S, Long: 64°09.551'W, 1750 m elev; corollas stellate, varying in color from white to light blue, fruits round, verrucose; growing in deep sandy irrigated soils along fencerow between two large cornfields, and in cornfields.

Ronald G. van den Berg, David M. Spooner, and María Luisa Ugarte 645  
Jan 24, 1994

Solanum sparsipilum (Bitter) Juz. and Buk.

Bolivia. Cochabamba. Ayopaya: 5.4 km north of Independencia on road to Sivingani, 1:250,000-scale map SE 19-8, Lat: 17°02.861'S, Long: 66°48.106'W, 2900 m elev; plants very small, no flowers present, very similar in appearance to cultivated potatoes but said by local people to be wild; growing along road near cultivated fields.

Ronald G. van den Berg, David M. Spooner, and Willman García Fernández 646  
Feb 3, 1994

Solanum circaeifolium Bitter

Bolivia. Cochabamba. Ayopaya: 3.4 km north of Independencia on road to Sivingani, 1:250,000-scale map SE 19-8, Lat: 17°03.844'S, Long: 66°48.202'W, 2840 m elev; plants young, without flowers; growing among prickly Compositae, on steep slope beside road.

Ronald G. van den Berg, David M. Spooner, and Willman García Fernández 647  
Feb 3, 1994

Solanum yungasense Hawkes

Bolivia. La Paz. Nor Yungas: 8 km south of Yolosa on road to San Juan, 1:250,000-scale map SE 19-3, Lat: 16°16'S, Long: 67°43'W, 1700 m elev; flowers just in bud, corolla white; growing between dense bushes along roadside.

Ronald G. van den Berg, David M. Spooner, and Willman García Fernández 648  
Feb 11, 1994

Solanum achacachense Cárdenas

Bolivia. La Paz. Omasuyos: 13.7 km northeast of Hualata, 1:250,000-scale map SD 19-15, Lat: 15°52.663'S, Long: 68°38.559'W, 4120 m elev; plants low-growing, in full flower but no fruits present, corolla rotate, rich purple; growing among steep rock cliffs by road.

Ronald G. van den Berg, David M. Spooner, and Willman García Fernández 649  
Feb 12, 1994

Solanum circaeifolium Bitter

Bolivia. La Paz. 0.5 km southwest of town square of Laripata (walk uphill) (Laripata is 10 km drive north of Soratá, 1:250,000-scale map SD 19-15, Lat: 15°44.614'S, Long: 68°38.774'W, 3120 m elev; plants with white stellate corollas, fruits not present; growing under bushes on slopes adjacent to pastures and cultivated fields.

Ronald G. van den Berg, David M. Spooner, and Willman García Fernández 650  
Feb 13, 1994

Solanum candolleanum Berthault

Bolivia. La Paz. Larecaja: growing in cemetery on outskirts of Tacacoma, 1:250,000-scale map SD 19-15, Lat: 15°35.496'S, Long: 68°38.774'W, 3560 m elev; plants in full flower, but few found in fruit, corollas rotate, purple, fruits round; common in protected area of cemetery.

Ronald G. van den Berg, David M. Spooner, and Willman García Fernández 651  
Feb 13, 1994

Solanum tuberosum L. ssp. *andigena* (Juz. and Buk.) Hawkes

Bolivia. La Paz. Larecaja: growing about Hotel La Mansion in area called Ladrilluni, ca 1 km south of town square of Soratá, 1:250,000-scale map SD 19-15, Lat: 15°46.866'S, Long: 68°38.739'W, 2730 m elev; growing at edge of plantation and in gardens; fruits round.

Ronald G. van den Berg, David M. Spooner, and Willman García Fernández 652  
Feb 13, 1994

Solanum candolleanum Berthault

Bolivia. La Paz. Franz Tamayo, ca 3 km south of Quiera, on road to Pelechuco, at a locality called Pauchi, ca 1 km south of home of Guillermo Quispe 1:250,000-scale map SD 19-10, Lat: 14°42'S, Long: 69°01'W, 3770 m elev; corolla blue, rotate, fruits round, mature; growing in moist organic soil at base of waterfall.

Ronald G. van den Berg, David M. Spooner, and Willman García Fernández 653  
Feb 18, 1994

Solanum neovavilovii Ochoa

Bolivia. La Paz. Franz Tamayo, growing along rock wall on south side of Muyapampa, on Pelechuco-Mojos path, ca 3 km east of Quiera, 1:250,000-scale map SD 19-10, Lat: 14°41'S, Long: 69°01'W, 3300 m elev; corollas blue, rotate-pentagonal, fruits (immature) conical; growing along rock wall by path in moist organic soil, in semi-shade of trees.

Ronald G. van den Berg, David M. Spooner, and Willman García Fernández 654  
Feb 18, 1994



Solanum bombycinum Ochoa

Bolivia. La Paz. Franz Tamayo, 10 m west (towards Pelechuco) of bridge crossing over Río Chullumuyo, on horse trail from Pelechuco to Mojos, ca 6 km east of Quiera, 1:250,000-scale map SD 19-10, Lat: 14<sup>o</sup>41'S, Long: 69<sup>o</sup>01'W, 2870 m elev; stems green-purple mottled, plants to 1 m tall, leaves densely pubescent, corolla rotate-pentagonal, lilac, fruits (immature) conical; growing in hard clay soil in moist valley.

Ronald G. van den Berg, David M. Spooner, and Willman García Fernández 655  
Feb 19, 1994

Solanum brevicaule Bitter

Bolivia. La Paz. Larecaja, at San Pedro, a place 8 km from a road junction beginning 2 km from town square of Soratá on road to Larecaja, 1:250,000-scale map SD 19-15, Lat: 68<sup>o</sup>S, Long: 40<sup>o</sup>W, 2700 m elev; corolla blue, rotate-pentagonal, fruits round; growing in cornfield.

Ronald G. van den Berg, David M. Spooner, and Willman García Fernández 656  
Feb 23, 1994

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## RECOMMENDATIONS FOR FUTURE COLLECTING IN BOLIVIA

Many areas in Bolivia have very seasonal climates, and potato populations flower and fruit in specific times, with different species best visited over our estimate of different 4-6 week periods ranging from early January to late March. Consequently, we were unable to visit all localities of our target species at ideal times for collecting. Also, roads closed by floods in the unseasonably rainy year of 1993 lost us much valuable collecting time and thwarted our plans to collect in certain areas, most notably: 1. on the road from Padilla to Mataral (S. chacoense, S. circaefolium, S. litusinum, and S. neocardenasii), 2. the road from Cochabamba to Independencia (S. circaefolium and S. okadae), 3. the road from Soratá to Tacacoma (S. candolleanum, S. circaefolium, and S. virgultorum), 4. La Paz Province from Achacachi northwest to the Peruvian border, collecting on the roads from Achacachi to Pelechuco, including side roads (S. flavoviridens, S. violacemarmoratum), 5. hike north of Pelechuco to Queara, Río Chullumayo valley, and trail to Puina (S. bombycinum, S. neovavilovii).

APPENDIX 1. Herbarium holdings at the Herbario Nacional de Bolivia, Correo Central Cajon Postal 10077, La Paz, Bolivia (LPB). See itinerary of February 2.

Following is an alphabetized list of all Bolivian wild potato species (unless otherwise indicated) with herbarium representatives at LPB. The numbers without other data following each species are Ochoa's (and/or Alberto Salas's, Ochoa's assistant) collection numbers. All of these are in Ochoa (1990), and full locality data can be obtained there. The non-Ochoa collections are provided full passport data:

Solanum acaule Bitter

11824, 11961, 14951, 15569

La Paz: Prov. Aroma, 65 km hacia el Sur, 10 km del desvío hacia Sapahaqui, 4150 m., 68°W, 17°S.; ladera con gramíneas en macollos, roseta, S. G. Beck 6018, 18 Jan 1981

La Paz: Prov. Las Andes, Khallutaca (El Alto 11 km hacia Tiahuanaco), 3900 m, 3°NE; anuales en pajonal de Stipa ichu y F. dolichophylla; tubérculos 1-2 cm, flor azul-morada, frutos 1-2 cm; S. G. Beck 248, 25 Jan 1979

La Paz: Prov. Murillo, Valle de Zongo, 4240 m, cespced al lado del Río Zongo, no muy húmedo, con muchas heces de llama, roseta -4cm altura, con tubérculos, flor violeta; S. G. Beck 2777, 12 Jan, 1980 (2 specimens)

La Paz: Proy. Murillo, 15.6 km above (SW) Cuticucho hydroelectric plant, 4100 m, 16°13'S, 68°07'W; fruits green, fleshy, moist puna on steep slopes with some low shrubs, J. C. Solomon 13384, 17 April, 1985

La Paz: Prov. Los Andes, Valle Hichu Kkota, pradera Húmeda, 4500 m; herbácea acaule, hojas divididas, flores violetas, nabo blanco; C. Ostria 126, 30 Jan, 1984

La Paz, Prov. Pacajes, Antaquira, 68°39'W, 17°04'S, 3900 m elev, altiplano in corral and manure pile; rosette to 10 cm across, corolla lilac; Timothy Johns 82-66, 6 Dec, 1982

[La Paz]: Achacachi; papas blancas; J[uan] Cañigüeral [S.J.] 976, 8 Jan, 1957

La Paz: Prov. Murillo, 40 km NNE linea recta de La Paz, Valle de Zongo, 4125 m; ladera con trozos de roca en pastizal de macollos; corola azul, roseta; S. G. Beck 6091, 1 Feb, 1981

La Paz: Prov. B. Saavedra, Estancia Jachatira, (Abra Pumasani - Ulla Ulla), 4450 m; lugar con estiércol de alpacas; flores azules-violetas; X. Menhofer X-1942, 7 Feb, 1983

Tarija: Prov. Aviles, cerca Cobre, 3550 m, N Exp. 15°; pasto húmedo, suelo húmedo, pH 6, flores azules, hasta 10 cm, geopyyt, tiene papas, rel. raro; E. Bastión 620, 29 Jan, 1986

S. alandiae Cárđ.

12012, 12013, 12014, 12017

S. arnezii Cárđ. (note: Ochoa synonymizes under S. chacoense Bitter)  
Dept. Santa Cruz. Prov. Cordillera: Camiri, 75 km hacia Monteagudo, abra de Incahuasi, 1600 m, al borde de camino; bosque montañoso, relativamente húmedo, 40 cm, corola blanco-morado. S. G. Beck and M. Liebman 9822. Dec 27, 1983

S. berthaultii Hawkes  
12008, 15565

S. boliviense Dunal  
11929, 11933, 11935, 11938, 11954

S. brevicaule Bitter  
11934, 15497

S. candelarianum Cárđ.  
15542, 15543

S. candolleanum Berthault  
11502, 11805, 11814, 11896, 11897, 11913, 14959, 15463

S. capsicibaccatum Cárđ.  
Cárđenas 5515, 5519

S. chacoense Bitter  
12026

S. circaeifolium Bitter var. circaeifolium  
11806, 11909

S. circaeifolium var. capsicibaccatum (Cárđ) Ochoa  
15489, 15567

S. curtilobum Juz. and Buk.  
Colomi - Cochabamba; Cárđenas 2199, Oct 1941

S. doddsii Correll  
12004

S. flavoviridens Ochoa  
T 11900 (isotype), 15460

S. gandarillasii Cárđ.  
12010

S. gourlayi Hawkes pachytrichum (Hawkes) Hawkes and Hjert.  
Dept. Potosí: Prov. Bustillos, 41 km hacia Pocoata, 3300m.; ladera seca con arbustos escasos, sobre el Río Colorado; corola morada, baya verde con puntos blancos. S. G. Beck 6166, 6/3/1981

S. gourlayi ssp. viddaurei (Cárđ.) Hawkes and Hjert.  
Dept. Tarija: Prov. Cercado, Cuesta de Sama cerca del camino, 2800 m.; puesto húmedo, suelo limoso, pH 5. E. Bastión 545, Jan 24, 1986

12003 (identified as S. viddaurei by Ochoa)

S. infundibuliforme Philippi  
11942, 11966, 11973, 11977

Oruro: Prov. L. Cabrera, Salinas de G. Mendoza hacia el Oeste vía Iswaya, ca. 3800 m.; cumbre rocas-pedregosa, erecta, 30 cm. S. B. Beck 11787, Mar 1, 1986

Cochabamba: Ayopaya - Cochabamba; Cárdenas 2179, Oct 1941

S. leptophyes Bitter  
15455

La Paz: Prov. Murillo, río Abajo, laderas al sur de Juparina con matorral abierto, 3100-3400 m.; S. G. Beck 14231, Feb 22, 1987.

S. megistacrolobum Bitter  
11914, 11916, 11963, 11964, 11981, 11985 (topotype), 12098

La Paz: Prov. Murillo, Calacoto, 18 km hacia Collana, 3800 m; laderas altas; sobre el valle del río con chacras pastizales y arbustos al borde, anual, baya globosa, único; S. G. Beck 13798, 3 April, 1988

S. microdontum Bitter  
15509, 15552

S. microdontum var. gigantophyllum (Bitter) Hawkes and Hjert.  
15534, 15540

Dept. Tarija: Prov. Cercado, cerca Tacumilla, ca. 2650 m., S. exp 20<sup>0</sup>, pH 5, suelo rocoso; Bastión 496; Jan 22, 1986

S. microdontum var. montepuncoense Ochoa. (Hawkes and Hjerting [1989] suggest that this taxon is a natural hybrid between S. microdontum ssp. gigantophyllum and S. violaceimarmoratum).  
T 12025 (isotype)

S. neovavilovii Ochoa  
14994

S. okadae Hawkes and Hjert.  
15501, 15508, 15488

S. oplocense Hawkes  
11572, 11576, 11927, 11928, 11969 (topotype)

S. soestii Hawkes and Hjert.  
15502, 15503, 15505

S. sparsipilum (Bitter) Juz. and Buk.  
11820, 11911, 11940

Cochabamba: Prov. Mizque, Cantón Molinero, Rakaypampa, Llanero, 2900 m.; M. Sigle 204, 8/1/87

S. sucrense Hawkes  
11926 (topotype)

S. tariense Hawkes11993, 11994, 12000, 12001, 12005, 15592, 15596, 15598Argentina. Prov. Salta: Dept. Santa Victoria. cuesta de Mesón, quebrada al pie; H. Sleumer 1002, February 12, 1953Bolivia. Dept. Tarija: Prov. Cercado, cerca Río de Molino, al camino a Tolomosa, ca. 1890 m.; plano suelo franco-arcilloso con pocas piedras, pH 7.5; E. Bastión 237, Dec 23, 1985Bolivia. Dept. Tarija, Priv. Cercado, cerca de Vivero, CODETAR/Cojmata, ca. 1980 m., NE-Exp. 10<sup>o</sup>; suelo rocoso; E. Bastión 125A, Dec 18, 1985S. toralapanum Cárđ. and HawkesLa Paz: Prov. Inquisivi, cantón Jesús de Manchara, comunidad Titicani - Tacana, 3900 m.; encuentra media cultivos, con frutos y flores lilas; X. Villavicencio L. 153, Mar 15, 1989Cochabamba: Prov. Mizque, Contón Molinero, Rakaypampa, Llanero, 2900 m.; M. Sigle 203, 8/1/87La Paz: 3900 m., sobre Chuquiaquillo, cerca de la vía debajo de cultivos. Juan Cañiqueral S. J. 1055, Jan 24, 1958Tarija: Prov. Cercado, cerca Tucumilla, ca. 2650 m., N Exp. 18<sup>o</sup>, E. Bastión 495, Jan 22, 1986S. violaceimarmoratum Bitter11901, 11908La Paz: Prov. Nor Yungas, 34 km de la cumbre hacia Corioco, Chuspipata, 3100m., cerca de la montaña; hierba 20 cm, corola morada en lugar alternado. S. G. Beck 7798 Jan 1, 1983S. virgultorum (Bitter) Cárđenas and Hawkes15546S. yungasense HawkesLa Paz: Nor Yungas, 4.5 km below Yolosa, 0.7 km W on a road to Río Huarinilla, 16<sup>o</sup>12'S, 67<sup>o</sup>45'W, 1200 m elev, ford across Río Coroico; corollas white; J. C. Solomon 8919, 14 Nov, 1982



APPENDIX 2. Herbarium holdings at the Herbario Nacional Forestal Dr. Martín Cárdenas, Casilla 538, Cochabamba, Bolivia (BOLV). See itinerary for February 4.

Most holdings at BOLV are for Bolivia, followed by Argentina and Perú. Those holdings preceded by an asterisk have abbreviated data that can be completed by reference to Hawkes and Hjerting (1969, 1989) or Ochoa (1990). We took photographs of all of these types. Following is an alphabetized accounting of the entire BOLV collection of sect. Petota. The types are listed by their name as filed in the herbarium, with their synonymy listed afterwards:

Solanum acaule:

Bolivia. Cochabamba: Koari, Meneses s. n., May 3, 1976

Bolivia. Cochabamba: Quillacallo, bosque de Polylepis, camino Sipe-Sipe-Lipichi, 3800 m.; planta con flores azules, frutos abundantes, dentro los cultivos, Isabella Henson 511, Jan 29, 1990

Perú. Puno. Cárdenas and Gandarillas s. n., May, 1943

S. ajanhuiri Juz. and Buk.

Bolivia. Cochabamba: Ayopaya-Cochabamba; Cárdenas 2200, Dec, 1941

Bolivia. La Paz: Prov. Ingavi, near Tiahuanaco; E. K. Balls, and J. G. Hawkes 6311, s. d.

S. alandiae Córd.

T \* Argentina; Cárdenas 5079

S. arnezii Córd.

T \* Cárdenas 5076 (2 sheets)

S. avilesii Hawkes and Hjert. (Ochoa [1990] treats this taxon under S. candelarianum Card., an homonym of S. candelarianum Buk. = S. stoloniferum Schld. and Bché., fide Hawkes and Hjert. [1990])

Bolivia. Santa Cruz: Entre Valle Grande and Pucará, hojas pubescentes, azul, grande. M. Cárdenas s. n., s. d. (annotated as S. alandiae by Hawkes and Hjerting, 1989)

\* Cárdenas 6113

S. berthaultii Hawkes

\* Meneses 2002, 2004

Cárdenas 3513

S. boliviense Dunal

\* Balls, Gourlay, and Hawkes, 6188, 6190 (2 sheets)

\* Cárdenas 6121

S. brevicaule Bitter

\* Puente San Miguel, Cárdenas s. n. (2 specimens)

\* Cárdenas 5518, 6114 (this sheet determined as S. brevicaule by Ochoa, but as S. gourlayi ssp. pachytrichum by Hawkes and Hjerting)

Parque Tunari, Grover Vega Nov 11, 1981

Cochabamba: Liriuni - Cochabamba; Cárdenas 8325, March, 1944

\* Meneses, 2009

S. bukasovii Juz.

Perú. Junín: Dist. Concepción, Prov. Tunja, alrededor de Concepción, del camino Concepción Santa Rosa de Ocopa; C. Ochoa 56, Feb 7, 1947

Perú. Junín: Dist. Comes, Prov. Tunja, 3500 m.; Cárdenas 60, Feb, 1947 (2 sheets)

S. caipipendense Cárdenas (= S. chacoense Bitter, fide Hawkes and Hjerting [1989] and Ochoa [1990])

T \* Cárdenas 5072 (3 sheets).

S. candolleianum Berthault.

Bolivia. La Paz: Mina Gran Poder; Cárdenas s. n., Mar, 1951

Bolivia. La Paz: Llina ?, Gran Poder, Tacoma;

S. cardenasii Hawkes (= S. phureja Juz. and Buk. fide Hawkes and Hjerting [1989] and Ochoa [1990])

\* Cárdenas 2002

S. cardiophyllum Lindley

México. Dist. Federal: Sierra de Guadalupe, 7000 ft.; Balls and Gourlay 4944, 4/7/1938 (= August ?)

S. chacoense Bitter

T \* of S. saltense Argentina; Balls, Gourlay and Hawkes 5935

S. chacoense X S. microdontum Bitter ssp. gigantophyllum (Bitter) Hawkes and Hjert.

\* Argentina; Peterson and Hjerting 32

T \* of S. jujuyense Hawkes, Argentina; Balls, Gourlay and Hawkes 5921

S. circaeifolium

\* Cárdenas 6115

S. colombianum Dunal

There are a number of herbarium sheets labelled as this taxon without any data other than "Herb. Kew", numbers 161, 162, 190, 192, 212, 229, 415, 605, 1912

Colombia: Putumayo: Laguna La Cocha, above El Encano, ca 11,000 ft., 7529

Colombia. Cundinamarca: La Caldera, Santa Bárbara, J. G. Hawkes and E. K. Balls 7423

Ecuador. Cañar: above Azogues, roadside, 12,000 ft. Balls 7084, May 23, 1939

S. colominense Cárdenas (= S. brevicaule Bitter, fide Hawkes and Hjerting [1989], Ochoa [1990])

T \* Cárdenas 3686

S. demissum Lindley

México. Puebla: Mt. Orizaba, Sierra Negra, 10,700 ft.; N. and E. K. Balls and W. B. Gurlayi B4411, May 5, 1938

S. doddsii Correll (= S. chacoense X S. alandiae fide Hawkes and Hjerting, 1989)  
T Bolivia.; Meneses 2007

S. edinense Berth. ssp. salamanii (Hawkes) Hawkes

México. México: Nevado de Toluca, Paraje, Munguía, 11,600 ft.; N. and E. K. Balls and W. B. Gurlayi 5010, July 12, 1939

S. fragariaefructum Hawkes (= S. multidissectum Hawkes, fide Hawkes [1990])  
Perú. Ayacucho: Prov. Caugallo, Pallaco?, Río?, 10,500 ft; Balls and Hawkes 6931

S. gandarillasii Cárđ.

T \* Cárđenas 5068 (2 specimens)

Serpas? km. 30, camino Sucre-Cochabamba, 2050 m.; Cárđenas s. n., May 8, 1974

S. glanduliferum Hawkes (= S. infundibuliforme Philippi fide Hawkes and Hjerting [1989] and Ochoa [1990])

T \* Balls, Gurlayi, and Hawkes 5956

S. gurlayi Hawkes

T \* Argentina: Balls, Gurlayi, and Hawkes 5979

S. gurlayi ssp. pachytrichum (Hawkes) Hawkes and Hjerting (= S. leptophyes Bitter, fide Ochoa [1990])

T \* Balls, Gurlay and Hawkes, 6117

S. gurlayi ssp. viddaurei (Cárđ.) Hawkes and Hjert. (identified and filed under S. viddaurei Cárđ., as it is recognized by Ochoa [1990])

T \* Cárđenas 5075 (2 sheets)

S. infundibuliforme Philippi

\* Cárđenas 6119 (part of a mixed collection with S. leptophyes Bitter, see under below)

\* Km. 45, Potosí - Camargo, Cárđenas s. n.

\* Balls, Gurlayi, and Hawkes 6126

S. juzepczukii Buk.

Bolivia. La Paz: Inguavi, Tiahuanaco; Balls and Hawkes 6336

S. lapazense Hawkes (= S. sparsipilum [Bitter] Juz. and Buk. fide Hawkes and Hjerting (1989) and Ochoa (1990))

T \* Balls 5903

S. leptophyes Bitter

\* Cárđenas 6119 (part of a mixed collection with S. infundibuliforme, see above)

S. megistacrolobum Bitter

\* Argentina; E. K. Balls, W. B. Gurlayi, and J. G. Hawkes 5986 p. p. (filed under

S. alticolum var. xanthotrichum)\* Argentina; Balls, 5991\* Bolivia; Sivingamao-Churgui; Cárdenas s. n.\* Bolivia; Balls, Gourlayi, and Hawkes 5987, p. p.Bolivia. 30 km a Camargo a Potosí; Cárdenas s. n., May, 1952S. microdontum Bitter\* Argentina; Balls 5936\* Argentina; Balls, 6040 (2 specimens)\* Argentina; Peterson and Hjerting P-37\* Argentina; Peterson and Hjerting P-49\* Bolivia; Balls 6125 (2 specimens)\* Bolivia Cárdenas 5067 (2 specimens)\* Bolivia; Cárdenas 5517 (2 specimens)\* Bolivia; Cárdenas 6117 (2 specimens)\* Bolivia; Meneses 2005S. multidissectum HawkesPerú. Cuzco: Prov. Canas, Checca; Vargas 10006S. oxycarpum ScheideMéxico. Veracruz: Perote, La Joya, 6500 ft.; Balls and Gourlayi, Sept 22, 1938S. pampasense HawkesPerú. Apurímac: Río Panyras? valley, 4 leagues above, 7000 ft.; E. K. Balls and J. G. Hawkes 7007, May 24, 1939S. sanctae-rosae Hawkes\* Argentina. Peterson and Hjerting 328S. semidemissum Juz.México. México: Mt. Popocatepetl, below Paraje Provincial; N. and E. K. Balls and W. B. Gourlayi 5154, July 31, 1938S. sparsipilum (Bitter) Juz. and Buk. (filed under S. brevimucronatum Hawkes)\* Balls 5895\* Cárdenas 3508\* Balls, Gourlayi, and Hawkes 5895, 6222S. stenotomum Juz. and Buk.Bolivia. La Paz: Ingavi, Tiahuanaco; E. K. Balls and J. G. Hawkes 6335

S. stoloniferum Schldl.

México. Tlaxcala: Mt. Malinche, Tetlanochan (San Francisco), 7500 ft.; N. and E. K. Balls and W. B. Gourlayi 4864 June 21, 1938

S. subandigenum var. camarguense Cárđ. (= S. oplocense Hawkes, fide Ochoa [1990]; = S. sucrense Hawkes, fide Hawkes and Hjerting [1989])

T \* Cárđenas 5078 (3 sheets)

S. sucrense Hawkes

\* Mollevilque (5 sheets); Cárđenas s. n.

\* Sivingamato, Cárđenas s. n. (2 sheets)

\* Balls 6169, 6170, 6171

S. tariense Hawkes

Argentina. Santa Victoria: Cuesta de Mesón, al pie de la quebrada , ca. 2500 m.; flor viol. pálida. 12/2/1953

S. trigalense Cárđ. = S. tariense Hawkes

T \* Cárđenas 5059 (3 sheets)

S. tariense X S. berthaultii

\* near Recolecta, Cárđenas s. n.

S. toralapanum Cárđ. and Hawkes

\* Cárđenas 3680, 3681, 3682, 6112

\* Meneses 2010

\* Colomi, Chaupare, Cárđenas s. n.

\* km 107, a Toro Toro a Cochabamba, Cárđenas s. n. (2 sheets)

\* Toralapa, Hacienda Casa Antigua, Cárđenas s. n.

S. vallegrandense Cárđ. (= S. berthaultii Hawkes fide Hawkes and Hjerting [1989] and Ochoa [1990])

T \* Cárđenas 5070 (2 sheets)

S. vallegrandense var. pojoense Cárđ. (= S. berthaultii Hawkes fide Hawkes and Hjerting [1989] and Ochoa [1990])

T \* Cárđenas 5071 (2 sheets)

S. vernei Bitt. and Wittm.

\* Argentina. Peterson and Hjerting 39

S. verturii Hawkes and Hjert.

\* Argentina. Peterson and Hjerting 30

S. violaceimarmoratum Bitter

\* Balls 6275 (5 sheets)

\* Cárđenas 6116 (2 sheets), 6118 (2 sheets)

\* Meneses 2012

APPENDIX 3. Herbarium holdings in the Departamento de Fitotecnia, Facultad de Ciencias Agrícolas y Pecuarias, Universidad de San Simón, Cochabamba, Bolivia. This herbarium is not listed in Holmgren et al. (1990). See itinerary of April 8.

Solanum achacachense Cárđ.

T \* Cárđenas 3688

S. candelarianum Cárđ. (= S. avilesii Hawkes and Hjert.)

T \* Cárđenas 5080

S. cevallos-tovari Cárđ. (= S. microdontum Bitter)

T \* Cárđenas 5087

S. cuevoanum Cárđ. (= S. chacoense Bitter)

T \* Cárđenas 5073

S. torrecillasense Cárđ (= S. alandiae Cárđ.)

S. ureyi Cárđ. (= S. megistacrolobum var. toralapanum [Card. and Hawkes] Ochoa)

T \* Cárđenas 3262

S. urunense Cárđ. (= S. acaule Bitter ssp. acaule)

T \* Cárđenas 5074

S. vallegrandense Cárđ (= S. berthaultii Hawkes)

T \* Cárđenas 5070

#### NON-TYPES

S. sucrense Hawkes (on label)

Cochabamba. Las Cuadras [near city of Cochabamba] , 2560 m, Cárđenas s. n., II, 1961 (2 specimens)

## APPENDIX 4. Priority for Bolivian collections at the start of the expedition.

Following is the result of our NRSP-6 germplasm mapping exercise (see itinerary of February 5). In many cases, localities were somewhat vague, and they were mapped as accurately as possible with data such as province. We prioritized our collecting plans based on number of NRSP-6 germplasm holdings and distribution of collections relative to overall known range, i.e., some collections with many germplasm accessions may have been concentrated in a small part of the range and were given a higher collection priority. Our collection priority code is: 1, highest priority; 4, lowest. The planning maps are deposited at NRSP-6. These were mapped based on a liberal taxonomic concept accepting taxa from both Hawkes and Hjerting (1989) and Ochoa (1990).

Species	Total NRSP-6 (No. mapped)	Total Bolivian distribution	Collection Priority
1. <u>S. acaule</u>	77 (70)	Throughout Andes	4
2. <u>S. achacachense</u>	1 (1)	N. La Paz Prov.	1
3. <u>S. alandiae</u>	12 (12)	S. Coch. Prov and Chuq. Prov.	3
4. <u>S. arnezii</u>	4 (4)	N. Chuq. Prov.	1
5. <u>S. astylei</u>	2 (2)	S. of Sucre town	1
6. <u>S. avilesii</u>	3 (3)	E. Sta. Cruz Prov. and E. Coch. Pr.	1
7. <u>S. berthaultii</u>	12 (12)	Coch. and Chuc. Prov.	3
8. <u>S. boliviense</u>	12 (12)	S of Sucre town	3
9. <u>S. bombycinum</u>	0	N La Paz Prov.	1
10. <u>S. brevicaule</u>	11 (11)	Cochabamba	2 (for E pops.)
11. <u>S. canasense</u>	1	Peru (Bolivia?)	3
12. <u>S. candolleianum</u>	5 (5)	N La Paz. Prov.	2
13. <u>S. capsicibac.</u>	4 (3)	NNW and SSE of Cochabamba city	2
14. <u>S. chacoense</u>	0	SE Coch. Prov. and E St. Cruz Prov.	1
15. <u>S. crc ssp. crc</u>	3 (3)	N La Paz Prov.	2
16. <u>S. crc ssp. gum</u>	4 (4)	SE La Paz Prov. and adj. E Coch. Pr.	2
17. <u>S. doddsii</u>	12 (11)	Coch. Prov. S of Totora	3
18. <u>S. flavoviridens</u>	0 (0)	N La Paz	1
19. <u>S. gandarillasii</u>	5 (4)	S Coch. adj. N Chus. Prov.	2

## Appendix 4, cont.

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20.	<u>S. grl</u> ssp. <u>grl</u>	7 (5)	? NRSP-6 records La Paz Prov., but Hawkes and Hjerting say just in Arg.	2
21.	<u>S. grl</u> ssp. <u>vid</u>	0	S Chuq. Prov.	1
22.	<u>S. hondelmannii</u>	16 (15)	S of Sucre town	4
23.	<u>S. hoopsei</u>	3 (3)	E- cent Chuq Prov.	2
24.	<u>S. infundibulif.</u>	7 (6)	Coch. Prov S to Arg	2
25.	<u>S. leptophyes</u>	19 (19)	La Paz Prov. - Potosí Prov. (but all 19 localities near Oruro or Potosí)	3
26.	<u>S. litusinum</u>	0	E Sta. Cruz Prov.	1
27.	<u>S. megistacrol.</u>	28 (21)	Throughout Andes	4
28.	<u>S. microdontum</u>	15 (13)	Throughout Andes	4
29.	<u>S. neocardenasii</u>	2 (2)	E Santa Cruz Prov.	1
30.	<u>S. neorosii</u>	0	Argentina, but close to Bolivia	2
31.	<u>S. neovavilovii</u>	0	N La Paz Prov.	1
32.	<u>S. okadae</u>	4 (4)	SE La Paz Prov. and adj. Coch. Prov.	2
33.	<u>S. oplocense</u>	22 (19)	Potosí, Chuquisaca; S of Sucre town	1
34.	<u>S. soestii</u>	0	SE La Paz Prov.	1
35.	<u>S. sparsipilum</u>	46 (39)	Throughout Andes	4
36.	<u>S. sucrense</u>	30 (24)	Potosí, Chuquisaca P; S of Sucre town	4
37.	<u>S. tarijense</u>	14 (13)	S. Bolivian Andes	4
38.	<u>S. toralapanum</u>	25 (25)	Throughout Andes	4
39.	<u>S. ugentii</u>	3 (3)	E-cent. Chuquisaca Prov.	2
40.	<u>S. ver</u> ssp <u>ver</u>	0	Argentina, but close to Bolivia	2
41.	<u>S. virgultorum</u>	0	Sta. Cruz, Coch., La Paz. Prov.	1
42.	<u>S. yungasense</u>	0	N La Paz Prov.	1
43.	<u>S. violaceimar.</u>	7 (7)	La Paz and Coch Prov.	2

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APPENDIX 5. Disposition of germplasm and herbarium collections, 1993 expedition. See cover for herbarium codes. This report was distributed before PROINPA extracted and distributed remaining seeds. The question mark under the germplasm column of PROINPA is necessary because we are unsure if sufficient seed exists for PROINPA to retain seed before the first seed increase at NRSP-6 (see Appendix 10).

Coll. #	Species	Map area	Germplasm dist.			Herbarium dist.		
			NRSP-6	PROINPA	BOLV	NRSP-6	WAG	WIS
6500	spl	28	X	?				
6501	mga	26	X	?				
6502	acl	28	X	?				
6503	ber	25	X	?	X	X	X	X
6505	spl	25	X	X	X	X	X	X
6507	mga	25			X	X		
6509	juz	30	T	?	X	X	X	X
6510	acl	30	X		X	X	X	X
6511	spl	30	X		X	X	X	
6512	acl	30	X	X	X		X	
6514	mga	31	X		X	X	X	X
6515	brc	31	X		X	X	X	X
6518	brc	31	X	?	X	X	X	X
6519	brc	32			X	X	X	X
6520	mga	32	X		X	X	X	X
6521	acl	32	X		X		X	
6522	mga	33	X		X	X	X	X
6523	acl	33	X	X	X	X	X	X
6524	blv	34	X	?	X	X	X	X
6525	tar	44	X	?	X	X	X	X
6526	spl	44	X	X	X	X	X	X

## APPENDIX 5, cont.

Coll. #	Species	Map area	Germplasm dist.			Herbarium dist.		
			NRSP-6	PROINPA	BOLV	NRSP-6	WAG	WIS
6527	tar	62	X	?	X	X	X	X
6528	spl	62	X		X	X	X	X
6529	tar	62	X	?	X	X	X	X
6530	ber	62	X	?	X	X	X	X
6531	blv	63	X	?	X	X	X	X
6532	blv	64	X	?	X	X	X	X
6533	brc	64	X	X	X	X	X	X
6535	blv	64	X	?	X	X	X	X
6536	brc	64	X	?	X	X	X	X
6537	mga	66	X		X	X	X	X
6539	ifd	67	X	?	X	X	X	X
6543	mga	67	X		X	X	X	
6544	spl	68	X	?	X	X	X	X
6545	brc	68	X	?	X	X	X	X
6546	ifd	68	X	?				
6547	ifd	70	X		X	X	X	X
6548	spl	70	X		X	X	X	
6552	spl	72	X	X	X	X		
6554	spl	72			X	X	X	X
6556	ifd	75			X	X	X	
6557	opl	77			X	X	X	
6558	ifd	77			X	X	X	
6559	opl	77			X	X	X	

## APPENDIX 5, cont.

Coll. #	Species	Map area	Germplasm dist.			Herbarium dist.		
			NRSP-6	PROINPA	BOLV	NRSP-6	WAG	WIS
6561	ifd	76	X		X	X	X	X
6562	mga	76			X	X		
6563	mga	76	X		X	X	X	X
6564	ifd	76	X	?	X	X	X	X
6566	mga	76	X	X	X	X	X	X
6568	mga	74	X		X	X	X	X
6569	ifd	74			X	X	X	
6572	mga	74	X	X	X	X	X	X
6573	acl	74	X		X	X	X	X
6574	ifd	79			X	X	X	X
6575	opl	79	X		X	X	X	X
6576	acl	79	X		X	X	X	X
6577	mga	80	X		X	X	X	X
6787	tar	81	X	?	X	X	X	X
6588	tar	81			X	X	X	X
6590	tar	81	X	?	X	X	X	X
6599	mcd	82	X	?	X	X	X	X
6602	mcd	82	X	?	X	X	X	X
6603	mcd	81			X	X	X	X
6606	brc	78			X	X		
6607	brc	73	X	X	X	X	X	
6608	brc	73	X	? T	X	X	X	X
6611	brc	73	X	?	X	X	X	X

## APPENDIX 5, cont.

Coll. #	Species	Map area	Germplasm dist.			Herbarium dist.		
			NRSP-6	PROINPA	BOLV	NRSP-6	WAG	WIS
6612	blv	73	X	?	X	X	X	X
6613	vid	73			X	X		
6614	vid	73	X		X	X	X	X
6615	brc	71	X	?	X	X	X	X
6616	mga	71	X	?	X	X	X	X
6618	spl	69	X	X	X	X	X	X
6619	blv	65	X	?	X	X	X	X
6620	vid	65			X	X	X	
6621	acl	65	X	X	X	X	X	
6622	tar	43	X	?	X	X	X	X
6623	tar	42	X	?	X	X		
6624	gnd	42	X	?	X	X	X	X
6626	tar	41	X	?	X	X	X	X
6629	ber	26	X	?	X	X	X	X
6630	spl	32	X					
6631	tor	29	X	?	X	X	X	X
6632	brc	29	X		X	X	X	X
6634	brc	29	X	X	X	X	X	X
6635	tor	29	X	X	X	X	X	
6644	aln	35	X	?	X	X	X	X
6645	aln	35	X	?	X	X	X	X
6646	crc	35	X	?	X	X	X	X
6647	aln	35	X	?	X	X	X	X

## APPENDIX 5, cont.

Coll. #	Species	Map area	Germplasm dist.			Herbarium dist.		
			NRSP-6	PROINPA	BOLV	NRSP-6	WAG	WIS
6649	dds	36	X	?	X	X	X	X
6650	aln	36			X	X		
6651	dds	36	X	?	X	X	X	X
6652	gnd	39			X	X		
6654	tar	39	X	?	X	X	X	
6656	gnd	39	X	?	X	X		
6658	gnd	42			X	X	X	X
6659	tar	45	X	?				
6660	opl	46	X	?	X	X		
6661	tar	46	X	?				
6663	opl	46	X	?	X	X	X	X
6665	opl	52	X	?	X	X		
6667	opl	54			X	X		
6669	tor	54	X		X	X	X	
6671	crc	54	T	T	X	X	X	X
6672	opl	54	X	?	X	X		
6673	mga	54	X		X	X	X	X
6674	brc	54			X			
6679	hps	58	X		X	X	X	X
6680	hps	58	X	X	X	X	X	X
6683	hps	61	X	?				

## APPENDIX 5, cont.

Coll. #	Species	Map area	Germplasm dist.			Herbarium dist.		
			NRSP-6	PROINPA	BOLV	NRSP-6	WAG	WIS
6684	hps	61	X	?	X			
6685	hps	61	X	?	X	X	X	
6687	ugt	58	X	?	X	X	X	X
6689	acl	58	X	?	X		X	
6690	tar	53	X	?	X	X		
6692	arz	53	X	?	X	X		
6701	dds	55	X	?	X	X		
6704	spl	24	X	?	X			
6706	spl	24	X	X	X	X	X	X
6707	crc	24	X	?	X	X	X	X
6708	spl	24	X	?	X	X	X	
6709	spl	24	X	?	X	X		
6710	mga	24	X		X	X		
6711	spl	23	X	?	X	X	X	X
6713	crc	20		T	X	X	X	X
6714	crc	20	X		X	X	X	X
6715	oka	20	X	?	X	X		
6716	oka	20	X	?	X	X	X	X
6717	sst	20		T	X	X		
6718	oka	20	X	?	X	X		
6719	sst	20			X	X	X	
6720	oka	20	X	?	X	X	X	X
6721	oka	20	X	?	X	X	X	

## APPENDIX 5, cont.

Coll. #	Species	Map area	Germplasm dist.			Herbarium dist.		
			NRSP-6	PROINPA	BOLV	NRSP-6	WAG	WIS
6722	sst	20		T	X	X	X	X
6723	spl	20			X			
6724	sst	20	X	?	X	X	X	
6727	adg	19	X T	? T	X	X	X	
6731	vio	15		T	X	X	X	X
6732	yun	16	T	T	X	X	X	X
6735	yun	17			X			
6738	yun	17	T	T	X	X		
6739	yun	16	T	T	X	X		
6741	brc	5	X	X				
6742	acl	5	X	X				
6743	cnd	5	T	T	X	X		
6745	adg	5	T	T				
6746	adg	5	T	T	X	X	X	X
6747	adg	5	T	T	X	X		
6748	adg	5	T	T	X			
6749	adg	4	T	T				
6750	adg	3	T	T				
6751	adg	3	T	T	X	X	X	X
6753	spl	2	X	?	X			
6759	brc	10	X	?	X	X	X	X
6762	brc	11	X	?	X	X		

## APPENDIX 5, cont.

Coll. #	Species	Map area	Germplasm dist.			Herbarium dist.		
			NRSP-6	PROINPA	BOLV	NRSP-6	WAG	WIS
6763	brc	11	X	?	X	X		
6765	brc	9	T	T	X			
6766	acl	9	X	X				
6767	crc	8	X		X	X	X	
6768	cnd	7	T	T	X	X	X	
6769	cnd	7	T	T	X	X		
6770	acl	21	X	?				
6771	vio	27			X			
6772	spl	29	X	?	X	X		
6773	spl	29	X	?				



APPENDIX 6. Disposition of germplasm and herbarium collections for 1994 expedition. See cover for herbarium codes. By agreement with PROINPA, seed and/or tuber collections were taken to the the Dutch/German genebank at Braunschweig, Germany (BGRC) for initial increase, with subsequent distribution of the first increase to PROINPA, CIP, and NRSP-6 (Appendix 11).

Coll #	Species	Map area	Germplasm <sup>1</sup> BGRC	Herbarium distribution		
				BOLV	WAG	PTIS
600	yun	15	T	X	X	X
601	yun	14	T	X		
602	yun	13	T	X	X	X
603	yun	13	T	X	X	X
604	yun	13	T			
605	adg	12	T	X	X	X
606	yun	17	T	X		
607	yun	18		X	X	X
608	chc	18	T	X		
609	dds	38	T	X	X	
610	tar	37	T,S	X	X	X
611	mcd	37	T	X	X	X
612	mcd	37	T	X	X	X
613	ber	37	T	X	X	X
614	dds	39	T	X	X	X
615	dds	39	T	X	X	X
616	tar	39		X	X	X
617	dds	41	T	X	X	X
618	ber	41	S	X	X	

## APPENDIX 6, cont.

Coll #	Species	Map area	Germplasm BGRC	Herbarium distribution		
				BOLV	WAG	PTIS
619	tar	41	S	X	X	
620	tor	58	S	X	X	X
621	chc	61	T	X	X	
622	hps	60		X	X	X
623	hps	60	S	X	X	X
624	arz	59	T	X	X	X
625	ugt	58	T	X	X	X
626	ugt	58	T	X	X	X
627	tor	58	S	X	X	X
628	ugt	58	S	X	X	X
629	brc	37		X	X	X
630	dds	53	S,T	X	X	X
631	dds	56	S	X	X	X
632	mcd	56		X	X	X
633	chc	57	T	X	X	X
634	arz	53	T	X	X	X
635	mcd	41		X	X	X
636	arz	41	T	X	X	X
637	arz	40	T	X	X	X
638	mcd	40	T	X	X	X

## APPENDIX 6, cont.

Coll #	Species	Map area	Germplasm BGRC	Herbarium distribution		
				BOLV	WAG	PTIS
639	mcd	40	T	X		
640	mcd	40		X	X	X
641	dds	39	T	X	X	X
642	lit	38	T	X	X	X
643	lit	38		X	X	X
644	dds	39	T	X	X	X
645	chc	38	S,T	X	X	X
646	spl	22	T			
647	crc	22	T	X		
648	yun	13	T	X	X	X
649	ach	9	T	X	X	X
650	crc	8		X	X	X
651	cnd	6	S	X	X	X
652	adg	7	S	X		
653	cnd	1	S	X	X	X
654	nvv	1	T	X	X	X
655	bmb	1		X	X	X
656	brc	8	S			

<sup>1</sup>S = seeds, T = tubers

APPENDIX 7. Summary of new collections of Solanum sect. Petota from the 1993 and 1994 expeditions to Bolivia.

	Map areas <sup>1</sup>	Total	Seeds	Tubers	Herb.
<u>Solanum acaule</u>	5,9,21,28,30(2),32 33,58,65,74,79	12	12		8
<u>S. alandiae</u>	35(3),36	4	3		4
<u>S. arnezii</u>	40, 41,53(2),59	5	1	4	5
<u>S. berthaultii</u>	25,26,37,41,62	5	4	1	5
<u>S. boliviense</u> <sup>2</sup>	34,63,64(2),65,73	6	6		6
<u>S. bombycinum</u>	1	1			1
<u>S. brevicaule</u> <sup>3</sup>	5,8,9(2),10,11(2) 29(2),31(2),32,37 54,64(2),68,71, 73(3),78	22	16	1	19
<u>S. candolleianum</u>	1,5,6,7(2)	5	2	3	5
<u>S. chacoense</u>	18,38,57,61	4	1	4	4
<u>S. circaeifolium</u> <sup>4</sup>	8(2),20(2),22,24 35,54	8	4	2	8
<u>S. doddsii</u>	36(2), 38,39(4),41 53,55,56	11	5	7	11
<u>S. gandarillasii</u>	39(2),42(2)	4	2		4
<u>S. hoopesii</u>	58(2),60(2),61(3)	7	6		6
<u>S. infundibuliforme</u>	67,68,70,74,75, 76(2),77,79	9	5		8
<u>S. juzepczukii</u>	30	1		1	1
<u>S. litusinum</u>	38(2)	2		1	2
<u>S. megistacrolobum</u> ssp. <u>megistacrolobum</u>	24,25,26,31,32,33, 54,66,67,71,74(2), 76(3),80	16	13		15

Table 2, cont.

	Map areas	Total	Seeds	Tubers	Herb.
<u>S. megistacrolobum</u> ssp. <u>toralapanum</u>	29(2),54,58(2)	5	5		4
<u>S. microdontum</u>	37(2),40(3),41,56, 81,82(2)	10	2	4	10
<u>S. neovavilovii</u>	1	1		1	1
<u>S. okadae</u>	20(5)	5	5		5
<u>S. oplocense</u> <sup>5</sup>	46(2),52, 54(2), 77(2),79	8	5		8
<u>S. soestii</u>	20(4)	4	1	2	4
<u>S. sparsipilum</u> <sup>6</sup>	2,20,22,23,24(4), 25,28,29(2),30,32 44,62,68,69,70,72(2)	21	18	1	17
<u>S. tarijense</u>	37,39(2),41(2),42, 43,44,45,46,53, 62(2),81(3)	16	14		14
<u>S. tuberosum</u> ssp. <u>andigena</u>	3(2),4,5(4),7,12 19	10	2	9	7
<u>S. ugentii</u>	58(4)	4	2	2	4
<u>S. vidaurrei</u>	65,73(2)	3	1		3
<u>S. violaceimarmoratum</u>	15,27	2			2
<u>S. yungasense</u>	13(4),14,15,16(2), 17(3),18	12		10	11
Grand totals		223	135	54	202

1. Refer to Map at beginning of report.

2. Included here (see Taxonomy section for explanations of footnotes 2-6) is S. astleyi.

3. Included here are S. achacachense, S. avilesii, S. gourlayi, S. leptophyes.

4. Included here is S. capsicibaccatum, and all varieties from both species.

5. Included here is S. hondelmannii

6. Included here are S. sucrense and S. virgultorum.

## Appendix 8. (from Spooner and van den Berg, 1992b)

Fig. 1. A comparison of the hypotheses of species boundaries and series affiliations of the Bolivian wild species of *Solanum* sect. *Petota* of Hawkes & Hjerting (1989) and Hawkes (1990) to those of Ochoa (1990a)<sup>1</sup>. This table traces synonymy, hypotheses of hybridization, and hypotheses of affiliations of species to series. Nomenclaturally designated hybrid species, subspecies, varieties, and forms are noted under the individual species. This table does not include *S. hoopesii* Hawkes & Okada and *S. ugentii* Hawkes & Okada (Hawkes & Okada, 1988) that were described too late to be included in Hawkes & Hjerting (1989) and Ochoa (1990a).

<sup>1</sup>The actual release date (data obtained from publisher) was 13 June 1991.

<sup>2</sup>Hawkes (1989, 1990) changed his earlier interpretation (Hawkes, 1956, 1963, 1978) of series *Commersoniana* and placed IEBN (see text) species in ser. *Commersoniana* and 2EBN species in ser. *Yungasensia*.

<sup>3</sup>Hawkes (1990) formally treats *S. x zudaniense* Cárdenas as a hybrid species formed by a natural cross between *S. berthaultii* and *S. tarijense*. Ochoa (1990a) synonymizes *S. zudaniense* under *S. tarijense*.

<sup>4</sup>Hawkes (1990) formally treats *S. x trigalense* Cárdenas as hybrid taxon formed by a natural cross between *S. chacoense* and *S. tarijense*. Ochoa (1990a) synonymizes *S. trigalense* under *S. tarijense*.

<sup>5</sup>Hawkes (1990) formally treats *S. x litusinum* as a hybrid species formed by a natural cross between *S. berthaultii* and *S. tarijense*. Ochoa (1990a) indicates that *S. x litusinum* may have resulted from this cross or possibly from a cross between *S. alandiae* and *S. chacoense*.

<sup>6</sup>Hawkes & Hjerting (1989) recognize *S. capsicibaccatum* and *S. circaeifolium* at the species level and divide *S. circaeifolium* into ssp. *circaeifolium* and ssp. *quimense* Hawkes & Hjert. Ochoa (1990a) divides *S. circaeifolium* into var. *capsicibaccatum* (Cárdenas) Ochoa (under which he synonymizes ssp. *quimense*) and var. *circaeifolium*.

<sup>7</sup>Hawkes & Hjerting (1989, in text) indicate that *S. bombycinum* may be synonymous with *S. villuspetalum* Vargas from Peru but later (Hawkes & Hjerting 1989, in postscript) note the tetraploid nature of *S. bombycinum* and suggest that it may be a good species. Hawkes (1990) relates *S. bombycinum* to *S. villuspetalum*, *S. multiflorum* Vargas and *S. urubambae* Juz. (all from Peru).

<sup>8</sup>Hawkes & Hjerting (1989) and Hawkes (1990) indicate that *S. neovavilovii* is probably synonymous with *S. violaceimarmoratum*.

<sup>9</sup>Hawkes & Hjerting (1989) recognize four subspecies within *S. acaule*: ssp. *acaule* (4x, distributed from southern Peru to northwestern Argentina), ssp. *aemulans* (Bitt. & Wittm.) Hawkes and Hjert. (4x, confined to northwestern Argentina), ssp. *punae* (Juz.) Hawkes & Hjert. (4x, distributed from central Peru to northern Argentina), and ssp. *albicans* (Ochoa) Hawkes (6x, confined to northern Peru). Hawkes (1990) recognizes all these taxa but elevates *S. albicans* (Ochoa) Ochoa to specific rank. Ochoa (1990a) recognizes two varieties of *S. acaule*: var. *acaule* (under which he synonymizes ssp. *punae*), and var. *aemulans* (Bitt. & Wittm.) Correll, and also recognizes *S. albicans*. Ochoa followed Brücher (1959), and Correll (1962), who also synonymized var. *punae* under var. *acaule*.

<sup>10</sup>Ochoa (1990a) suggests that *S. astleyi* may be an ecotype of *S. boliviense*.

<sup>11</sup>Ochoa (1990a) divides *S. megistacrolobum* into var. *megistacrolobum* and var. *toralapanum* (Cárdenas & Hawkes) Ochoa.

<sup>12</sup>*Solanum avilesii* Hawkes & Hjerting, J. Linn. Soc., Bot. 86: 410. 1983 is the legitimate name for this taxon, not *S. candelarianum* Cárdenas, Bol. Soc. Peruana Bot. 5: 12. 1956, because of the earlier homonym, *S. candelarianum* Buk., Trudy Prikl. Bot. Suppl. 47: 218. 1930 (Hawkes, 1990).

<sup>13</sup>Hawkes & Hjerting (1989) include *S. canasense*, *S. neorossii*, and *S. vernei* for the flora of Bolivia. Although there are no records of these species there, populations are known from very near the border with Peru, Argentina, and Argentina, respectively. Ochoa (1990a) makes no mention of *S. neorossii* and *S. vernei*, and considers *S. canasense* a "mere variant" of *S. bukasovii* (from Peru). Hawkes (1990) maintains the latter two as distinct species, separating them (in the key) by differences in length and appression of hairs on the inflorescence.

<sup>14</sup>Ochoa (1990a) recognizes *S. candolleianum* f. *sihuanpampinum* Ochoa but does not provide a Latin description.

<sup>15</sup>Hawkes & Hjerting (1989) treat *S. doddsii* as a natural interspecific hybrid between *S. alandiae* and *S. chacoense*. They also indicate that it was only known from a single site, and the species is now extinct. Ochoa (1990a) accepts *S. doddsii* at the species level and relates it to *S. alandiae*.

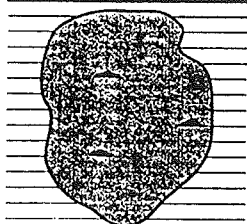
<sup>16</sup>Hawkes & Hjerting (1989) recognize *S. gourlayi* and *S. leptophyes* at the specific level and divide *S. gourlayi* into ssp. *gourlayi* (confined to Argentina), ssp. *pachytrichum* (Hawkes) Hawkes & Hjert. (confined to Bolivia), ssp. *vidaurrei* (Cárdenas) Hawkes & Hjert. (occurring in Bolivia and Argentina). Hawkes (1990) later accepts a fourth subspecies, ssp. *saltense* A. Clausen & K. Okada, from Argentina, in agreement with Clausen & Okada (1987). Ochoa (1990a) recognizes *S. leptophyes* but synonymizes ssp. *gourlayi* and ssp. *pachytrichum* under it. He treats *S. vidaurrei* as a distinct species.

<sup>17</sup>Hawkes & Hjerting (1989) divide *S. microdontum* into ssp. *microdontum* and ssp. *gigantophyllum* (Bitt.) Hawkes & Hjert., both occurring in Bolivia and Argentina. Ochoa (1990a) treats these taxa at the varietal level (valid name for ssp. *gigantophyllum* at the varietal level = var. *metriophyllum* [Bitt.] Ochoa), and in addition recognizes a third variety, var. *montepuncoense* Ochoa. Hawkes & Hjerting (1989) consider the latter as a natural hybrid between *S. microdontum* ssp. *gigantophyllum* and *S. violaceimarmoratum*. Hawkes (1990) accepts var. *montepuncoense*. Although he maintains the hybridization hypothesis of Hawkes & Hjerting (1989) he does not nomenclaturally designate it as a hybrid taxon (as in the case of 4, 5, 6, above).

<sup>18</sup>Hawkes & Hjerting (1989) recognize *S. oplocense* and *S. hondelmannii* as distinct species, but Ochoa (1990a) considers *S. hondelmannii* as a "hybrid variant" of *S. oplocense*, possibly involving *S. chacoense* or *S. x litusinum*.

## Appendix 8 (cont.).

Series <sup>1</sup>	Hawkes and Hjerting, 1989; Hawkes 1990	Ochoa 1990 [1991] <sup>1</sup>
<i>Commersoniania</i> Buk. ( <i>Yungasensia</i> Correll) <sup>2</sup>	<i>S. amezii</i> Cárdenas	<i>S. berthaultii</i> <sup>3</sup> <i>S. chacoense</i> <sup>4</sup> <i>S. flavoviridens</i> <i>S. litusinum</i> Ochoa <sup>5</sup> <i>S. tarijense</i> <sup>3,4</sup> <i>S. yungasense</i>
	<i>S. chacoense</i> Bitter	
	<i>S. flavoviridens</i> Ochoa	
	<i>S. tarijense</i> Hawkes	
	<i>S. yungasense</i> Hawkes	
<i>Circaeifolia</i> Hawkes	<i>S. capsicibaccatum</i> Cárdenas	<i>S. circaeifolium</i> <sup>6</sup> <i>S. soestii</i>
	<i>S. circaeifolium</i> Bitter	
	<i>S. soestii</i> Hawkes & Hjert.	
<i>Conicibaccata</i> Bitter		<i>S. bombycinum</i> Ochoa <sup>7</sup> <i>S. neovavilovii</i> Ochoa <sup>8</sup> <i>S. violaceimarmoratum</i>
	<i>S. violaceimarmoratum</i> Bitter	
<i>Acaulia</i> Juz.	<i>S. acaule</i> Bitter	<i>S. acaule</i> <sup>9</sup>
<i>Cuneolata</i> Hawkes	<i>S. infundibuliforme</i> Philippi	<i>S. infundubuliforme</i>
<i>Megistacroloba</i> Cárdenas & Hawkes	<i>S. astleyi</i> Hawkes & Hjert.	<i>S. boliviense</i> <sup>10</sup> <i>S. megistacrolobum</i> <sup>11</sup>
	<i>S. boliviense</i> Dunal	
	<i>S. megistacrolobum</i> Bitter	
	<i>S. toralapanum</i> Cárdenas & Hawkes	
<i>Tuberosa</i> (Rydb.) Hawkes	<i>S. achacachense</i> Cárdenas	<i>S. achacachense</i> <i>S. alandiae</i> <i>S. candelarianum</i> <sup>12</sup> <i>brevicaule</i> <i>S. candolleianum</i> <sup>14</sup> <i>S. doddsii</i> Correll <sup>15</sup> <i>S. gandarillasii</i> <i>S. leptophyes</i> <sup>16</sup> <i>S. microdontum</i> <sup>17</sup> <i>S. neocardenasii</i> <i>S. okadae</i> <i>S. oplocense</i> <sup>18</sup> <i>S. sparsipilum</i> <i>S. sucrensense</i> <i>S. vidaurrei</i> Cárdenas <sup>16</sup> <i>S. virgultorum</i>
	<i>S. alandiae</i> Cárdenas	
	<i>S. avilesii</i> Hawkes & Hjert.	
	<i>S. berthaultii</i> Hawkes	
	<i>S. brevicaulis</i> Bitter	
	<i>S. canasense</i> Hawkes <sup>13</sup>	
	<i>S. candolleianum</i> Berthault	
	<i>S. gandarillasii</i> Cárdenas	
	<i>S. gourlayi</i> Hawkes	
	<i>S. hondelmannii</i> Hawkes & Hjert.	
	<i>S. leptophyes</i> Bitter	
	<i>S. microdontum</i> Bitter	
	<i>S. neocardenasii</i> Hawkes & Hjert.	
	<i>S. neorossii</i> Hawkes & Hjert. <sup>13</sup>	
	<i>S. okadae</i> Hawkes & Hjert.	
	<i>S. oplocense</i> Hawkes	
	<i>S. sparsipilum</i> (Bitter) Juz. & Buk.	
	<i>S. x sucrensense</i> Hawkes	
	<i>S. vernei</i> Bitter & Wittm. <sup>13</sup>	
	<i>S. virgultorum</i> (Bitter) Cárdenas & Hawkes	

**PROINPA**

PROGRAMA NACIONAL DE LA PAPA

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## **PROGRAMA DE INVESTIGACION DE LA PAPA IBTA - CIP - COTESU**

COCHABAMBA: Casilla 4285; Telfs. 40929 - 49013 E-mail: PROINPA @ UNBOL.BO; Fax 591-42-45708

SUCRE: Casilla 405; Telf. 21247  
Fax: 064-21247POTOSI: Telfs. 24189-23764  
Fax: 062-23764

TARIJA: Casilla 1158; Telf. 23950

### **I REUNION BOLIVIANA DE RECURSOS GENETICOS DE PAPA, RAICES Y TUBERCULOS ANDINOS**

7-10 febrero 1994  
Cochabamba, Bolivia

#### **PROGRAMA**

Lunes, 7 de febrero de 1994:

<b>Hora</b>	<b>Actividad</b>	<b>Disertante (s)</b>	<b>Tema(s)</b>	<b>Moderador(es)</b>
08:00-09:00	Inscripción de participantes			Ing. E. Carrasco
09:00- 9:30	Acto Inaugural	Ing. G. Aguirre, Co-Director, PROINPA Ing. R. Vera, Director General, IBTA Dr. A. Devaux Co-Director, PROINPA	•Palabras de Bienvenida  •Inauguración  •Presentación de la Reunion	
09:30-10:30	Conferencia	Dr. J.G. Hawkes	El Rol Histórico y Social de la Papa	Dr. J. Rissi/ Ing. N. Ortuño
10:30-10:45	Refrigerio			
10:45-11:30	Conferencia	Dr. A. Okada	El IBPGR y la Conservación de los Recursos Genéticos	J. Rissi/ Ing. N. Ortuño
11:30-12:15	Conferencia	Dra. C. Goedert	Consecuencias de la CNUMAD en el Sistema Mundial sobre la Conservación y Utilización Sostenible de los Recursos Fitogenéticos	Dr. J. Rissi/ Ing. N. Ortuño
12:30-14:00	Almuerzo			



## Lunes, 7 de febrero de 1994:

Hora	Actividad	Disertante (s)	Tema(s)	Moderador(es)
14:00-14:45	Conferencia	Dr. D. Debouck	La Convención Internacional sobre Diversidad Biológica y sus Implicaciones para la Conservación de Recursos Genéticos en la Zona Andina	Profesor A. Contreras/ Ing. M. L. Ugarte
15:00-16:00	Minitaller I (ver Programa adjunto)		La Importancia de la Biodiversidad en la Sostenibilidad de la Agricultura en la Zona Andina	Dr. J. Franco/ Ing. M. L. Ugarte
16:00-16:20	Refrigerio			
16:20-17:30	Minitaller I		Minitaller I	
19:30-	Cóctel de Bienvenida			

## Martes, 8 de febrero de 1994:

Hora	Actividad	Disertante (s)	Tema(s)	Moderador(es)
08:30-09:15	Conferencia	Ing. S. Alandia	Antecedentes y Formación de Colecciones Germoplasmáticas de Tubérculos Andinos y Quinoa en Bolivia	Ing. J. Quiroga Dr. C. Arbizu/ Ing. C. Claire
09:15-10:00	Conferencia	Dr. N. Estrada	Utilización de Especies Silvestres en el Mejoramiento del Cultivo de Papa	Dr. C. Arbizu/ Ing. C. Claire
10:00-10:20	Refrigerio			
10:20-10:50	Conferencia	Dr. J. Franco	Importancia de los Nematodos en los Tubérculos Andinos	Dr. R. Pineda/ Ing. W. García
10:50-11:30	Discusión			
11:30-12:00	Libre			
12:00-14:00	Almuerzo			
14:00-14:45	Conferencia	Ing. J. Rea	Manejo <i>In situ</i> de Germoplasmas de Tubérculos Andinos en el Ecosistema Andino	Ing. E. Velasco/ Ing. G. Saravia
14:45-15:25	Minitaller II (ver Programa adjunto)		Manejo <i>In-situ</i> de Variedades Nativas y Raíces y Tubérculos Andinos	
15:25-15:45	Refrigerio			
15:45-16:40	Minitaller II		Minitaller II	
16:40-17:30	Discusión			

Miércoles, 9 de febrero de 1994:

Hora	Actividad	Disertante (s)	Tema(s)	
08:00	Salida a Toralapa			Ing. E. Carrasco
09:45-16:00	Visita Estación Experimental Toralapa		Banco de Germoplasma y Campos de Experimentación.	
16:00	Retorno a Cochabamba			

Jueves, 10 de febrero de 1994:

Hora	Actividad	Disertante (s)	Tema(s)	Moderador(es)
08:30-09:15	Conferencia	Dr. Z. Huaman	Conservación y Utilización de Cultivares de Papa Nativos de América Latina en el CIP	Ing. J. Quiroga Dr. E. Fernandez-Northcote/ Ing. P. Mamani
09:15-10:00	Conferencia	Dr. D. Spooner	Descubrimientos en la Taxonomía de la Papa Utilizando Nuevos Datos Moleculares	Dr. E. Fernandez-Northcote/ Ing. P. Mamani
10:00-10:15	Refrigerio			
10:15-12:00	Minitaller III (ver Programa adjunto)		Manejo <i>Ex-situ</i> de Germoplasma de Papa, Raíces y Tubérculos Andinos	Dr. E. Fernandez-Northcote/ Ing. P. Mamani
12:30-14:00	Almuerzo			
14:00-14:30	Conferencia	Dr. H. Zandstra	Acción del CIP en la Ecoregión Andina	Dr. E. Debouck/ Ing. S. Gonzales
14:30-15:15	Conferencia	Dr. M. Holle	El Papel de las Raíces y Tubérculos Andinos en el Ecosistema Andino	Dr. E. Debouck/ Ing. S. Gonzales
15:15-15:40	Conferencia	Dr. M. Baudoin	Estructuración de un Sistema de Conservación de Recursos Genéticos en Bolivia	Dr. R. Pineda/ Ing. W. García
15:40-15:55	Refrigerio			
16:00-17:00	Minitaller IV (ver Programa adjunto)		El Rol de los Programas Nacionales y del Sector Privado en el Manejo de Recursos Genéticos y Mecanismos de Coordinación Regional	Dra. C. Goedert/ Dr. G. Avila
17:00-17:30	Discusión			

Jueves, 10 de febrero de 1994:

Hora	Actividad	Disertante (s)	Tema(s)	Moderador(es)
17:30-18:00	Refrigerio			Ing. J. Quiroga
18:00-18:30	Acto de Homenaje		<b>Distinciones Honoríficas:</b>	
		Ing. J. Rosales, Sub-Secretario de Desarrollo Agropecuario (SNAG)	-25 años de COTESU en Bolivia	
			-30 años de la Estación Experimental Toralapa	Ing. C. Claure
			<b>Acto de Homenaje:</b>	
		Ing. H. Vargas, CIAB	-30 años de la Estación Experimental Toralapa	
		Dr. H. Zandstra, CIP	-Reconocimiento al Dr. Nelson Estrada	
18:45-19:00	Clausura	Ing. J. Rosales, Sub-Secretario de Desarrollo Agropecuario (SNAG)		
19:00	-Entrega de Certificados	Comité Organizador		
20:00	-Cena/Peña de Clausura			

**DATOS COMPLEMENTARIOS:**

- **INSCRIPCION:** Profesionales BS 80. - Universitarios BS. 60
- Las inscripciones se recibirán a partir del 1<sup>TO</sup> de febrero de 1994 en las oficinas del PROINPA
- Se otorgará certificados
- **Lugar de la Reunión:** Hotel Diplomat, Av. Ballivián (el Prado) tel. 50687, Cochabamba.

**PROINPA**  
**PROGRAMA DE INVESTIGACION DE LA PAPA**  
**IBTA - CIP - COTESU**

COCHABAMBA: Casilla 4285; Telfs. 40929-49506; E-mail: PROINPA @ UNBOL.BO; Fax: 591-42 -45708  
 SUCRE: Casilla 405; Telf. 21247      POTOSÍ: Telfs. 24189-23764      TARIJA: Casilla 1158; Telf. 23950  
 Fax: 064-21247      Fax: 062-23764

Cochabamba, 8 de abril de 1993

Dr. José Salinas  
 Director General/IBTA  
 La Paz

Dr. André Devaux  
 Ing. Gino Aguirre  
 Dr. Nelson Estrada  
 PROINPA  
 Cochabamba

Estimados colegas:

Muchas gracias por haberme recibido a mi y al Dr. Ronald van den Berg estos dos meses en esta importante expedición para coleccionar papas silvestres y cultivadas en Bolivia. Su amabilidad y profesionalismo son muy apreciados. Espero volver pronto para continuar nuestra valiosa colaboración. Por favor sepan que si ustedes algún día viajan al Inter-Regional Potato Introduction Project, o a la Universidad de Wisconsin, yo tratare de devolver todas las atenciones que ustedes han tenido conmigo.

Como hablamos hoy, hay aproximadamente 130 colecciones de germoplasma coleccionadas en esta expedición, la mayoría de semilla verdadera de papa. Esta establecido que de todas las colecciones coleccionadas que contienen más de 300 semillas, se quedará un juego en Bolivia en PROINPA. Todo el germoplasma importado a los Estados Unidos pasa por un procedimiento oficial de cuarentena, y después debe de pasar por un ciclo de multiplicaciones en el Inter-Regional Potato Introduction Project antes de ser disponible a investigadores mundiales. La estación de cuarentena ejecuta ensayos de eliminación para evitar enfermedades en 200 semillas, si las hay disponibles. Por esto, sería aconsejable tener como mínimo 300 semillas para importar a Estados Unidos. Como hablamos, ustedes no hacen regularmente multiplicaciones de este tipo de material y acordamos de que yo me llevaría todas las semillas, si es que el número de semillas coleccionadas esta por debajo de 300. Estén seguros que nosotros tendremos los mejores cuidados con estas semillas, y les proveeremos 2,000 semillas por entrada proveniente del primer ciclo de multiplicación cuando este disponible.

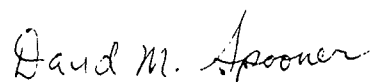
- 2 -

También como acordamos, hay hasta cuatro juegos de duplicados del herbario de esta expedición, y un juego entero lo dejaré en el Herbario Dr. Martin Cardenas en Cochabamba. Si solamente hay una muestra de este herbario, ella será dejada en Cochabamba. Los otros duplicados serán depositados en el Inter-Regional Potato Introduction Project, la Universidad de Wisconsin, y en la Universidad de Agricultura de Holanda.

Yo espero tener un reportaje de la expedición completo pronto después de mi llegada a los Estados Unidos, les mandare copia a ustedes. Adicionalmente, un reportaje formal de la expedición científica será escrito y sometido a una revista científica con el Ing Willman Garcia y la Ing. Maria Luisa Ugarte de PROINPA, como coautores.

Gracias de nuevo por toda su colaboración, la cual espero poder hacerles reciproca en el futuro.

Sinceramente,



David Spooner  
Taxonomo de Plantas  
USDA, ARS

cc: Director, Herbario Martin Cardenas, Cochabamba

Cochabamba, 10 de febrero de 1994

Señor  
Ing. Rafael Vera  
Director General  
IBTA  
La Paz

Estimado Ing. Vera:

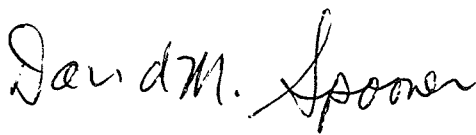
REF.: Disposición del germoplasma y las colecciones de herbario de las recolecciones de papa efectuadas en Bolivia en 1993, 1994 y apoyo colaborativo

La colaboración del PROINPA a las expediciones de recolección de especies de papas silvestres del Dr. Spooner (Universidad de Wisconsin, EE.UU.) y del Dr. Ronald van den Berg (Universidad Agronómica de Wageningen, Holanda) se iniciaron a principios de 1993 a pedido del Dr. Armando Cardozo, Director General del IBTA en esa época. Los acuerdos en cuanto a la repartición del material colectado, entre los colaboradores de este trabajo de colección y de conservación, fueron establecidos en base a la cantidad y tipo de material disponible (tubérculos o semilla botánica). Se tomó en cuenta las ventajas compartidas en cuanto a las facilidades y capacidad técnica disponibles tanto en Wisconsin como en Wageningen para conservar y multiplicar este material para distribuirlo posteriormente a los otros colaboradores y tenerlo disponible para otras distribuciones futuras.

El 8 de febrero participamos (Dr. David Spooner y el Dr. Ronald van den Berg) en una reunión con oficiales del PROINPA (Dr. André Devaux, Ing. Gino Aguirre, Dr. Nelson Estrada y el Ing. Enrique Carrasco). Llegamos al siguiente acuerdo relativo a la disposición del germoplasma y de las colecciones de herbario realizadas en las expediciones hechas en Bolivia de recolección de papa en 1993, 1994 y del apoyo colaborativo.

1. Todas las colecciones de tubérculos de la expedición de 1994, y todas las multiplicaciones en el PROINPA de tubérculos de la expedición de 1993, serán transferidas al Banco de Genes Holandes-Aleman en Braunschweig, Alemania (BGRC). Estos serán multiplicados en el plazo más corto posible. Preferencialmente, las multiplicaciones serán en forma de cruces entre plantas individuales de la misma colección para producir semillas. Si no se produce la semilla, serán incrementados los tubérculos.
2. Colecciones de semilla de la expedición de 1994, serán transferidas al BGRC donde multiplicaciones serán efectuadas en el plazo más corto posible. Los tubérculos y semillas serán completados en un plazo de dos años.
3. El germoplasma de ésta primera multiplicación será dividida en partes iguales entre el PROINPA, BGRC, CIP y NRSP-6.

4. Ejemplares de herbario de la expedición de 1994 serán divididos como fueron divididos en la expedición de 1993; serán divididos entre el herbario del Jardín Botánico en Cochabamba, Bolivia, el herbario del Departamento de Taxonomía de la Universidad Agronómica de Wageningen, Holanda, y el herbario de NRSP-6.
5. El informe de la expedición de 1994, será concluido y distribuido a todos los concernientes un mes después de la terminación de la expedición a fines de febrero, incluyéndose la información cartográfica correspondiente, señalando los sitios de las recolecciones.
6. Un documento científico será preparado para publicación por el Dr. Spooner, el Dr. van den Berg y los Ings. Ugarte (PROINPA) y García (PROINPA) para ser revisado por científicos.
7. Como forma de incrementar el relacionamiento y apoyo colaborativo con Bolivia (PROINPA), se ha previsto buscar financiamiento con el USDA, OICD para el entrenamiento para el año 1995 en manejo de germoplasma por períodos de 4 a 6 semanas, de los técnicos que participaron en ésta recolección, cuyo apoyo financiero lo negociará el Dr. David Spooner.
8. La Universidad de Wageningen, a través del Dr. Ronald van den Berg buscará fuentes de apoyo al trabajo de manejo de recursos genéticos del PROINPA mediante una beca de postgrado (Msc. o Ph.D.), la cual se consolidará posteriormente.



Dr. David Spooner  
USDA, ARS  
Profesor Asociado  
Universidad de Wisconsin



Dr. Ronald van den Berg  
Depto de Taxonomía  
Universidad Agronómica de  
Wageningen

cc: Ing. Mario Viscarra, Director Técnico, IBTA  
Dr. Zósimo Huamán, Especialista en Recursos Genéticos, CIP  
Dr. André Devaux, Co-Director, PROINPA  
Ing. Gino Aguirre, Co-Director, PROINPA  
Dr. Nelson Estrada, Jefe, Depto. de Fitomejoramiento, PROINPA  
Ing. Enrique Carrasco, Co-Jefe, Depto. de Fitomejoramiento, PROINPA



Ministerio de Hacienda y Desarrollo Económico  
 Secretaría de Agricultura y Ganadería  
 INSTITUTO BOLIVIANO DE TECNOLOGIA AGROPECUARIA

La Paz, 17 de febrero de 1994  
 IBTA-DG-C-No.002/94

Señor  
 Dr. Ronald Van den Berg  
 DEPTO. DE TAXONOMIA  
 UNIVERSIDAD AGRONOMICA DE WAGENINGEN  
 Holanda.-

Ref.: GERMOPLASMA Y COLECCIONES DE PAPA

Distinguido Dr. Van den Berg:

En atención a su nota del 10 de Febrero de 1994 sobre el destino del Germoplasma y las colecciones de herbario de las recolecciones de papa efectuadas en Bolivia en 1993, 1994 manifestamos que estamos de acuerdo con la propuesta efectuada por Ud. y el Dr. David Spooner.

También manifestamos nuestro acuerdo y agradecimiento con relación a la edición del informe de la expedición, el documento científico y el apoyo de Colaboración Ofertado.

Con este motivo saludo a Ud.

Atentamente,

Ing. C. Rafael Vera V.  
 DIRECTOR EJECUTIVO  
 I. B. T. A.

c.c.: Ing. Mario Viscarra, Directo Técnico, IBTA  
 Dr. Zósimo Huamán, Especialista en Recursos Genéticos, CIP  
 Dr. André Devaux, Co-Director, PROINPA  
 Ing. Gino Aguirre, Co-Director, PROINPA  
 Dr. Nelson Estrada, Jefe Depto. de Fitomejoramiento, PROINPA  
 Ing. Enrique Carrasco, Co-Jefe, Depto. de Fitomejoramiento,  
 PROINPA



## APPENDIX 13. Distribution of report for 1994-1994 potato collecting expedition.

## NRSP-6 TECHNICAL COMMITTEE

J.B. Bamberg  
 Potato Introduction Station  
 4312 Hwy 42  
 Sturgeon Bay, WI 54235  
 (414) 743-5406  
 FAX: 414-743-1080  
 IR1JB@PRIME.ARS-GRIN.GOV

R.L. Dunkle  
 USDA, ARS, Midwest Area  
 1815 N. University St.  
 Peoria, IL 61604  
 (309) 685-4011  
 FAX: 309-681-6684  
 A03ADMWA@ATTMAIL.COM

F.I. Lauer  
 Dept. of Hort. Science  
 University of Minnesota  
 St. Paul, MN 55108  
 (612) 624-3612  
 FAX: 612-624-4941  
 LAUER002@MAROON.TC.UMN.EDU

R.L. Lower  
 140 Agriculture Hall  
 University of Wisconsin  
 Madison, WI 53706  
 (608) 262-2349  
 FAX: 608-262-4556  
 RICHARD.LOWER@MAIL.ADMIN.WISC.EDU

J.C. Miller, Jr.  
 Dept. of Hort. Science  
 Texas A&M University  
 College Station, TX 77843  
 (409) 845-3828  
 FAX: 409-845-0627  
 JCMILLER.JR@TAMU.EDU

A.R. Mosley  
 Dept. of Crop Science  
 Oregon State University  
 Corvallis, OR 97331  
 (503) 737-2821  
 FAX: 503-737-1589  
 MOSLEYA@CSS.ORST.EDU

J.J. Pavek  
 USDA, ARS, Univ. of Idaho  
 Research & Extension Center  
 1693 S. 2700 West, POB AA  
 Aberdeen, ID 83210  
 (208) 397-4181  
 FAX: 208-397-4311  
 ABERDEEN@AG.UIDAHO.EDU

H.L. Shands  
 USDA, ARS, NPS  
 BARC-West, Bldg. 005  
 Beltsville, MD 20705  
 (301) 504-5059  
 FAX: 301-504-5467  
 SHANDS@PRIME.ARS-GRIN.GOV

D.T. Smith  
 Agricultural Experiment Station  
 Texas A&M University  
 College Station, TX 77843  
 (409) 845-4757  
 FAX: 409-845-9329  
 Z269PR@TAMVMI.TAMU.EDU

D.R. Tompkins  
 USDA, CSRS, Aero Space Bldg.  
 901 D Street, Room 330  
 Washington, DC 20250-2200  
 (202) 401-4603  
 FAX: 202-401-4888

V.V. Volk  
Agricultural Experiment Station  
Oregon State University  
Corvallis, OR 97331-3201  
(503)737-2441  
FAX: 503-737-3178  
VOLKV@CGRB.ORST.EDU

E.L. Civerolo  
USDA, ARS, NPS  
Rm. 230, Bldg. 005, BARC-West  
Beltsville, MD 20705-2350  
(301) 504-6915  
FAX: 301-504-5467  
A03ECIVEROLO@ATTMAIL.COM

M.W. Martin  
Potoat Introduction Station  
4312 Hwy 42  
Sturgeon Bay, WI 54235  
(414) 743-5406  
FAX: 414-743-1080

A.F. Reeves  
Aroostook State Farm  
59 Houlton Road  
Presque Isle, ME 04769  
(207) 762-8281  
FAX: 207-762-8281  
REEVES@MAINE.MAINE.EDU

**CIP**

Hubert Sandstra, Director General  
Av.La Universidad  
Estacion La Molina  
Lima, Peru

Zózimo Huáman  
Genetic Resources Dept.  
Av. La Universidad  
Estacion La Molina  
Lima, Peru

T. Richard Tarn  
Agriculture Canada, Res. Station  
850 Lincoln Rd., POB 20280  
Fredericton, New Brunswick  
Canada E3B 4Z7  
(506) 452-3260  
FAX: 506-452-3316  
AG30900@NCCCOT2.AGR.CA

A. Tschanz  
USDA, APHIS, Federal Cent. Bldg.  
6505 Belcrest Road  
Hyattsville, MD 20782  
(301) 436-8896  
FAX: 301-436-8700  
A348ATSCHANH@ATTMAIL.COM

R.C. Seem  
NY State Agric Exp Station  
PO Box 462  
Geneva, NY 14456-0462  
(315) 787-2211  
FAX: 315-787-2397  
BOB.SEEM@CORNELL.EDU

Carlos Ochoa  
Centro Internacional de la Papa  
1894 Javier Prado Este  
Aparado 5969  
Lima, Peru

**Proyecto de Investigacion de la  
Papa (PROINPA)  
PROINPA@PAPA.BO  
FAX: 591-42-45708**

Gino Aguirre  
Proyecto de Investigacion de la Papa  
Instituto Boliviano Tecnologia Agro.  
Av. Man Césped, 293  
Casilla 4285  
Cochabamba, Bolivia

Andre Devaux  
Proyecto de Investigacion de la Papa  
Instituto Boliviano Tecnologia Agro.  
Av. Man Césped, 293  
Casilla 4285  
Cochabamba, Bolivia

Maria Luisa Ugarte  
Proyecto de Investigacion de la Papa  
Instituto Boliviano Tecnologia Agro.  
Av. Man Césped, 293  
Casilla 4285  
Cochabamba, Bolivia

Nelson Estrada  
Proyecto de Investigacion de la Papa  
Instituto Boliviano Tecnologia Agro.  
Av. Man Césped, 293  
Casilla 4285  
Cochabamba, Bolivia

William Garcia Fernandez  
Proyecto de Investigacion de la Papa  
Instituto Boliviano Tecnologia Agro.  
Av. Man Césped, 293  
Casilla 4285  
Cochabamba, Bolivia

**Other Individuals**

Ing. Rafael Vera  
 Director General  
 Instituto Boliviano Tecnologia  
 Agropecuaria (IBTA)  
 Edificio El Condor  
 Batallon Colorado  
 Pisa No. 13  
 La Paz, Bolivia

Susana Arrazola R.  
 Herbario Nacional Forestal  
 Dr. Martin Cardenas  
 Casilla 538  
 Cochabamba, Bolivia

Stephan G. Beck  
 Herbario Nacional de Bolivia  
 Correo Central Cajon Postal 10077  
 La Paz, Bolivia

Andrea Clausen  
 Instituto Nacional de Tecnologia  
 Agropecuaria  
 Estacion Esperimental Agropecuaria  
 Balcarce  
 CC 276, 7600 Balcarce  
 Argentina

R.E. Hanneman, Jr.  
 USDA, ARS, Dept. Horticulture  
 1575 Linden Drive  
 University of Wisconsin  
 Madison, WI 53706

J.G. Hawkes  
 School of Continuing Studies  
 University of Birmingham  
 PO Box 363  
 Birmingham B15 2TT  
 England

Roel Hoekstra  
 Institute of Crop Science & Plant  
 Breeding  
 Federal Research Center of Agriculture  
 d3300 Braunschweig, GERMANY

Katsuo A. Okada  
 Intl. Plant Genetic Resources Inst.  
 Oficina Regional para America del Sur  
 c/o CIAT, Apdo Aereo 6713  
 Cali, Colombia

Rivero Ortega  
 Universidad Nacional del Cusco  
 Apartado 295  
 Cusco, Peru

P.W. Simon  
 USDA, ARS, Dept. Horticulture  
 1575 Linden Drive  
 University of Wisconsin  
 Madison, WI 53706

Calvin Sperling  
 USDA, ARS, BA  
 BARC-West, Bldg. 001  
 Beltsville, MD 20705

David M. Spooner  
 USDA, ARS, Dept. Horticulture  
 1575 Linden Drive  
 University of Wisconsin  
 Madison, WI 53706

Ronald G. van den Berg  
 Dept. Plant Taxonomy  
 Generaal Foulkesweg 37  
 PO Box 8010, 6700 E.D.  
 Wageningen, The Netherlands

George White  
 USDA, ARS, Germplasm Resources Lab  
 Room 224, BARC-West, Bldg. 003  
 Beltsville, MD 20705

Ing. Moises Zavaleta R.  
 San Miguel-J-28 (Calocoto)  
 Apartado 1259  
 La Paz, Bolivia

Jaap Hardon  
 Center for Genetic Resources  
 PO Box 224  
 6200 AE  
 The Netherlands

Daniel De Bouck  
Intl. Plant Genetic Resources Inst.  
Oficina Regional para America del Sur  
c/o CIAT, Apdo Aereo 6713  
Cali, Colombia

J. Peter Hjerting  
Kobenhavns Universitet  
Botanisk Have  
Oster Farimaggade 2B  
DK-1353 Kobenhavn K  
DENMARK

Michael Nee  
New York Botanical Garden  
Bronx, NY 10458-5126

William D'Arcy  
Missouri Botanical Garden  
PO Box 299  
St. Louis, MO 63166

James C. Solomon  
Missouri Botanical Garden  
PO Box 299  
St. Louis, MO 63166

Richard Lester  
School of Biological Sciences  
Univ. of Birmingham  
Birmingham B15 2TT  
United Kingdom

George Ayad  
Genetic Diversity Group  
International Board for Plant Genetic Resources (IBPGR)  
Via delle Sette Chiese 142  
00145 Rome, Italy