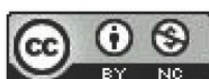
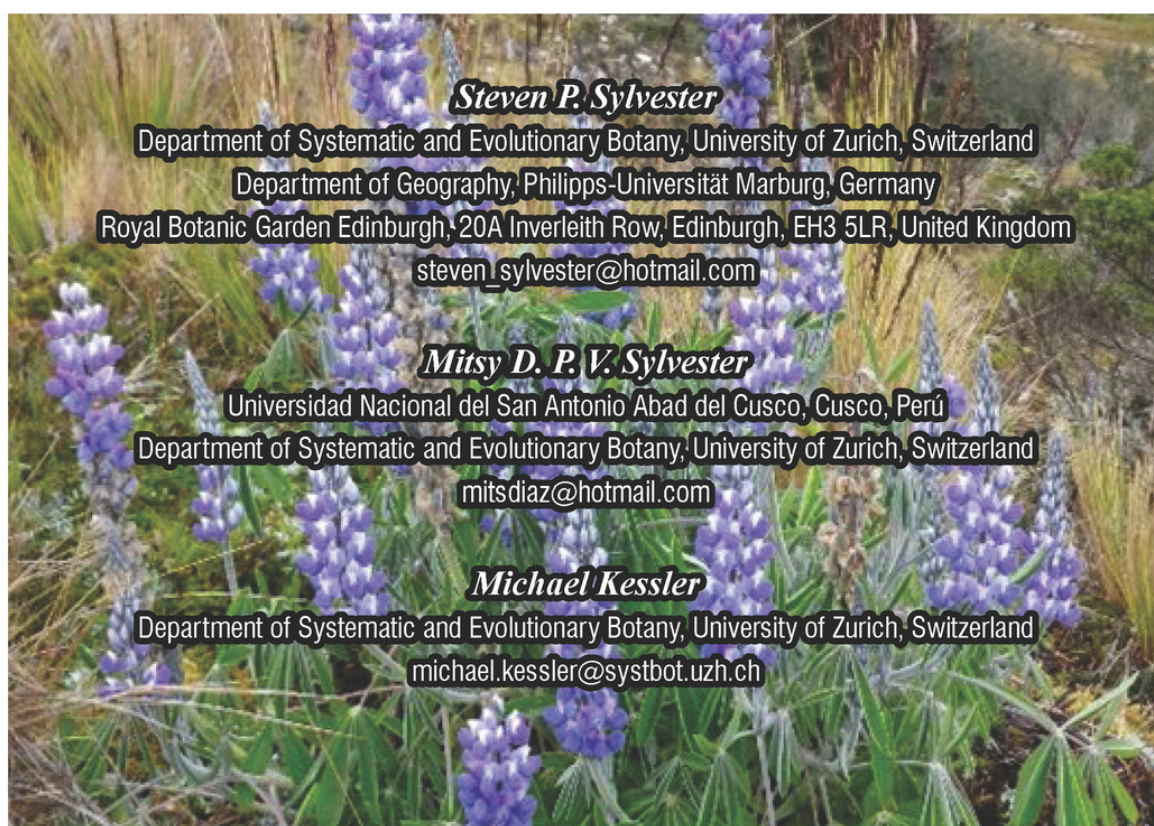


Four new and five overlooked records of vascular plants from high elevation puna grasslands of the southern Peruvian Andes

Cuatro nuevos registros y cinco revisiones de plantas vasculares de pastizales de puna de gran altitud en los Andes del sur peruano



Abstract

We present 4 new and 5 overlooked records of vascular plant species for Peru from high elevation puna grasslands in the Urubamba and Vilcabamba Cordilleras, southern Peru. The new species records are: *Lasiocephalus lingulatus* (Asteraceae); *Cardamine vulgaris* (Brassicaceae); *Lupinus herzogii*, *Lupinus soratensis* (Fabaceae). Other species records, i.e., *Calamagrostis sclerantha*, *Festuca soukupii* (Poaceae); *Aphanes parvula*, *Lachemilla tanacetifolia* (Rosaceae), and *Valeriana mandonii* (Valerianaceae), that are mentioned in literature for Peru but have not been acknowledged by the Peru Checklist or the *Catalogue of the Flowering Plants and Gymnosperms of Peru* are also included. Previous knowledge on the distribution of these species is discussed.

Keywords: records, vascular plants, puna, southern Peruvian Andes.

Resumen

Presentamos 4 nuevos registros y 5 revisiones de registros de especies de plantas vasculares para Perú de pastizales de puna de gran altitud en las cordilleras de Urubamba y Vilcabamba, del sur de Perú. Los nuevos registros de especies son: *Lasiocephalus lingulatus* (Asteraceae); *Cardamine vulgaris* (Brassicaceae); *Lupinus herzogii*, *Lupinus soratensis* (Fabaceae). Otros registros de especies: *Calamagrostis sclerantha*, *Festuca soukupii* (Poaceae); *Aphanes parvula*, *Lachemilla tanacetifolia* (Rosaceae), y *Valeriana mandonii* (Valerianaceae), que son mencionados en la literatura para Perú, pero que no han sido reconocidos por el Checklist de Perú o por el *Catálogo de las angiospermas y gimnospermas del Perú*, están también incluidos. El conocimiento previo sobre la distribución de estas especies está en discusión.

Palabras clave: registros, plantas vasculares, puna, Andes del sur peruano.

Introduction

High Andean puna grasslands, found above the upper forest-line (ca. > 3800 m.a.s.l.) from northern Peru to Chile (Wilcox *et al.*, 1986; Garcia & Beck, 2006; Montesinos-Tubée *et al.*, 2015 and references therein), have received relatively little floristic attention compared with the paramo grasslands of north-western South America (e.g. Luteyn, 1999; Madriñán *et al.*, 2013; W³TROPICOS-Paramo Flora, 2017). Nevertheless, our recent research over a relatively small area in the southern Peruvian Andes highlights that the high elevation puna remains a veritable treasure trove of taxonomic and ecological novelties waiting to be discovered (Heitkamp *et al.*, 2014; Kessler *et al.*, 2014; Sylvester, 2014; Sylvester *et al.*, 2014a,b; Pfanzelt *et al.*, 2015; Sundue *et al.*, 2015; Ospina *et al.*, 2016; Sylvester *et al.*, 2016a,b). Here we present

4 new records and 5 overlooked records, belonging to 6 families and 8 genera, of vascular plant species for Peru that we discovered during botanical exploration of the high puna of southern Peru and discuss previous knowledge on the distribution of these species.

Material and methods

The new and overlooked records were recovered among collections made in the high elevation puna grasslands of the Cordilleras Urubamba and Vilcabamba, southern Peru, between 2010 and 2013, as part of a larger ecological project to reconstruct the potential natural vegetation and soils of these Andean landscapes (see Heitkamp *et al.*, 2014 and Sylvester *et al.*, 2014a for preliminary studies). Species names were checked against the *Catalogue of the Flowering Plants and Gymnosperms of Peru* (Brako & Zarucchi, 1993), additions

to this (Vásquez *et al.*, 2002; Ulloa Ulloa *et al.*, 2004; Smith *et al.*, 2005; Rodríguez *et al.*, 2006; Salvador *et al.*, 2008; Linares *et al.*, 2010; Huamantupa *et al.*, 2014; Gonzáles *et al.*, 2011, 2016; Sylvester *et al.*, 2016a), and the online checklist for Peru (W³TROPICOS-Peru Checklist, 2017).

Results

Results: New species records for Peru

The 4 new species records for Peru belong to the genera: *Lasiocephalus* (Asteraceae), *Cardamine* (Brassicaceae) and *Lupinus* (Fabaceae).

ASTERACEAE

Lasiocephalus lingulatus Schldl., Mag. Neuesten Entdeck. Gesammten Naturk. Ges. Naturf. Freunde Berlin 8: 309. 1814. Fig. 1a.

LECTOTYPE: ECUADOR. *Humboldt s.n.* in Herb. Willd. Cat. No. 16435 (Lectotype: B). Lectotype chosen by Cuatrecasas (1978) but indicated as holotype.

Peruvian specimen examined: Dpto. Cusco, prov. La Convención, distrito Vilcabamba, large prominent ledge on the south facing cliff at the end of the Totora-Purkay valley, 4 km east of the Totora-Purkay village, 4536 m, 13°11'00.1"S, 73°03'07.3"W, 3-V-2013, S. P. Sylvester 1880 (K!, LPB!, Z!).

Notes: Previously considered endemic to the paramos of Ecuador (Luteyn, 1999; Jørgensen & Ulloa Ulloa, 1994). This species was found to be locally frequent in undisturbed open *Polylepis* woodland intermixed with *Calamagrostis* and *Festuca* tussock grassland.

BRASSICACEAE

Cardamine vulgaris Phil., Linnaea 28: 665. 1858. Fig. 1b.

TYPE: CHILE. *Philippi s.n.* (Holotype: B).

Peruvian specimen examined: Dpto. Cusco, prov. La Convención, distrito Santa Teresa, grazed slopes, nestled in-between rocks, in the central Phacchaq valley on the east side of the river, Yanama, 4245 m, 13°15'40.2"S, 72°50'18.5"W, 4-V-2012, S. P. Sylvester 1545 (CUZ!, MO!, Z!).

Notes: Previously known from Argentina and Chile (Zuloaga & Morrone, 1997). TROPICOS.ORG (2017) also lists the specimen *Sagástegui et al.* 12095 for the region of Cajamarca, prov. Celendin. This species was found infrequent in open grazed puna grassland.

FABACEAE

Lupinus herzogii Ulbr., Meded. Rijks-Herb. 27: 44. 1915. Fig. 1c-d.

TYPE: BOLIVIA. 4100 m, I-1911, *Herzog* 2253 (Holotype: B; Isotype: L).

Peruvian specimens examined: Dpto. Cusco, prov. Calca, distrito Calca, the grassy grazed land found to the immediate east of the prominent tower known by locals as "Kontorqayku" 5 km northeast of Huarán, 4248 m, 13°16'07.0"S, 72°01'07.2"W, 25-IV-2011, S. P. Sylvester 1153 (CUZ!, Z!); distrito Calca, the *Polylepis* forest found to the immediate east of the prominent tower known by locals as "Kontorqayku" 5 km northeast of Huarán, 4310 m, 13°16'03.7"S, 72°01'02.0"W, 2-VI-2011, S.P. Sylvester 1341 (CUZ!, Z!); distrito Calca, on the edge of the Wakapacana *Polylepis subsericans* forest on the eastern side of the valley 7.2 km and 10°N from Huarán, 4681 m, 13°15'04.6"S, 72°00'55.1"W, 18-VII-2011, S. P. Sylvester 1353 (CUZ!, Z!); distrito Calca, upper Potrereros forest on the north facing mountainside above the main Potrereros forest, 4 km southwest of Cancha Cancha village, Huarán, 4726 m, 13°15'46.0"S,

72°02'51.2"W, 24-VII-2011, *S. P. Sylvester* 1363 (CUZ!, Z!); prov. La Convención, distrito Santa Teresa, grazed slopes in the central Phacchaq valley on the east side of the river, Yanama, 4236 m, 13°15'43.7"S, 72°50'18.6"W, 3-V-2012, *S. P. Sylvester* 1538 (CUZ!, Z!); distrito Santa Teresa, grazed slopes in the central Phacchaq valley on the east side of the river, Yanama, 4268 m, 13°15'40.1"S, 72°50'17.4"W, 19-V-2012, *S. P. Sylvester* 1619 (CUZ!, Z!); distrito Santa Teresa, grazed slopes at the topmost eastern portion of the Phacchaq valley, 8.5 km north of Yanama, 4276 m, 13°15'27.7"S, 72°50'23.8"W, 31-V-2013, *S.P. Sylvester* 2188 (LPB!, Z!); distrito Vilcabamba, grazed slopes towards the top of the Totorá-Purkay valley, 3km east of the Totorá-Purkay village, 4159 m, 13°10'51.1"S, 73°03'34.2"W, 8-V-2013, *S. P. Sylvester* 1966 (LPB!, Z!); prov. Urubamba, distrito Urubamba, Area de Conservación Protegida Mantamay, 10 km up the valley from Yanahuara, by the side of Laguna Manalloqsa in the small valley 3 km east of Laguna Ipsaycocha, ledges on cliff side 250°W of Lago Manalloqsa, further down gully from the large *Polylepis* forest, 4802 m, 13°12'08.3"S, 72°08'44.4"W, 3-II-2011, *S.P. Sylvester* 514 (CUZ!, Z!).

Notes: Previously considered endemic to Bolivia (Jørgensen *et al.*, 2014, 2015 and onwards). This species is common in both the heavily grazed and fairly undisturbed puna tussock grasslands of both the Cordillera Urubamba and Vilcabamba, where it appears to be unpalatable to livestock (*S. P. Sylvester pers. observation*).

Lupinus soratensis Rusby, Bull. New York Bot. Gard. 6 (22): 510. 1910.

TYPE: BOLIVIA. Sorata, 7500 ft, 4 Sept 1901, R. S. Williams 2430 (Holotype: NY; Isotypes: K, NY, US). Fig. 1e-f.

Peruvian specimens examined: Dpto.

Cusco, prov. La Convención, distrito Santa Teresa, on the slopes below the pass linking Yanama with Totorá, 4110 m, 13°19'30.1"S, 72°47'08.4"W, 25-IV-2012, *S.P. Sylvester* 1448 (CUZ!, Z!); distrito Santa Teresa, grazed slopes in the central Phacchaq valley on the east side of the river, Yanama, 4200 m, 13°15'59.8"S, 72°50'19.1"W, 29-IV-2012, *S. P. Sylvester* 1466 (CUZ!, Z!); distrito Santa Teresa, grazed slopes in the upper Phacchaq valley on the east side of the river, Yanama, 4500 m, 13°14'37.9"S, 72°50'16.2"W, 20-V-2012, *S.P. Sylvester* 1624 (CUZ!, Z!).

Notes: Previously considered endemic to Bolivia (Jørgensen *et al.*, 2014, 2015 and onwards). This woody shrub can grow as high as 3 m and forms dense thickets (Fig. 1e). It is common in heavily grazed puna grasslands of the Cordillera Vilcabamba, appearing to be unpalatable to livestock (*S. P. Sylvester pers. observation*). Flowers observed to be visited by beetles (Fig. 1f).

Results: Overlooked Species Records for Peru

Certain species were discovered that were not included in the Catalogue of the Flowering Plants and Gymnosperms of Peru (Brako & Zarucchi, 1993), additions to this (Vásquez *et al.*, 2002; Ulloa Ulloa *et al.*, 2004; Smith *et al.*, 2005; Rodríguez *et al.*, 2006; Salvador *et al.*, 2008; Linares *et al.*, 2010; Huamantupa *et al.*, 2014; Gonzáles *et al.*, 2011, 2016; Sylvester *et al.*, 2016a), or the online checklist for Peru (W³TROPICOS-Peru Checklist, 2017), but were mentioned in taxonomic treatments that were overlooked by the aforementioned works. These belong to the genera: *Calamagrostis*, *Festuca* (Poaceae), *Aphanes*, *Lachemilla* (Rosaceae), and *Valeriana* (Valerianaceae).

POACEAE

Calamagrostis sclerantha Hack.,

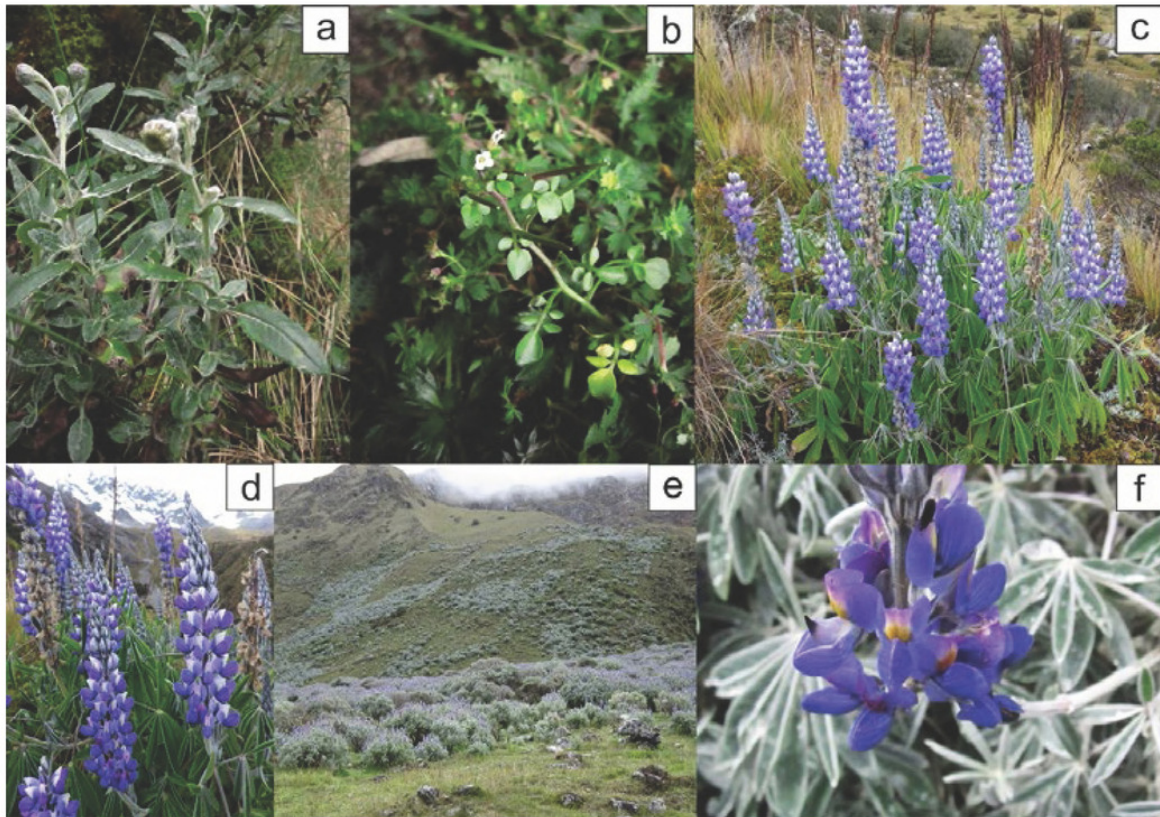


Fig. 1. Photographs of the news species records for Peru. a. *Lasiocephalus lingulatus*, S.P. Sylvester 1880. b. *Cardamine vulgaris*, S.P. Sylvester 1545. c-d. *Lupinus herzogii*, S. P. Sylvester 1966. e-f. *Lupinus soratensis*, S. P. Sylvester 1448.

Oesterr. Bot. Z. 52 (3): 108. 1902.

TYPE: ARGENTINA. Salta, Nevado del Castillo, 19-23-III-1873, Hieronymus & Lorentz 60 (Holotype: G; Isotypes: B, IT-BAA4417 (photo ex B), LIL (fragm.), US-1127175 (fragm. ex B), US-3048361, W).

Peruvian specimens examined: Dpto. Cusco, prov. La Convención, distrito Vilcabamba, grazed slopes towards the top of the Totora-Purkay valley, 3 km east of the Totora-Purkay village, 4159 m, 13°10'51.1"S, 73°03'34.2"W, 8-V-2013, S. P. Sylvester 1977 (LPB!, USM!, Z!).

Notes: Found locally common in grazed puna grassland at the one site in distrito Vilcabamba where it was encountered. This species is mentioned to occur in Argentina, Bolivia and Peru in the Catalogue of New World Grasses (Soreng & Greene, 2003;

Soreng *et al.*, 2003 and onwards). As the only Peruvian specimen, Bradley C. Bennett 2494 (MO), was collected from Dpto. Puno, prov. Sandia, our specimen from Dpto. Cusco extends the westerly distribution of this species ca. 400 km.

Festuca soukupii Stančík, Folia Geobot. Phytotax. 39 (1): 103–104, f. 2, 1–5. 2004.

TYPE: ECUADOR. Imbabura. Munic. Cayambe, Volcán Cayambe, 78°55.6'W, 00°31.6'N, swamps below the refuge with *Loricaria* sp., *Festuca glumosa*, *Distichia muscoides* etc., 4450 m s.m., 20-X-2000, Stančík 4162 (Holotype: PRC; Isotypes: AAU, QCA).

Peruvian specimens examined: Dpto. Cusco, prov. La Convención, distrito Vilcabamba, forest towards the top of the Totora-Purkay valley on the north side of

the river, 3 km east of the Totora-Purkay village, 4171 m, 13°10'50.2"S, 73°03'33.0"W, 7-V-2013, S. P. Sylvester 1955 (LPB!, USM!, Z!).

Notes: Found locally common in open *Polylepis pepeii* B. B. Simpson woodland intermixed with grazed puna grassland at the one site in distrito Vilcabamba where it was encountered. Previously known from Ecuador and Colombia (Stančík, 2003). Stančík & Peterson (2007) mention this species for northern Peru citing numerous specimens from the region of Cajamarca. Our specimens from southern Peru extends the latitudinal distribution of this species 900 km further south.

ROSACEAE

Aphanes parvula Gutte, Wiss. Z. Karl-Marx-Univ. Leipzig, Math.-Naturwiss. Reihe 34 (4): 455. 1985. Fig. 2a.

TYPE: PERU. Dpto. Junin, prov. Youli, La Oroya oberhalb Chancayllo, Berg mit *Puya rairmondii*, 3680 m, 5.4.1974, Gutte 2289ab (Holotype: LZ).

Peruvian specimens examined: Dpto. Cusco, prov. Calca, distrito Calca, grazed ground below the southwest facing crags of the Laguna Yanacocha 1.5 km east of Cancha Cancha village, Huarán, 4310 m, 13°14'25.4"S, 72°01'16.1"W, 25-III-2011, S. P. Sylvester 905 (CUZ!, Z!); distrito Calca, the northwest facing slope found to the immediate north of the prominent tower known by locals as "Kontorqayku" 5 km northeast of Huarán, 4311 m, 13°16'02.8"S, 72°01'13.1"W, 27-IV-2011, S. P. Sylvester 1186 (CUZ!, LPB!, Z!).

Notes: This species was found to be common to very common in grazed puna grassland and rocky open *Polylepis* woodland, amongst vegetation found in damp cracks. Although the type specimen

of this species comes from Peru, TROPICOS.ORG (2017) only provide distribution information for Bolivia (Jørgensen *et al.*, 2014, 2015 and onwards). Romoleroux (1996) also mentions this species to occur in Peru but does not cite specimens.

Lachemilla tanacetifolia Rothm., Notul. Syst. (Paris) 7: 9. 1938. Fig. 2b.

TYPE: COLOMBIA. "pic Tolima Lomas", 1844 Goudot 3 (Lectotype: P).

Peruvian specimens examined: Dpto. Cusco, prov. Urubamba, distrito Ollantaytambo, Abra Malaga, 1km southwest of Abra Malaga church nestled in a ravine on the other side of the ridge close to the main path leading along the mountainside from the church, 4429 m, 13°08'40.2"S, 72°18'14.7"W, 31-IX-2010, S. P. Sylvester 208 (CUZ!, LPB!, Z!); distrito Urubamba, Area de Conservacion Protegida Mantamay, 10 km up the valley from Yanahuara, by the side of Laguna Manalloqsa in the small valley 3 km east of Laguna Ipsaycocha, 20 m south of Laguna Manalloqsa on rocky slope, 4638 m, 13°12'00.9"S, 72°08'42.0"W, 6-II-2011, S. P. Sylvester 572 (CUZ!, Z!); prov. La Convención, distrito Vilcabamba, large prominent ledge on the south facing cliff at the end of the Totora-Purkay valley, 4 km east of the Totora-Purkay village, 4522 m, 13°11'00.3"S, 73°03'08.5"W, 1-V-2013, S. P. Sylvester 1873 (LPB!, USM!, Z!).

Notes: This species was found to be very common in grazed puna grassland and open *Polylepis* woodland intermixed with *Festuca* and *Calamagrostis* tussock grasses. Previously known from the paramos of Venezuela, Colombia and Ecuador (Romoleroux, 1996; Jørgensen & León-Yáñez, 1999; Luteyn, 1999). Luteyn (1999) and Romoleroux (1996) mention this species to occur in the northern paramos of Peru

but do not cite specimens. The specimens cited here thus represent the most southerly distribution records for this species.

VALERIANACEAE

Valeriana mandonii Britton, Bull. Torrey Bot. Club 18: 264. 1891. Fig. 2c.

TYPE: BOLIVIA. Sorata, Rusby 874 (Holotype: ?; Isotypes: K, NY, MICH, MO)

Peruvian specimens examined: Dpto. Cusco, prov. Calca, distrito Calca, prominent ledge situated on the southwest facing cliff face 1.5 km south (170°) of Cancha Cancha village, Huarán, 4522 m, 13°14'35.2"S, 72°01'14.1"W, 21-III-2011, S. P. Sylvester 816 (Z!); distrito Calca, grazed ground below the southwest facing crags of the Laguna Yanacocha 1.5 km east of Cancha Cancha village, Huarán, 4310 m, 13°14'25.4"S, 72°01'16.1"W, 25-III-2011, S. P. Sylvester 885 (CUZ!, Z!); distrito Calca, the grassy grazed land found to the immediate east of the prominent tower known by locals as "Kontorqayku" 5 km northeast of Huarán, 4255 m, 13°16'08.4"S, 72°01'06.6"W, 23-IV-2011, S. P. Sylvester 1138 (CUZ!, Z!); distrito Calca, the northwest facing slope found to the immediate north of the prominent tower known by locals as "Kontorqayku" 5 km northeast of Huarán, 4324 m, 13°16'03.2"S, 72°01'13.3"W, 27-IV-2011, S. P. Sylvester 1179 (Z!); distrito Calca, the southwest facing slope found to the immediate east of the prominent tower known by locals as "Kontorqayku" 5 km northeast of Huarán, 4223 m, 13°16'13.2"S, 72°01'05.7"W, 11-V-2011, S. P. Sylvester 1234 (CUZ!, Z!); prov. Urubamba, distrito Urubamba, Area de Conservación Protegida Mantamay, 10 km up the valley from Yanahuara, by the side of Laguna Manalloqsa in the small valley 3 km east of Laguna Ipsaycocha, directly below crags 250°W of Laguna Manalloqsa, 4645 m, 13°12'01.1"S, 72°08'48.4"W, 5-II-2011, S. P.

Sylvester 549 (CUZ!, F!).

Notes: Found in a variety of habitats including rocky ground, heavily grazed puna grassland, tussock grassland, and *Polylepis* forest. Weberling (2005) cites the specimen Stork 10227 (F) for the Dpto. Junín, prov. Huancayo of Peru under the name *Valeriana mandonii* subsp. *andina* (Britton) Weberl. TROPICOS.ORG (2017) also mention the specimen Percy Núñez V. 10064 (MO) for the Santuario Histórico Machu Pichu, Lluhuchayor, between Huayllabamba and Warmihuañusca.

S. P. Sylvester 905. b. *Lachemilla tanacetifolia*, specimen uprooted, S. P. Sylvester 572. c. *Valeriana mandonii*, S. P. Sylvester 549.



Fig. 2. Photographs of some of the overlooked species records for Peru. a. *Aphanes parvula*,

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