

**Taxonomic revision of the
Andean genus *Xenophyllum*
(Compositae, Senecioneae)**

by

Joel Calvo, Andrés Moreira-Muñoz

PHYTOKEYS 158 (SPECIAL ISSUE)

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Cover photo: Joel Calvo

Cover image: *Xenophyllum digitatum* from Bolivia, Potosí, cordillera Kari Kari. Picture by Joel Calvo.

First published 2020

ISBN 978-619-248-018-9 (paperback)

Pensoft Publishers

12 Prof. Georgi Zlatarski Street, 1700 Sofia, Bulgaria

Fax: +359-2-870-42-82

info@pensoft.net

www.pensoft.net

Printed in Bulgaria, October 2020

Taxonomic revision of the Andean genus *Xenophyllum* (Compositae, Senecioneae)

Joel Calvo¹, Andrés Moreira-Muñoz¹

¹ Instituto de Geografía, Facultad de Ciencias del Mar y Geografía, Pontificia Universidad Católica de Valparaíso, Avenida Brasil 2241, 2362807 Valparaíso, Chile

Corresponding author: Joel Calvo (calvocasas@gmail.com)

Academic editor: A.R. Magee | Received 5 February 2020 | Accepted 1 July 2020 | Published 3 September 2020

Citation: Calvo J, Moreira-Muñoz A (2020) Taxonomic revision of the Andean genus *Xenophyllum* (Compositae, Senecioneae). *PhytoKeys* 158: 1–106. <https://doi.org/10.3897/phytokeys.158.50848>

Abstract

The Andean genus *Xenophyllum* (Compositae, Senecioneae) is distributed along the high-Andes from northeastern Colombia to northern Chile and northwestern Argentina, mainly thriving in the paramo and puna ecoregions. It comprises suffruticose plants forming dense mats, hummocks, or clumps of erect stems. They are characterized by displaying involucre bracts fused at the base, supplementary bracts absent, and mostly radiate capitula with white ray corollas, seldom yellow or pink (disciform in one species). Traditionally, *Xenophyllum* species were treated as members of the genus *Werneria*, a morphologically close genus that includes rosetteform or scapiform perennial herbs. As currently circumscribed, *Xenophyllum* mostly differs from *Werneria* in having elongate stems. Herein, the first modern and comprehensive revision of the genus recognizing twenty-two species and two subspecies is presented. *Werneria decumbens* is synonymized with *X. weddellii*, as well as *X. fontii* with *X. humile* and *X. oscarovarrii* with *X. dactylophyllum*. Likewise, four varietal names and two sectional names are proposed as new synonyms. Seven names are lectotypified, the name *X. sotarense* is epitypified, *W. decumbens* neotypified, and the supraspecific name *W. sect. Integrifoliae* Rockh. is typified. The combination *X. crassum* subsp. *orientale* **comb. nov.** is made. Descriptions and distribution maps are provided for all accepted species, in addition to an identification key. Ten species are illustrated, three of them for the first time.

Keywords

Andes, Asteraceae, Neotropics, nomenclature, taxonomy, typification, *Werneria*

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Introduction

Xenophyllum V.A.Funk (Compositae, Senecioneae), is a genus of some 22 species distributed along the highlands of the Andes from northeastern Colombia to northwestern Argentina and northern Chile. The genus extends in distribution from the Colombian department of Norte de Santander (paramo del Almorzadero, ca. 7°N) to La Rioja Province in northwestern Argentina (Sierra de Famatina, ca. 29°S). Peru and Bolivia harbor the highest species diversity (12 and 11 species, respectively), followed by Ecuador (7 spp.), Chile (6 spp.), Argentina (5 spp.), and Colombia (3 spp.). The largest number of endemic species is found in Ecuador, 4 of the 7 species (57%) in the country (Fig. 1). Species of *Xenophyllum* are mostly small suffruticose plants characterized by displaying involucre bracts fused at the base, supplementary bracts absent, radiate capitula (disciform in one species), usually white ray corollas (yellow or pink in a few species), balusterform filament collars, obtuse or auriculate anther bases, truncate style branches with a crown of sweeping trichomes or penicillate, and glabrous or white-villous achenes. Two main habits can be differentiated according to the type of growth form (1) species forming dense mats or hummocks; (2) species forming clumps of somewhat distantly spaced stems or even having a shrubby habit (Calvo and Funk 2020).

Species of the genus were traditionally treated under the morphologically similar genus *Werneria* Kunth until the end of 20th century, when Funk (1997a) coined the genus *Xenophyllum*. This new genus was meant to segregate from *Werneria* those species forming loose or tightly compressed hummocks or well-developed mats, and accordingly, the genus *Werneria* was re-circumscribed to accommodate the rosetteform species growing solitary or in small clumps. However, the type of growth form is not unequivocal for segregating both genera because some species of *Werneria* can also form compressed mats (e.g., *W. aretioides* Wedd., *W. weberbaueriana* Rockh.). We did not find any diagnostic morphological synapomorphies to support either of the two genera, but the presence or absence of elongate stems allows placing most species in one genus or the other. On this basis, *Werneria* comprises rosetteform or scapiform perennial herbs while *Xenophyllum* includes suffruticose species. Although phylogenetic studies are required to elucidate their evolutionary relationships, Funk (1997a) pointed out that these groups are probably not monophyletic. For the time being, and in pursuit of pragmatism, the revision of both groups has been presented separately following Funk's proposal. Indeed, her treatment was adopted in all subsequent regional catalogues and floras of the Andean countries (Nordenstam 1999; Jørgensen 2014; Freire and Ariza-Espinar 2014; Ávila et al. 2016).

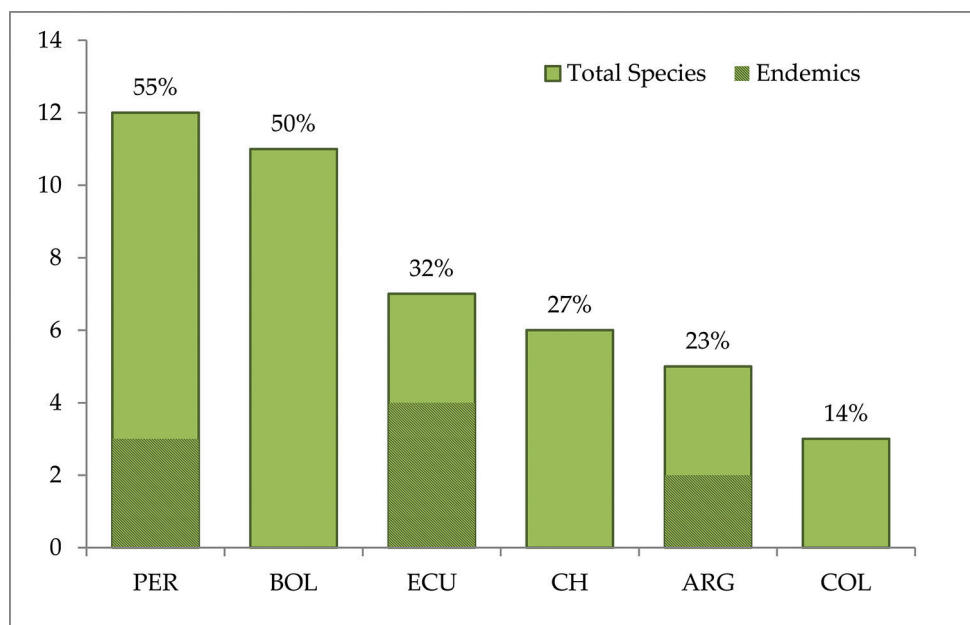


Figure 1. Number of *Xenophyllum* species per country – The percentage of endemic species is shaded. Country abbreviations are explained in Material and methods.

The taxonomic history of the group before the establishment of the genus *Xenophyllum* is detailed in Calvo et al. (in press). After the original publication of *Xenophyllum* in 1997, the taxonomic contributions into the understanding of the genus were limited to a few new combinations (Cabrera and Freire 1999; Calvo et al. 2017), a synopsis of the Peruvian species (Beltrán 2016), and the description of new species (Linares et al. 2010; Calvo and Funk 2020). For this reason, we present the first modern and comprehensive revision of the genus *Xenophyllum*. It includes updated nomenclature, identification keys, detailed descriptions, distributions maps, and drawings.

Material and methods

This study is mostly based on the revision of 1014 herbarium specimens (types included, duplicates excluded) kept at the following herbaria: A, AAU, B, BA, BM, BOLV, BR, C, CAS, CAUP, COL, CONC, CUVC, F, GB, GH, GOET, HA, HSB, HSP, HUSA, HUTPL, K, LE, LIL, LOJA, LPB, MA, MERL, MO, NY, P, Q, QCA, QCNE, QPLS, RB, SGO, UC, US, USM, and W. Additionally, digital herbarium specimens or supplementary information were obtained from BC, CORD, CUZ, E, ICESI, LL, LP, S, SI, TCD, and UDBC; herbarium acronyms follow Thiers (2020). Field work was also conducted in southern Colombia, Ecuador, southern Peru, Bolivia, and northern Chile, which allowed us to study 13 out of the 22 species in the field. The collections were mainly kept at BOLV, CAUP, CONC, and SGO.

A comprehensive synonymy of the genus *Xenophyllum* was compiled. Types of all accepted names and synonyms were studied. However, we did not locate original material of *Werneria dactylophylla* var. *glanduloso-denticulata* Rockh. This appears in Unverified names and we suggest its application based on the opinion of previous authors.

A general description of the genus and detailed species descriptions were prepared. For this, qualitative characters were studied with the aid of a binocular dissecting microscope, while quantitative characters were recorded using a Mitutoyo digital caliper, CD-15DC. A Zeiss Standard 16WL microscope was used for examination of the achene trichomes. Information concerning the habitat, elevation, and flowering period of each species was obtained from the herbarium specimen labels.

Accepted species are presented in an order that represents their morphological affinities. An index to the taxonomic names treated is provided in Appendix I. Likewise, all studied exsiccatae can be found in Appendix II. The information of the examined specimens that do not correspond to type material is detailed at the end of each species. They are consecutively listed in alphabetical order by country, primary political division, and collector surname. When herbarium specimens from a political division have not been studied but the presence of the respective species is expected there, the name of that political division is included and marked accordingly in the Distribution and habitat section. The maps were generated using QGIS 3.4 Madeira. The country abbreviations used in the distribution maps are: ARG (Argentina), BOL (Bolivia), BR (Brazil), CH (Chile), COL (Colombia), ECU (Ecuador), and PER (Peru).

Morphology

Habit. Species of the genus *Xenophyllum* are small suffruticose plants with two main habits according to the type of growth form. One comprises the species forming dense mats or hummocks (Fig. 2A, B), which exhibit the morphology and growth typical of cushion plants. They consist of a compact mass of closely spaced stems with reduced apical dominance. Underneath the living distal stem, the leaves wither and remain attached to the stem (marcescent leaves) or fall off and only the leaf base remnants persist (Fig. 2B). This nonphotosynthetic stem part resembles a rhizome, hence it is here referred to as rhizome-like stem and is described separately from the aerial photosynthetic part (Fig. 3A).

In contrast, the second habit type includes the species forming clumps of somewhat distantly spaced stems that are uniform in appearance along its whole length (Fig. 2C, D). Among these species, *X. staffordiae* (Sandwith) V.A.Funk can be considered shrub as the stems reach a height of ca. 60 cm.

Leaves. The leaves are alternate, simple, usually subimbricate to stellate-imbricate (spirally arranged), and are extended into a sheath-like base that is more or less noticeable depending on the amount of indumentum at the leaf attachment. The leaf length provided in the text strictly corresponds to the leaf lamina (sheath-like base excluded, Fig. 3C). The shape of the leaf lamina can be linear, triangular, or spatulate. A single



Figure 2. Main habit types in *Xenophyllum* **A, B** species forming dense mats or hummocks **C, D** species forming clumps of somewhat distantly spaced stems **A** *X. humile* (Ecuador, Pichincha, pr. Papallacta) **B** *X. sotarense* (Colombia, Cauca, Sotará Volcano) **C** *X. juniperinum* (Chile, Antofagasta, Aucanquilcha Volcano) **D** *X. digitatum* (Bolivia, Potosí, cordillera Kari Kari). Pictures by Joel Calvo.

species, *X. esquilachense* (Cuatrec.) V.A.Funk, has somewhat distantly arranged leaves that lack sheath-like base and are abruptly narrowed at the base.

The leaf morphology has a relevant taxonomic value within the genus [see treatment under *Werneria* by Blake (1928)]. Leaf division is useful to distinguish two sets of species (1) 12 species with undivided or entire leaves, which are linear (rarely triangular), truncate to aristate at the apex, and terete (e.g., *X. acerosum* (Cuatrec.) V.A.Funk) or rather flat in cross section (e.g., *X. marcidum* (S.F.Blake) V.A.Funk); and (2) 11 species having the leaf apex divided (*X. poposa* (Phil.) V.A.Funk being the single species included in both sets because of its leaf dimorphism). Within this latter set, in turn, three subsets can easily be recognized according to the division type: species with notched leaf apex (shallowly 2 to 3-divided; e.g., *X. incisum* (Phil.) V.A.Funk), forked leaf apex (deeply 2 to 3-divided; e.g., *X. digitatum* (Wedd.) V.A.Funk), or finger-like leaf apex (with multiple projections or lobes; e.g., *X. dactylophyllum* (Sch.Bip.) V.A.Funk). The leaf margin, on the other hand, can be entire (e.g., *X. weddellii* (Phil.) V.A.Funk), entire and ciliate (e.g., *X. decorum* (S.F.Blake) V.A.Funk), entire and distantly scabrous-ciliate (i.e., *X. esquilachense*), or denticulate (e.g., *X. ciliolatum* (A.Gray) V.A.Funk).

Species of *Xenophyllum* are largely glabrous with an exception of a few species that can have floccose-lanate indumentum (e.g., *X. staffordiae*) or evanescent arachnoid trichomes (e.g., *X. amblydactylum* (S.F.Blake) V.A.Funk). The presence of indumentum is very variable at specific level, and therefore, it is not useful for distinguishing species.

Capitula. All species have radiate and erect capitula except for *X. esquilachense* that displays disciform capitula and *X. staffordiae* that has radiate capitula rather nodding. Among the radiate species, most taxa have ray corollas conspicuously surpassing the involucre (e.g., *X. marcidum*). Three species, however, are characterized by their ray corollas not surpassing the involucre, i.e., *X. ciliolatum*, *X. juniperinum* (Hieron.) J.Calvo, and *X. staffordiae*. When the ray corollas are well-developed, this character is very noticeable.

The ray florets are pistillate and fertile. The color of the ray corollas is usually white, sometimes slightly purplish on the abaxial surface near the apex. Three species have yellow or pale yellow ray corollas and *X. roseum* (Hieron.) V.A.Funk is the single species in the genus with pink ray corollas. The corolla limb has 2 to 7 veins (sometimes inconspicuous) and it is subentire to 3-toothed at the apex.

The disc florets are hermaphroditic. The corollas are tubular, 5-lobed at the apex, yellow, whitish, creamy, or purplish.

Involucres. The involucre is cupuliform or narrowly cupuliform. They lack supplementary bracts (calculus) and the involucre bracts are typically fused at the base. The number of involucre bracts, although quite constant within each species, is not very useful for distinguishing purposes because of the significant overlap among several species. Rather useful is the involucre bract length; the provided measurements strictly refer to its free part (Fig. 3B). Likewise, it has to be clarified that the involucre length corresponds to the distance from the apex of the involucre bracts to the peduncle attachment point. The involucre was found to be a defining character of the genus.

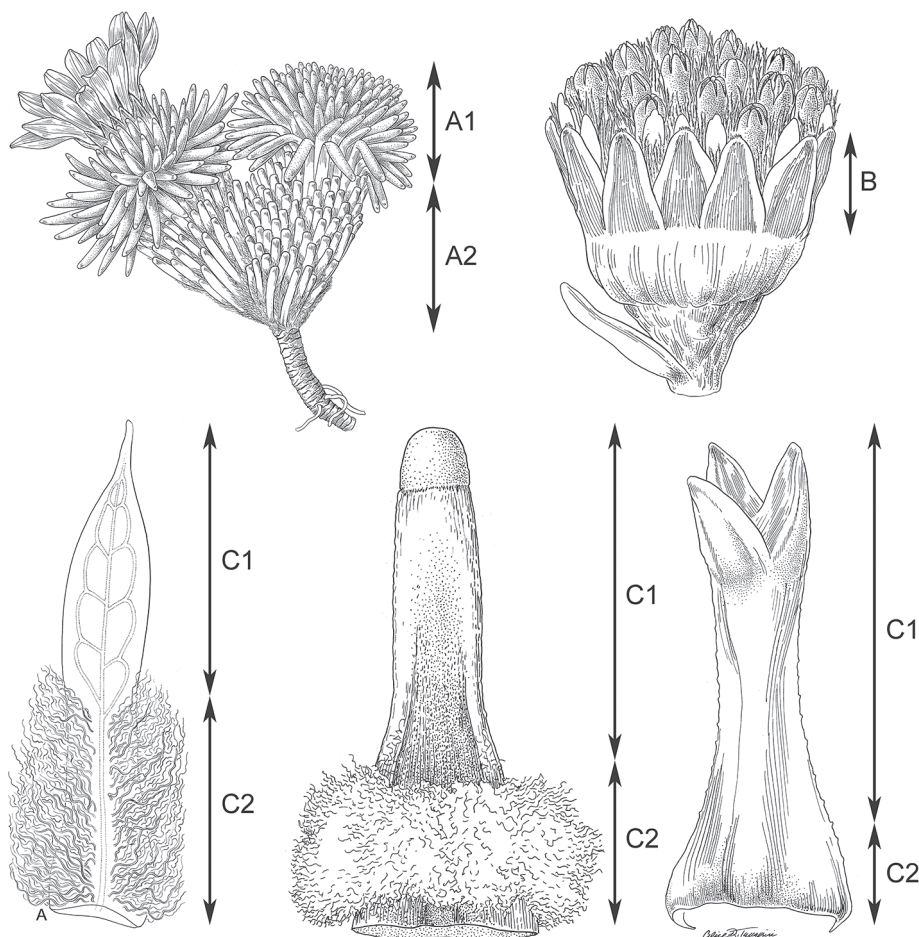


Figure 3. Diagram of measurements used in descriptions **A1** aerial photosynthetic part of the stem (referred to as aerial part in the descriptions of the species forming dense mats or hummocks) **A2** rhizome-like stem of the species forming dense mats or hummocks **B** free part of the involucral bracts (notice the typically fused base) **C1** leaf lamina **C2** sheath-like leaf base. Details taken from Alice Tangerini's illustrations.

Floral microcharacters. Species of *Xenophyllum* have balusterform filament collars, obtuse or auriculate anther bases, and anther apical appendages 2–4-times longer than wide.

Further variability has been found in the morphology of the style branch apex. In all species examined it is truncate but differs on its ornamentation; some species bear a crown of sweeping trichomes (e.g., *X. juniperinum*, *X. sotarense* (Hieron.) V.A.Funk) whereas others display a tuft with scanty or many longer trichomes, i.e., penicillate (e.g., *X. digitatum*, *X. rosenii* (R.E.Fr.) V.A.Funk). We found that this character presents intraspecific variability (e.g., *X. dactylophyllum*, *X. rigidum* (Kunth) V.A.Funk), hence it has not been considered valuable for taxonomic purposes. Salomón et al.

(2016) stated similar conclusions after studying the floral microcharacters in 72 South American *Senecio* species and several species from other Senecioneae genera. They noticed transitional states in trichome length, making difficult the difference between the typical crown of short trichomes and the apices with a tuft of elongate trichomes.

Achenes. The achenes are homomorphic, cylindrical, 6 to 9-ribbed, mostly glabrous except in the Ecuadorian endemic species *X. funkianum* J. Calvo, *X. rigidum*, and *X. roseum* that are white-villous. The achenes of *X. acerosum*, another species endemic to Ecuador, are described as having scattered arachnoid trichomes but such observation is based on the study of immature achenes, and therefore, mature achenes are required for confirming it. An accurate description of the achene size could not be provided for this latter species and for a few other species due to a lack of collections with mature achenes.

In *X. funkianum* and *X. rigidum*, the achene indumentum is composed of twin fili-form trichomes, not myxogenic, with acute to subacute, asymmetrical, slightly forked or not apex; see Calvo and Funk (2020, fig. 2D).

The pappus of all species is capillary, composed of barbellate, whitish to partially rose- or purple-colored bristles.

Taxonomic treatment

Xenophyllum V.A. Funk, *Novon* 7(3): 235. 1997.

Werneria subg. *Euwerneria* Rockh., Bot. Jahrb. Syst. 70: 285. 1939, *pro parte, nom. inval.* (Turland et al. 2018, ICN Art. 21.3, 22.2, and 38.1).

Werneria sect. *Digitifoliae* Rockh., Bot. Jahrb. Syst. 70: 276, 285. 1939, syn. nov. Type: *Werneria digitata* Wedd. [$\equiv$ *Xenophyllum digitatum* (Wedd.) V.A. Funk] (Turland et al. 2018, ICN Art. 10.8).

Werneria sect. *Aciculares* Rockh., Bot. Jahrb. Syst. 70: 277, 291. 1939, syn. nov. Type: *Werneria humilis* Kunth [$\equiv$ *Xenophyllum humile* (Kunth) V.A. Funk], designated here.

Type. *Xenophyllum dactylophyllum* (Sch. Bip.) V.A. Funk.

Description. Suffrutescent plants, forming mats, hummocks, or clumps of erect stems. **Rhizomes** 4–10 $\times$ 0.1–1 cm, horizontal to oblique, glabrous; rhizome-like stems (when present) up to 35 cm long covered with matted lanate, arachnoid, or pilose indumentum and old leaves or leaf base remnants, rather erect, simple or branched from the base. **Stems** 1–20(–60) cm long, simple or branched, glabrous, sparsely pilose, arachnoid, or lanate. **Leaves** alternate, simple, subimbricate, imbricate, or stellate-imbricate (rarely somewhat distantly arranged), extending into a sheath-like base that is glabrous or bears arachnoid or long silky trichomes (abruptly narrowed at the base in one species); leaf laminae 2.5–27.6 $\times$ 0.5–6.7 mm, linear, triangular, or spatulate, aristate, acute, obtuse, notched, forked, or finger-like at the apex, entire, denticulate, shortly ciliate, or scabrous-ciliate at the margin, flat to terete, sometimes slightly curved

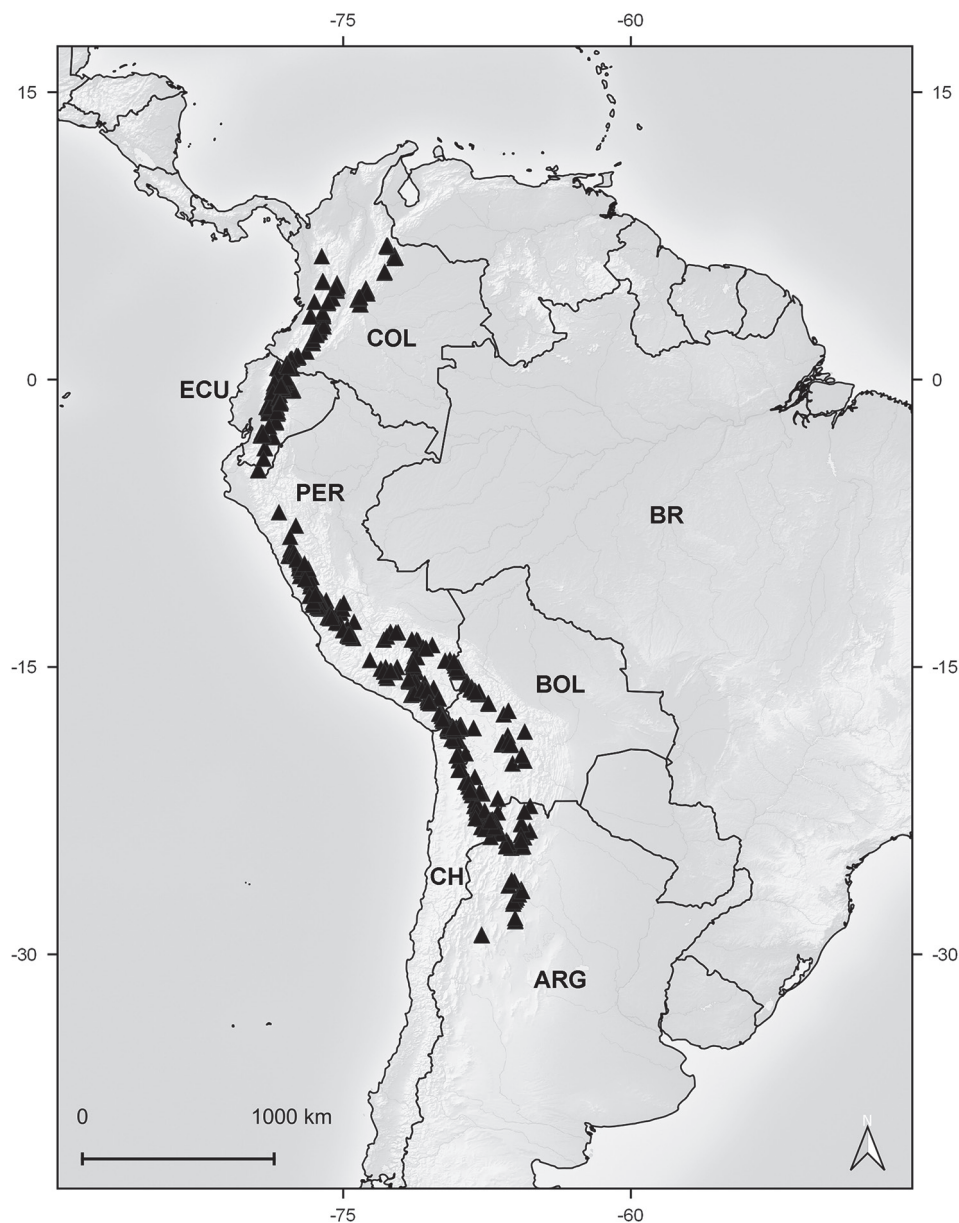


Figure 4. Distribution map of genus *Xenophyllum*.

forwards in cross section, glabrous (rarely floccose-lanate), 1-nerved above (sometimes barely visible or un conspicuous), 1-nerved beneath (sometimes barely visible or un conspicuous), usually fleshy, matte or shiny (sometimes papillose). *Capitula* radiate (disciform in one species), solitary, terminal, erect (rarely somewhat nodding), sessile to subsessile (rarely shortly pedunculate). *Involucres* 3.3–19.7 × 2.7–15.8 mm, cu-

puliform or narrowly cupuliform, with bracts fused at the base, glabrous; involucre bracts 8 to 21, $1.1\text{--}14.9 \times 0.7\text{--}3.9$ mm, linear-oblong to subulate, acute to obtuse at the apex, greenish to dark-purplish; supplementary bracts absent; receptacle epaleaceous, rather plane, smooth or seldom alveolate. **Ray florets** 8 to 39, pistillate, fertile; corollas $3.6\text{--}19.7 \times 0.4\text{--}3.4$ mm, 2 to 7-veined (sometimes inconspicuous), subtire to 3-toothed at the apex, surpassing or not the involucre, white, yellow, or pink (disciform species with peripheral florets having corollas reduced to a vestigial tube or without corolla). **Disc florets** 7 to 95, hermaphroditic; corollas 3.1–10.6 mm long, 5-lobed, yellow, whitish, creamy, or purplish; filament collars balusterform; anther bases obtuse or auriculate; anther appendages 2–4-times longer than wide; style branches truncate with a crown of sweeping trichomes or penicillate, yellowish to purplish. **Achenes** $1.6\text{--}5.4 \times 0.4\text{--}1.3$ mm, cylindrical, 6 to 9-ribbed, glabrous or white-villous (with scattered arachnoid trichomes in one species); pappus capillary, 1 to 2-seriate, composed of bristles 2.1–19 mm long, barbellate, whitish to partially rose- or purple-colored. Chromosome number $2n = 104\text{--}108(\pm 4)$ (Diers 1961).

Distribution and habitat. Colombia, Ecuador, Peru, Bolivia, northern Chile, and northwestern Argentina. The *Xenophyllum* species thrive in the paramo and puna ecoregions, between elevations of (2600–)3000–5500 m (Fig. 4).

Etymology. The generic name *Xenophyllum* means strange leaves (“xénos”: strange, alien, foreign; “phyll-”: relating to leaves).

Key to the species of *Xenophyllum*

- 1 Leaves entire, undivided at the apex.....2
- Leaves notched, forked, or finger-like at the apex.....13
- 2 Ray corollas not surpassing the involucre, yellow3
- Ray corollas conspicuously surpassing the involucre, white or pink.....4
- 3 Leaves linear, denticulate, erect (not addressed to the stem); involucre bracts $4.1\text{--}7.7$ mm long; stems 4–7 cm long, erect or decumbent....9. *X. ciliolatum*
- Leaves linear-triangular, minutely, irregularly denticulate, addressed to the stem; involucre bracts $2.8\text{--}3.4$ mm long; stems 8–15 cm long, erect.....10. *X. juniperinum*
- 4 Ray corollas entirely pink.....4. *X. roseum*
- Ray corollas white, sometimes purplish beneath.....5
- 5 Leaf apices aristate (arista 0.5–1 mm long).....6
- Leaf apices acute to obtuse.....7
- 6 Plants forming distant, rather solitary, erect stems; involucre ca. 8.6×7.3 mm; ray corollas ca. 12 mm long; disc florets ca. 501. *X. acerosum*
- Plants forming dense mats or hummocks; involucre $4.9\text{--}5 \times 4.8\text{--}5$ mm; ray corollas $6.3\text{--}6.5$ mm long; disc florets 14 to 15.....3. *X. sotarense*
- 7 Stems glabrous.....8
- Stems densely arachnoid9

- 8 Leaves triangular, denticulate in the upper half; involucre bracts 13 to 15; ray florets 14 to 21 with corollas 7.4–12.9 mm long; disc florets 35 to 48 **8. *X. marcidum***
- Leaves linear-subulate, entire; involucre bracts 8 to 12; ray florets 9 to 15 with corollas 5.9–8 mm long; disc florets 24 to 32 **11. *X. weddellii***
- 9 Achenes white-villous **10**
- Achenes glabrous **11**
- 10 Leaf laminas 5.3–7.8 × 0.8–0.9 mm; ray florets 20 to 23; capitula surpassing the leaves **5. *X. funkianum***
- Leaf laminas 12.6–13.5 × 2.3–2.4 mm; ray florets 38 to 41; capitula enclosed among the leaves **6. *X. rigidum***
- 11 Involucres 10.2–19.7 mm long; ray florets 13 to 21 with corollas 13–19.7 mm long; disc florets 50 to 95 **7. *X. crassum***
- Involucres 3.3–9.3 mm long; ray florets 8 to 13 with corollas 3.6–12.2 mm long; disc florets 7 to 39 **12**
- 12 Leaf laminas spreading at nearly 90° from the sheath-like bases, 2.5–10.8 mm long, finely papillose; plants forming dense mats or hummocks (in paramo and humid puna) **2. *X. humile***
- Leaf laminas barely spreading from the sheath-like bases, 2.5–7.1 mm long, not papillose; plants forming clumps of erect stems, rarely dense mats (in subhumid, dry, and desertic puna) **13. *X. poposa***
- 13 Capitula disciform **22. *X. esquilachense***
- Capitula radiate **14**
- 14 Ray corollas not surpassing the involucre, pale yellow; capitula rather nodding; stems 30–60 cm tall **21. *X. staffordiae***
- Ray corollas conspicuously surpassing the involucre, white; capitula erect; stems 2–24 cm tall **15**
- 15 Leaves 2 to 3-forked or finger-like at the apex **16**
- Leaves 3-notched at the apex **19**
- 16 Leaves finger-like at the apex (at least 9-divided) **20. *X. dactylophyllum***
- Leaves forked (2 to 3-divided) **17**
- 17 Leaves 2-forked **15. *X. rosenii***
- Leaves 3-forked **18**
- 18 Leaf lobes 3.6–5.9 mm long, entire or divided; involucres 12.1–16.7 mm long; ray corollas 9.2–14.1 mm long; disc florets 49 to 63 **16. *X. digitatum***
- Leaf lobes 1.3–2.6 mm long, entire (rarely notched); involucres 7–8.4 mm long; ray corollas 7.1–8.2 mm long; disc florets 29 to 33 **17. *X. pseudodigitatum***
- 19 Stems arachnoid; leaf laminas 0.5–1.1 mm wide; disc florets 7 to 18 **13. *X. poposa***
- Stems glabrous; leaf laminas 1.3–3.7 mm wide; disc florets 22 to 58 **20**
- 20 Ray florets 20 to 39; disc florets 37 to 58; involucre bracts 5.2–8 mm long **21**
- Ray florets 8 to 13; disc florets 22 to 37; involucre bracts 3.1–5.4 mm long **22**

- 21 Leaf margins entire and shortly ciliate; central lobe smaller than lateral ones; ray florets 20 to 21 with corollas 10.4–11.9 mm long; achenes 4.8–5.4 mm long 18. *X. decorum*
- Leaf margins entire; central lobe larger than lateral ones; ray florets 26 to 39 with corollas 8.3–9.2 mm long; achenes 2.5–3.1 mm long..... 14. *X. lorochaqui*
- 22 Leaf laminas with evanescent arachnoid trichomes above; involucre bracts 10 to 13, 4.9–5.4 mm long; disc corollas 5.4–6 mm long..... 19. *X. amblydactylum*
- Leaf laminas glabrous; involucre bracts 8 to 9, 3.1–4.3 mm long; disc corollas 4.4–5 mm long..... 12. *X. incisum*

1. *Xenophyllum acerosum* (Cuatrec.) V.A.Funk, Novon 7(3): 238. 1997.

Werneria acerosa Cuatrec., Brittonia 8: 45. 1954. Type. Ecuador. Azuay: “Oriente” border, eastern Cordillera, between Oña and the río Yacuambi, 3050–3415 m, 10/19 Sep 1945, *F. Prieto* 280 (holotype: F-1402673!; isotypes: G-00305681 (digital image!), GH s.n.!, K-000527742 (digital image!), MO-1652045!, NY s.n.!, P-02088566 (digital image!), S-R-6520 (digital image!), UC-986455!, US-00037296!, VEN-34483 (digital image!)).

Description. Suffrutescent plant, forming distant, rather solitary, erect stems. **Rhizomes** 6–10 × 0.2–0.3 cm, horizontal to oblique, glabrous. **Stems** 12–20 cm tall, usually simple, sometimes branched at the upper part, covered with adpressed, arachnoid trichomes, with leaves restricted to the upper part. **Leaves** imbricate, extending into a sheath-like base that bears arachnoid trichomes; leaf laminas 4.6–5 × ca. 0.9 mm, linear-acicular, aristate at the apex (arista up to 1 mm long, purplish), entire, terete in cross section, glabrous, unconspicuously nerved on both faces, somewhat fleshy, drying coriaceous, matte, papillose. **Capitula** radiate, erect, sessile, partially enclosed among the leaves. **Involucres** ca. 8.6 × 7.3 mm, cupuliform; involucre bracts ca. 13, 5.2–5.5 × 1.1–1.6 mm, rather acute at the apex, dark-purplish. **Ray florets** ca. 13; corollas ca. 12 × 2.3–2.5 mm, 4 to 5-veined, subentire to 3-toothed at the apex, conspicuously surpassing the involucre, white, purplish beneath. **Disc florets** ca. 50; corollas 3.8–4.2 mm long, pale yellow to creamy; style branches truncate with a crown of sweeping trichomes, yellowish. **Achenes** cylindrical, with scattered arachnoid trichomes (immature); pappus 3.1–3.3 mm long, barbellate, whitish. Chromosome number unknown. Fig. 5.

Distribution and habitat. Endemic to Ecuador (Azuay, Zamora-Chinchipe [expected]). It grows in marshy places of the paramo ecoregion, between elevations of 3050–3070 m (Fig. 6).

Thus far, *X. acerosum* is only known from the type locality in the paramo of Yacuambi, which is located above Saraguro on the border between the Ecuadorian provinces of Azuay and Zamora-Chinchipe.

Phenology. Collected in flower in September and November.

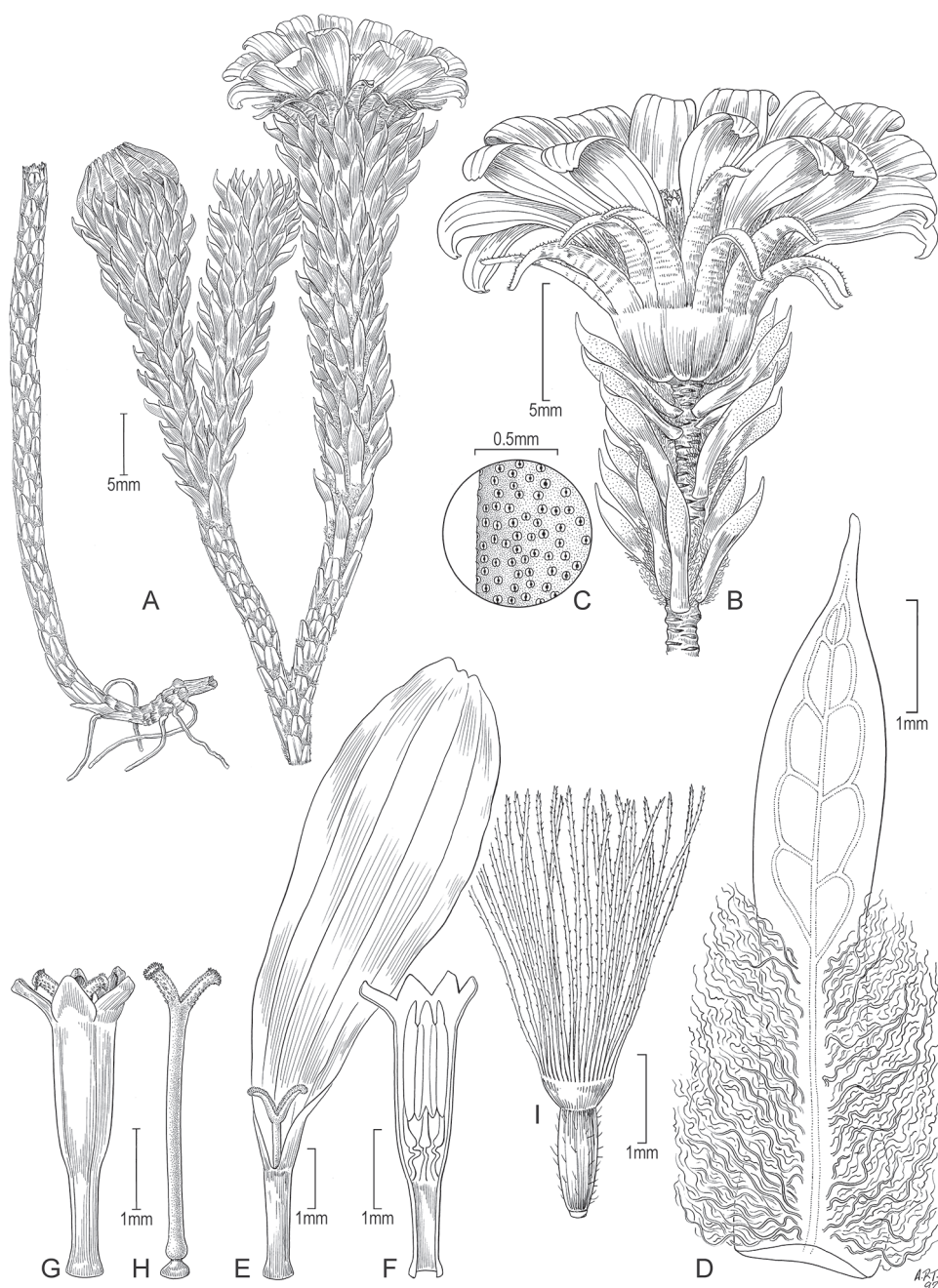


Figure 5. *Xenophyllum acerosum* **A** habit **B** stem apical part and capitulum **C** detail of leaf surface **D** adaxial leaf surface **E** ray corolla and style **F** disc corolla and stamens (vertically sectioned, style removed) **G** disc corolla and style branches **H** style **I** immature achene with pappus. All details drawn from Prieto 280 (US). Illustration by Alice Tangerini.

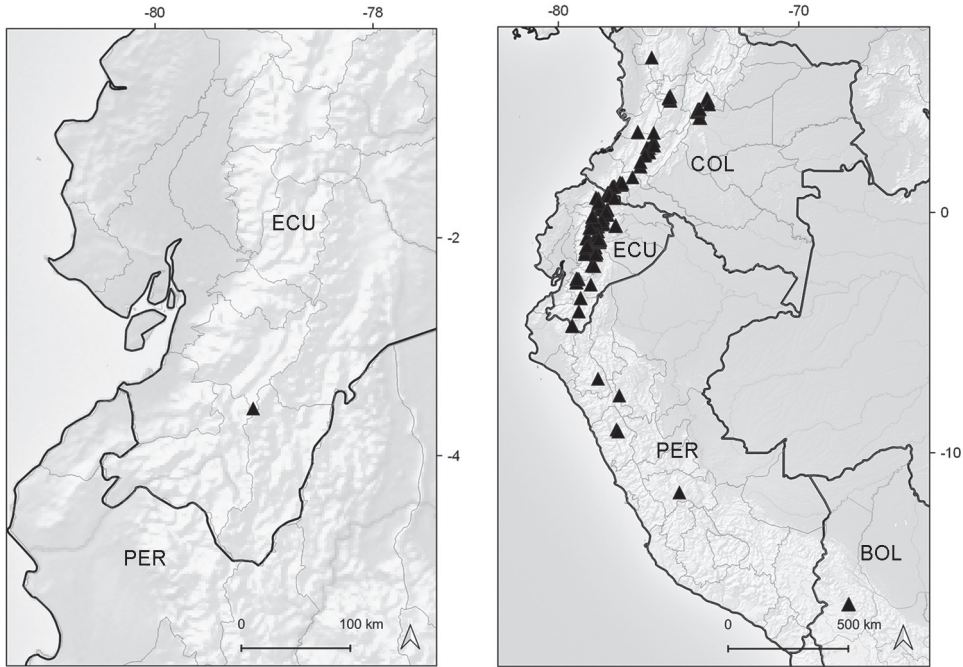


Figure 6. Distribution map of *Xenophyllum acerosum* (left hand) and *X. humile* (right hand).

Etymology. The adjective *acerosus* -a -um means needle-shaped, and it refers to the leaf shape of this species.

Notes. *Xenophyllum acerosum* is unique in the genus in its distant, rather solitary, erect stems arising from long rhizomes and by its linear-acicular, aristate leaves. The stems only bear leaves in the upper part.

Additional specimen examined. **ECUADOR. Azuay:** Cordillera Cordoncillo, along road from Babes (ca. 2 km E of Urdaneta) towards 28 de Mayo, 3°34'S, 79°6'W, 10 Nov 2018, *P. Sklenář* 15820 (PRC n.v., QCA).

2. *Xenophyllum humile* (Kunth) V.A.Funk, Novon 7(3): 239. 1997.

Werneria humilis Kunth, Nov. Gen. Sp. [ed. fol.] 4: 150. 1818. Type. Ecuador. ["in summis Andibus Quitensium" according to the *ind. loc.*], [without date], *F.W.H.A. Humboldt & A.J.A. Bonpland s.n.* (lectotype: P-00320181 (digital image!), designated as "holotype" by Funk (1997a: 239); isolectotypes: B-W-16433-01-0 (digital image!), F-972259 (fragment! [almost nothing left]), P s.n.).

Werneria humilis var. *lindenii* Wedd., Chlor. Andina 1: 82. 1856 ["Lindenii"]. Type. Colombia. Tolima: [nevado del] Tolima, limes inferior nivis perpetuae, [without date], *J. Goudot s.n.* (lectotype: P-02088543 (digital image!), designated here; isolectotype: P-02088544 (digital image!)), syn. nov.

Werneria humilis var. β Wedd., Chlor. Andina 1: 82. 1856, *nom. inval.* (Turland et al. 2018, ICN Art. 24.1 and 32.1c).

Werneria lehmannii Hieron., Bot. Jahrb. Syst. 28(5): 647. 1901 [“Lehmannii”]. *nom. illeg.* (Turland et al. 2018, ICN Art. 53.1), replaced name, *non W. lehmannii* Klatt 1894. *Werneria articulata* S.F.Blake, Contr. U.S. Natl. Herb. 22: 651. 1924, replacement name. *Werneria humilis* f. *articulata* (S.F.Blake) Rockh., Bot. Jahrb. Syst. 70: 294. 1939. Type. Ecuador. Imbabura/Pichincha: páramo de Mojanduleur [Mojanda], Otavalo, 3400–4000 m, [without date], *F.C. Lehmann 6230* (lectotype: K s.n.!, designated by Funk (1997a: 238); isoelectotype: US-00037320 (right hand specimen, fragment!)).

Werneria humilis var. *fontii* Cuatrec., Trab. Mus. Nac. Ci. Nat., Ser. Bot. 27: cuadro 22. 1934 [“Fontii”], *nom. nud.* (Turland et al. 2018, ICN Art. 38.1).

Werneria fontii Cuatrec., Trab. Mus. Nac. Ci. Nat., Ser. Bot. 29: 42. 1935 [“Fontii”]. *Xenophyllum fontii* (Cuatrec.) V.A.Funk, Novon 7(3): 239. 1997. Type. Colombia. Tolima: vert. merid. mont. Tolima, San Juan del Agua, 4200 m, 15 May 1932, *J. Cuatrecasas 2862* (lectotype: MA-246359!, designated as “holotype” by Funk (1997a: 239); isoelectotypes: F-844457!, K-000527741 (digital image!), MA-246359b!, MA-246359c!), *syn. nov.*

Oresigonia brevifolia Willd. ex Rockh., Bot. Jahrb. Syst. 70: 293. 1939, *nom. inval. pro syn.* (Turland et al. 2018, ICN Art. 36.1).

Werneria humilis var. *angustifolia* Cuatrec., *nom. nud. in sched.* (Turland et al. 2018, ICN Art. 38.1).

Description. Suffrutescent plant, forming dense mats or hummocks, with rhizome-like stems up to 15 cm long covered with lanate indumentum and old leaves, rather erect, simple or branched from the base. **Stems** 1–3 cm tall (aerial part), lanate. **Leaves** stellate-imbricate to subimbricate, extending into a sheath-like base that bears long silky trichomes, usually with the leaf lamina spreading at nearly 90° from the sheath-like base; leaf laminae 2.5–10.8 × 0.5–1.5 mm, linear, obtuse to truncate, usually callous-like tipped at the apex, entire, elliptical to almost terete in cross section, glabrous, 1-nerved above (sometimes barely visible), 1-nerved beneath (sometimes barely visible), fleshy, drying coriaceous, matte, finely papillose. **Capitula** radiate, erect, sessile to subsessile (rarely with a short peduncle up to 5 mm long). **Involucre** 4.6–9.3 × 2.9–9 mm, cupuliform; involucre bracts (8–)10 to 13, 3.1–6.1 × 1–2.1 mm, obtuse at the apex, greenish to dark-purplish. **Ray florets** (8–)10 to 13; corollas 4.2–12.2 × 0.4–2.1 mm, 4 to 7-veined, subentire to 3-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** (8–)22 to 39; corollas 3.1–5 mm long, whitish, usually purple-tipped; style branches truncate with a crown of sweeping trichomes, purplish. **Achenes** 2–2.8 × 0.4–0.6 mm, cylindrical, 7 to 9-ribbed, glabrous; pappus 2.1–7.9 mm long, barbellate, whitish, rarely partially rose-colored. Chromosome number unknown. Figs 2A, 7.

Additional iconography. Funk (1997a: 237, fig. 1A); Funk (1997b: 33, fig. 3B, C); Beltrán (2016: 358, fig. 2C, as photo).

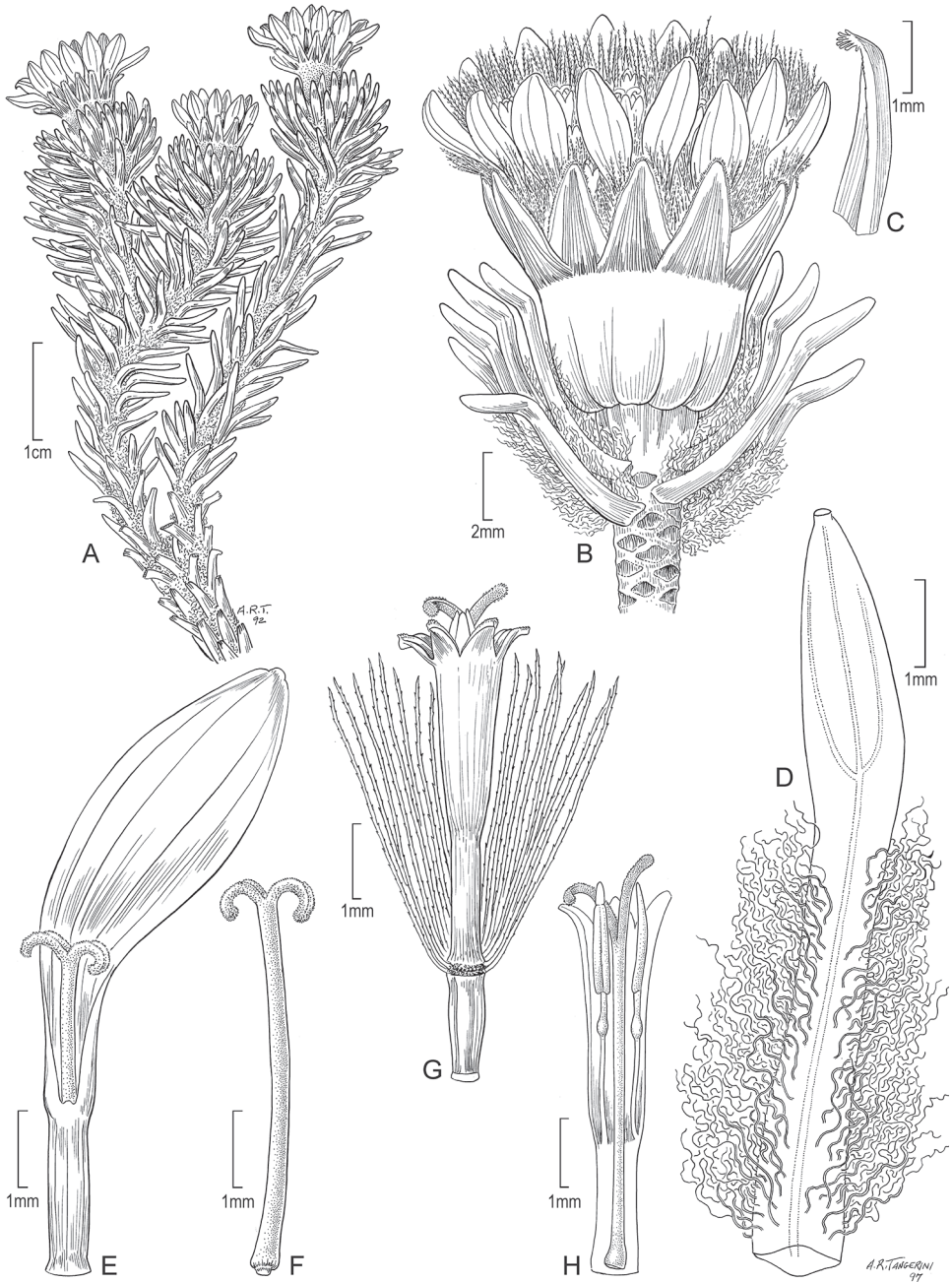


Figure 7. *Xenophyllum humile* **A** habit **B** stem apical part and capitulum **C** detail of involucre bract apex **D** adaxial leaf surface **E** ray corolla and style **F** style **G** disc floret (frontward bristles removed) **H** disc corolla, stamens, and style (vertically sectioned). All details drawn from Funk & Montezuma 11443 (US) except for **A** (drawn from Øllgaard & Balslev 8749, US) and **G, H** (drawn from Funk 8093, US). Illustration by Alice Tangerini.

Distribution and habitat. Northwestern Colombia to northern Bolivia. Bolivia (La Paz), Colombia (Antioquia, Caldas, Cauca, Cundinamarca, Huila, Meta, Nariño, Quindío [expected], Risaralda, Tolima, Valle del Cauca), Ecuador (Azuay, Bolívar, Cañar [expected], Carchi, Chimborazo, Cotopaxi, Imbabura, Loja, Morona-Santiago, Napo, Orellana, Pichincha, Sucumbíos, Tungurahua, Zamora-Chinchipe), Peru (Amazonas [n.v.], Ancash, Cajamarca, Junín, La Libertad [expected], San Martín). This species grows in marshes, grasslands, rocky outcrops, and exposed places of the paramo and humid puna ecoregions, between elevations of (2700–)3000–4800 m (Fig. 6).

The species is very common along the paramos of Colombia and Ecuador, but it becomes very scattered towards its southern limit. No collections have been studied from the region comprised between central Peru (Junín) and northern Bolivia (La Paz).

Phenology. Flowering nearly all year round.

Etymology. The epithet *humile* means low-growing, close to the ground.

Notes. *Xenophyllum humile* (Kunth) V.A.Funk is a morphologically polymorphic species with rhizome-like stems covered with lanate indumentum and marcescent leaves, obtuse to truncate leaf apex (usually callous-like tipped), (8–)10 to 13 involucre bracts, and (8–)10 to 13 ray florets with white corollas. The leaves are usually bent backwards due to a sort of articulation at the inflexion point between the leaf lamina and the sheath-like base. It is also characterized by its glabrous achenes, although we studied a single specimen from El Cajas (Azuay, Ecuador) displaying achenes with indumentum (*Ulloa & Minga 1393*, HA).

The species shows high variability in leaf size and density, which led some authors to describe infraspecific taxa or even to propose distinct species. *Werneria fontii* Cuatrec. was described from Tolima (Cordillera Central, Colombia) mainly on the basis of the compact habit of the plants thriving in this area. These plants are certainly smaller than typical forms and display short leaves with the leaf lamina barely spreading from the sheath-like base. Specimens also collected in the paramos of Tolima were previously used by Weddell (1856) to describe a variety that he characterized as having flesher leaves than typical variety, which is in line with the remarks stated by Cuatrecasas (1935) under *W. fontii*. However, these small and compact plants are not exclusive from this region. We studied similar forms from Farallones de Cali (Cordillera Occidental, Colombia), Nariño (southern Colombia), Tungurahua (Ecuador), and from Ancash (central Peru). On the other hand, some specimens from the paramos of Chingaza and Sumapaz (Cordillera Oriental, Colombia) display unusual narrow leaves that Cuatrecasas named *in sched.* as *W. humilis* var. *angustifolia* (Cuatrecasas 25628, US-01269081; *Cleef 1316*, US-01324876). From label information, it can be understood that these plants grow almost submerged in the water, which would explain the singular morphology of these forms. The Bolivian populations, which represent the southern limit of distribution of *X. humile*, rather exhibit a morphology similar to the typical forms. The puzzling pattern of the different morphologies along the whole distribution area makes unadvisable the recognition of more than a single species.

Xenophyllum humile shows morphological affinities with *X. funkianum*, *X. rigidum*, *X. roseum*, and *X. sotarense* (see comments under these species). Some specimens from

Cundinamarca (Colombia) have the rhizome-like stems covered with a dense lanate indumentum and with scarce leaves along them (e.g., *Pedraza & Franco* 452, COL; *Cleef & Florschütz* 5469, COL, US). They might be confused with *X. crassum* subsp. *orientale* (Cuatrec.) J. Calvo, although their distributions areas do not overlap and *X. humile* has shorter and narrower leaves, shorter involucral bracts, and smaller capitula. We also studied a few specimens containing material mixed with *Werneria pygmaea* Gillies ex Hook. & Arn., a strictly rosetiform species that can be readily differentiated because it grows in lax clumps or solitary plants and its leaves are acute to obtuse at the apex and have the leaf lamina barely spreading from the sheath-like base (vs. leaves obtuse to truncate at the apex or callous-like tipped, usually with the leaf lamina spreading at nearly 90° from the sheath-like base in *X. humile*); see *Cuatrecasas & Idrobo* 27005 (COL) and *Soderstrom* 1293 (US).

An isoelectotype of the name *Werneria humilis* Kunth is kept at the Willdenow Herbarium. This specimen was sent by Humboldt to Willdenow as stated at the bottom right of the sheet. It is not numbered but contains individuals identical to those from the lectotype at P.

Regarding the name *Werneria fontii*, it should be noted that the three specimens at MA are numbered with the same herbarium number, i.e., MA-246359. The isoelectotypes, therefore, are indicated as MA-246359b and MA-246359c in order to differentiate them from the lectotype.

Additional specimens examined. BOLIVIA. La Paz: Murillo, bajando de la cumbre 16.7 km hacia Unduavi, pasando Pongo, 16°19'S, 67°57'W, 28 Apr 1991, *S.G. Beck* 18750 (LPB, USM); Murillo, entre Pongo y Unduavi, mina 50, subiendo hasta la mina San Luis, 16°17'S, 67°55'W, 28 Oct 1994, *S.G. Beck et al.* 21519 (LPB); Nor Yungas, San Luis, al NE en línea recta a 3.5 km del poblado de Pongo, 16°18'S, 67°55'W, 13 Nov 2016, *F. Zenteno et al.* 19280 (LPB). **COLOMBIA. Antioquia:** páramo Frontino, cerro de Campanas, 6°27'N, 76°7'W, 29 Oct 1976, *J.D. Boeke & J.B. McElroy* 294 (US); **Caldas:** páramo del Ruiz, higher slopes, 29 Aug 1957, *H.G. Barclay* 5238 (COL); Villamaría, Nevado del Ruiz, a orillas de la carretera, 23 Sep 1980, *L.A. Camargo* 7406 (COL); cordillera Central, vertiente occidental, nevado de Santa Isabel, cabeceras del río Otún, 4°46'N, 75°25'W, 25 Nov 1946, *J. Cuatrecasas* 23219 (CONC); cordillera Central, vertiente occidental, páramos del nevado del Ruiz, 5 May 1940, *J. Cuatrecasas* 9283 (US); S side of Nevado el Cisne near laguna Verde, 4°50'N, 75°21'W, 28 Jan 1986, *V.A. Funk* 8091 (COL, US); S side of Nevado el Cisne near laguna Verde, 4°50'N, 75°21'W, 28 Jan 1986, *V.A. Funk* 8093 (COL, US); Cordillera Central alrededores del refugio del Ruiz, carretera El Silencio, 4°50'N, 75°22'W, 7 Oct 1978, *O. Rangel, H. Sturm & S. Zuluaga* 1734 (COL); Manizales, sector del Cisne, 4°51'N, 75°21'W, Oct 2010, *W.G. Vargas* 22353 (ICESI); **Cauca:** Puracé, P.N.N. Puracé, entre Pilimbalá y el volcán Puracé, 2°22'N, 76°24'W, 14 Nov 2004, *J. Betancur & M. Gutiérrez* 11215 (COL); Popayán, volcán Sotará, antecima del volcán, 2°6'N, 76°35'W, 30 Nov 2017, *J. Calvo, T. Buira & C. Velasco* 7622 (CAUP); cordillera Central, vertiente occidental, cabeceras del río Páez, páramos entre Perro Muerto y la laguna del Páez, 2°59'N, 76°2'W, 4/5 Dec 1944, *J. Cuatrecasas* 19095 (F); S del P.N. Puracé, inmedia-

ciones de la laguna La Magdalena, sector Valencia, 1°55'N, 76°36'W, 15 Sep 1987, *A. Duque* 559 (COL); páramo de Las Papas, El Boquerón y alrededores de la laguna La Magdalena, 1°55'N, 76°36'W, 16 Oct 1958, *J.M. Idrobo* & *H.G. Barclay* 4039 (COL); Totoró, vereda Santa Teresa, páramo Carga Chiquillo, 2°26'N, 76°23'W, 9 Jul 2002, *E.L. Muñoz* 915 (CAUP); páramo de Moras, between Mozoco and Pitayó, Tierra Adentro, 2°41'N, 76°14'W, Feb 1906, *H. Pittier* 1418 (US); Totoró, corregimiento de Gabriel López, trayecto a la laguna la Herradura, 2°30'N, 76°13'W, 17 Apr 2009, *B.R. Ramírez* & *J.F. Álvarez* 21060 (CAUP); Jambaló, Pitayó-Quichaya, área especial de manejo Cresta de Gallo, 2°42'N, 76°19'W, 3 Mar 2000, *G. Reina* 472 (CAUP); **Cundinamarca**: P.N.N. Sumapaz, Nazaret, Santa Rosa, 4°11'N, 74°11'W, 2 Oct 1999, *M. Ángel et al.* 9 (COL); Cordillera Oriental al sur de Usme, páramo de Chisacá, near edge of laguna Grande (Piñuelal), 4°18'N, 74°7'W, 16 Nov 1958, *H.G. Barclay* & *P. Jua-jibioy* 6220 (COL); La Calera, P.N.N. Chingaza, lagunas de Buitrago, 4°45'N, 73°49'W, 24 Jun 2017, *L. Camelo*, *J. Castillo* & *J. Bernal* 205 (COL); Bogotá, localidad de Usme, El Carrizal, alrededores de la laguna El Pato, 4°18'N, 74°9'W, 17 Jan 2013, *N. Castaño* & *A. Orejuela* 1429 (COL); páramo de Palacio, lagunas de Buitrago y alrededores, 4°45'N, 73°49'W, 16 Dec 1971, *A.M. Cleef* 294 (COL, US); páramo de Sumapaz, Chisacá, cabeceras del río S. Rosa, aprox. 1 km al S de la laguna Larga, 4°17'N, 74°12'W, 25 Aug 1972, *A.M. Cleef* 5277 (US); cabeceras de la quebrada Chuza entre la mina de cal del páramo de Palacio y el páramo de Chingaza, laguna Seca y alrededores, 1 km approx. al NW de la laguna, 4°40'N, 73°47'W, 19 Sep 1972, *A.M. Cleef* & *P.A. Florschütz* 5469 (COL, US); macizo de Bogotá, eastern drainage, páramo de Palacio, quebrada de Casarreales, 14 Dec 1959, *J. Cuatrecasas*, *M.T. Murillo* & *R. Jaramillo* 25628 (COL, MA, US); páramo de Chisacá, around the laguna de Chisacá, 4°17'N, 74°12'W, 29 Dec 1959, *J. Cuatrecasas* & *R. Jaramillo* 25746 (COL); macizo de Bogotá-macizo de Sumapaz, vertiente oriental, Media Naranja, 4°11'N, 74°15'W, 4 Jan 1969, *J. Cuatrecasas* & *J.M. Idrobo* 27005 (COL [mixed with *Werneria pygmaea*]); La Calera, páramo Chingaza, laguna Seca, 4°40'N, 73°46'W, 28 Dec 1999, *A. Díaz s.n.* (COL); páramo de Chisacá, entre las lagunas y Nazareth, 25 Aug 1977, *S. Díaz-Piedrahita* 1131 (COL); Fómeque, P.N.N. Chingaza, inmediaciones del campamento permanente del área administrativa del parque, sendero Suasié, 12 Nov 2015, *D. Giraldo-Cañas et al.* 6026 (COL); páramo de Chisacá, laguna Verde, 16 Sep 1952, *T. Hammen* 506 (COL); Fómeque, páramo de Chingaza, laguna del Medio, 4°30'N, 73°44'W, 15 Dec 1963, *G. Huertas* & *L.A. Camargo* 5831 (COL); páramo de Chisacá, 5 Apr 1960, *L.E. Mora* 1101 (COL); P.N.N. Sumapaz, vereda Santa Rosa, alrededores de la laguna de los Tunjos, 4°16'N, 74°12'W, 7 Aug 1998, *P. Pedraza et al.* 274 (COL); laguna de Chisacá, 4°17'N, 74°12'W, 13 Dec 1998, *P. Pedraza* & *P. Franco* 452 (COL); pico el Zapato, 4°14'N, 74°11'W, 14 Jan 1999, *P. Pedraza*, *C. Pedraza* & *A. Varón* 614 (COL); páramo de Chisacá, alrededores de las lagunas de Chisacá (hoya del río Magdalena), 4°17'N, 74°12'W, 10 Feb 1961, *P. Pinto* & *J. Hernández* 485 (COL); Sumapaz, a 2 km de la división de la carretera a San Juan, 3 Oct 1978, *O. Rangel* 1655 (COL); Pasca, páramo de Chisacá al SE de la laguna de los Tunjos, 4°16'N, 74°12'W, 7 Nov 1987, *R. Sánchez* 727 (COL); páramo de Siberia, 24 Feb 1952, *M. Schneider*

1182 (COL); páramo de Chisacá, 4°17'N, 74°12'W, 5 Oct 1966, *T.R. Soderstrom* 1293 (US [mixed with *W. pygmaea*]); macizo de Sumapaz, delante de las lagunas de Chisacá, 4°17'N, 74°11'W, 30 Sep 1963, *L. Uribe Uribe* 4492 (COL); páramo de Sumapaz, lagunas de Chisacá, 4°17'N, 74°11'W, 2 Dec 1968, *L. Uribe Uribe* 6206 (COL); Fómeque, P.N.N. Chingaza, lagunas de Buitrago, 4°45'N, 73°49'W, 12 Aug 2000, *F. Zapata* 66 (COL); **Huila:** vía al Nevado del Huila, 2°47'N, 76°1'W, 8 Dec 1993, *C. Barbosa* 9586 (COL); páramo de Las Papas, colinas al SE de la laguna La Magdalena sobre el cerro La Carona y El Boquerón, vertiente del Magdalena, 1°55'N, 76°35'W, 8 Sep 1958, *J.M. Idrobo, P. Pinto & H. Bischler* 3109 (COL); **Meta:** páramo de Sumapaz, Cerro Nevado del Sumapaz, pico del Nevado, exposición SE, 3°56'N, 74°6'W, 30 Jan 1972, *A.M. Cleef* 1316 (US); páramo de Sumapaz, Cerro Nevado del Sumapaz, pico del Nevado, lado NE, 3°56'N, 74°6'W, 11 Jan 1973, *A.M. Cleef* 7628 (COL, US); macizo de Sumapaz, entre el plano del Nevado y la laguna del Sorbedero, 3°56'N, 74°8'W, 13 Jul 1981, *S. Díaz-Piedrahita et al.* 2792 (COL); **Nariño:** Pasto, volcán Galeras, 1°13'N, 77°21'W, 1 Oct 1965, *C.E. Acosta* 12 (COL); Pasto, volcán Galeras, 1°13'N, 77°21'W, 1 Oct 1965, *C.E. Acosta* 13 (COL); in monte ignivomo Azufral, 18 May 1876, *E. André* 3281 (US); Cumbal, volcán de Chiles, en la antena vía El Laurel, Maldonado-Carchi, 0°49'N, 77°55'W, Jul 2012, *F. Ávila* 2247 (UDBC); Cumbal, volcán de Chiles, en la antena vía El Laurel, Maldonado-Carchi, 0°49'N, 77°55'W, Jul 2012, *F. Ávila* 2252 (UDBC); Cumbal, volcán de Chiles, en la antena vía El Laurel, Maldonado-Carchi, 0°49'N, 77°55'W, Jul 2012, *F. Ávila* 2259 (UDBC); Cumbal, volcán de Chiles, en la antena vía El Laurel, Maldonado-Carchi, 0°49'N, 77°55'W, Jul 2012, *F. Ávila* 2272 (UDBC); Mallama-Piedrahancha, páramo del Infiernillo, km 97 vía Pasto-Tumaco, vereda Pueblo Viejo, entre la cabaña principal de la reserva y el sitio "Las Lagunetas", 1°3'N, 77°46'W, 8 Jan 2009, *L.M. Caballero et al.* 31 (COL); macizo del volcán Galeras, E slope, around La Torre, 1°12'N, 77°21'W, 7 Feb 1965, *J. Cuatrecasas & L.E. Mora* 26899 (COL, US); La Cruz, corregimiento de La Estancia, volcán Doña Juana, 1°28'N, 76°55'W, 16 Nov 2001, *S.L. Díaz Ibarra* 2087 (CAUP); volcán de El Galeras (N slope) above Pasto, 1°12'N, 77°21'W, 18 Oct 1944, *J.A. Ewan* 16323 (US); camino de herradura entre Túquerres y el volcán Azufral, 8 Jan 1952, *A. Fernández & L.E. Mora* 1136 (COL); Cumbal, en la base del cerro nevado o volcán, 28 Oct 1955, *A. Fernández* 2897 (COL); al N de Yacuanquer, 1°9'N, 77°23'W, 4 Jan 1943, *M. Garganta* 488 (COL); volcán Galeras near Pasto, 1°12'N, 77°21'W, 11 Jan 1981, *A. Gentry et al.* 30523 (COL); Túquerres, volcán Azufral, E slopes, ca. 9–13 km W of Túquerres, 1°5'N, 77°40'W, 12 May 1989, *J.L. Luteyn, J. Fuertes & O. Rangel* 12826 (COL, US); Túquerres, volcán Azufral, 1°5'N, 77°40'W, 10 Feb 1962, *L.E. Mora* 1881a (US); Túquerres, volcán Azufral, 1°5'N, 77°40'W, 10 Feb 1962, *L.E. Mora* 1883 (US); Túquerres, volcán Azufral, 1°5'N, 77°43'W, 30 Sep 1979, *L.E. Mora* 7536 (COL); Pasto, P.N.N. Galeras, alrededores del volcán Galeras, 1°15'N, 77°26'W, 2 Sep 1999, *P. Pedraza & M. Alvear* 667 (COL); Pasto, volcán Galeras, 1°13'N, 77°21'W, 6 Aug 1977, *P. Pinto et al.* 1829 (COL); volcán Galeras, páramo, 1°13'N, 77°20'W, 22 Oct 1968, *T. Plowman* 1954 (US); alrededores de Cumbal, 20 Jul 1952, *R. Romero-Castañeda* 3279 (COL); Pasto, volcán El Galeras, 4 Jun 1946, *R.E. Schultes*

& *M. Villarreal* 7955 (COL, CONC, F); Cumbal, volcán Chiles, 0°49'N, 77°56'W, 23 Oct 1978, *H. Sturm* 115 (COL); Túquerres, laguna Verde, 1°5'N, 77°43'W, May 1853, *J.J. Triana* 2803.1 (COL); **Risaralda:** Cordillera Central, páramo del Quindío, 4°44'N, 75°23'W, 15 Aug 1922, *F.W. Pennell* & *T.E. Hazen* 10020 (US); **Tolima:** at top of Cordillera Central, Florida-Herrera camino, 3°19'N, 76°2'W, 16 Nov 1944, *E.L. Core* 1587 (US); Santa Isabel, paso de la Cordillera Central por la quebrada de África, 4°45'N, 75°22'W, 5 Feb 1980, *S. Díaz-Piedrahita* & *R. Jaramillo* 1798 (COL); páramo de Ruiz, 16/17 Dec 1917, *F.W. Pennell* 3039 (NY, US); **Valle del Cauca:** Los Farallones, ca. filo de la cordillera, al N del cerro Pance, vert. del Pacífico, 3°21'N, 76°42'W, 26 Jul 1991, *E. Calderón* 43A (COL); alto de Los Farallones, 3°20'N, 76°41'W, 27 Feb 1979, *C. Downey* 131 (COL). **ECUADOR. Azuay:** P.N. Cajas, cerca de la laguna Toreadora, 2°46'S, 79°13'W, 15 Nov 2000, *L. Endara* & *M. Nonhebel* 496 (QCA); P.N. Cajas, ca. 30 km W of Sayausí, at pass NE toward highest peak, 2°46'S, 79°14'W, 23 Oct 1995, *V.A. Funk* & *X. Montezuma* 11431 (QCA); P.N. Cajas, ca. 30 km W of Sayausí, at pass NE toward highest peak, 2°46'S, 79°14'W, 23 Oct 1995, *V.A. Funk* & *X. Montezuma* 11432 (HA, QCA); P.N. Cajas, ca. 30 km W of Sayausí, at pass NE toward highest peak, 2°46'S, 79°14'W, 23 Oct 1995, *V.A. Funk* & *X. Montezuma* 11433 (QCA); 5 km W of Soldados on Cuenca-San Joaquín-Angas rd., ca. 100 m up slopes N of rd. toward large laguna, near laguna Estrellas Cocha, 2°54'S, 79°15'W, 24 Oct 1995, *V.A. Funk* & *X. Montezuma* 11442 (QCA); 5 km W of Soldados on Cuenca-San Joaquín-Angas rd., ca. 100 m up slopes N of rd. toward large laguna, near laguna Estrellas Cocha, 2°54'S, 79°15'W, 24 Oct 1995, *V.A. Funk* & *X. Montezuma* 11443 (US); 5 km W of Soldados on Cuenca-San Joaquín-Angas rd., ca. 100 m up slopes N of rd. toward large laguna, near laguna Estrellas Cocha, 2°54'S, 79°15'W, 24 Oct 1995, *V.A. Funk* & *X. Montezuma* 11444 (US); W of Cuenca on gravel road between Soldados and Balao (hwy 25), laguna Estrellas Cocha, 6 km W of Arch at Soldados Park entrance, 2°54'S, 79°15'W, 18 Apr 2018, *V.A. Funk* & *J.M. Bonifacino* 14028 (US); W of Cuenca on gravel road between Soldados and Balao (hwy 25), laguna Estrellas Cocha, 6 km W of Arch at Soldados Park entrance, 2°54'S, 79°15'W, 18 Apr 2018, *V.A. Funk* & *J.M. Bonifacino* 14031 (US); carretera Cuenca-Angas, entre Soldados y Angas, 3 Aug 1983, *J. Jaramillo* & *V. Winnerskjold* 5497 (QCA); parque de recreación Cajas, 2 Sep 1984, *J. Jaramillo* 7202 (QCA); P.N. Cajas, road Cuenca-Sayausí-Molleturo, km 38.4, from the pass to the top of ridge north of pass, 2°46'S, 79°14'W, 4 Jan 2000, *P.M. Jørgensen*, *C. Ulloa* & *E. Narváez* 2098 (HA, QCNE); P.N. Cajas, road Cuenca-Sayausí-Molleturo, km 38.4, from the pass to the top of ridge north of pass, 2°46'S, 79°14'W, 4 Jan 2000, *P.M. Jørgensen*, *C. Ulloa* & *E. Narváez* 2117 (HA, QCNE); arriba laguna Dos Chorreras, llamado “upper meadow”, 2°46'S, 79°9'W, 2 Jul 1995, *B. León* & *K. Young* 3481 (QCA); Cuenca, Sayausí, Tres Cruces, 2°46'S, 79°14'W, 12 Apr 2013, *D. Minga* & *A. Verdugo* 2567 (HA); eastern cordillera, between Oña and the río Yacuambi, 3°34'S, 79°5'W, 10/19 Sep 1945, *F. Prieto* 285 (COL, RB); Cajas N.P., E side of cerro Amarillo, 2°45'S, 79°15'W, 14 Jul 1997, *P. Sklenář* & *V. Sklenářová* 2556 (QCA); vicinity of Toreador [laguna Toreadora], between Molleturo and Quinoas, 2°46'S, 79°13'W, 15 Jun 1943, *J.A. Steyermark* 53216

(RB); P.N. Cajas, Cuenca-Molleturo km 28, sendero Patoquinoas-Totoras, 2°47'S, 79°12'W, 29 Aug 2003, *C. Ulloa & D. Minga* 1393 (HA); carretera Cuenca-San Joaquín-Angas, entre Soldados y Angas, 2°55'S, 79°15'W, 8 Oct 1990, *R. Valencia & J.C. Matheus* 395 (QCA); **Bolívar**: Guaranda, subcuenca del río Chimbo, cerro Tili-lag, 1°36'S, 78°52'W, 23 Jan 1982, *V. Pasaca* 1397 (LOJA); **Carchi**: páramo del Ángel, 21 Aug 1957, *H.G. Barclay* 5017 (COL); páramo del Ángel, high ridge, 22 Aug 1957, *H.G. Barclay* 5104 (COL); páramo del Ángel, on high ridge, 23 Aug 1957, *H.G. Barclay* 5137 (COL); along road from El Chical to Tulcán, at summit of road midway through paramo del Ángel, 0°48'N, 77°56'W, 15 Oct 2012, *T.B. Croat et al.* 104336 (QCNE); loma Paneílo, 7.7 km W of Tufiño on road to Maldonado, 0°45'N, 77°50'W, 11 Nov 1988, *L.J. Dorr & L.C. Barnett* 6035 (QCA, QCNE); roas between Tulcán and Maldonado, S of volcán Chiles, 0°47'N, 77°58'W, 12 Mar 1985, *B. Eriksen* 59003 (QCA, QCNE); paramo El Ángel, between towns of El Ángel and Tulcán near the pass, 4 Mar 1992, *V.A. Funk & M. Gavilanes* 11071 (QCA, QCNE); paramo El Ángel, between towns of El Ángel and Tulcán near the pass, 4 Mar 1992, *V.A. Funk & M. Gavilanes* 11072 (QCA, QCNE); volcán Chiles, rd. from Tulcán to Maldonado, 32 km W of the bridge at the W edge of Tulcán, 5 Mar 1992, *V.A. Funk & M. Gavilanes* 11075 (QCA, QCNE); volcán Chiles, rd. from Tulcán to Maldonado, 38 km W of the bridge at the W edge of Tulcán, 5 Mar 1992, *V.A. Funk & M. Gavilanes* 11078 (QCA, QCNE); El Ángel-Tulcán, around laguna El Voladero, 0°42'N, 77°53'W, 9 Aug 1990, *P.M. Jørgensen et al.* 92321 (COL, QCA, QCNE); páramo El Ángel, laguna S de El Voladero, 0°37'N, 78°26'W, 18 Dec 1990, *S. León* 1116 (QCA); páramo El Ángel, laguna S de El Voladero, 0°37'N, 78°26'W, 1 Sep 1983, *P. Mena* 192 (QCA); páramo El Ángel, laguna S de El Voladero, 0°37'N, 78°26'W, [without date], *P. Mena* 43 (QCA); Espejo, reserva ecológica El Ángel, sitio de lagunas El Voladero, 0°42'N, 77°53'W, 31 Oct 1993, *W. Palacios* 11636 (QCNE); S slopes of volcán Chiles, 0°49'N, 77°57'W, 21 Oct 1987, *P.M. Ramsay & P.J. Merrow-Smith* 866 (QCA, QCNE); El Ángel, 19 Aug 1999, *M. Smeets & M. Lind van Wijngaarden* 736 (QCA, QCNE); Espejo, asociación 23 de Julio, 0°43'N, 77°55'W, 3 Aug 2003, *D. Suárez, M. Chinchero & M. Cabascango* 1325 (QCNE); Espejo, parroquia La Libertad, humedal Potrerillos, 0°42'N, 77°52'W, 3 Aug 2011, *H. Valles & S. Chimbolema* 373 (QCA); **Chimborazo**: eastern slope of Mount Chimborazo, 1°27'S, 78°46'W, 24 Jul 1939, *E. Asplund* 7819 (LIL); Cordillera Oriental, páramo de la laguna Negra, al N y al E de Alao, 1°46'S, 78°26'W, 11 Aug 1959, *H.G. Barclay & P. Juajibioy* 8782 (COL); Colta, vía Ambrosio Lazo, El Puyal, 1°41'S, 78°48'W, 2 May 2013, *J. Caranqui, W. Haro & F. Salas* 2182 (QCA); Alausí, laguna de Ozogoché, 2°13'S, 78°37'W, 10 Jul 2013, *J. Caranqui* 2439 (QCA); comunidad de Ambrosio Lazo, sector Patococha-Loma Caparina, 1°44'S, 78°53'W, 5 Jun 2009, *D. Cárate et al.* 609 (QCA); comunidad de Ambrosio Lazo, quebrada Cóndor, sector Yurak Rume, 1°43'S, 78°54'W, 6 Jun 2009, *D. Cárate et al.* 646 (QCA); comunidad de Ambrosio Lazo, Cóndor Alto, 1°43'S, 78°52'W, 7 Jun 2009, *D. Cárate et al.* 675 (QCA); nev. Chimborazo, cerca al refugio, 1°29'S, 78°48'W, 13 Jul 2009, *D. Cárate et al.* 950A (QCA); SW slope of volcano Chimborazo, 1°1'S, 78°47'W, 27 Jun 2012, *N. Morueta-Holme, K. Engemann & P. Sandoval* 84 (QCA); El

Altar, N side of the volcano, on the ridge below the Canoningo peak, 1°41'S, 78°24'W, 19 Aug 1995, *P. Sklenář & V. Kostečková* 1039 (QCA); cerro Yanaurcu, on the W side of the N ridge of the mountain, 2°14'S, 78°30'W, 29 Oct 1995, *P. Sklenář & V. Kostečková* 148-17 (QCA); W side of the Chimborazo volcano, 1°28'S, 78°52'W, 5 Jul 1999, *P. Sklenář* 7508 (QCA, QCNE); **Cotopaxi**: P.N. Cotopaxi, faldas N de Rumiñahui, 0°40'S, 78°30'W, 28 Oct 1982, *H. Balslev, J. Brandbyge & L. Coloma* 3347 (QCA); around the Illiniza peaks, 4–10 mi. W from town of Magdalena, 0°39'S, 78°40'W, 2 Apr 1991, *R. Bensman* 370 (QCNE); entre Aucacocha y Tambo, 31 Dec 1983, *J. Jaramillo* 6297 (QCA); paramo de Quispicacha, E slope of loma Pucyucuchu, 1°5'S, 78°50'W, 24 Oct 2006, *P. Sklenář* 9086 (QCA, QCNE); paramo de Quispicacha, E slope of loma Pucyucuchu, 1°5'S, 78°50'W, 23 Oct 2006, *P. Sklenář* 9125 (QCA); paramo de Quispicacha, summit plateau of loma Pucyucuchu, 1°5'S, 78°50'W, 25 Oct 2006, *P. Sklenář* 9268 (QCA); **Imbabura**: Otavalo, reserva ecológica Cotacachi-Cayapas, SW base of Cotacachi mountain, 0°25'N, 78°20'W, 28 Apr 1996, *J.L. Clark* 2534 (QCNE); laguna de Mojanda, 0°8'N, 78°16'W, 13 Aug 1976, *B. Øllgaard & H. Balslev* 8749 (US); cúspide cerro Fuya-Fuya, al S de Otavalo, 0°8'N, 78°17'W, 27 Jan 1980, *J. Jaramillo & F. Coello* 2078 (QCA); Cotacachi, slopes of volcán Cotacachi, 0°35'N, 78°20'W, 11 Oct 1987, *P.M. Ramsay & P.J. Merrow-Smith* 759 (QCA, QCNE); nevado Cotacachi, on the SW side of the SE ridge of the volcano, 0°21'N, 78°21'W, 9 Sep 1995, *P. Sklenář & V. Kostečková* 120-1 (QCA); cerro Imbabura, on the E side of the volcano, 0°15'N, 78°10'W, 5 Jun 1995, *P. Sklenář & V. Kostečková* 31-20 (QCA); **Loja**: Loma del Oro cerca de Yacuambi, cerca de las lagunas de Condorcillo, 3°34'S, 79°4'W, 25 Oct 1997, *R. Bussmann & S. Lange s.n.* (HUTPL); Cajanuma, Podocarpus, camino a las lagunas del Compadre, 4°7'S, 79°9'W, 13 Dec 2017, *J. Calvo* 7681 (HUTPL); Jimbura-Zumba road, km 17, at small lake, 4°44'S, 79°25'W, 27 Jul 1990, *P.M. Jørgensen, C. Ulloa & M. Gavilanes* 92210 (QCA, QCNE); lagunas N of km 17 on road Jimbura-Zumba, 4°43'S, 79°26'W, 13 Aug 2001, *S. Laegaard et al.* 21588 (QCNE); Podocarpus N.P., along the trail from Nudo de Cajanuma towards lagunas Compadre, ca. 3–4 km from the refuge, 4°7'S, 79°9'W, 19 Aug 2004, *P. Sklenář* 8369 (QCA); **Morona-Santiago**: 24 km E of Gualaceo on rd. to Limón, at pass up rd. to tower, 3°0'S, 78°39'W, 25 Oct 1995, *V.A. Funk & R.X. Zamora* 11450 (QCA); cerros Yuibug-Pailacajas, E side of the mountain ridge, 1°45'S, 78°27'W, 30 Jul 1997, *P. Sklenář & V. Sklenářová* 2903 (QCA); W side of the rocky mountain ridge to the E of cerro Yuibug, 1°44'S, 78°27'W, 1 Aug 1997, *P. Sklenář & V. Sklenářová* 3099 (QCA); **Napo**: Archidona, Sumaco Napo-Galeras N.P., Sumaco, crater, 0°34'S, 77°38'W, 16 Mar 1996, *J.L. Clark* 2219 (QCNE); rd. from Quito to Baeza, just at the pass, 0°19'S, 78°12'W, 22 Feb 1992, *V.A. Funk et al.* 11024 (QCA, QCNE); SW-slope 1.5 km from cerro Quilindaña, 0°47'S, 78°21'W, 1 Apr 1979, *L. Holm-Nielsen* 16403 (QCA, US); NW slope of Antisana, N of lago Mauca-Machay, 0°26'S, 78°9'W, 2 Nov 1979, *L. Holm-Nielsen* 20787 (QCA); cordillera de los Llanganates, loma between río Muyu, río Toro and río Verde Grande, 5 km WNW of cerro Hermoso, 1°12'S, 78°19'W, 9 Nov 1980, *L. Holm-Nielsen & J. Jaramillo* 28223 (QCA); cordillera de los Llanganates, W shoulder of cerro Hermoso, 1.5 km W of the summit, 1°13'S, 78°17'W, 11 Nov

1980, *L. Holm-Nielsen & J. Jaramillo* 28475 (QCA); cordillera de los Llanganates, shoulder of cerro Hermoso, 1.5 km W of the summit, 1°13'S, 78°18'W, 12 Nov 1980, *L. Holm-Nielsen & J. Jaramillo* 28722 (QCA); Antisana, Jan 1865, *J. Isern* 43 (MA); carretera Pifo-Papallacta, páramo de Guamaní, 0°19'S, 78°12'W, 15 Jan 1981, *J. Jaramillo* 4129 (QCA); páramo de Guamaní, N of paso de La Virgen, 0°17'S, 78°10'W, 10 Jun 1984, *S. Laegaard* 52249 (QCA, QCNE); Archidona, volcán Sumaco, segunda cumbre cerca al cráter, 0°32'S, 77°37'W, 19 Sep 2012, *P. Lozano et al.* 79 (QCA); 13.5 km W of Papallacta, 26 Mar 1972, *B. MacBryde & J.D. Dwyer* 1207 (QCA); Pisayambo, laguna Cochas Negras, 1°6'S, 78°19'W, 14 Jan 1999, *B. Merino & Á. Sánchez s.n.* (LOJA [mixed with *X. crassum* subsp. *crassum*]); Llanganati, below summit of Pan de Azúcar, 1°9'S, 78°18'W, 15 May 1982, *B. Øllgaard et al.* 38552 (QCA); Llanganati, ridge between Pan de Azúcar and Las Torres de Llanganati, 1°9'S, 78°17'W, 15 May 1982, *B. Øllgaard et al.* 38573 (QCA); páramo de Soguillas, near Las Torres de Llanganati, old crater ridge, 1°8'S, 78°15'W, 16 May 1982, *B. Øllgaard & L. Holm-Nielsen* 38755 (QCA); reserva ecológica Oyacachi, 0°13'S, 78°8'W, 16 Dec 2008, *K. Romoleroux, D. Cárate & L.E. López* 5355 (QCA); NE side of Antisana, 0°27'S, 78°8'W, 1 Nov 2007, *P. Sklenář & E. Rejzková* 10707 (QCA); volcán Antisana, W side of the mountain, 0°30'S, 78°10'W, 21 Jul 1997, *P. Sklenář & V. Sklenářová* 2810 (QCA); NE side of volcán Antisana, 0°27'S, 78°8'W, 17 Aug 1997, *P. Sklenář & V. Sklenářová* 3403 (QCA); NE side of volcán Antisana, 0°27'S, 78°8'W, 17 Aug 1997, *P. Sklenář & V. Sklenářová* 3422 (QCA); NE side of volcán Antisana, 0°27'S, 78°8'W, 18 Aug 1997, *P. Sklenář & V. Sklenářová* 3435 (QCA); NE side of volcán Antisana, 0°27'S, 78°8'W, 18 Aug 1997, *P. Sklenář & V. Sklenářová* 3538 (QCA); Quijos, reserva ecológica Antisana, páramo de Guamaní, carretera Pifo-Papallacta, La Virgen, 0°20'S, 78°12'W, 24 Jul 1998, *H. Vargas, E. Narváez & W. Quizhpe* 1936 (QCNE); Tena, P.N. Llanganates, vía Salcedo-Tena, de laguna Chaloa Cocha desvío a Rayo Filo, 0°57'S, 78°23'W, 20 Sep 1998, *H. Vargas, E. Narváez & S. Orellana* 2679 (QCNE); **Orellana**: N side of cerro Sumaco, 100 m NW of campsite, 0°32'S, 77°37'W, 24 Apr 1979, *L. Holm-Nielsen, J. Jaramillo & T. Vries* 17109 (QCA); N side of cerro Sumaco, 100 m NW of campsite, 0°32'S, 77°37'W, 24 Apr 1979, *L. Holm-Nielsen, J. Jaramillo & T. Vries* 17126 (QCA); N side of cerro Sumaco, upper part of the loma NW of campsite, 0°32'S, 77°37'W, 25 Apr 1979, *L. Holm-Nielsen, J. Jaramillo & T. Vries* 17204 (QCA); S side of crater of cerro Sumaco, 0°33'S, 77°37'W, 26 Apr 1979, *L. Holm-Nielsen, J. Jaramillo & T. Vries* 17312 (QCA); Sumaco, 0°32'S, 77°37'W, Jun 1865, *J. Isern* 313 (MA); S side of cerro Sumaco, 100–200 m S of the main crater, 0°33'S, 77°37'W, 29 Apr 1979, *B. Løjtman & U. Molau* 12942 (QCA); **Pichincha**: vicinity of Quito, Rucu Pichincha, 0°9'S, 78°33'W, 31 Aug 1939, *E. Asplund* 8612 (LIL); Cordillera Oriental, entre Pifo y el boquerón de cerro Corrales, páramo de Guamaní, 0°19'S, 78°12'W, 15 Aug 1959, *H.G. Barclay & P. Juajibioy* 8900 (COL); flanco SW del volcán Sincholagua, 0°35'S, 78°21'W, 1 Jun 1985, *J. Bosco* 145 (QCA); faldas SE volcán Guagua Pichincha, proximidades del refugio, 0°10'S, 78°35'W, 25 May 1985, *J. Bosco & M. Marcillo* 72B (QCA); entre Pifo y Papallacta, 0°19'S, 78°12'W, 26 Nov 1977, *S. Castroviejo, M. Costa & E. Valdés-Bermejo* 1053 (MA); Rumiñahui, bosque protector Pasochoa, línea

de cumbre del Pasochoa, 0°22'S, 78°27'W, 17 Nov 1990, *C.E. Cerón & R. Alarcón* 12307 (QCNE); Cayambe, laguna San Marcos, 0°7'N, 77°57'W, 27 Dec 1999, *B. Cuamacás & E. Gudiño* 473 (QCNE); Quito, parroquia Lloa, sector NE del volcán Guagua Pichincha, 0°10'S, 78°35'W, 12 Aug 2014, *D. Fernández et al.* 1739 (QCNE); Quito, parroquia Lloa, sector NE del volcán Guagua Pichincha, 0°10'S, 78°35'W, 12 Aug 2014, *D. Fernández et al.* 1743 (QCNE); Quito, volcán Atacazo, 0°22'S, 78°35'W, 28 Jun 2000, *D. Fernández, M. Cerna & P. Villacrés* 325 (QCNE); Atacazo, 0°21'S, 78°37'W, Sep 1928, *F.G. Firmín* 531 (US); road from Cayambe city to Mt. Cayambe, dirt/rock road high on Mt. Cayambe, W slope, 0°0', 78°1'W, 24 Apr 2018, *V.A. Funk & J.M. Bonifacino* 14094 (US); páramo de Guamaní, carretera Quito-Pifo-Papallacta, 0°23'S, 78°9'W, 20 Oct 1990, *E. Guerrón* 13 (QCA, QCNE); volcán Cayambe, S slope of the volcanic cone, valley near road to refugio, 0°3'S, 78°0'W, 18 Jun 1980, *L. Holm-Nielsen* 24224 (QCA); volcán Cayambe, S slope of the volcanic cone, near the refugio, 0°2'S, 77°59'W, 18 Jun 1980, *L. Holm-Nielsen* 24245 (QCA); volcán Iliniza, NE slope below the refugio, 0°39'S, 78°42'W, 13 Aug 1980, *L. Holm-Nielsen, B. Øllgaard & C. Sperling* 24899 (QCA); volcán Iliniza, NE slope below the refugio, 0°38'S, 78°42'W, 13 Aug 1980, *L. Holm-Nielsen, B. Øllgaard & C. Sperling* 24959 (QCA); volcán Iliniza, NE slope below the refugio, 0°38'S, 78°42'W, 13 Aug 1980, *L. Holm-Nielsen, B. Øllgaard & C. Sperling* 24982 (QCA); route de Tufiño à Maldonado, 10 km après Tufiño, 6 Jul 1988, *C. Huttel* 1385 (QCA); Andium quitensium, crescit in jugis Andium, Dec 1860, *W. Jameson s.n.* (QPLS); vía Chillogallo-San Juan, partidero desde la población de San Juan hacia faldas del Atacazo “antenas militares”, 0°20'S, 78°36'W, 13 Jul 1980, *J. Jaramillo & M. Lascano* 3142 (QCA); NE Pasochoa, 0°27'S, 78°28'W, 30 Jul 1980, *J. Jaramillo, R. Narváez & F. Coello* 3168 (QCA); 1 km SE of Cayambe on road to hacienda Piemonte, 10 May 1990, *R.M. King, P.M. Peterson & E.J. Judziewicz* 10052 (QCA, QCNE); páramo de Guamaní, paso de la carretera Quito-Baeza, 0°19'S, 78°12'W, 25 Aug 1985, *B.B. Larsen & B. Dall* 190 (QCA); páramo de Guamaní, carretera Pifo-Papallacta, km 27, 0°19'S, 78°12'W, 13 Jan 1991, *S. León* 1135 (QCA); páramo de Guamaní, carretera Pifo-Papallacta, km 27, 0°19'S, 78°12'W, 13 Jan 1991, *S. León* 1136 (QCA); in m. Antisana, Sep 1897, *L. Mille* 469 (QPLS); upper SE slopes of Guagua Pichincha, between the refuge and the crater rim, 0°11'S, 78°36'W, 9 Jan 1988, *U. Molau, B. Eriksen & B.B. Klitgaard* 2403 (QCA, QCNE); faldas occidentales del volcán Antisana, 0°28'S, 78°12'W, 4 Mar 1984, *L. Muñoz* 339 (QCA); volcán Cayambe, N slopes, along road to the antenna, 0°5'N, 77°59'W, 9 Jul 1980, *B. Øllgaard et al.* 34196 (QCA); road Olmedo-laguna San Marcos, E of the pass, 0°7'N, 77°59'W, 10 Jul 1980, *B. Øllgaard et al.* 34456 (QCA); páramo de Guamaní, laguna de Hoyas, 0°15'S, 78°12'W, 8 Aug 1987, *P.M. Ramsay & P.J. Merrow-Smith* 186 (QCA, QCNE); páramo de Guamaní, 0°15'S, 78°12'W, 7 Oct 1987, *P.M. Ramsay & P.J. Merrow-Smith* 726 (QCA, QCNE); W side of a mountain ridge ca. 2 km to the W from cerro SaraUrcu, 0°6'S, 77°57'W, 29 Aug 1995, *P. Sklenář & V. Kostečková* 100-11 (QCA); W side of a mountain ridge ca. 2 km to the W from cerro SaraUrcu, 0°6'S, 77°57'W, 30 Aug 1995, *P. Sklenář & V. Kostečková* 111-7 (QCNE); nevado Cayambe, SW slopes left from the road to the refuge, 0°1'N, 78°1'W, 1 Jul 1995, *P. Sklenář & V.*

Kostečková 49-16 (QCA); nevado Cayambe, SW slopes left from the road to the refuge, 0°1'N, 78°1'W, 1 Jul 1995, *P. Sklenář & V. Kostečková* 51-9 (QCNE); Cotopaxi volcano, on the N side of the mountain, 0°39'S, 78°25'W, 28 Jun 1999, *P. Sklenář* 7328 (QCA, QCNE); NE slopes of Rucu Pichincha, 0°10'S, 78°34'W, 18 May 1995, *P. Sklenář & V. Kostečková* 8-1 (QCNE); in pasc. andin. m. Rucu Pichincha, Jul 1871, *L. Sodiro* 61/3 (QPLS); cerro Atacazo, pendiente N cumbre Atacazo, 0°20'S, 78°36'W, 18 Jun 1983, *B. Treiber de Espinosa* 101 (QCA); volcán Cayambe, cerca del refugio, 0°0', 78°1'W, 6 Oct 2010, *C. Ulloa et al.* 2416 (QCA); **Sucumbíos**: parroquia El Playón de San Francisco, 0°36'N, 77°40'W, 16 Oct 2008, *D. Reyes et al.* 3688 (QCNE); **Tungurahua**: páramo del Caryhuayrazo, lado SW, entrando por el arenal del Chimborazo, 1°24'S, 78°48'W, 1 Aug 1988, *C.E. Cerón, M. Cerón & G. Viteri* 4397 (QCNE); páramo del Caryhuayrazo, lado SW, entrando por el arenal del Chimborazo, 1°24'S, 78°48'W, 1 Aug 1988, *C.E. Cerón, M. Cerón & G. Viteri* 4408 (QCNE); páramo del Caryhuayrazo, lado SW, entrando por el arenal del Chimborazo, 1°24'S, 78°48'W, 1 Aug 1988, *C.E. Cerón, M. Cerón & G. Viteri* 4423 (QCNE); Santiago de Pillaro, páramos de Pisayambo, alrededor de la laguna de Pisayambo, 1°5'S, 78°23'W, 9 Oct 1998, *E. Cueva* 207 (QCNE); cordillera de los Llanganates, Achiriqui, páramo de Jaramillo, 12.7 km NW of cerro Hermoso, 1°9'S, 78°21'W, 7 Nov 1980, *L. Holm-Nielsen & J. Jaramillo* 28012 (QCA); cordillera de los Llanganates, N end of the loma between río Muyu and río Verde Grande, 5.5 km WNW of cerro Hermoso, 1°12'S, 78°19'W, 9 Nov 1980, *L. Holm-Nielsen & J. Jaramillo* 28183 (QCA); cordillera de los Llanganates, N end of the loma between río Muyu and río Verde Grande, 5.5 km WNW of cerro Hermoso, 1°12'S, 78°19'W, 9 Nov 1980, *L. Holm-Nielsen & J. Jaramillo* 28186 (QCA); cordillera de los Llanganates, S side of laguna Verde at cerro Hermoso, 1.8 km from the summit, 1°14'S, 78°18'W, 11 Nov 1980, *L. Holm-Nielsen & J. Jaramillo* 28423 (QCA); cordillera de los Llanganates, páramo de Jaramillo, 12 km NW of cerro Hermoso, 1°9'S, 78°21'W, 14 Nov 1980, *L. Holm-Nielsen & J. Jaramillo* 28781 (QCA); páramo de Jaramillo, 2 Nov 1984, *J. Jaramillo* 7359 (QCA); Santiago de Pillaro, P.N. Llanganates, desde el río Millín hasta la colina Ashpachaca, 1°8'S, 78°22'W, 12 Oct 1998, *E. Narváez & W. Quizhpe* 302 (QCNE); Santiago de Pillaro, P.N. Llanganates, W of cerro Hermoso, near saddle between headwaters of río Verde and río Topo, 1°11'S, 78°19'W, 12 Nov 1999, *D. Neill et al.* 11959 (QCNE); Santiago de Pillaro, P.N. Llanganates, SW ridge of cerro Hermoso, 1°13'S, 78°17'W, 14 Nov 1999, *D. Neill et al.* 12077 (QCNE); Santiago de Pillaro, P.N. Llanganates, SW ridge of cerro Hermoso, 1°13'S, 78°17'W, 14 Nov 1999, *D. Neill et al.* 12095 (COL, QCNE); Santiago de Pillaro, P.N. Llanganates, SW ridge of cerro Hermoso, 1°13'S, 78°17'W, 14 Nov 1999, *D. Neill et al.* 12112 (COL, QCA, QCNE); Ambato, ladera NW del cerro Carihuairhazo, 1°23'S, 78°45'W, 2 Feb 2012, *K. Romoleroux & G. Peyre* 5756 (QCA); P.N. Llanganates, 1°7'S, 78°21'W, 15 Feb 2009, *S. Salgado* 686 (QCA); volcán Tungurahua, N side of the mountain, trail to the summit, 1°27'S, 78°27'W, 8 Aug 1997, *P. Sklenář & V. Sklenářová* 3246 (QCA); cerro Hermoso, SW ridge of the mountain, 1°14'S, 78°18'W, 6 Sep 1997, *P. Sklenář & V. Sklenářová* 3604 (QCA); cerro Hermoso, SW ridge of the mountain, 1°14'S, 78°18'W, 6 Sep 1997, *P. Sklenář & V.*

Sklenářová 3632 (QCA); Patate, P.N. Llanganates, faldas del cerro Pan de Azúcar, en el trayecto páramo de Soguillas-cerro Pan de Azúcar, 1°9'S, 78°17'W, 13 Oct 1998, *H. Vargas, J.C. Ronquillo & N. Granda* 2837 (QCNE); Patate, P.N. Llanganates, faldas del cerro Pan de Azúcar, en el trayecto páramo de Soguillas-cerro Pan de Azúcar, 1°9'S, 78°17'W, 13 Oct 1998, *H. Vargas, J.C. Ronquillo & N. Granda* 2838 (QCNE); Patate, P.N. Llanganates, alrededores de la laguna Pan de Azúcar, 1°9'S, 78°17'W, 14 Oct 1998, *H. Vargas, J.C. Ronquillo & N. Granda* 2869 (QCNE); **Zamora-Chinchipe:** cordillera de Sabanilla, cerca de la carretera Jimbura-Zumba, alrededor de la laguna Negra, 4°42'S, 79°25'W, 22 Oct 1996, *R. Bussmann & S. Lange s.n.* (HUTPL, QCNE). **PERU. Ancash:** cordillera Blanca, quebrada Illanro, nevado Portachuelo, north side to west of glacier, 9°2'S, 77°35'W, 13 Jul 1979, *M. Gibby & J.A. Barrett* 185 (BM); Carhuaz, Huascarán N.P., quebrada Ulta, below Ulta pass, 9°7'S, 77°31'W, 28 Jul 1985, *D.N. Smith* 11323 (F, MO, USM); **Cajamarca:** surroundings of Cajamarca, Jan 1986, *B. Becker & F.M. Terrones* 303 (LPB); surroundings of Cajamarca, 29 Jan 1986, *B. Becker & F.M. Terrones* 328 (LPB); Tingo, minas Conga, 6°55'S, 78°21'W, 3 Oct 2005, *A. Granda* 2491 (MOL); **Junín:** Jauja, encima de la hacienda Runatullu, 11°39'S, 74°58'W, 23 Apr 1913, *A. Weberbauer* 6628 (MOL, USM); **San Martín:** Mariscal Cáceres, valle al oeste del campamento Chochos en el P.N. del río Abiseo, 7°37'S, 77°28'W, 28 Jun 1996, *A. Cano et al.* 7388 (USM).

3. *Xenophyllum sotarense* (Hieron.) V.A.Funk, *Novon* 7(3): 240. 1997.

Werneria sotarensis Hieron., Bot. Jahrb. Syst. 21(3): 363. 1895 [“soratensis”]. Type. Colombia. Cauca: Popayán al Sotará, cúspide del Sotará, 4400 m, Feb 1869, *A. Stübel* 339b (lectotype: MA-246367 (fragment!), designated by Funk (1997a: 240)). Epitype, designated here: Colombia. Cauca: Popayán, volcán Sotará, cima del volcán, 2°06'31"N, 76°35'31"W, 4440 m, 30 Nov 2017, *J. Calvo, T. Buira & C. Velasco* 7640 (MA-01-00928840!; isoeotype: CAUP s.n.!).

Werneria leucobryoides S.F.Blake, J. Washington Acad. Sci. 18: 494. 1928. Type. Ecuador. Napo: in m. Quilindaña ad nives perpetuas, Dec 1897, *E. Festa s.n.* (holotype: NY s.n.!; isotypes: G-00305674 (digital image!), P-02088568 (digital image!), Q-001222!, QPLS s.n.!, US-00037321 (fragment!)).

Description. Suffruticose plant, forming dense mats or hummocks, with rhizome-like stems up to 5 cm long covered with sparse pilose indumentum and old leaves, rather erect, simple or branched from the base. **Stems** 1–1.5 cm tall (aerial part), sparsely pilose. **Leaves** densely stellate-imbricate, extending into a sheath-like base that bears scattered multicellular trichomes; leaf laminae 4–5 × 1–1.2 mm, linear, aristate at the apex (arista up to 0.5 mm long that falls as the leaves age), entire, thinly hyaline (in dried specimens), elliptical in cross section, glabrous, unconspicuously nerved above, 1-nerved beneath (barely visible), fleshy, drying coriaceous, matte, finely papillose. **Capitula** radiate, erect, sessile to subsessile. **Involucre**s 4.9–5 × 4.8–5 mm, cupuliform; in-

volucral bracts 12 to 13, $3.2\text{--}4 \times 1.2\text{--}1.3$ mm, obtuse at the apex, greenish. **Ray florets** ca. 13; corollas $6.3\text{--}6.5 \times 0.8\text{--}1.2$ mm, 2 to 4-veined, subentire to 2-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** 14 to 15; corollas 3.3–4 mm long, whitish, usually purple-tipped; style branches truncate with a crown of sweeping trichomes, purplish. **Achenes** ca. 2.2×0.5 mm, cylindrical, 7 to 8-ribbed, glabrous; pappus 4.8–6.2 mm long, barbellate, whitish. Chromosome number unknown. Fig. 2B.

Additional iconography. Blake (1928: 496, fig. 1Q–S sub *Werneria leucobryoides*).

Distribution and habitat. Southern Colombia to central Ecuador. Colombia (border Cauca/Huila), Ecuador (Chimborazo, Morona-Santiago, Napo, Tungurahua). It grows in rocky outcrops and scree slopes around the upper limit of vegetation of the superparamo ecoregion, between elevations of 4125–4800 m (Fig. 9).

Phenology. Flowering from July to December.

Etymology. The epithet *sotarense* refers to the Sotar  Volcano, the *locus classicus* of this species. It is located in southern Colombia on the border between the departments of Cauca and Huila.

Notes. *Xenophyllum sotarense* is characterized by its linear, 4–5 mm long, densely stellate-imbricate leaves, which are typically aristate at the apex. The arista measures up to 0.5 mm long and falls as the leaf ages. The sheath-like base bears scattered multicellular trichomes.

It is morphologically close to *X. humile*, especially to those small and compact plants with leaf laminae barely spreading from the sheath-like bases (see comments under it). To avoid misidentifications the following characters should be carefully studied: leaf apex (aristate or clearly acute when the arista falls in *X. sotarense* vs. obtuse to truncate in *X. humile*) and stem indumentum (sparsely pilose in *X. sotarense* vs. lanate in *X. humile*). *Xenophyllum sotarense* also shows morphological affinities with *X. roseum*. The involucre length (4.9–5 mm in *X. sotarense* vs. 10–12 mm in *X. roseum*), the ray corolla length and color (6.3–6.5 mm, white in *X. sotarense* vs. 11.8–19 mm, pink in *X. roseum*), and the achene indumentum (glabrous in *X. sotarense* vs. white-villous in *X. roseum*) are useful characters for differentiating them.

The lectotype of *Werneria sotarensis* Hieron. at MA consists in a single sterile fragment barely informative and no isoelectotypes appear to be extant; the duplicate at B was destroyed in 1943 (F0BN015821). For that reason, an epitype collected in the *locus classicus* has been designated. It is noteworthy that the plants from this locality are restricted on the volcano summit and co-occur with *X. humile*, a species much more abundant in the area that was also found at lower elevations.

The isotypes of *Werneria leucobryoides* S.F.Blake located at the Ecuadorian herbaria Q and QPLS show that the collector of this material was the Italian naturalist Enrico Festa instead of Luis Sodiro as the protologue indicates. This correction has been adopted since these specimens are the only ones that bear a label handwritten by Sodiro. It is feasible to think that the collector information was corrected on the specimens belonging to Sodiro's personal herbarium but omitted on the duplicates to be distributed.

Additional specimens examined. ECUADOR. **Chimborazo:** El Altar, N side of the volcano, on the ridge below the Canonigo peak, $1^{\circ}41'S$, $78^{\circ}24'W$, 19 Aug 1995, *P*

Sklenář & V. Kostečková 90-5 (QCNE); **Morona-Santiago**: cerros Yuibug-Pailacajas, E side of the mountain ridge, 1°45'S, 78°27'W, 31 Jul 1997, *P. Sklenář & V. Sklenářová* 2941 (QCA, US); cerros Yuibug-Pailacajas, E side of the mountain ridge, 1°45'S, 78°27'W, 31 Jul 1997, *P. Sklenář & V. Sklenářová* 3022 (QCA); **Napo**: cerro Antisana, NW of north peak of Antisana, 0°27'S, 78°9'W, 28 Jul 1960, *P.J. Grubb et al.* 630 (K, NY); NE side of volcán Antisana, 0°27'S, 78°8'W, 17 Aug 1997, *P. Sklenář & V. Sklenářová* 3414 (QCA, US); NE side of volcán Antisana, 0°27'S, 78°8'W, 17 Aug 1997, *P. Sklenář & V. Sklenářová* 3418 (QCA); NE side of volcán Antisana, 0°27'S, 78°8'W, 17 Aug 1997, *P. Sklenář & V. Sklenářová* 3424 (QCA); volcán Antisana, NE side of the volcano, 0°27'S, 78°8'W, 21 Sep 2017, *P. Sklenář* 14116 (QCA); in pascuis summis m. Quilindaña, 0°47'S, 78°19'W, [without date], *L. Sodiro s.n.* (QPLS); **Tungurahua**: Santiago de Píllaro, P.N. Llanganates, SW ridge of cerro Hermoso, 1°13'S, 78°17'W, 14 Nov 1999, *D. Neill et al.* 12104 (QCNE); Santiago de Píllaro, P.N. Llanganates, SW ridge of cerro Hermoso, 1°13'S, 78°17'W, 14 Nov 1999, *D. Neill et al.* 12167 (QCNE); P.N. Llanganatis, slope on the W side of cerro Hermoso, 1°13'S, 78°17'W, 3 Dec 2010, *P. Sklenář* 13132 (QCA); cerro Hermoso, SW ridge of the mountain, 1°14'S, 78°18'W, 6 Sep 1997, *P. Sklenář & V. Sklenářová* 3741 (US).

4. *Xenophyllum roseum* (Hieron.) V.A.Funk, *Novon* 7(3): 240. 1997.

Werneria rosea Hieron., Bot. Jahrb. Syst. 28(5): 648. 1901. *Werneria humilis* var. *rosea* (Hieron.) Rockh., Bot. Jahrb. Syst. 70: 295. 1939. Type. Ecuador. Azuay: páramo del Cajas, W Andes of Cuenca, 3800–4300 m, [without date], *F.C. Lehmann* 5687 (lectotype: K-000527743 (digital image!)), designated by Funk (1997a: 240); isolectotype: US-00037306 (fragment!).

Werneria purpurea Spruce ex Rockh., Bot. Jahrb. Syst. 70: 295. 1939, *nom. inval. pro syn.* (Turland et al. 2018, ICN Art. 36.1).

Description. Suffruticose plant, forming dense mats or hummocks, with rhizome-like stems up to 6.5 cm long covered with matted lanate indumentum and leaf bases, rather erect, simple or branched from the base. **Stems** 1.5–2 cm tall (aerial part), lanate. **Leaves** stellate-imbricate, extending into a sheath-like base that bears long silky trichomes, usually with the leaf lamina spreading at nearly 90° from the sheath-like base; leaf laminae 4.6–10.6 × 1.3–1.5 mm, linear, obtuse, callous-like tipped at the apex (the young ones usually bearing a quickly deciduous arista up to 0.5 mm long), entire, elliptical to almost terete in cross section (rather flat when dried), glabrous, unobscurely nerved above, 1-nerved beneath (barely visible; in dried specimens the nerves are noticeable on both faces), fleshy, matte, papillose. **Capitula** radiate, erect, sessile. **Involucres** 10–12 × 7.9–8 mm, cupuliform; involucre bracts ca. 13, 5.5–7.6 × 1.6–2 mm, acute at the apex, greenish, purple-edged. **Ray florets** 11 to 13; corollas 11.8–19 × 2.5–3 mm, 4-veined, subentire to 3-toothed at the apex, conspicuously surpassing the involucre, pink. **Disc florets** 28 to 34; corollas 5.7–8 mm long, yellowish;

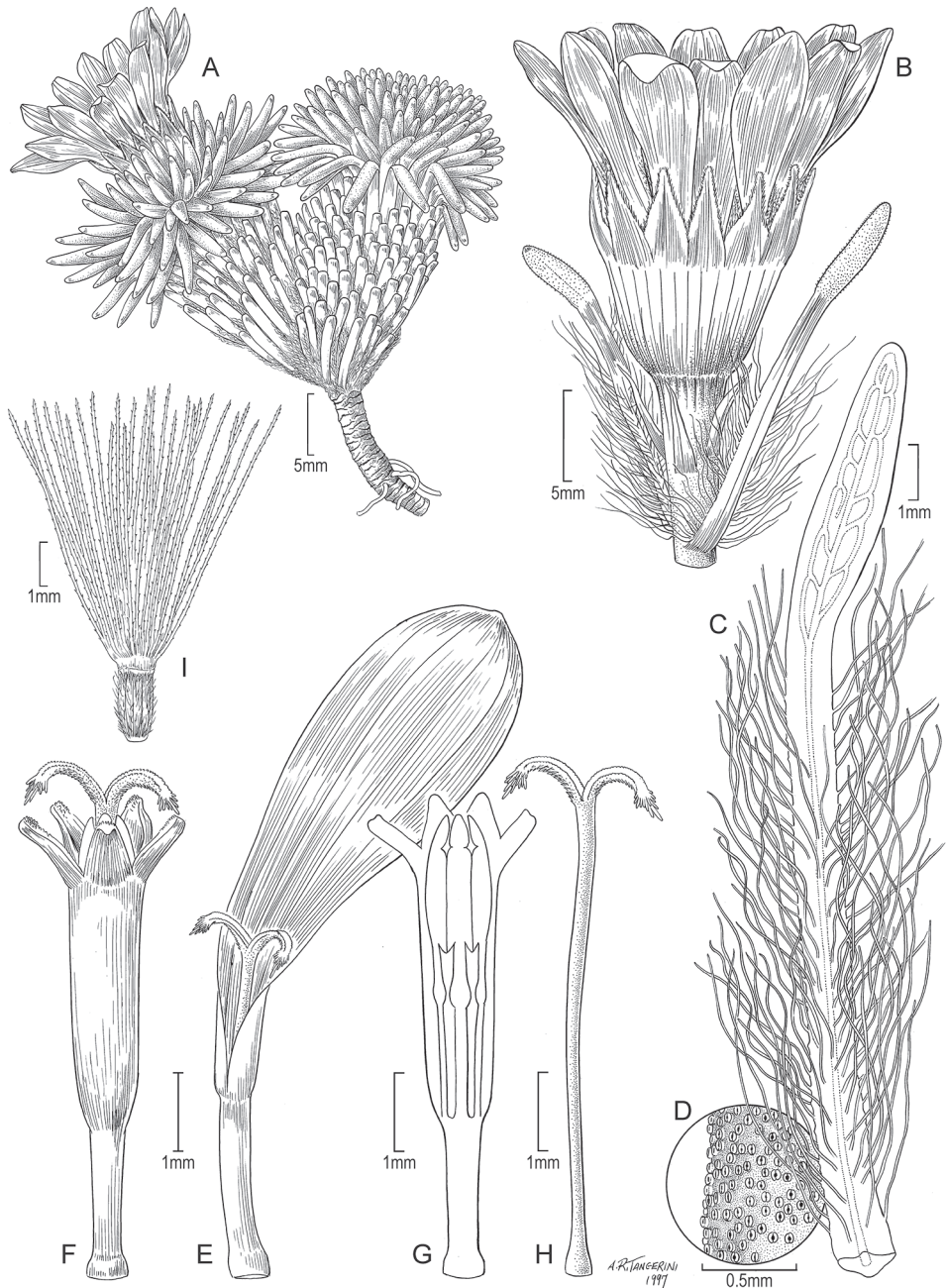


Figure 8. *Xenophyllum roseum* **A** habit **B** capitulum **C** adaxial leaf surface **D** detail of leaf surface **E** ray corolla and style **F** disc corolla and style branches **G** disc corolla and stamens (vertically sectioned, style removed) **H** style **I** immature achene with pappus. All details drawn from *Jameson s.n.* (US) except for **A** (drawn from *Funk & Montezuma 11441*, US). Illustration by Alice Tangerini.

style branches penicillate, yellowish. *Achenes* cylindrical, white-villous with trichomes ca. 0.5 mm long (immature); pappus ca. 7 mm long, barbellate, whitish. Chromosome number unknown. Fig. 8.

Distribution and habitat. Endemic to Ecuador (Azuay, Cañar, Loja). It grows in moist grasslands and exposed places of the paramo ecoregion, between elevations of 3650–4275 m (Fig. 9).

Xenophyllum roseum is a narrow endemic species only known from El Cajas National Park (Azuay) and the Culebrillas Lagoon (Cañar). A single collection from Loja (*Jameson s.n.*, US) would also support its presence in this province. However, the label information does not provide a precise locality (“province of Loxa”), and therefore, it has not been represented on the map. New collections are required to confirm that *X. roseum* thrives in Loja.

Phenology. Flowering from August to March.

Etymology. The adjective *roseus -a -um* means rose-like, rose-colored, pink-colored. It refers to the characteristic pink ray corollas of this species.

Notes. *Xenophyllum roseum* is well defined by its linear, stellate-imbricate leaves that usually have the leaf lamina spreading at nearly 90° from the sheath-like base, and by the obtuse leaf apex that usually bears a quickly deciduous arista when young. The achenes are covered with a white-villous indumentum and the ray corollas are pink. This latter character makes this species unique within the genus. The color is very noticeable on living plants but in old dried specimens it might be less obvious, and therefore, somewhat equivocal for identification purposes.

It is morphologically similar to *X. humile* and *X. sotarense*. From the former species, it differs in the ray corolla length and color (11.8–19 mm, pink in *X. roseum* vs. 4.2–12.2 mm, white in *X. humile*), disc corolla length and color (5.7–8 mm, yellowish in *X. roseum* vs. 3.1–5 mm, whitish in *X. humile*), and achene indumentum (white-villous in *X. roseum* vs. glabrous in *X. humile*). The deciduous arista that usually adorns the young leaves of *X. roseum* also helps to differentiate it from *X. humile*. With respect to *X. sotarense*, the differences are detailed under this latter species. Among the aforementioned species, *X. roseum* overlaps its distribution area with that of *X. humile*.

Additional specimens examined. **ECUADOR. Azuay:** road Cuenca-Angas, 28 Dec 1976, *J.D. Boeke* 650 (QCA, US); P.N. Cajas, cerca de la laguna de Soldados, 2°54'S, 79°18'W, 17 Nov 2000, *L. Endara & M. Nonhebel* 554 (QCA); Cajas, ca. 30 km W of Sayausí, at pass NE toward highest peak, 2°46'S, 79°14'W, 23 Oct 1995, *V.A. Funk & X. Montezuma* 11426 (HA, QCA, US); 5 km W of Soldados on Cuenca-San Joaquín-Angus rd., ca. 100 m up slopes N of rd. toward large laguna, near laguna Estrellas Cocha, 2°54'S, 79°15'W, 24 Oct 1995, *V.A. Funk & X. Montezuma* 11441 (US); W of Cuenca on gravel road between Soldados and Balao (hwy 25), laguna Estrellas Cocha, 6 km W of Arch at Soldados Park entrance, 2°54'S, 79°15'W, 18 Apr 2018, *V.A. Funk & J.M. Bonifacino* 14033 (US); Assuay, Oct 1864, *W. Jameson s.n.* (E); P.N. Cajas, páramo de Soldados, road Cuenca-San Joaquín-Soldados, at the pass above Soldados, 2°54'S, 79°17'W, 8 Jan 2000, *P.M. Jørgensen et al.* 1738 (HA, QCNE, US); P.N. Cajas, road Cuenca-Sayausí-Molleturo, at the pass, km 38.4, 2°46'S, 79°14'W, 3 Jan

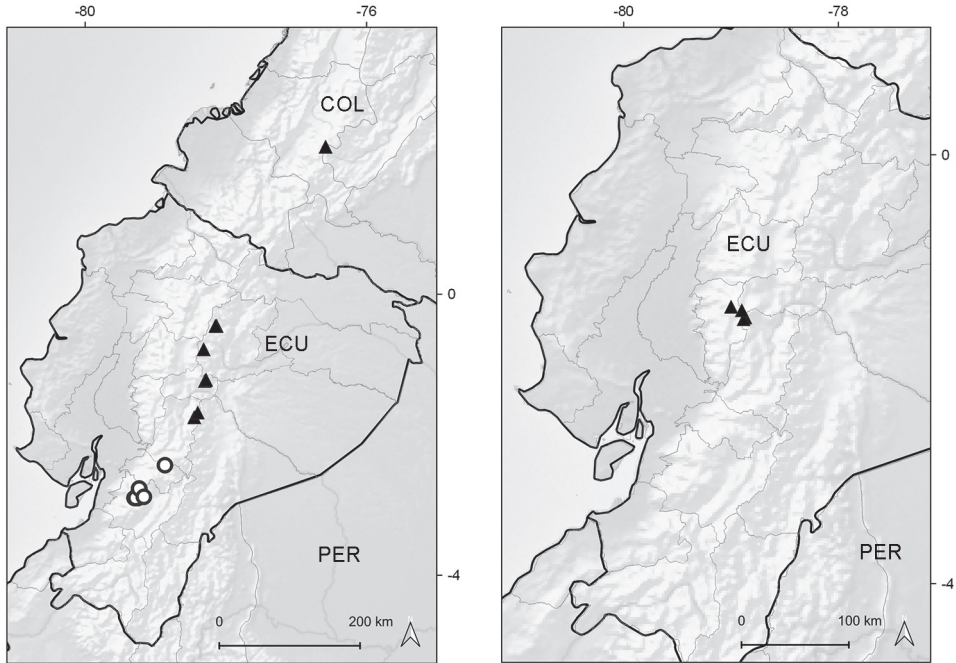


Figure 9. Distribution map of *Xenophyllum sotarense* (left hand, closed triangle), *X. roseum* (left hand, open circle), and *X. funkianum* (right hand).

2000, *P.M. Jørgensen, C. Ulloa & E. Narváez* 2083 (HA, US); Cuenca, Sayausí, Tres Cruces, 2°46'S, 79°14'W, 13 Oct 2017, *D. Minga, M. Jiménez & N. Guzmán* 3242 (HA); área nacional de recreación Cajas, Totorococha-Mazan valley, 2°53'S, 79°10'W, 12 Sep 1987, *P.M. Ramsay & P.J. Merrow-Smith* 448 (QCNE); Andibus Ecuadorensibus, in repisis m. Azuay, Aug 1857/9, *R. Spruce* 6013 (BM, C, E, F [fragment], GH, GOET, K, LE, NY, P, TCD, W); P.N. Cajas, km 35.7 redondel Cuenca-Molleturo, en el paso, sendero Paragüillas, 2°46'S, 79°14'W, 13 Jan 2003, *C. Ulloa, P.M. Jørgensen & X. Clavijo* 1173 (HA); Cuenca, Sayausí, P.N. Cajas, Tres Cruces, sendero del estacionamiento hacia arriba, 2°46'S, 79°14'W, 28 Apr 2015, *C. Ulloa et al.* 2534 (HA); **Cañar:** El Tambo, camino de la laguna Culebrillas hasta Ingapirca, cerca de la comunidad de Cajontambo, 2°26'S, 78°52'W, 11 Mar 2009, *D. Minga & F. Nugra* 1594 (HA); **Loja:** province of Loxa, Sep 1864, *W. Jameson s.n.* (US).

5. *Xenophyllum funkianum* J.Calvo, *PhytoKeys*: 139: 30. 2020.

Type. Ecuador. Chimborazo: Mt. Chimborazo area, at the end of *Polylepis* road and beginning of hike to *Polylepis* forest, 1°31'50"S, 78°52'55"W, 4233 m, 20 Apr 2018, *V.A. Funk & J.M. Bonifacio* 14059 (holotype: US!; isotypes: MO!, QCA!).

Description. Suffrutescent plant, forming lax mats, with rhizome-like stems 20–35 cm long covered with arachnoid indumentum and leaf base remnants resembling paleae, horizontal, creeping, simple or branched from the base. **Stems** 2–3 cm tall (aerial part), arachnoid. **Leaves** imbricate, extending into a sheath-like base that bears arachnoid trichomes; leaf laminae $5.3\text{--}7.8 \times 0.8\text{--}0.9$ mm, linear, rather acute, callous-like tipped at the apex, entire, elliptical in cross section, glabrous, unobviously nerved above, 1-nerved beneath (only visible in the lower third), fleshy, shiny, papillose. **Capitula** radiate, erect, sessile. **Involucres** $9\text{--}11 \times 5\text{--}7$ mm, cupuliform; involucral bracts 13 to 14, $4.7\text{--}6.9 \times 1\text{--}1.7$ mm, acute at the apex, dark-burgundy. **Ray florets** 12 to 13; corollas $8.9\text{--}11.6 \times 2.3\text{--}3$ mm, 4-veined, subentire to 3-toothed at the apex, conspicuously surpassing the involucre, white, somewhat purplish beneath. **Disc florets** 20 to 23; corollas 5–5.6 mm long, yellowish; style branches truncate with a crown of sweeping trichomes, yellowish. **Achenes** cylindrical, white-villous (immature); pappus 3.9–6.2 mm long, barbellate, whitish. Chromosome number unknown. Fig. 10.

Additional iconography. Calvo and Funk (2020: 32, fig. 2, as photo).

Distribution and habitat. Endemic to Ecuador (Bolívar, Chimborazo). This species grows in exposed places and on sandy soils of the dry superparamo ecoregion, at elevations of 4100–4300 m (Fig. 9).

The species is known from a few collections near the Chimborazo Volcano. Its distribution area partially overlaps with those of *X. humile* and *X. rigidum*. See Calvo and Funk (2020) for further details.

Phenology. Flowering from April to July.

Etymology. The epithet honors the American botanist Vicki A. Funk (1947–2019), who described the genus *Xenophyllum* and greatly contributed to the understanding of the family Compositae.

Notes. *Xenophyllum funkianum* is distinguished by its creeping rhizome-like stems 20–35 cm long, the straight linear leaves extending into a sheath-like base that bears arachnoid trichomes, the dark-burgundy sessile involucres with 13 to 14 involucral bracts, the 12 to 13 ray florets with white corollas somewhat purplish beneath, and by having white-villous achenes.

The morphologically closest species is *X. rigidum*. However, they can be differentiated by the leaf lamina size ($5.3\text{--}7.8 \times 0.8\text{--}0.9$ mm in *X. funkianum* vs. $12.6\text{--}13.5 \times 2.3\text{--}2.4$ mm in *X. rigidum*), involucre size ($9\text{--}11 \times 5\text{--}7$ mm in *X. funkianum* vs. $11.5\text{--}12.8 \times 7.2\text{--}11.3$ mm in *X. rigidum*), number of disc florets (20 to 23 in *X. funkianum* vs. 38 to 41 in *X. rigidum*), and by the way of growing of the rhizome-like stems (distinctly horizontal in *X. funkianum* vs. rather erect in *X. rigidum*). *Xenophyllum funkianum* is, furthermore, a smaller plant and the capitula are not enclosed among the leaves as in *X. rigidum*. Another similar species is *X. humile*; they differ in involucre length ($9\text{--}11$ mm in *X. funkianum* vs. $4.6\text{--}9.3$ mm in *X. humile*), achene indumentum (white-villous in *X. funkianum* vs. glabrous in *X. humile*), and habit (rather creeping in *X. funkianum* vs. forming dense mats or hummocks in *X. humile*). Moreover, *X. funkianum* differs in having the leaf lamina barely spreading from the sheath-like base (vs. leaf lamina usually spreading at nearly 90° from the sheath-like base in *X. humile*).



Figure 10. *Xenophyllum funkianum* **A** habit **B** habit with capitula **C** stem apical part **D** detail of leaf apex **E** capitulum **F** ray floret (frontward bristles removed) **G** disc corolla and style branches **H** stamen. All details drawn from Funk & Bonifacino 14059 (US). Illustration by Alice Tangerini.

Additional specimens examined. **ECUADOR. Bolívar:** road to Salinas, 1.8 km W of Guaranda-Ambato hwy., 1°25'S, 79°0'W, 25 Jun 1989, *L.J. Dorr & I. Valdespino* 6474 (QCA, QCNE, US); **Chimborazo:** Mt. Chimborazo area, side road ends and connects to trail that leads to the *Polylepis* forest, 1°32'S, 78°53'W, 20 Apr 2018, *V.A. Funk & J.M. Bonifacino* 14061 (US); W side of the Chimborazo volcano, arenal around loma Guagua Lozán, 1°27'S, 78°54'W, 3 Jul 1999, *P. Sklenář* 7528 (QCA, QCNE).

6. *Xenophyllum rigidum* (Kunth) V.A.Funk, *Novon* 7(3): 240. 1997.

Werneria rigida Kunth, *Nov. Gen. Sp.* [ed. fol.] 4: 149. 1818. Type. Ecuador. [“in summis Andibus Quitensium” according to the *ind. loc.*], [without date], *F.W.H.A. Humboldt & A.J.A. Bonpland s.n.* (lectotype: Humboldt and Bonpland’s collection at P as the first-step lectotype, designated as “holotype” by Funk (1997a: 240); P-00320180 (digital image!) as the second-step lectotype, designated here; isoelectotypes: B-W-16432-01-0 (digital image!), HAL-0113456 (digital image!), P-02088567 (digital image!), P-02088569 (digital image!), P-02088570 (digital image!)).

Oresigonia pycnophylla Willd. ex Rockh., *Bot. Jahrb. Syst.* 70: 292. 1939, *nom. inval. pro syn.* (Turland et al. 2018, ICN Art. 36.1).

Description. Suffruticose plant, forming mats or hummocks, with rhizome-like stems up to 16 cm long covered with matted lanate indumentum and leaf bases, rather erect, simple or branched from the base. **Stems** 2.5–4 cm tall (aerial part), lanate. **Leaves** stellate-imbricate, extending into a sheath-like base that bears long silky trichomes; leaf laminae 12.6–13.5 × 2.3–2.4 mm, linear, obtuse at the apex, entire, elliptical in cross section, glabrous, unobscurely nerved above, 1-nerved beneath (only visible in the lower half), fleshy, drying coriaceous, rather matte, papillose. **Capitula** radiate, erect, sessile, completely enclosed among the leaves. **Involucre** 11.5–12.8 × 7.2–11.3 mm, cupuliform; involucre bracts ca. 13, 6.9–8.5 × 1.7–2 mm, rather acute at the apex, dark-purplish. **Ray florets** ca. 13; corollas 9.6–11 × 1.5–1.9 mm, 4 to 6-veined, subentire to 3-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** 38 to 41; corollas 5.1–6.2 mm long, whitish, usually yellow-tipped; style branches truncate with a crown of sweeping trichomes or slightly penicillate, purplish. **Achenes** 2.9–3.8 × 1–1.1 mm, cylindrical, white-villous with trichomes ca. 1 mm long (ribs invisible); pappus 6.8–8.4 mm long, barbellate, whitish. Chromosome number unknown. Fig. 11.

Additional iconography. Funk (1997b: 33, fig. 3D).

Distribution and habitat. Endemic to Ecuador (Bolívar, Chimborazo, Cotopaxi, Napo, Pichincha, Tungurahua). It grows in rocky outcrops and on sandy soils, rather dry, around the upper limit of vegetation of the superparamo ecoregion, at elevations of (3500–)3900–5100 m (Fig. 12).

Phenology. Flowering from April to November.

Etymology. The epithet *rigidum* means stiff, inflexible and it describes the leaves of this species.

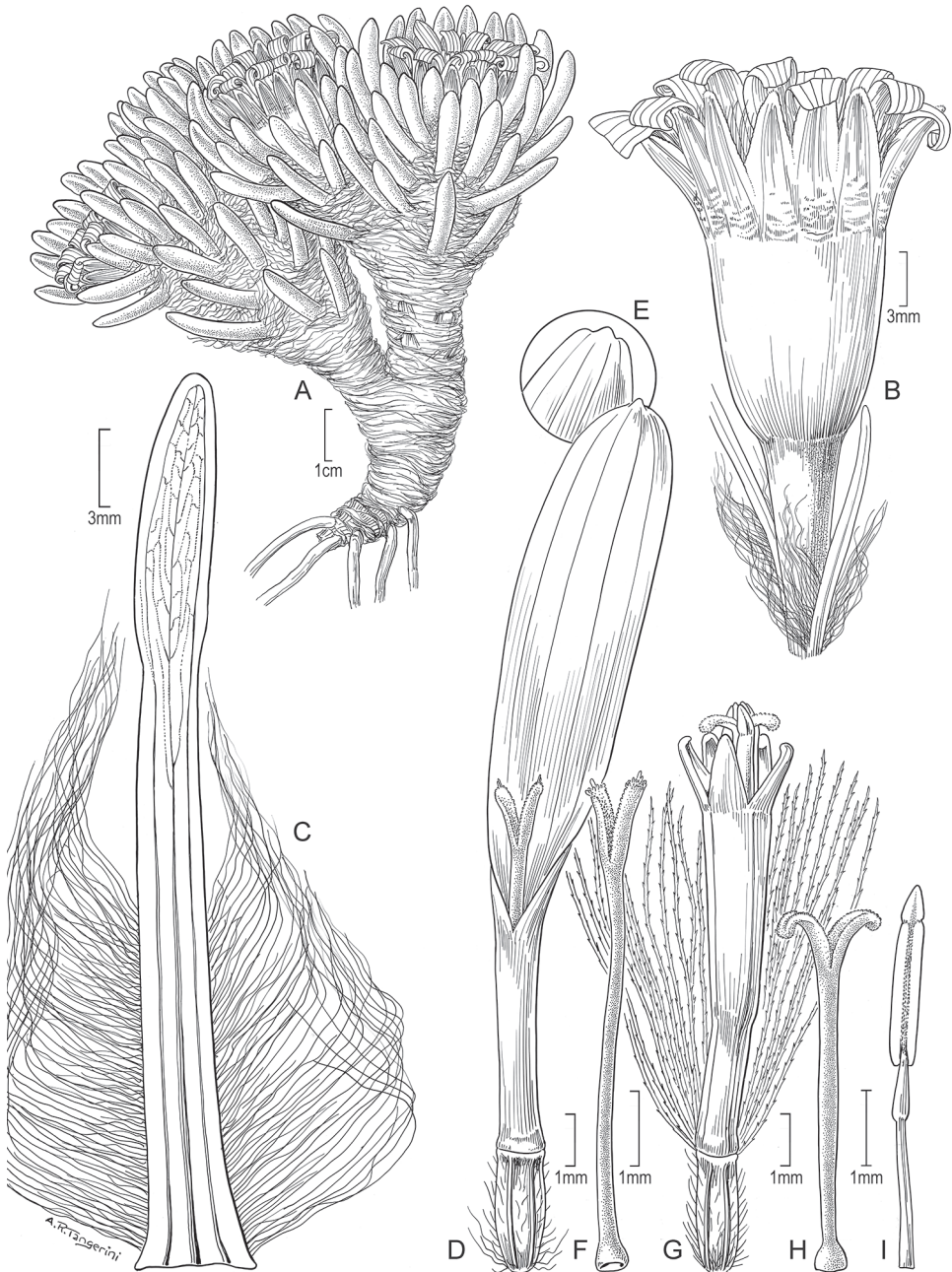


Figure 11. *Xenophyllum rigidum* **A** habit **B** capitulum **C** adaxial leaf surface **D** ray floret (pappus removed) **E** detail of ray corolla apex **F** style of ray floret **G** disc floret (frontward bristles removed) **H** style of disc floret **I** stamen. All details drawn from *Asplund* 8391 (US) except for **A** (drawn from *Grubb et al.* 569, NY), **C** (drawn from *Asplund* 17334, NY), and **G–I** (drawn from *Anthony & Tate* 316, US). Illustration by Alice Tangerini.

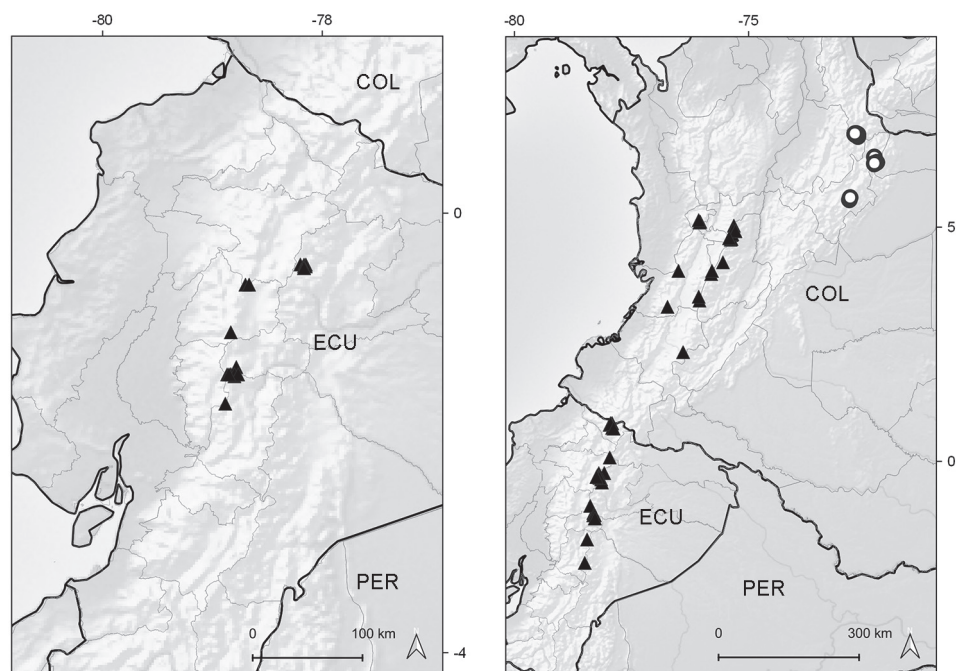


Figure 12. Distribution map of *Xenophyllum rigidum* (left hand), *X. crassum* subsp. *crassum* (right hand, closed triangle), and *X. crassum* subsp. *orientale* (right hand, open circle).

Notes. *Xenophyllum rigidum* is readily distinguished by its tough, linear, and apically obtuse leaves, as well as by its white-villous achenes. The rhizome-like stems are very robust and covered with a matted lanate indumentum where the leaf bases are sunk in. Another characteristic feature of this species is that the capitula are completely enclosed among the leaves.

Xenophyllum rigidum is morphologically close to *X. funkianum*, *X. crassum* (S.F.Blake) V.A.Funk subsp. *crassum* (see comments under these taxa), and *X. humile*. From the latter species, it differs in having larger leaves ($12.6\text{--}13.5 \times 2.3\text{--}2.4$ mm vs. $2.5\text{--}10.8 \times 0.5\text{--}1.5$ mm in *X. humile*), longer involucral bracts (6.9–8.5 mm vs. 3.1–6.1 mm in *X. humile*), higher number of disc florets (38 to 41 vs. (8–)22 to 39 in *X. humile*), and white-villous achenes (vs. glabrous in *X. humile*).

The specimen B-W-16432-01-0 kept at the Willdenow Herbarium is considered part of the original material and designated as isoelectotype. Willdenow received the specimen from Humboldt as stated by Schlechtendal on the blue label at the bottom of the sheet. Although unnumbered, it contains an individual identical to those from the lectotype. See Hind and Jeffrey (2001) for further details on Humboldt and Bonpland's material in the Willdenow Herbarium.

Additional specimens examined. **ECUADOR. Bolívar:** volcán Chimborazo, W side of the mountain, ca. 4 km from the road Ambato-Guaranda, $1^{\circ}28'S$, $78^{\circ}48'W$, 14 Sep 1995, *P. Sklenář* & *V. Kostečková* 1274 (QCA); **Chimborazo:** southern slope of Mount Chimborazo, $1^{\circ}29'S$, $78^{\circ}48'W$, 18 Aug 1939, *E. Asplund* 8391 (CAS, US); comunidad

de Ambrosio Lazo, sector Patococha-Loma Caparina, 1°44'S, 78°53'W, 5 Jun 2009, *D. Cárate et al.* 593 (QCA); rd. to el refugio, ca. 17 km from Ambato-Guaranda rd., 0.5 km from refugio Whymper, 1°28'S, 78°50'W, 21 Oct 1995, *V.A. Funk* 11422 (US); Mt. Chimborazo, along road toward los refugios del Chimborazo, near the end of the access road at the superparamo, near camping spaces, 1°28'S, 78°50'W, 20 Apr 2018, *V.A. Funk & J.M. Bonifacino* 14053 (US); cerca del refugio E. Whymper, lado SW del Chimborazo, 1°28'S, 78°50'W, 14 Oct 1980, *S. Halloy B-182* (NY); Chimborazo, Nov 1864, *J. Isern* 83 (C, MA); E side of the Chimborazo volcano, top of the terminal moraine around a small glacial lake, 1°28'S, 78°46'W, 4 Jul 1997, *P. Sklenář & V. Sklenářová* 2228 (QCA, US); W side of the Chimborazo volcano, 1°28'S, 78°52'W, 5 Jul 1999, *P. Sklenář* 7538 (QCA); S side of Chimborazo volcano, 1°28'S, 78°51'W, 1 Nov 2006, *P. Sklenář* 9338 (QCA); **Cotopaxi**: around the Illiniza peaks, 4 mi. W of town of Magdalena, 0°39'S, 78°40'W, 2 Apr 1991, *R. Bensman* 358 (QCNE); paramo de Quispicacha, summit plateau of loma Pucyucuchu, 1°5'S, 78°50'W, 25 Oct 2006, *P. Sklenář* 9269 (QCA, QCNE); Illiniza, slope along the main pathway to the saddle, 0°39'S, 78°42'W, 5 Dec 2010, *V. Zeisek* 13161 (QCA); **Napo**: Antisana, Oct 1923, *H.E. Anthony & G.H.H. Tate* 316 (US); Mount Antisana, 17 Aug 1955, *E. Asplund* 17334 (NY); Antisana, 13 Aug 1979, *J. Black* 163 (AAU); Quijos, reserva ecológica Antisana, faldas SW del volcán Antisana, 0°29'S, 78°10'W, 28 Nov 1998, *A. Freire & L. Haro* 2953 (QCNE, US); on south side of western glacier Antisana, 19 Jul 1960, *P.J. Grubb et al.* 569 (NY); on boggy plain above hacienda Antisana, 8 Aug 1960, *P.J. Grubb et al.* 704 (K); lado WNW del Antisana, 0°28'S, 78°9'W, 3 Feb 1980, *S. Halloy B-62* (LIL); paramo nordwestlich von Antisana, 27 Mar 1934, *E. Heinrichs* 652 (MA); Quijos, reserva ecológica Antisana, SW slopes of volcán Antisana, just 100 m below glacier, 0°29'S, 78°9'W, 28 Nov 1998, *D. Neill et al.* 11495 (QCNE); volcán Antisana, W side of the mountain, 0°30'S, 78°10'W, 21 Jul 1997, *P. Sklenář & V. Sklenářová* 2793 (QCA); Quijos, reserva ecológica Antisana, faldas occidentales del volcán Antisana, NE de laguna Santa Lucía, 0°28'S, 78°10'W, 1 Aug 1998, *H. Vargas & E. Narváez* 2113 (QCNE, US); Quijos, reserva ecológica Antisana, faldas SW del volcán Antisana, 0°30'S, 78°10'W, 28 Nov 1998, *H. Vargas & E. Narváez* 3103 (QCNE, US); Quijos, reserva ecológica Antisana, faldas SW del volcán Antisana, 0°30'S, 78°10'W, 28 Nov 1998, *H. Vargas & E. Narváez* 3117 (QCNE, US); Antisana, west side, Mar 1880, *E. Whymper s.n.* (BM); **Pichincha**: Mt. Antisana, 16 Jul 1939, *E.K. Balls* 7308 (K); Antisana, falda WSW, 14 Sep 1986, *A. Ehrenburg* 172 (QCA); faldas occidentales del volcán Antisana, 0°28'S, 78°12'W, 8 Mar 1984, *L. Muñoz* 365 (LOJA, QCA); **Tungurahua**: Mocha, ca. 2 km NW of the mountain Carihuairazo, 1°24'S, 78°47'W, 23 Apr 1995, *J.L. Clark* 725 (COL, QCNE).

7. *Xenophyllum crassum* (S.F.Blake) V.A.Funk, Novon 7(3): 239. 1997.

Werneria crassa S.F.Blake, J. Washington Acad. Sci. 18: 495. 1928. Type. Colombia. Caldas: páramo del Quindío, 3700–4200 m, 15/20 Aug 1922, *F.W. Pennell & T.E. Hazen* 10031 (lectotype: K-000527739 (digital image!)), designated by Funk (1997a: 239); isoelectotypes: GH s.n.!, NY s.n.!).

Description. Suffrutescent plant, forming dense mats or hummocks, with rhizome-like stems up to 17 cm long covered with matted lanate indumentum and leaf bases, rather erect, simple or branched from the base. **Stems** 1.5–4 cm tall (aerial part), lanate. **Leaves** stellate-imbricate, extending into a sheath-like base that bears long silky trichomes, usually with the leaf lamina spreading at nearly 90° from the sheath-like base; leaf laminae 6.5–27.6 × 1.2–2.2 mm, linear, obtuse, usually callous-like tipped at the apex, entire, flat to elliptical in cross section, glabrous, 1-nerved above, 1-nerved beneath, fleshy, matte or shiny. **Capitula** radiate, erect, sessile to subsessile (rarely with a short peduncle up to 8 mm long). **Involucre** 10.2–19.7 × 7.8–15.8 mm, cupuliform; involucre bracts 11 to 21, 6–14.9 × 1.6–2.2 mm, rather acute at the apex, greenish to dark-purplish. **Ray florets** 13 to 21; corollas 13–19.7 × 1.7–3.4 mm, 4 to 6-veined, subtire to 3-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** 50 to 95; corollas 6.6–8.1 mm long, yellow; style branches truncate with a crown of sweeping trichomes, yellowish, purple-tipped. **Achenes** 2.6–4 × 0.8–1 mm, cylindrical, 6 to 8-ribbed, glabrous; pappus 7.8–19 mm long, barbellate, whitish. Chromosome number unknown.

Notes. Funk (1997a) stated that the holotype of the name *Werneria crassa* S.F.Blake (US-1141291) may have been destroyed while on loan to B, and accordingly, she designated the duplicate at K as the lectotype (Turland et al. 2018, ICN Art. 9.3).

Key to the subspecies of *Xenophyllum crassum*

- 1 Leaf laminae 14.7–27.6 mm long; involucre bracts 16 to 21, 8.6–14.9 mm long; ray florets 16 to 21; disc florets ca. 95.... **7a. *X. crassum* subsp. *crassum***
- Leaf laminae 6.5–12.7 mm long; involucre bracts 11 to 13, 6–8.2 mm long; ray florets 13 to 15; disc florets ca. 50 **7b. *X. crassum* subsp. *orientale***

7a. *Xenophyllum crassum* subsp. *crassum*

Description. **Stems** 2.5–4 cm tall (aerial part), lanate. **Leaves** stellate-imbricate, extending into a sheath-like base that bears long silky trichomes, usually with the leaf lamina spreading at nearly 90° from the sheath-like base; leaf laminae 14.7–27.6 × 1.2–2.2 mm, linear, obtuse, usually callous-like tipped at the apex, entire, flat to elliptical in cross section, glabrous, 1-nerved above, 1-nerved beneath, fleshy, rather matte. **Capitula** radiate, erect, sessile to subsessile. **Involucre** 12.6–19.7 × 11–15.8 mm, cupuliform; involucre bracts 16 to 21, 8.6–14.9 × 1.5–2.2 mm, acute at the apex, greenish to dark-purplish. **Ray florets** 16 to 21; corollas 14.5–19.7 × 2.9–3.4 mm, 4 to 6-veined, subtire to 3-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** ca. 95; corollas 6.5–8.1 mm long, yellow. **Achenes** 2.6–4 × 0.8–1 mm, cylindrical, 6 to 8-ribbed, glabrous; pappus 14–19 mm long, barbellate, whitish. Chromosome number unknown. Fig. 13.

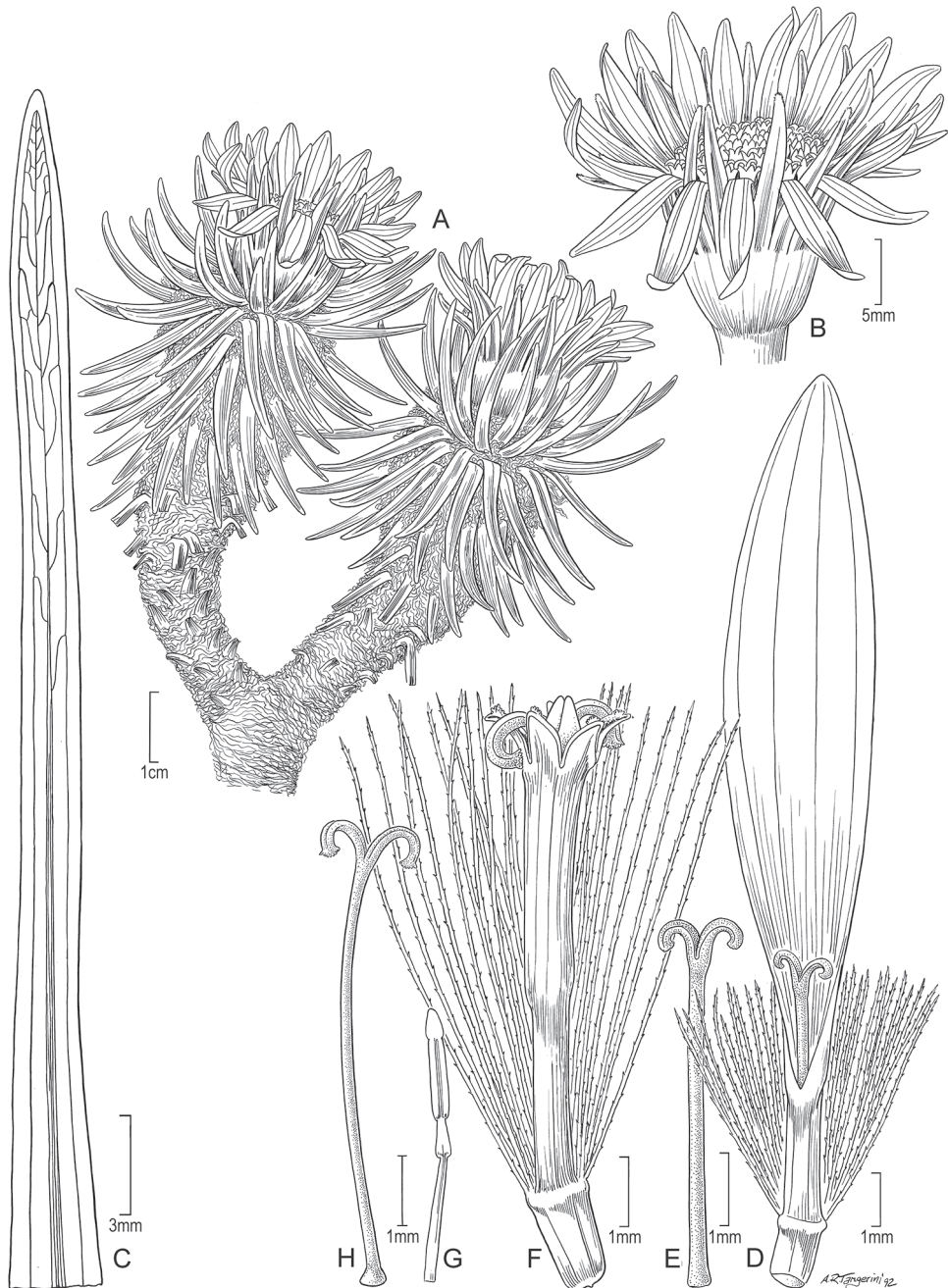


Figure 13. *Xenophyllum crassum* subsp. *crassum* **A** habit **B** capitulum **C** adaxial leaf surface **D** ray floret (frontward bristles removed) **E** style of ray floret **F** disc floret (frontward bristles removed) **G** stamen **H** style of disc floret. All details drawn from *Funk & Gavilanes 11070* (US). Illustration by Alice Tangerini.

Additional iconography. Funk (1997b: 33, fig. 3A, sub *X. crassum*).

Distribution and habitat. Central Colombia to central Ecuador. Colombia (Caldas, Cauca, Nariño, Risaralda, Tolima, Quindío, Valle del Cauca), Ecuador (Carchi, Chimborazo, Cotopaxi [expected], Morona-Santiago [expected], Napo, Pichincha, Tungurahua). It grows in marshes and moist grasslands of the paramo ecoregion, between elevations of 3125–4500 m (Fig. 12).

Phenology. Flowering nearly all year round.

Etymology. The adjective *crassus* -a -um means thick and it refers to the robust rhizome that this species displays.

Notes. This taxon forms dense mats or hummocks and it is characterized by its linear, apically obtuse leaves, which are flat to elliptical in cross section and prominently 1-nerved on both faces. The rhizome-like stems are robust, long, and covered with a matted lanate indumentum that covers the leaf bases.

This subspecies can be differentiate from *X. crassum* subsp. *orientale* by the leaf length (14.7–27.6 mm vs. 6.5–12.7 mm in subsp. *orientale*), number and length of the involucre bracts (16 to 21, 8.6–14.9 mm vs. 11 to 13, 6–8.2 mm in subsp. *orientale*), number of ray florets (16 to 21 vs. 13 to 15 in subsp. *orientale*), number of disc florets (ca. 95 vs. ca. 50 in subsp. *orientale*), and pappus length (14–19 mm vs. 7.8–8 mm in subsp. *orientale*). Both taxa have a well defined distribution area. The typical subspecies grows along the Cordillera Central and Cordillera Occidental in Colombia and extends southwards to central Ecuador. In contrast, *X. crassum* subsp. *orientale* is restricted in the northern part of the Cordillera Oriental of Colombia.

The habit of *X. crassum* subsp. *crassum* also resembles that of *X. rigidum*, but *X. crassum* subsp. *crassum* differs in having longer and narrower leaves (14.7–27.6 × 1.2–2.2 mm vs. 12.6–13.5 × 2.3–2.4 mm in *X. rigidum*), higher number of involucre bracts and ray florets (16 to 21 vs. ca. 13 in *X. rigidum*), and by displaying glabrous achenes (vs. white-villous in *X. rigidum*). Their distribution areas only overlap in the Antisana Volcano (Napo, Ecuador).

Additional specimens examined. COLOMBIA. **Caldas:** páramo del Ruiz, middle slopes, 30 Aug 1957, *H.G. Barclay* 5285 (COL); Cordillera Central, páramo de Las Letras, SW of Letras, 5°2'N, 75°19'W, 4 Dec 1958, *H.G. Barclay* & *P. Juajibioy* 6245 (COL, US); Manizales, N.P. Los Nevados, Casa del Cisne, 4°51'N, 75°21'W, 19 Sep 1999, *D. Stancik* 3381 (COL); Villa María, P.N.N. Nevados, cerca al refugio El Cisne, 4°50'N, 75°22'W, 28 Nov 2010, *W.G. Vargas* 22382 (COL, ICESI); **Cauca:** P.N. Puracé, 2°20'N, 76°24'W, 31 Aug 1972, *H. Sánchez* 351 (CUVC); **Nariño:** Cumbal, volcán de Chiles, en la antena vía El Laurel, Maldonado-Carchi, 0°49'N, 77°55'W, Jul 2012, *F. Ávila* 2232 (UDBC); Cumbal, volcán de Chiles, en la antena vía El Laurel, Maldonado-Carchi, 0°49'N, 77°55'W, Jul 2012, *F. Ávila* 2236 (UDBC); **Quindío:** páramo Quindío, Oct 2004, *W.G. Vargas* 15711 (COL, ICESI); **Risaralda:** Santuario San José del Palmar, serranía de Tatamá, P.N.N. Tatamá, sectores Mirlas, Piedra Bomba, Frailejonal, Lagunas y Ventanas, acceso desde Santuario, 5°6'N, 76°3'W, 16 Jul 2009, *J. Betancur*, *F. Gómez* & *J.N. Gómez* 14253 (COL); Pereira, alrededores de la laguna de Otún, 4°46'N, 75°25'W, 3 Feb 1980, *S. Díaz-Piedrahita*, *H. Valencia* & *R.*

Jaramillo 19700 (COL); Santuario, vereda Las Colonias, 400 m arriba la cascada, 5°7'N, 76°2'W, 3 Feb 1983, *J.H. Torres et al. 1633* (COL); Santuario, macizo de Tamaná, cerca al campamento "El Reposo", 5°9'N, 76°4'W, 7 Feb 1983, *J.H. Torres et al. 1663* (COL); Macizo de Tamaná, valle de San Francisco, cerca al campamento, 14 Feb 1983, *J.H. Torres et al. 1944* (COL); Pereira, P.N.N. Nevados, laguna del Otún, 4°46'N, 75°25'W, 20 Nov 2008, *W.G. Vargas 19700* (ICESI); Pereira, laguna del Otún, 4°46'N, 75°25'W, 28 Oct 2009, *W.G. Vargas 21036* (COL, ICESI); **Tolima:** Cordillera Central, Nevado del Ruiz, páramos entre Termales y Nevado y Líbano, above turn-off of road to Líbano, 4°56'N, 75°20'W, 18 Dec 1958, *H.G. Barclay & P. Juajibioy 6409* (COL); Santa Isabel, camino del paso de la quebrada del África, 4°45'N, 75°22'W, 7 Feb 1980, *S. Díaz-Piedrahita & R. Jaramillo 1918* (COL); road on N side of Nevado del Ruiz, near fork in road that leads to El Rosario, approx. 8 km E of intersection with road to Manizales, 4°55'N, 75°17'W, 23 Jan 1986, *V.A. Funk 8044* (COL); road on N side of Nevado del Ruiz, near fork in road that leads to El Rosario, approx. 8 km E of intersection with road to Manizales, 4°55'N, 75°17'W, 23 Jan 1986, *V.A. Funk 8046* (COL); Cajamarca, corregimiento Anaime, La Castellana, 5 Jun 1994, *B. Restrepo 430* (COL); Cajamarca, páramo de Anaime, reserva Semillas de Agua, 4°15'N, 75°33'W, 6 Jun 2000, *W.G. Vargas 8108* (ICESI); **Valle del Cauca:** Riofrío, Venecia, páramo El Duende, 4°4'N, 76°30'W, 3 Jun 2010, *J.C. Benavides 4859* (COL); Los Farallones, cuenca del río Timba, vert. oriental, quebrada Valle Escondido, 3°18'N, 76°44'W, 23 Aug 1991, *E. Calderón 88A* (COL); cabeceras de los ríos Tuluá y Bugalagrande, páramo de Las Vegas, 4°4'N, 75°47'W, 22 Mar 1946, *J. Cuatrecasas 20322* (CONC); Pradera, I.P. Bolo Azul, finca La Cabaña, 3°26'N, 76°3'W, 28 Nov 1989, *S. Sarria 591* (COL, CUVIC); Palmira, La Nevera, 3°31'N, 76°4'W, 23 Mar 2008, *W.G. Vargas 18840* (ICESI); Tuluá, corregimiento de Barragán, 4°0'N, 75°48'W, 21 Nov 1997, *W.G. Vargas 4201* (COL). **ECUADOR. Carchi:** road between Tulcán and Maldonado, S of volcán Chiles, 0°47'N, 77°58'W, 12 Mar 1985, *B. Eriksen 59010* (QCA, QCNE); paramo El Ángel, between towns of El Ángel and Tulcán near the pass, 4 Mar 1992, *V.A. Funk & M. Gavilanes 11069* (QCA, QCNE); paramo El Ángel, between towns of El Ángel and Tulcán near the pass, 4 Mar 1992, *V.A. Funk & M. Gavilanes 11070* (QCA, QCNE, US); volcán Chiles, rd. from Tulcán to Maldonado, 36 km W of the bridge at the W edge of Tulcán, 5 Mar 1992, *V.A. Funk & M. Gavilanes 11073* (QCA, QCNE); volcán Chiles, rd. from Tulcán to Maldonado, 38 km W of the bridge at the W edge of Tulcán, 5 Mar 1992, *V.A. Funk & M. Gavilanes 11077* (QCA, QCNE); Espejo, reserva ecológica El Ángel, sitio de lagunas El Voladero, 0°42'N, 77°53'W, 31 Oct 1993, *W. Palacios 11680* (QCNE); S slopes of volcán Chiles, 0°49'N, 77°57'W, 21 Oct 1987, *P.M. Ramsay & P.J. Merrow-Smith 869* (QCA, QCNE); páramo del Ángel, lado ecuatoriano del volcán Chiles, 0°48'N, 77°56'W, May 1989, *O. Rangel et al. 4406* (COL, US); SW side of volcán Chiles, 0°48'N, 77°57'W, 20 Jun 1995, *P. Sklenář & V. Kostečková 37-8* (QCA); SW side of volcán Chiles, 0°48'N, 77°57'W, 22 Jun 1995, *P. Sklenář & V. Kostečková 48-1* (QCA); volcán Chiles, SW side of the volcano, 0°48'N, 77°57'W, 23 Jun 1995, *P. Sklenář & V. Kostečková 713* (QCNE); Espejo, reserva ecológica El Ángel, asociación 23 de Julio, 0°43'N, 77°55'W, 3 Aug 2003, *D. Suárez, M. Chinchero & M.*

Cabascango 1355 (QCNE); **Chimborazo**: Altar, hacienda Releche, sector Pashuazo, 1°40'S, 78°27'W, 23 Jul 2009, *D. Cárate, F. Naranjo & S. Chiriboga* 1054 (QCA); Atillo, frente al campamento de ingenieros del ejército, 2°10'S, 78°30'W, 12 Apr 2009, *D. Cárate, J. Salvador & S. Rojas* 151 (QCA); **Napo**: road Quito-Baeza, near the pass at Papallacta, 0°20'S, 78°12'W, 30 Oct 1983, *B. Eriksen & B.B. Larsen* 45435 (QCA, QCNE); páramo de Papallacta, sector El Paso, 0°19'S, 78°12'W, 28 Oct 1984, *A. Freire* 27 (QCA); Pisayambo, laguna Cochas Negras, 1°6'S, 78°19'W, 14 Jan 1999, *B. Merino & Á. Sánchez s.n.* (LOJA [mixed with *X. humile*]); Llanganati, páramo SE of choza Aucacocha, between Aucacocha and Pan de Azúcar, 1°9'S, 78°18'W, 15 May 1982, *B. Øllgaard et al.* 38514 (QCA); reserva ecológica Oyacachi, 0°15'S, 78°5'W, 29 Sep 2007, *K. Romoleroux et al.* 4642 (QCA); La Virgen de Papallacta, a 50 m desde la vía al Tena, hacia el interior del páramo, 0°21'S, 78°11'W, 31 Mar 2010, *C.V. Sandoya-Sánchez, E. Gortaire & J. Irazábal* 335 (QCA); NE side of volcán Antisana, 0°27'S, 78°8'W, 18 Aug 1997, *P. Sklenář & V. Sklenářová* 3559 (QCA); Tena, P.N. Llanganates, vía Salcedo-Tena, de laguna Chaloa Cocha desvío a Rayo Filo, 0°57'S, 78°23'W, 20 Sep 1998, *H. Vargas, E. Narváez & S. Orellana* 2630 (QCNE); **Pichincha**: Cordillera Oriental, cerro de Corrales, páramo de Guamaní, on north side of boquerón, highest point of road to Papallacta, 0°19'S, 78°12'W, 16 Aug 1959, *H.G. Barclay & P. Juajibioy* 8855 (COL); Quito, embalse Salve Faccha, 0°20'S, 78°15'W, 31 Aug 2001, *D. Fernández, G. Pérez & L. Calvopiña* 416 (QCNE); páramo de Guamaní, carretera Quito-Pifo-Papallacta, 0°23'S, 78°9'W, 20 Oct 1990, *E. Guerrón* 15 (QCA); páramo de Guamaní, close to paso de La Virgen, 0°20'S, 78°13'W, 8 Feb 1984, *S. Laegaard* 51328 (QCA); páramo de Guamaní, paso de la carretera Quito-Baeza, 0°19'S, 78°12'W, 25 Aug 1985, *B.B. Larsen & B. Dall* 191 (QCA); páramo de Guamaní, carretera Pifo-Papallacta, km 23, 0°18'S, 78°14'W, 4 Nov 1990, *S. León* 1012 (LOJA, QCA); páramo de Guamaní, laguna de Hoyas, 0°15'S, 78°12'W, 8 Aug 1987, *P.M. Ramsay & P.J. Merrow-Smith* 140 (QCA); páramo de Guamaní, on the right of the road Quito-Papallacta, 0°20'S, 78°12'W, 28 Jun 1997, *P. Sklenář & V. Sklenářová* 2010 (QCA); páramo de Guamaní, along the road to the antennas, 0°19'S, 78°12'W, 19 Jun 1999, *P. Sklenář* 7314 (QCA); N side of nevado Cayambe, on the right side along the road towards the military antennas, 0°5'N, 77°58'W, 6 Aug 2004, *P. Sklenář* 8175 (QCA); **Tungurahua**: P.N. Llanganates, laguna Cable, 1°8'S, 78°18'W, 28 Nov 1996, *J.L. Clark & J. Fair* 3521 (QCNE); Llanganates, entre bordes de Mesa Tablón y entrada de Aucacocha, 1°9'S, 78°19'W, 27 Dec 1983, *J. Jaramillo, V. Zak & J. Yépez* 6004 (F, QCA); Aucacocha, sector NE de la laguna Aucacocha, 1°9'S, 78°19'W, 29 Dec 1983, *J. Jaramillo* 6091 (QCA); Aucacocha, sector NE de la laguna de Aucacocha, 1°9'S, 78°19'W, 30 Dec 1983, *J. Jaramillo, V. Zak & J. Yépez* 6262 (QCA); Santiago de Pillaro, P.N. Llanganates, base of cerro Hermoso on W side, near lake, 1°13'S, 78°17'W, 13 Nov 1999, *D. Neill et al.* 12049 (QCNE); Santiago de Pillaro, P.N. Llanganates, SW flank of cerro Hermoso, above lake, 1°13'S, 78°17'W, 14 Nov 1999, *D. Neill et al.* 12064 (QCA, QCNE); Patate, P.N. Llanganates, alrededores de la laguna Pan de Azúcar, 1°9'S, 78°17'W, 14 Oct 1998, *H. Vargas, J.C. Ronquillo & N. Granda* 2870 (QCNE).

7b. *Xenophyllum crassum* subsp. *orientale* (Cuatrec.) J. Calvo, comb. nov.

urn:lsid:ipni.org:names:77211291-1

Werneria crassa subsp. *orientalis* Cuatrec., Phytologia 45: 29. 1980. Type. Colombia.

Santander: páramo del Almorzadero, vertiente norte, 3600–3800 m, 28 Nov 1941, J. Cuatrecasas 13511 (holotype: US-00037302!; isotypes: BC-634974 (digital image!), F-1233032!).

Werneria crassa f. *minor* Cuatrec., nom. nud. in sched. (Turland et al. 2018, ICN Art. 38.1).

Description. *Stems* 1.5–2.5 cm tall (aerial part), lanate. *Leaves* stellate-imbricate, extending into a sheath-like base that bears long silky trichomes, usually with the leaf lamina spreading at nearly 90° from the sheath-like base; leaf laminae 6.5–12.7 × 1.2–2 mm, linear, obtuse, usually callous-like tipped at the apex, entire, flat to elliptical in cross section, glabrous, 1-nerved above, 1-nerved beneath, fleshy, rather shiny (in dried specimens). *Capitula* radiate, erect, sessile to subsessile (rarely with a short peduncle up to 8 mm long). *Involucres* 10.2–12.2 × 7.8–10.6 mm, cupuliform; involucre bracts 11 to 13, 6–8.2 × 1.6–2.1 mm, acute to obtuse at the apex, greenish to dark-purplish. *Ray florets* 13 to 15; corollas 13–13.2 × 1.7–2.6 mm, 4 to 5-veined, subentire to 3-toothed at the apex, conspicuously surpassing the involucre, white. *Disc florets* ca. 50; corollas 6.6–6.9 mm long, yellow. *Achenes* cylindrical, glabrous (immature); pappus 7.8–8 mm long, barbellate, whitish. Chromosome number unknown.

Distribution and habitat. Endemic to Colombia (Arauca [expected], Boyacá, Norte de Santander, Santander). It grows in marshes and wet exposed areas of the páramo ecoregion, between elevations of 3200–4600 m (Fig. 12).

Phenology. Flowering nearly all year round.

Etymology. The adjective *orientalis* -is -e means eastern, which refers to the further eastern distribution of this taxon in relation to the typical subspecies. It occurs in the northern part of the Cordillera Oriental of Colombia (Eastern Ranges).

Notes. *Xenophyllum crassum* subsp. *orientale* is characterized by the leaf length (6.5–12.7 mm), the number of involucre bracts (11 to 13), and the number of ray florets (13 to 15). In dried specimens, the leaves are rather shiny. This taxon was synonymized with *X. crassum* subsp. *crassum* by Ávila et al. (2016) but no discussion supporting such taxonomic decision was provided. The aforementioned morphological differences against the typical subspecies, in addition to the fact that their distribution areas are well defined and do not overlap, lead us to maintain the treatment by Cuatrecasas (1980).

It should be noted that *X. crassum* subsp. *orientale* has been confused with *Werneria pygmaea*, a species that grows in the same habitat. Indeed, we detected several specimens that contain mixed material, including an isotype (see comments below). *Xenophyllum crassum* subsp. *orientale* has erect, robust rhizome-like stems whereas *W. pygmaea* is a strictly rosette-forming species not forming hummocks. Further differences are detailed in Calvo et al. (in press). Some confusion with *X. humile* is also likely (see comments under it).

The presumed isotype of *W. crassa* subsp. *orientalis* Cuatrec. kept at COL (COL-000005514) comes from “extremo S en Peralonso, 3100 m”, a locality slightly different from that indicated in the protologue, i.e., “vertiente norte, 3700–3800 m” [as “3600–3800 m” on the labels]. It is excluded from the type material as it does not belong to the same gathering. On the other hand, it has to be noted that the isotype at BC contains an individual corresponding to *W. pygmaea* (above on the right hand, with fragments of *Disterigma* sp. (Ericaceae) at the base).

Additional specimens examined. **COLOMBIA.** **Boyacá:** Cordillera Oriental, Sierra Nevada del Cocuy, Alto Ritacuya, 6°30'N, 72°19'W, 11 Apr 1959, *H.G. Barclay & P. Juajibioy* 7352 (COL, US); páramo de Monguí, laguna Colorada, 5°38'N, 72°50'W, 1 Sep 1998, *J.A. Calleja & J.C. Jaramillo* 204 (COL); Sierra Nevada del Cocuy, alto valle Lagunillas, 500 m al NNE de la laguna Pintada, 6°22'N, 72°19'W, 3 Oct 1972, *A.M. Cleef & P.A. Florschütz* 5784 (COL, US); Sierra Nevada del Cocuy, quebrada Bocatoma, morrena al W de la lagunita glaciar occidental, 6°23'N, 72°16'W, 5 Nov 1972, *A.M. Cleef & P.A. Florschütz* 5870 (COL); Sierra Nevada del Cocuy, quebrada Bocatoma, laguna rellena, 6°23'N, 72°16'W, 3 Mar 1973, *A.M. Cleef* 8736 (COL, US); Sierra Nevada del Cocuy, quebrada Bocatoma, orilla SE de la laguna rellena, 6°23'N, 72°16'W, 3 Mar 1973, *A.M. Cleef* 8762 (COL, US); páramo de la Sarna entre Sogamoso y Vado Hondo, 5°35'N, 72°51'W, 5 Apr 1973, *A.M. Cleef* 9411a (COL); Nevado de Cocuy, alto valle de Las Lagunillas, 6°21'N, 72°19'W, 12 Sep 1938, *J. Cuatrecasas* 1486 (COL, US); **Norte de Santander:** Chitagá, corregimiento Presidente, vereda Presidente, alrededores de la quebrada El Salado, en el ascenso a la terraza pantanosa entre las lagunas El Salado y El Tambor, 7°0'N, 72°42'W, 22 May 2007, *D.I. Capacho-Navia et al.* 243 (COL); Chitagá, corregimiento Presidente, vereda Presidente, laguna El Tambor, sobre margen al costado SE, 7°0'N, 72°42'W, 15 Mar 2007, *D.I. Capacho-Navia et al.* 362 (COL [mixed with *Werneria pygmaea*]); Cordillera Oriental, páramo del Almorzadero, vertiente norte, 6°59'N, 72°44'W, 28 Nov 1941, *J. Cuatrecasas* 13505 (COL [mixed with *W. pygmaea*], US); **Santander:** páramo del Almorzadero, 6°59'N, 72°44'W, 17 Nov 1978, *J. Aguirre & A.M. Cleef* 880 (COL); Cordillera Oriental, páramo de Almorzadero, on road between Chitagá and Cerrito, about half way to Boquerón, 6°56'N, 72°40'W, 31 Dec 1959, *H.G. Barclay & P. Juajibioy* 10363 (COL); páramo de Almorzadero, on road between Chitagá and Cerrito, approx. 7 km S of highest point of paramo, 6°59'N, 72°40'W, 31 Dec 1959, *H.G. Barclay & P. Juajibioy* 10370 (COL [mixed with *W. pygmaea*], US); Alto del Almorzadero, vertiente sur, 6°58'N, 72°43'W, 20 Jul 1940, *J. Cuatrecasas & H. García Barriga* 10012 (COL, US); páramo del Almorzadero, km 50–51, 7°0'N, 72°44'W, 20 Sep 1969, *J. Cuatrecasas & L. Rodríguez* 27887 (COL, US).

8. *Xenophyllum marcidum* (S.F.Blake) V.A.Funk, *Novon* 7(3): 240. 1997.

Werneria marcida S.F.Blake, *J. Washington Acad. Sci.* 18: 492. 1928. Type. Peru. Lima: Río Blanco, 4570 m, 20/25 Mar 1923, *J.F. Macbride* 3032 (holotype: F-534102!; isotypes: BM s.n.!, G-00305676 (fragment, digital image!), G-00305677 (digital image!), GH s.n.!, MA-246360!, S-R-6525 (digital image!), US-00037326!, W-3718!).

Werneria sedoides S.F.Blake, J. Washington Acad. Sci. 18: 493. 1928. Type. Peru. Ancash: Punco, Estación 21 miles West of Huallanca, 4115 m, 1 Oct 1922, *J.F. Macbride & W. Featherstone* 2475 (holotype: F-518901!; isotypes: US-00037308!, G-00305678 (fragment, digital image!), G-00305679 (digital image!)).

Description. Suffruticose plant, forming dense mats or hummocks, with rhizome-like stems up to 8 cm long covered with old leaves, rather erect, simple or branched from the base. **Stems** 1–2 cm tall (aerial part), glabrous. **Leaves** densely imbricate, extending into a glabrous sheath-like base; leaf laminae $3.3\text{--}7.6 \times 1.7\text{--}2.6$ mm, triangular, acute at the apex, denticulate in the upper half, rather flat in cross section, glabrous, 1-nerved above (barely visible), 1-nerved beneath, rather fleshy, matte. **Capitula** radiate, erect, sessile to subsessile. **Involucres** $8.8\text{--}10.8 \times 5.7\text{--}10$ mm, cupuliform; involucre bracts 13 to 15, $4.8\text{--}6.7 \times 1.8\text{--}2.2$ mm, acute at the apex, greenish to dark-purplish. **Ray florets** 14 to 21; corollas $7.4\text{--}12.9 \times 1.6\text{--}2.3$ mm, 3 to 4-veined, subentire to 2-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** 35 to 48; corollas 5–6.2 mm long, yellowish; style branches truncate with a crown of sweeping trichomes, purplish. **Achenes** $2.8\text{--}3 \times$ ca. 1 mm, cylindrical, ca. 7-ribbed, glabrous; pappus 5–8.8 mm long, barbellate, whitish to partially purple-colored. Chromosome number unknown. Fig. 14.

Additional iconography. Blake (1928: 496, fig. 1H–J sub *Werneria marcidus*, fig. 1N–P sub *W. sedoides*); Funk (1997a: 237, fig. 1B); Beltrán (2016: 358, fig. 2B, as photo).

Distribution and habitat. Central Peru to northern Bolivia. Bolivia (La Paz), Peru (Ancash, Arequipa, Ayacucho, Huancavelica, Huánuco, Junín [expected], Lima, Moquegua [expected], Pasco [expected], Puno). It grows on exposed rocky slopes and cryoturbated soils of the subhumid and humid puna ecoregions, between elevations of 4550–5350 m (Fig. 15).

Phenology. Flowering from February to September.

Etymology. The adjective *marcidus* -a -um means withered. It probably refers to the fact that a large proportion of the stem bears marcescent leaves and the green ones are restricted to the distal part.

Notes. *Xenophyllum marcidum* is characterized by its triangular, densely imbricate leaves. Among the *Xenophyllum* members forming dense mats or hummocks, this species is readily distinguishable due to the leaves are denticulate in the upper half, acute at the apex, and rather flat in cross section. The capitula are radiate and have 14 to 21 ray florets with white, considerably long corollas.

Because of the marginally denticulate leaves, on dried specimens *X. marcidum* might be confused with *X. ciliolatum*, a species that has a partially overlapping distribution area. They can be easily differentiated by the habit (forming dense mats or hummocks in *X. marcidum* vs. forming clumps of erect or decumbent stems in *X. ciliolatum*), leaf lamina shape (triangular in *X. marcidum* vs. linear in *X. ciliolatum*), number of involucre bracts (13 to 15 in *X. marcidum* vs. ca. 8 in *X. ciliolatum*), number of ray florets (14 to 21 in *X. marcidum* vs. 8 to 11 in *X. ciliolatum*), and by the ray corolla length and color ($7.4\text{--}12.9$ mm, white in *X. marcidum* vs. $6.2\text{--}7.3$ mm, yellow in *X. ciliolatum*).

Additional specimens examined. **BOLIVIA. La Paz:** Murillo, nev. Charquini, above aqueduct on N facing slope, $16^{\circ}17'S$, $68^{\circ}6'W$, 12 Apr 1995, *V.A. Funk & N. Bernal*

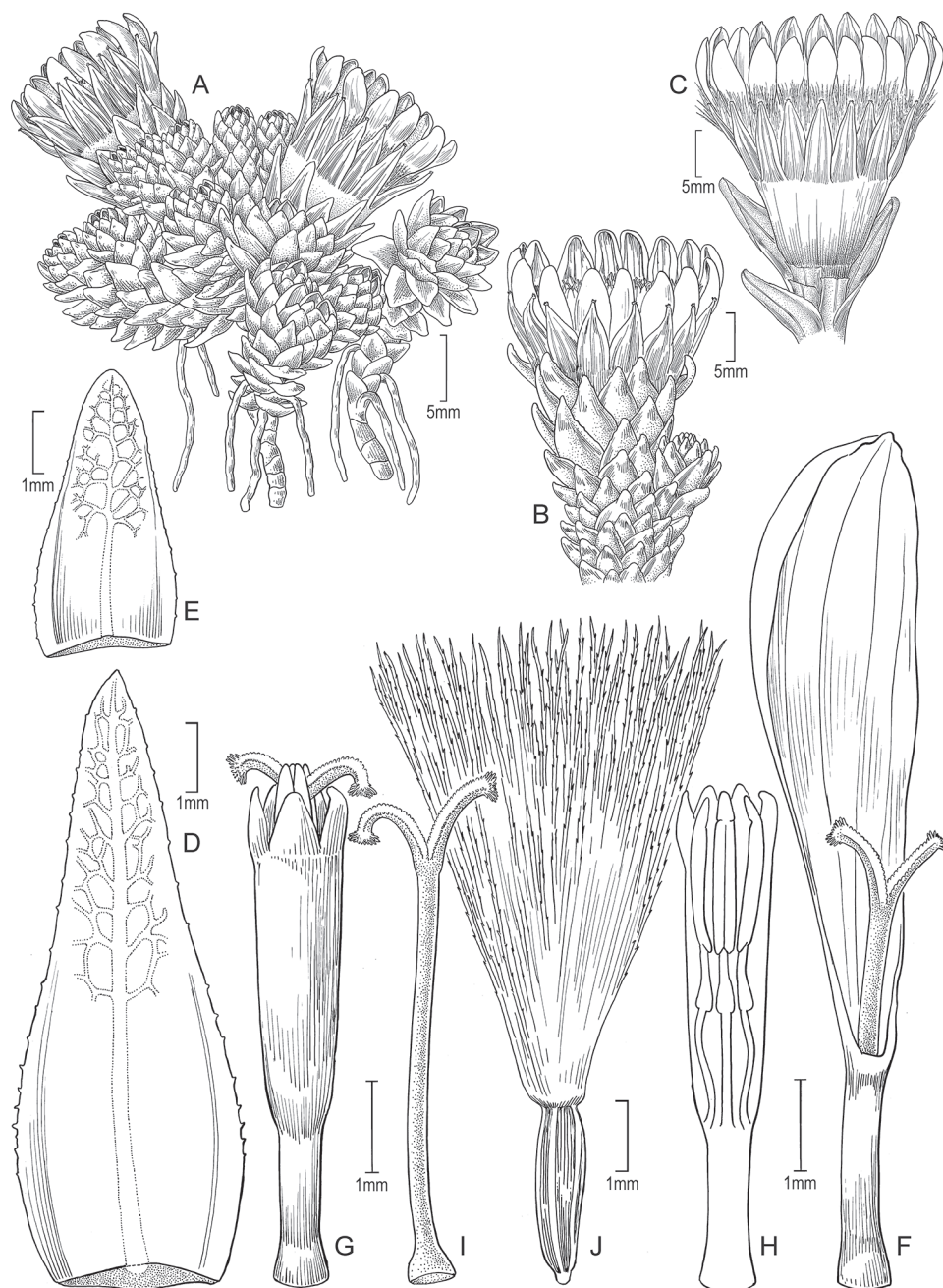


Figure 14. *Xenophyllum marcidum* **A** habit **B** stem apical part and capitulum **C** capitulum **D** adaxial leaf surface **E** uppermost leaf **F** ray corolla and style **G** disc corolla and style branches **H** disc corolla and stamens (vertically sectioned, style removed) **I** style **J** achene with pappus. All details drawn from *Funk & Bernal* 11285 (US) except for **A** (drawn from *Stafford* 749, K) and **C–E, H** (drawn from *Macbride & Featherstone* 2475, US). Illustration by Alice Tangerini.

11285 (LPB, US); Bautista Saavedra, Charazani, miterhalb Medallani, 15°4'S, 69°6'W, 17 Feb 1994, *B. Herzog* 795 (LPB); Murillo, subida del paso de Zongo (acueducto), al nev. Charquini, 16°17'S, 68°6'W, 30 Jul 1982, *X. Menhofer* 1461 (LPB, US); Murillo, paso de Zongo, nev. Charquini, 16°17'S, 68°6'W, 1 Aug 1982, *X. Menhofer* 1461A (LPB); Franz Tamayo, Pelechuco, al N en línea recta a 0.58 km del campamento Chocollo, 14°43'S, 69°13'W, 25 Nov 2017, *F. Zenteno, D. Villalba & L. Mamani* 21274 (LPB). **PERU. Ancash:** Recuay, carretera a Pachacoto, abra de Yanashallash, 9°50'S, 77°8'W, 28 May 2001, *A. Cano* 11496 (USM); Carhuaz, Huascarán N.P., lateral valley of quebrada Ishinca, trail to lago Ishinca, 9°23'S, 77°25'W, 12 Feb 1985, *D.N. Smith, R. Valencia & A. Gonzales* 9469 (LPB, MO, QCA, USM); collado sobre el río Pumapampa, 18 Mar 1983, *O. Tovar et al.* 9627 (USM); collado encima río Pumapampa, 18 Mar 1983, *O. Tovar et al.* 9666 (USM); nevado de Cajat, entre Huaraz-La Unión, 22 Mar 1983, *O. Tovar et al.* 9842 (USM); **Arequipa:** Castilla, Orcopampa, minas de Poracota, quebrada Huamanihuayta, 15°13'S, 72°30'W, 20 Apr 2011, *H. Beltrán* 7101 (USM); **Ayacucho:** Ayacucho, abra Apacheta, camino a Pars, 13°25'S, 74°40'W, 4 Aug 2010, *A. Cano, W. Mendoza & A. Delgado* 19760 (USM [mixed with *Werneria orbignyana* Wedd.]); **Huancavelica:** Huachocolpa, alrededores de la unidad minera Caudalosa, 13°4'S, 75°0'W, 23 Mar 2015, *P. Gonzáles* 3544 (USM); San José de Aco-bambilla, top of quebrada Ocrococha, 12°40'S, 75°22'W, 12 Aug 1961, *J.R. Lloyd & J.K. Marshall* 309 (K); **Huánuco:** Dos de Mayo, Lauricocha, 10°18'S, 76°39'W, 1955, *A. Cardich* 208 (USM); Dos de Mayo, Gayco, 10°24'S, 76°46'W, Apr 1956, *A. Cardich* 217 (USM); **Lima:** Huarochirí, desvío de carretera central hacia Chinchán y Marcapomacocha, 11°34'S, 76°15'W, 23 Sep 2014, *H. Beltrán & W. Aparco* 7750 (USM); Oyón, encima de mina Uchuchacua, parte más alta por carretera, 10°36'S, 76°40'W, 5 Apr 2015, *H. Beltrán & W. Aparco* 7769 (USM); Huarochirí, Chicla, abra Anticona (Ticlio), 11°35'S, 76°11'W, 29 Apr 2017, *H. Beltrán, S. Castillo & M. Arakaki* 7986 (USM); Ticlio bajo, 11°35'S, 76°11'W, 16 May 1959, *L. Diers* 940 (USM); Huarochirí, San Damián, Chanape, 11°53'S, 76°15'W, 5 Jul 2013, *P. Gonzáles & B. Brito* 2632 (USM); Anticona, pequeño arroyo con orientación SW, 11°35'S, 76°11'W, 5 Aug 2012, *E. Linares & A. Galán* 3077 (USM); **Puno:** Carabaya, Corani, Minaspata, 14°1'S, 70°41'W, 15 Oct 2017, *P. Gonzáles* 3832 (USM); San Antonio de Esquilache, 16°6'S, 70°17'W, 18 May 1937, *D. Stafford* 749 (K).

9. *Xenophyllum ciliolatum* (A.Gray) V.A.Funk, Novon 7(3): 239. 1997.

Werneria ciliolata A.Gray, Proc. Amer. Acad. Arts 5: 140. 1861. Type. Peru. Junín: Andes Peru, Casa Cancha, [without date], *Capt. Wilkes Expedition s.n.* (lectotype: US-00037299!, designated by Calvo et al. (2017: 229); isolectotype: GH-00967832 (fragment, digital image!)).

Werneria ciliata Wedd. ex Sch.Bip., Linnaea 34: 530. 1866, *nom. inval. pro syn.* (Tur-land et al. 2018, ICN Art. 36.1).

Description. Suffrutescent plant, forming clumps of erect or decumbent stems. *Rhizomes* 5–8 × 0.3–0.5 cm, horizontal to oblique, glabrous. *Stems* 4–7 cm tall, simple or branched, glabrous, with leaves usually clustered in the upper part. *Leaves* imbricate, erect (not adpressed to the stem), extending into a glabrous sheath-like base; leaf laminae 4.9–8.6 × 0.6–1.2 mm, linear, rather acute at the apex, denticulate, elliptical to slightly curved forwards in cross section, glabrous, 1-nerved above (barely visible), 1-nerved beneath (sometimes purple-colored), rather fleshy, matte. *Capitula* radiate, erect, sessile. *Involucres* 8.9–12.4 × 4–7.3 mm, narrowly cupuliform; involucre bracts ca. 8, 4.1–7.7 × 1.4–2.5 mm, acute at the apex, greenish to dark-purplish. *Ray florets* 8 to 11; corollas 6.2–7.3 × 0.8–1.2 mm, 3-veined, subtire to 2-toothed at the apex, not surpassing the involucre, yellow. *Disc florets* 11 to 28; corollas 5–7.3 mm long, yellow; style branches truncate with a crown of sweeping trichomes, yellowish. *Achenes* 2–3.3 × 1–1.2 mm, cylindrical, 7 to 8-ribbed, glabrous; pappus 6.2–7.4 mm long, barbellate, whitish. Chromosome number unknown.

Iconography. Beltrán (2016: 358, fig. 2E, as photo).

Distribution and habitat. Central Peru to central Bolivia. Bolivia (Cochabamba, La Paz, Oruro, Potosí), Peru (Arequipa, Ayacucho, Cusco, Huancavelica, Junín, Lima, Moquegua, Pasco [expected], Puno). This species grows in rocky outcrops, scree slopes, cryoturbated soils, and exposed grasslands of the subhumid and humid puna ecoregions, between elevations of 3900–5350 m (Fig. 15).

Phenology. Flowering from February to November.

Etymology. The adjective *ciliolatus* -a -um is the diminutive of *ciliatus* -a -um, which describes the denticulate leaf margin of this species.

Notes. *Xenophyllum ciliolatum* is one of the species displaying yellow ray corollas not surpassing the involucre. It is characterized by having erect or decumbent stems 4–7 cm tall, linear leaves 4.9–8.6 mm long with denticulate margin, ca. 8 involucre bracts, and 8 to 11 ray florets. The leaves are erect (not adpressed to the stem) and tend to be clustered upwards.

The morphologically closest species is *X. juniperinum*, known from southern Peru (Tacna), northern Chile, and western Bolivia (Oruro and Potosí). They differ in habit (erect or decumbent stems 4–7 cm long in *X. ciliolatum* vs. erect stems 8–15 cm long in *X. juniperinum*), leaf disposition (clustered up the stem and erect in *X. ciliolatum* vs. uniformly arranged along the stem and adpressed in *X. juniperinum*), leaf lamina shape (linear in *X. ciliolatum* vs. linear-triangular in *X. juniperinum*), leaf margin (denticulate in *X. ciliolatum* vs. minutely, irregularly denticulate in *X. juniperinum*), and involucre bract length (4.1–7.7 mm in *X. ciliolatum* vs. 2.8–3.4 in *X. juniperinum*). Their distribution areas do not overlap. *Xenophyllum ciliolatum* also shows morphological affinities with *X. marcidum* (see comments under it) and *X. weddellii*. From this latter species, *X. ciliolatum* differs in having denticulate leaf margin (vs. entire in *X. weddellii*), yellow ray corollas not surpassing the involucre (vs. white and conspicuously surpassing the involucre in *X. weddellii*), and disc corollas 5–7.3 mm long (vs. 4.5–5.2 mm long in *X. weddellii*). These species co-occur in southern Peru (Arequipa, Moquegua, Puno).

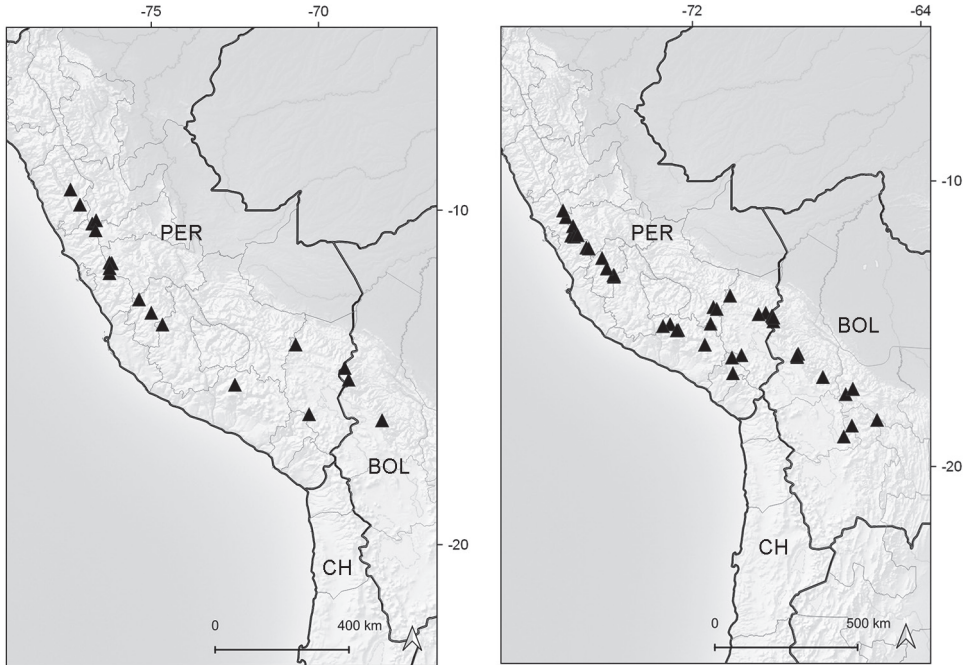


Figure 15. Distribution map of *Xenophyllum marcidum* (left hand) and *X. ciliolatum* (right hand).

The lectotype designation of the name *Werneria ciliolata* A.Gray by Calvo et al. (2017) should be rather attributed to Funk (1997a) although she used the term “holotype”. It is here corrected to lectotype because it cannot be established that the author only used this element and that the gathering is represented by a single specimen (McNeill 2014).

Additional specimens examined. BOLIVIA. Cochabamba: cordillera del Tunari, laderas de la cumbre del Tunari, 17°17'S, 66°23'W, 25 Mar 1990, *G. Navarro* 596 (BOLV); cordillera del Tunari, laderas altas de la cumbre del Tunari, 17°17'S, 66°23'W, 25 Mar 1990, *G. Navarro* 628 (BOLV); cordillera del Tunari, cumbres del pico Tunari, 17°17'S, 66°23'W, 18 Feb 1990, *G. Navarro* 637 (BOLV); Quillacollo, cordillera alta del Tunari, cima de la Falso Tunari, 17°28'S, 66°38'W, 22 Aug 2010, *M. Zárate* 3770 (BOLV); **La Paz:** Los Andes, subiendo cerca de Peñas, por las lagunas de Hichucota, hacia la cumbre al lado del glacial Ankokota, 16°3'S, 68°18'W, 22 May 1999, *S.G. Beck* 24639 (LPB); Los Andes, above cumbre (pass) on rd. through Hichu-Kkota valley on rd. to mina La Fabulosa, 21 km from base of lag. Khara Kkota, 16°10'S, 68°20'W, 29 Apr 1995, *V.A. Funk* 11403 (LPB, US); Franz Tamayo, Ulla Ulla, cordillera Apolobamba cerca al pueblo de Pelechuco 17 km NE, 14°55'S, 69°10'W, 22 Aug 1986, *P. Holt* 14A (LPB); Franz Tamayo, Ulla-Ulla, nev. Manuel Llipani, 20 Jul 1982, *X. Menhofer* 10 (LPB); Franz Tamayo, paso de Pelechuco, 14°47'S, 69°10'W, 22 Jul 1982, *X. Menhofer* 23 (LPB); Omasuyos, Hichu Cota, subiendo a la cumbre, 16°7'S, 68°21'W, 28 Apr 1985, *M. Moraes* 153 (LPB); Loayza, Pata Mina-Viloco, 17 Aug 1982, *O. Murgia* 390 (LPB); Los Andes, valle de

Hichu Kkota, 17 Nov 1983, *C. Ostria* 54 (LPB); Loayza, bajando de Viloco hacia Choquetanga, 16°52'S, 67°26'W, 15 Aug 1994, *N. Salinas et al.* 3294 (LPB); Franz Tamayo, Pelechuco, al N en línea recta a 3.8 km del campamento Chocollo, 14°43'S, 69°13'W, 25 Nov 2017, *F. Zenteno, D. Villalba & L. Mamani* 21275 (LPB); **Oruro**: Eduardo Abaroa, Challapata, desde Challapata subiendo hasta el final del camino hacia Azanaque, luego subiendo hasta las cumbres del Azanaque, 18°57'S, 66°42'W, 29 May 2016, *I. Jiménez* 8406 (LPB); **Potosí**: Colquechaca, 18°22'S, 65°32'W, 1 Feb 2010, *F.S. Zenteno* 16389 (USM); Azanaque, 18°34'S, 66°25'W, 3 May 2016, *F.S. Zenteno* 17034 (USM). **PERU**. **Arequipa**: pr. Chivay, nevado Huarancante, 15°44'S, 71°34'W, 3 Apr 2005, *C. Aedo & A. Galán* 11103 (MA); Castilla, Orcopampa, minas de Poracota, quebrada Sora, 15°13'S, 72°30'W, 20 Apr 2011, *H. Beltrán* 7100 (USM); Castilla, Orcopampa, minas de Poracota, cerca a quebrada Faculla, 15°14'S, 72°33'W, 20 Apr 2011, *H. Beltrán* 7111 (USM [mixed with *X. digitatum*]); La Unión, Huaynacotas, Sarajorepampa, 15°1'S, 72°47'W, 18 Mar 2011, *D. Montesinos* 2950 (HSP, MOL, USM); Castilla, Tapay, cerro Blanco, Apacheta, 14 Sep 2011, *N. Vega* 1744 (USM); **Ayacucho**: Páucar del Sara Sara, Oyolo, a 15 km al NO de Pampamarca, camino a Sayla, 15°5'S, 73°2'W, 14 Sep 2013, *C. Tejada* 226 (HSP); **Cusco**: Espinar, hacienda K'achachi (Uchupata), 15°0'S, 71°22'W, 22 Jun 1956, *C. Vargas* 11223 (US); Canas, alturas de Layo, 14°29'S, 71°9'W, 12 Aug 1957, *C. Vargas* 11871 (US); Canas, Langui, alturas, 14°25'S, 71°16'W, 14 Sep 1961, *C. Vargas* 13620 (LPB, US); **Huancavelica**: Huamanga, Licapa, 13°18'S, 74°45'W, 29 Oct 2009, *A. Cano et al.* 19436 (USM); Huaytará, Pilpichaca (abra Apacheta), 13°18'S, 74°46'W, 4 Jul 2010, *A. Cano, W. Mendoza & A. Delgado* 19658 (USM); Huaytará, Pilpichaca (abra Apacheta), 13°21'S, 74°45'W, 4 Jul 2010, *A. Cano, W. Mendoza & A. Delgado* 19721 (USM); Huaytará, Pilpichaca (Lillinta-Ingahuasi), 13°18'S, 74°45'W, 26 Jun 2010, *A. Cano et al.* 19849 (USM); Huachocolpa, alrededores de la unidad minera Caudalosa, 13°4'S, 75°0'W, 23 Mar 2015, *P. Gonzáles* 3545 (USM); Huaytará, 7 km lineales al NE del abra Apacheta, en el límite entre Huancavelica y Ayacucho, distr. Pilpichaca, 13°18'S, 74°46'W, 11 Apr 2005, *J. Roque* 4799 (USM); Huaytamayoc-Tansiri, 12°42'S, 75°10'W, May 1956, *O. Tovar* 2560 (USM); **Junín**: Anticona, abajo entre Casapalca y Oroya, 11°35'S, 76°11'W, 26 Jun 1954, *O. Tovar & L. Constance* 9194 (USM-29378 [mixed with *X. decorum* and *X. digitatum*]); Yauli, Ticlio, 11°35'S, 76°11'W, 28 Jun 1999, *G. Yarupaitán* 1688 (US); **Lima**: Yauyos, Laraos, camino Jalcacha a Palca, 12°20'S, 75°43'W, 25 May 1995, *H. Beltrán* 1702 (USM); Huaral, Pacaros, abra de Antajirca, límite entre Lima y Pasco, 11°2'S, 76°32'W, 20 Jun 2015, *H. Beltrán & W. Aparco* 7842 (USM); Yauyos, Laraos, Carhuanisho, 12°22'S, 75°38'W, 4 Jun 2017, *H. Beltrán* 8086 (USM); Huarochirí, arriba de la laguna de Chumpicocha, 11°57'S, 76°9'W, 27 May 1953, *E. Cerrate* 2006 (USM); Huarochirí, San Damián, Chanape, Soyracocha, 11°54'S, 76°1'W, 10 Jul 2013, *P. Gonzáles & B. Brito* 2658 (USM); Huarochirí, San Damián, abra entre Chanape y la comunidad Checca, 11°55'S, 76°15'W, 14 Jul 2013, *P. Gonzáles & B. Brito* 2665 (USM); **Moquegua**: General Sánchez Cerro, Yunga, Perusa, 16°11'S, 70°37'W, 3 Mar 2018, *D. Montesinos & J. Calvo* 5956 (HSP); Mariscal Nieto, Calacoa, faldas Ticsani, SE, 16°44'S, 70°35'W, 4 Mar 2018, *D. Montesinos & J. Calvo* 6006 (HSP); **Puno**: Ananea ad pagum Rinconada et circa lacum alpestrim Comuni, 14°37'S,

69°26'W, 21 Oct 1976, *L. Bernardi, A. Charpin & F. Jacquemoud* 16772 (US); unpaved track across pampa to the N and W of the road between abra Pampilla and Ananea, 14°40'S, 69°41'W, 16 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin* 13180 (USM); Carabaya, Corani, Minaspata, 14°1'S, 70°41'W, 15 Oct 2017, *P. Gonzáles* 3837 (USM); San Antonio de Esquilache, 16°6'S, 70°17'W, 13 May 1937, *D. Stafford* 730 (BM, K); Crestón, San Antonio [de Esquilache], 1 Jul 1937, *T.G. Tutin* 1203 (BM).

10. *Xenophyllum juniperinum* (Hieron.) J.Calvo, Phytotaxa 326(3): 228. 2017.

Werneria juniperina Hieron., Bot. Jahrb. Syst. 21(3): 365. 1895. Syntypes. Chile/Bolivia. Tacora-Sajama, 4200–4300 m, Oct 1876, *A. Stübel* 106 (B, destroyed; photo F0BN015812!); Bolivia. Oruro: alrededores de Tomarapi, 4200–4400 m, Oct 1876, *A. Stübel* 116 (B, destroyed; photo F0BN015812!). Neotype, designated by Calvo et al. (2017: 228): Chile. Arica-Parinacota: camino a Tacora antes del Portezuelo, 18°07'59"S, 69°32'37"W, 4505 m, 26 May 2011, *A. Moreira-Muñoz, M. Muñoz & V. Morales* 1640 (SGO s.n.!; isoneotype: CONC-180071!).

Werneria lycopodioides S.F.Blake, J. Washington Acad. Sci. 18: 493. 1928. *Xenophyllum lycopodioides* (S.F.Blake) V.A.Funk, Novon 7(3): 240. 1997. Type. Peru. Tacna: Tacna, volcán Tacora, co. Quiñuta [cerro Queñuta], 5000 m, Apr 1926, *E. Werdermann* 1164 (holotype: GH s.n.!; isotypes: B s.n.!, BM s.n.!, CAS s.n.!, CONC-28852!, E-00301054 (digital image!), F-694487!, G-00305675 (digital image!), K-000527738 (digital image!), LIL-26668!, LPB s.n.!, LP-002608 (digital image!), M-0147059 (digital image!), MO s.n.!, NY s.n.!, OS-0000378 (digital image!), UC s.n.!, US-00622867!, US-01256002!).

Description. Suffrutescent plant, forming clumps of erect stems. **Rhizomes** 5–10 × 0.4–0.6 cm, horizontal to oblique, glabrous. **Stems** 8–15 cm tall, usually simple, glabrous, with leaves uniformly arranged along it. **Leaves** imbricate, adpressed to the stem, extending into a glabrous sheath-like base; leaf laminae 5–7 × 1.1–2 mm, linear-triangular, rather acute at the apex, minutely, irregularly denticulate, obtusely triangular in cross section, glabrous, 1-nerved above (barely visible), 1-nerved beneath, fleshy, drying coriaceous, matte. **Capitula** radiate, erect, sessile. **Involucre**s 7–7.7 × 4–6.2 mm, narrowly cupuliform; involucre bracts 8 to 11, 2.8–3.4 × 1.8–2.8 mm, acute at the apex, dark-purplish. **Ray florets** 8 to 13; corollas 4.5–5.5 × 0.4–0.7 mm, unconspicuously veined, subentire to slightly 3-toothed at the apex, not surpassing the involucre, yellow. **Disc florets** 28 to 36; corollas 5.5–5.7 mm long, yellow; style branches truncate with a crown of sweeping trichomes, yellowish. **Achenes** 3.4–3.9 × 0.8–1 mm, cylindrical, 7 to 8-ribbed, glabrous; pappus 5.2–9 mm long, barbellate, whitish. Chromosome number unknown. Figs 2C, 16.

Additional iconography. Blake (1928: 496, fig. 1K–M sub *Werneria lycopodioides*); Beltrán (2016: 358, fig. 2A, sub *X. lycopodioides*, as photo); Calvo et al. (2017: 228, fig. 1, as photo).

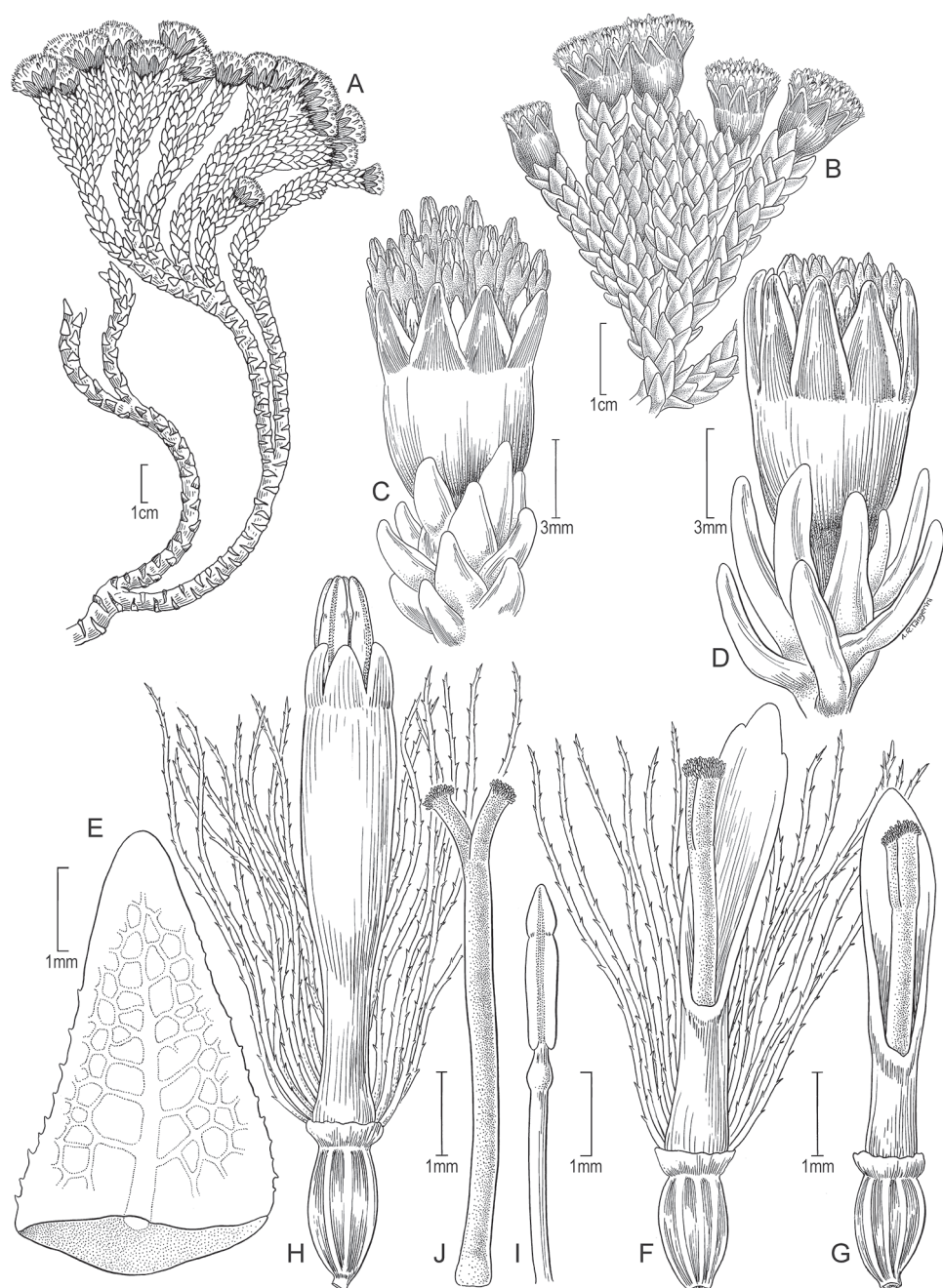


Figure 16. *Xenophyllum juniperinum* **A** habit **B** stem apical part and capitula **C, D** uppermost leaves and capitulum (notice leaf variability) **E** adaxial leaf surface **F** ray floret (frontward bristles removed) **G** ray floret (pappus removed) **H** disc floret (frontward bristles removed) **I** stamen **J** style. **A, B** drawn from *Werdermann 1164* (GH), **C–E** (drawn from *Werdermann 1164*, CAS), and **F, G** (drawn from *Werdermann 1164*, US). Illustration by Alice Tangerini.

Distribution and habitat. Southern Peru to northern Chile. Bolivia (Oruro, Potosí), Chile (Antofagasta, Arica-Parinacota, Tarapacá [expected]), Peru (Tacna). It grows in exposed places on rocky and sandy soils of the dry and desertic puna ecoregions, between elevations of 4000–5200 m (Fig. 17).

Most populations of this species are located between eastern Tacna (Peru), north-eastern Arica-Parinacota (Chile), and northwestern Oruro (Bolivia). However, a few collections are from further south (northeastern Antofagasta in Chile and western Potosí in Bolivia). Its presence in the Chilean region of Tarapacá is expected.

Phenology. Flowering from April to December.

Etymology. It is named after the genus *Juniperus* L. (Cupressaceae) due to the leaves of this species resembling those of some species belonging to the mentioned genus.

Notes. *Xenophyllum juniperinum* forms clumps of erect stems 8–15 cm long, which bear imbricate leaves that are adpressed to the stem and uniformly arranged along it. The leaves are somewhat broadened at the base and the margin is minutely, irregularly denticulate. The yellow ray corollas not surpassing the involucre is a distinctive character of this species, which is shared with *X. ciliolatum* (see comments under it for comparison purposes).

Although the syntypes of the name *Werneria juniperina* Hieron. were apparently destroyed at B in 1943, it should be mentioned that Rockhausen (1939) had the opportunity to study them and designated the collection *Stübel 106* as “typus”. See Calvo et al. (2017) for further details on the neotypification.

Additional specimens examined. BOLIVIA. Oruro: Sajama, cerca 8 km SO hacia la quebrada de Tirallani (pasando quebrada Sururia), 18°9'S, 68°52'W, 25 Mar 2005, *S.G. Beck 31109* (LPB); Sajama, subiendo al cerro Sajama, desde la quebrada Tirallani, 18°9'S, 68°52'W, 27 Mar 2005, *S.G. Beck 31148* (LPB); Sajama, de Tambo Quemado 10 km hacia Chachacomani y subiendo sobre una mina de azufre, sobre el glaciar Acotango, 18°21'S, 69°17'W, 14 Mar 2012, *S.G. Beck 32750* (LPB, US); Sajama, de Tambo Quemado 10 km hacia Chachacomani y subiendo sobre una mina de azufre, sobre el glaciar Acotango, 18°21'S, 69°17'W, 14 Mar 2012, *S.G. Beck 32753* (LPB); Sajama, de Tambo Quemado 10 km hacia Chachacomani y subiendo sobre una mina de azufre, sobre el glaciar Acotango, 18°21'S, 69°17'W, 14 Mar 2012, *S.G. Beck 32757* (LPB); P.N. Sajama, 5 km antes de la entrada para el pueblo de Sajama, 18°10'S, 68°57'W, 15 Nov 1999, *G. Bourdy 2197* (LPB); Sajama, S side of nev. Sajama just below snowline on E side of río Sururia, N walk up from 4300 m where rd. circles nev., 18°8'S, 68°53'W, 19 Apr 1995, *V.A. Funk 11352* (LPB, US); Sajama, ladera Sajama, 18 Aug 1982, *E. Jordan 158* (LPB, US); Sajama, S del nevado Sajama, 18°7'S, 68°52'W, 17 Mar 1984, *M. Liberman 812* (LPB, US); Sajama, Turco, 18°11'S, 68°12'W, 1993, *J. Mallea 15* (LPB); Sajama, Turco, 18°11'S, 68°12'W, 1993, *J. Mallea 24* (LPB); Sajama, nevado Sajama, 18 Aug 1982, *X. Menhofer 1506* (LPB, US); Sajama, Berg nördl. volcán Payachatas, 18°9'S, 69°6'W, 17 Sep 2001, *B.J. Ruthsatz 10539* (LPB); Sajama, Chachacomani, Acotango, 18°21'S, 69°2'W, 23 Sep 2001, *B.J. Ruthsatz 10549* (LPB); **Potosí:** Daniel Campos, a 11 km al W de San Pedro Quemes, 20°44'S, 68°8'W, 21 Jun 1999, *C. Salles 229* (LPB). **CHILE. Antofagasta:** El Loa,

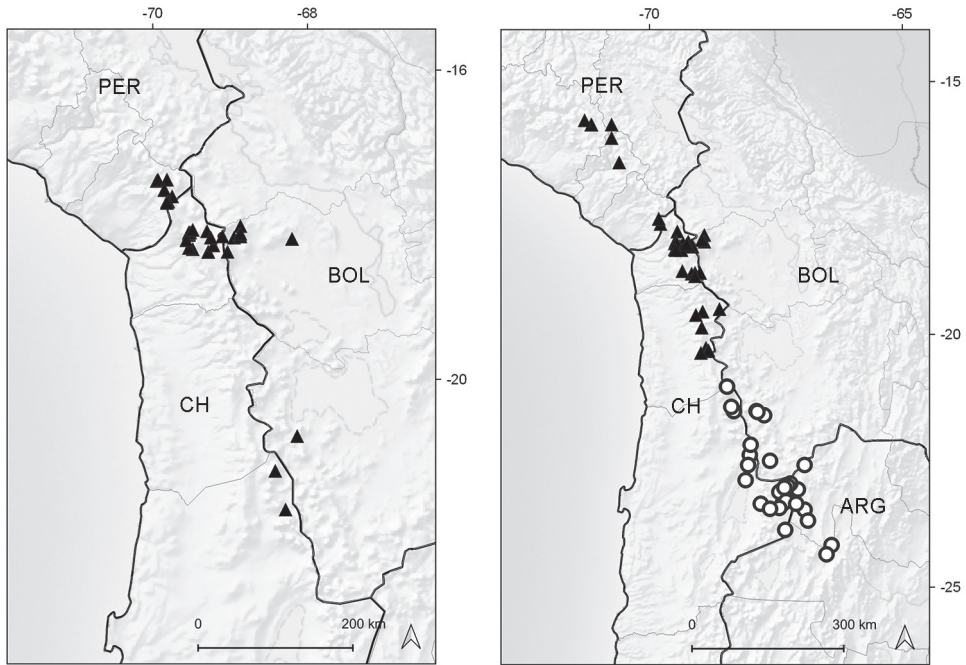


Figure 17. Distribution map of *Xenophyllum juniperinum* (left hand), *X. weddellii* (right hand, closed triangle), and *X. incisum* (right hand, open circle).

trayecto entre cerro Carasilla y salar Ascotán, ladera exposición N, 21°41'S, 68°17'W, 28 Mar 1985, *M. Arroyo, C. Villagrán & J. Armesto* 85-394B (CONC); Ollagüe, volcán Aucanquilcha, ladera E, cerca de la línea del andarivel abandonado, 21°11'S, 68°25'W, 23 Apr 2019, *J. Calvo & A. Moreira-Muñoz* 7930 (CONC, SGO); **Arica-Parinacota:** Parinacota, cerro Guane Guane, 18°10'S, 69°15'W, 20 Apr 1980, *M. Arroyo, C. Villagrán & J. Moreno* 2623A (CONC); Parinacota, camino desde Pacollo hasta nevados de Putre, 18°4'S, 69°29'W, 15 Apr 1984, *M. Arroyo* 84-857 (CONC); Parinacota, cerro Choquelimpie, 18°16'S, 69°13'W, 19 Apr 1984, *M. Arroyo* 84-912 (CONC); Tacora, 14 km hacia Aguas Calientes, después 1 km más arriba, 17°42'S, 69°48'W, 11 Feb 2015, *S.G. Beck* 34533 (LPB); Parinacota, camino entre Pacollo y Colpitas, 18°5'S, 69°18'W, 18 Jan 2000, *E. Belmonte* 20005 (CONC, MA); Parinacota, quebrada Vilasamanani, 18°18'S, 69°32'W, 15 Dec 1988, *E. Belmonte* 88619 (CONC); Parinacota, quebrada Ichusgualla, 18°12'S, 69°34'W, 16 Dec 1988, *E. Belmonte* 88635 (CONC); above road to Tacora (rt. A23), slope of co. de Llancoma, 18°8'S, 69°32'W, 7 Mar 2014, *V.A. Funk, M. Diazgranados & J.M. Bonifacio* 13103 (US); NW slope of Volcán Tarapacá along small trail to the snow line, 18°6'S, 69°31'W, 9 Mar 2014, *V.A. Funk, M. Diazgranados & J.M. Bonifacio* 13136 (US); cerro Chapiquiña, sobre el portezuelo, antenas, 18°19'S, 69°29'W, 9 Jun 2012, *A. Moreira-Muñoz* 1936 (SGO); bajando desde Portezuelo Taapacá hacia Putre, en el límite comunal, 18°6'S, 69°32'W, 20 Oct 2012, *A. Moreira-Muñoz et al.* 2037 (SGO, US); pasado Azufrera Tacora,

17°42'S, 69°49'W, 17 Mar 2015, *A. Moreira-Muñoz & F. Luebert* 2408 (SGO); Aguas Calientes, Tacora, 17°43'S, 69°49'W, 17 Sep 1955, *M. Ricardi* 3377 (CONC); Aguas Calientes, volcán Tacora, 17°43'S, 69°49'W, 19 Sep 1955, *M. Ricardi* 3405 (CONC); nevados de Putre, cerro Taapaca, 18°6'S, 69°32'W, 15 Apr 2011, *S. Teillier & A. Buben* 6579 (CONC). **PERU. Tacna:** Tarata, Poma, carretera Tarata-Puno, 17°25'S, 69°56'W, 4 Dec 1997, *A. Cano* 7946 (USM); Tarata, cordillera del Barroso, 17°33'S, 69°51'W, 29 Mar 1998, *A. Cano* 8244 (USM); 32 km N of Tarata, ca. 50 km S of abra Livini (Puno), road from Tarata to Mazo-Cruz (Puno), rd. 36, 17°26'S, 69°57'W, 11 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin* 13139 (US, USM); Tarata, laguna Casire [Casiri], 17°25'S, 69°49'W, 3 Apr 1998, *M.I. La Torre* 2375 (USM); Pasan los Vientos, cordillera del Barroso, 7 Dec 1997, *J. Roque et al.* 538 (US, USM); Tarata, cordillera del Barroso, carretera Alto Perú-Palca, 17°33'S, 69°51'W, 7 Dec 1997, *J. Roque* 559 (USM [mixed with *X. poposa*]); Tarata, cordillera del Barroso, carretera Alto Perú-Palca, 17°33'S, 69°51'W, 7 Dec 1997, *J. Roque* 560 (USM).

11. *Xenophyllum weddellii* (Phil.) V.A.Funk, Novon 7(3): 240. 1997.

Werneria weddellii Phil., Anales Mus. Nac., Santiago de Chile 8: 40. 1891 ["Weddellii"]. Type. Chile. Tarapacá: laguna de Huasco, 1 Mar 1885, *F. Philippi* s.n. (lectotype: SGO-044581!, designated as "holotype" by Funk (1997a: 240); isoelectotype: LP-002610 (digital image!)).

Werneria decumbens Hieron., Bot. Jahrb. Syst. 21(3): 364. 1895. Type. Chile/Bolivia. Tacora a Tomarapi, 4200–4400 m, Oct 1876, *A. Stübel* 100c (B, destroyed; photo F0BN015808!). Neotype, designated here: Bolivia. Oruro: Parque Nacional Samaja, laguna Huainyacota [Huafía Khota], 18°02'S, 68°55'W, 4350 m, 11 Aug 2007, *M. Velayos, C. Aedo & C. Monge* 11263 (MA-758188!; isoneotype: LPB s.n.!), syn. nov.

Description. Suffruticose plant, forming clumps of rather decumbent stems. *Rhizomes* 7–10 × 0.5–0.8 cm, horizontal to oblique, glabrous. *Stems* 3–8 cm tall, simple or branched, glabrous, with leaves rather uniformly arranged along it. *Leaves* imbricate, extending into a glabrous sheath-like base; leaf laminas 3.4–7(–11.8) × 1.3–1.6 mm, linear-subulate, acute at the apex, entire, obtusely triangular in cross section, glabrous, un conspicuously nerved above, 1-nerved beneath (barely visible), fleshy, matte. *Capitula* radiate, erect, sessile. *Involucres* 7–9 × 5–7 mm, cupuliform; involucre bracts 8 to 12, 3.2–5.9 × 1.4–2.3 mm, acute to obtuse at the apex, greenish, sometimes purple- edged. *Ray florets* 9 to 15; corollas 5.9–8 × 1–1.2 mm, 3 to 4-veined, subentire at the apex, conspicuously surpassing the involucre, white, rarely pale purplish beneath. *Disc florets* 24 to 32; corollas 4.5–5.2 mm long, whitish to creamy, sometimes with the tube purplish; style branches truncate with a crown of sweeping trichomes, purplish. *Achenes* 3.8–4 × 0.9–1 mm, cylindrical, 8 to 9-ribbed, glabrous; pappus 6.3–7.5 mm long, barbellate, whitish. Chromosome number unknown.

Iconography. Beltrán (2016: 358, fig. 2F, as photo).

Distribution and habitat. Southern Peru to northern Chile. Bolivia (Oruro), Chile (Arica-Parinacota, Tarapacá), Peru (Arequipa, Moquegua, Puno, Tacna [n.v.]). It grows along the banks of marshes and salt lagoons of the subhumid and dry puna ecoregions, between elevations of 3800–4700 m (Fig. 17).

Phenology. Flowering nearly all year round.

Etymology. This species honors H.A. Weddell (1819–1877), a British botanist (French by choice) and physician who devoted part of his life to the study of the South American flora.

Notes. *Xenophyllum weddellii* is a species forming clumps of rather decumbent stems with linear, entire, glabrous leaves. It has 8 to 12 involucral bracts and 9 to 15 ray florets with white corollas that conspicuously surpass the involucre. On living plants, the color of the leaves is typically glaucous green.

The leaf apex is acute but we studied a specimen showing two lateral divisions near the apex (*Moreira-Muñoz & Diazgranados* 2625, SGO). It is identified as *X. weddellii* because the remaining characters perfectly fit with this species. Two emerging protrusions near the apex were also observed in a few other collections, which indicates that Moreira-Muñoz's collection can be considered as an extreme of variability.

This species is morphologically similar to *X. ciliolatum* (see comments under it) and *X. incisum*. From this latter species, it mainly differs in the leaf lamina shape (linear-subulate, tapering upwards in *X. weddellii* vs. linear-oblong, similar width from base to apex in *X. incisum*) and leaf apex (acute in *X. weddellii* vs. 3-notched with the lobes rather truncate at the apex in *X. incisum*). It is interesting to mention that both species have similar ecological requirements and they usually thrive near the banks of the salt lagoons and moist valley bottoms. They could be referred to as allopatric species since their distribution areas are well defined and do not overlap.

The single original collection that we found comes from the Huasco Lagoon (Tarapacá, Chile). However, Philippi (1891) indicated additional sites in the protologue, i.e., “Machuca” and “regione inter Copacoya et Inacaliri”. These localities are located further south in the region of Antofagasta, where this species appears to be absent. In contrast, *X. incisum* is not rare in this region and, indeed, the provenance of the type material is “Inter Copacoya et Inacaliri”. The lack of original material of *X. weddellii* from these localities and the fact that we did not study any collection from there suggests that Philippi might had confused both species.

The holotype designation of the name *Werneria weddellii* Phil. has been corrected to lectotype according to McNeill (2014). In addition, the name *Werneria decumbens* Hieron. is synonymized with *X. weddellii* as suggested by Funk (1997a). Since the original material was likely destroyed at B in 1943, a neotype is designated. The provenance of the selected collection perfectly matches the protologue information.

Additional specimens examined. **BOLIVIA. Oruro:** Sajama, al borde del río Sajama, en el pueblo de Sajama, 18°8'S, 68°58'W, 24 Aug 2008, *S.G. Beck* 32617 (LPB); Sajama, 18°10'S, 68°55'W, 9 Feb 1998, *F. Loza de la Cruz* 264 (LPB, USM). **CHILE. Arica-Parinacota:** N de Misitune, 18°15'S, 69°22'W, 25 Nov 2001, *C. Aedo* 6968 (CONC, MA); Parinacota, salar de Surire, 18°51'S, 69°6'W, 29 Mar 1992, *G. Arancio* 92-454

(CONC); salar de Surire, 18°47'S, 69°6'W, 27 Mar 1996, *M. Argomedo* 9 (CONC); Parinacota, cerca de laguna de Cotacotani, camino a Guane Guane, 18°10'S, 69°14'W, 9 Mar 1984, *M. Arroyo* 84-728 (CONC); Parinacota, salar de Surire, alrededores del salar, 18°48'S, 69°10'W, 6 Aug 1986, *E. Belmonte* 86119 (CONC); Parinacota, lago Chungará, 18°14'S, 69°10'W, 9 May 1996, *E. Belmonte* 96068 (CONC); Las Cuevas, 18°12'S, 69°28'W, 23 Mar 1997, *E. Belmonte* 97049 (CONC); Arica, altiplano de Arica, Las Cuevas, 18°12'S, 69°28'W, 15 Nov 1977, *H. Escobar* 206 (CONC); rt. 11, on the edge of lago Chungará, large island, 18°16'S, 69°9'W, 6 Mar 2014, *V.A. Funk, M. Diazgranados & J.M. Bonifacino* 13087 (US); rd. from rt. 11 to Parque Nacional Lauca (rt. A201), ca. 15 km W of intersection of rt. A201, A211 & A235, 18°19'S, 69°29'W, 8 Mar 2014, *V.A. Funk, M. Diazgranados & J.M. Bonifacino* 13127 (US); rd. from rt. 11 to Parque Nacional Lauca (rt. A201), ca. 5 km W of intersection of rt. A201, A211 & A235, 18°19'S, 69°30'W, 8 Mar 2014, *V.A. Funk, M. Diazgranados & J.M. Bonifacino* 13133 (US); Putre, Ch11-road to Putre at kilometer 150, 18°9'S, 69°29'W, 15 Dec 1999, *M.F. Gardner & S.G. Knees* 6266 (E); Aguas Calientes, 17°43'S, 69°49'W, Nov 1955, *U. Levi* 11 (CONC); camino de Putre a Chucuyo, km 10, 18°13'S, 69°16'W, 12 Feb 1964, *C. Marticorena, O. Matthei & M. Quezada* 198 (CONC); termas de Jurasí, 18°12'S, 69°30'W, 26 May 2011, *A. Moreira-Muñoz, M. Muñoz & V. Morales* 1658 (SGO); base del cerro Chapiquiña, bofedal Ojo de Agua, 18°19'S, 69°29'W, 9 Jun 2012, *A. Moreira-Muñoz* 1941 (SGO); lado este Portezuelo Chapiquiña, frente Ojo de Agua, 18°19'S, 69°29'W, 19 Oct 2012, *A. Moreira-Muñoz et al.* 2016 (SGO); quebrada profunda antes de Colpitas, después de cruce del río, 17°58'S, 69°27'W, 20 Oct 2012, *A. Moreira-Muñoz et al.* 2022 (SGO); quebrada Ancochallane, 18°15'S, 69°24'W, 18 Jun 2015, *A. Moreira-Muñoz* 2495A (SGO); camino Umirpa a Tignamar, ca. km 28, 18°45'S, 69°21'W, 26 May 2016, *A. Moreira-Muñoz & M. Diazgranados* 2625 (SGO); Parinacota, entre Cotacotani y Chungará, 18°15'S, 69°13'W, 20 Apr 1980, *J. Moreno* 2668 (CONC); Parinacota, entre central de Chapiquiña y Portezuelo de Chapiquiña, 18°20'S, 69°29'W, 17 May 1989, *H. Niemeyer, C. Fernández & A. Hoffmann* 8992 (CONC); Aguas Calientes, Tacora, 17°43'S, 69°49'W, 17 Sep 1955, *M. Ricardi* 3379 (CONC); Arica, Misitune, lecho del río Lauca, 18°20'S, 69°22'W, 7 Sep 1963, *F. Schlegel* 4751 (CONC); Tacora-Humapalca-río Azufre, 17°49'S, 69°47'W, 4 Jan 2013, *S. Teillier* 7740 (CONC); Arica, Chilcaya, 18°47'S, 69°0'W, 20 Apr 1927, *C. Troll* 3320 (B, CONC); Parinacota, portezuelo de Putre, 18°12'S, 69°20'W, 18 May 1979, *C. Villagrán et al.* 1175 (CONC); **Tarapacá:** Iquique, Huara, road from Lirima to Pachica, along the río Chancacolla (after La Rinconada), 19°52'S, 68°58'W, 11 Dec 2008, *R. Baines et al.* 363 (E); La Cruz, 20°22'S, 68°59'W, 3 Dec 1948, *V. Castillo s.n.* (CONC); South edge of salar Huasco, NW of intersection of rt. A-687 & A-683, 20°20'S, 68°51'W, 4 Mar 2014, *V.A. Funk, M. Diazgranados & J.M. Bonifacino* 13082 (US); Iquique, Huara, km 108 on A 483 to Colchane, 19°33'S, 68°57'W, 18 Feb 2003, *M.F. Gardner & S.G. Knees* 6525 (E); comuna de Pica, salar de Huasco, bofedal de Huasco-Lípez, 20°19'S, 68°50'W, 23 Mar 2003, *S. Teillier & G. Mieres* 5447 (CONC); Iquique, camino de Chusmiza a quebrada de Aroma, 19°37'S, 69°5'W, 20 Mar 1982, *C. Villagrán & M. Arroyo* 4093 (CONC); Iquique, trayecto

entre Cariquima y Guaitani, 19°30'S, 68°37'W, 6 Sep 1997, *C. Villagrán, F. Hinojosa & C. Latorre* 9167 (CONC). **PERU. Arequipa:** [without locality, pr. Vincocaya according to coordinates], 15°51'S, 71°9'W, 21 Dec 2006, *F. Cáceres, E. López & L. Castillo* 6025 (HUSA); río Sumbay, 15°51'S, 71°9'W, 22 Dec 2006, *F. Cáceres, E. López & L. Castillo* 6063 (HUSA); río Sumbay, 15°51'S, 71°9'W, 23 Dec 2006, *F. Cáceres, E. López & L. Castillo* 6149 (HUSA); río Sumbay, 15°51'S, 71°9'W, 23 Dec 2006, *F. Cáceres, E. López & L. Castillo* 6178 (HUSA); Caylloma, Yanque, entre Imata y Chalhuanca, 15°46'S, 71°17'W, 17 May 2017, *V. Quipuscoa et al.* 5570 (HSP); **Moquegua:** Ubinas, Querala, Gasahuasi, 16°7'S, 70°45'W, 6 Apr 2011, *D. Montesinos* 3090 (HSP, USM); General Sánchez Cerro, Chojata, quebrada Huarata, 16°36'S, 70°36'W, 4 Mar 2018, *D. Montesinos & J. Calvo* 5984 (HSP); **Puno:** San Román, hacienda Tincopalca, 15°51'S, 70°45'W, 11 Mar 1953, *E. Petersen & J.P. Hjerting* 1090 (C, LIL, USM).

12. *Xenophyllum incisum* (Phil.) V.A.Funk, *Novon* 7(3): 239. 1997.

Werneria incisum Phil., *Anales Mus. Nac., Santiago de Chile* 8: 41. 1891. Type. Chile. Antofagasta: inter Copacoya et Inacaliri, 19 Feb 1885, *F. Philippi s.n.* (lectotype: Philippi's collection at SGO as the first-step lectotype, designated as "holotype" by Funk (1997a: 239); SGO-060388! as the second-step lectotype, designated here; isolectotypes: LP-002607 (digital image!), SGO-000006431 (ruined!)).

Description. Suffruticose plant, forming clumps of rather decumbent stems. **Rhizomes** 4–8 × 0.4–0.6 cm, horizontal to oblique, glabrous. **Stems** 4–8 cm tall, simple or branched, glabrous, with leaves rather uniformly arranged along it. **Leaves** imbricate, extending into a glabrous sheath-like base; leaf laminae 3.2–7.3 × 1.4–1.9 mm, linear-oblong, 3-notched at the apex, sometimes with the central lobe wider than lateral ones (rarely subentire), entire, obtusely triangular to slightly curved forwards in cross section, glabrous, unconspicuously nerved above, 1-nerved beneath, fleshy, matte; leaf lobes 0.5–1 × 0.5–0.6 mm, obtuse to truncate. **Capitula** radiate, erect, sessile. **Involucres** 6.4–8.3 × 4.6–6.1 mm, cupuliform; involucre bracts 8 to 9, 3.1–4.3 × 1.1–2.6 mm, obtuse at the apex, greenish. **Ray florets** 8 to 13; corollas 6.2–8.9 × 0.6–1.2 mm, 2 to 4-veined, subentire to 3-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** 26 to 37; corollas 4.4–5 mm long, pale yellow to creamy; style branches truncate with a crown of sweeping trichomes, purplish. **Achenes** 2.3–2.4 × 0.8–0.9 mm, cylindrical, ca. 8-ribbed, glabrous; pappus 4.8–8 mm long, barbellate, whitish. Chromosome number unknown. Fig. 19C.

Additional iconography. Cabrera (1978: 473, fig. 200G, H, sub *Werneria incisum*).

Distribution and habitat. Restricted to northern Chile, northwestern Argentina, and southwestern Bolivia. Argentina (Jujuy, Salta), Bolivia (Potosí), Chile (Antofagasta). This species grows along the banks of salt lagoons and desert plains with a certain humidity of the dry and desertic puna ecoregions, between elevations of (2600–)3500–4900 m (Fig. 17).

Phenology. Flowering from October to March.

Etymology. The epithet *incisum* means sharply and deeply cut into, which describes the leaf apex of this species. However, its leaf apex is rather notched (shallowly cut into).

Notes. This species can be properly identified by the combination of the following characters: rather decumbent, 4–8 cm tall, glabrous stems, linear-oblong leaf lamina, 3-notched leaf apex with truncate lobes (rarely subentire), 8 to 9 involucre bracts, 8 to 13 ray florets with white corollas conspicuously surpassing the involucre, and glabrous achenes.

Xenophyllum incisum is somewhat variable in leaf apex shape. Typical forms have 3-notched leaf apex, usually with the central lobe wider than lateral ones, but in some specimens the apex is barely notched or even subentire (e.g., *Moreira-Muñoz* 298, CONC; *Arroyo et al.* 97315, CONC). In these specimens, however, the leaf apex is truncate and slightly curved forwards as typically in the species. Similarly, we studied one specimen having the leaf apex with each lobe 3-notched (*Villagrán et al.* 9321, CONC).

This species has morphological affinities with *X. larochoaqui* J. Calvo & V.A. Funk, *X. weddellii* (see comments under these species), and *X. poposa*. With regard to the latter species, the main and unequivocal character that allows a proper identification is the stem indumentum (glabrous in *X. incisum* vs. arachnoid in *X. poposa*). The characters concerning the leaf apex have traditionally been used for discriminating among these species, however, they are barely useful because *X. poposa* also shows high variability in leaf apex (see further comments under it). A rather useful character is the leaf section, which is obtusely triangular to slightly curved forwards in *X. incisum* vs. terete or almost so in *X. poposa*. The sheath-like base is also more broadened in *X. incisum*.

The holotype designation by Funk (1997a) is corrected to lectotype because the gathering indicated by Philippi in the protologue is not represented by a single specimen. Moreover, a second-step lectotypification is made because two specimens of this gathering were found at SGO.

Additional specimens examined. ARGENTINA. **Jujuy:** Susques, a 30 km de Jama, entre Jama y Susques, 23°28'S, 66°56'W, 22 Jan 2000, *A. Bardón s.n.* (LIL); Achibarca, 23°41'S, 66°52'W, 11 Mar 1927, *A. Castellanos s.n.* (BA); bolsón del Vilama, 22°35'S, 66°56'W, 28 Sep 1939, *J.S. Collan 44* (LIL); **Salta:** Tusle [Tuzgle], pr. mina Concordia, 24°10'S, 66°24'W, 29 Oct 1901, *R.E. Fries 707* (US); abra del Gallo, ca. 40 km al SW de S. Antonio de los Cobres, en el camino a Pastos Grandes, 24°21'S, 66°30'W, 17 Dec 1946, *A. Krapovickas 3209* (K, LIL). BOLIVIA. **Potosí:** Sud Lípez, laguna Verde 36 km hacia laguna Colorada, 22°30'S, 67°37'W, 28 Apr 2000, *S.G. Beck 27510* (LPB); Nor Lípez, ruta laguna Hedionda-Alota, 23 km de laguna Hedionda, 21°32'S, 67°52'W, 23 Sep 2006, *S.G. Beck 32410* (LPB, USM); Sud Lípez, laguna Pastos Grandes, al E de la laguna, 21°36'S, 67°44'W, 20 May 1989, *E. García 1101* (LPB, USM); Sud Lípez, cerro Tapaquillcha, 21°31'S, 67°53'W, 13 Apr 1980, *M. Liberman 206* (LPB). CHILE. **Antofagasta:** El Loa, salar de Quisquiro, 23°17'S, 67°21'W, Jan 1997, *G. Arancio 10676* (CONC); El Loa, sector N del salar de Aguas Calientes, 23°4'S, 67°22'W, Jan 1997, *G. Arancio 10697* (CONC); El Loa, salar de Aguas Calientes, 23°27'S, 67°37'W, 17 Mar 1992, *G. Arancio 92-341* (CONC); El Loa, camino de San Pedro de Atacama a paso Jama, quebrada Llano Vilama, 22°53'S, 68°6'W, 6 Apr 1997, *M. Arroyo, L. Cavieres &*

A. Humaña 97217 (CONC); El Loa, ojos del río Salado, pequeño salar en el extremo N, 23°21'S, 67°22'W, 8 Apr 1997, *M. Arroyo, L. Cavieres & A. Humaña* 97276 (CONC, MA); El Loa, salar Quisquiro, lado E, 23°18'S, 67°18'W, 8 Apr 1997, *M. Arroyo, L. Cavieres & A. Humaña* 97315 (CONC); El Loa, cerro Nevados de Poquis, ladera SO, 23°4'S, 67°4'W, 9 Apr 1997, *M. Arroyo, L. Cavieres & A. Humaña* 97373 (CONC); El Loa, salar de Aguas Calientes, 23°7'S, 67°26'W, 11 Apr 1997, *M. Arroyo, L. Cavieres & A. Humaña* 97463 (CONC); El Loa, laguna El Chivato Muerto, 23°26'S, 67°26'W, 14 Feb 1994, *G. Baumann* 352 (CONC); salar de Ascotán, 21°31'S, 68°20'W, 19 Jan 1957, *F. Behn* 19596 (CONC); Antofagasta, Loa, Toconao, N del salar de Quisquiro, quebrada de Taina, 23°11'S, 67°19'W, 4 Mar 2019, *J. Calvo* 7914 (CONC, SGO); Antofagasta, Loa, San Pedro de Atacama, Machuca-El Tatío, ca. 6.2 km al S de El Tatío, 22°23'S, 68°1'W, 5 Mar 2019, *J. Calvo* 7924 (SGO); salar de Ascotán, along the margins of the salar, 21°2'S, 68°28'W, 4 Mar 2014, *V.A. Funk, M. Diazgranados & J.M. Bonifacio* 13077 (US); salar de Ascotán, along the margins of the salar, 21°2'S, 68°28'W, 4 Mar 2014, *V.A. Funk, M. Diazgranados & J.M. Bonifacio* 13078 (US); salar de Tara, 23°2'S, 67°20'W, 7 Dec 1988, *A. Hoffmann s.n.* (CONC); Cebollar, entre el salar de Ascotán y el salar de San Martín, 21°26'S, 68°23'W, 20 Feb 1964, *C. Marticorena, O. Matthei & M. Quezada* 405 (CONC); vegas del río Zapaleri, 22°57'S, 67°13'W, 18 Dec 1996, *A. Moreira-Muñoz* 257 (CONC); borde W salar de Tara, 23°0'S, 67°16'W, 18 Dec 1996, *A. Moreira-Muñoz* 289 (CONC); borde sur salar de Tara, 22°59'S, 67°18'W, 18 Dec 1996, *A. Moreira-Muñoz* 298 (CONC); Mucar [laguna], 23°21'S, 67°6'W, 14 Dec 1965, *L. Peña* 5 (CONC); Machuca, 22°35'S, 68°3'W, 18 Feb 1885, *F. Philippi s.n.* (GB); Tarapacá [without locality and date, probably a duplicate of Philippi 18 Feb 1885], *F. Philippi s.n.* (US); El Loa, San Pedro de Atacama, Socaire, laguna Sico, 23°52'S, 67°19'W, 5 Apr 1997, *S. Teillier* 4058 (CONC); El Loa, salar de Ascotán, 21°31'S, 68°20'W, Feb 1997, *S. Teillier* 4226 (CONC); El Loa, trayecto entre Talabre y laguna Lejía, 23°21'S, 67°48'W, 2 Apr 1998, *C. Villagrán, F. Hinojosa & C. Latorre* 9321 (CONC).

13. *Xenophyllum poposa* (Phil.) V.A.Funk, *Novon* 7(3): 240. 1997 [“poposum”].

Werneria poposa Phil., *Anales Mus. Nac.*, Santiago de Chile 8: 40. 1891. Type. Chile. Antofagasta: Copacoya, 18 Feb 1885, *F. Philippi s.n.* (lectotype: Philippi's collection at SGO as the first-step lectotype, designated as “holotype” by Funk (1997a: 240); SGO-000006433! as the second-step lectotype, designated here; isolectotypes: LP-002609 (digital image!), SGO-000006434!).

Werneria lorentziana Hieron., *Bot. Jahrb. Syst.* 21(3): 364. 1895 [“Lorentziana”]. Syn-types. Chile/Peru. [“prope Tacora, 4200 m, Oct 1876, *A. Stübel* 107” according to the *ind. loc.*] (B, destroyed); Bolivia. Oruro: [“prope Tomarapi, 4200–4400 m, Oct 1876, *A. Stübel* 117” according to the *ind. loc.*] (B, destroyed). Neotype, designated as “lectotype” by Freire and Ariza-Espinar (2014: 227): Argentina. Salta: alrededores del Nevado del Castillo, 19/23 Mar 1873, *P.G. Lorentz & G. Hieronymus* 117 (CORD-00005637 (digital image!); isoneotype: GOET s.n.).

Werneria humilis Griseb. ex Hieron., Bot. Jahrb. Syst. 21(3): 364. 1895, *nom. inval. pro syn.* (Turland et al. 2018, ICN Art. 36.1).

Werneria incisa var. *pubescens* Rockh., Bot. Jahrb. Syst. 70: 290. 1939. *Xenophyllum incisum* var. *pubescens* (Rockh.) Cabrera & S.E.Freire, Monogr. Syst. Bot. Missouri Bot. Gard. 74: 1245. 1999. Type. Argentina. La Rioja: Sierra Famatina, laguna Moradita, 13 Mar 1907, *F. Kurtz 14632* (lectotype: CORD-00005636 (digital image!)), designated as “isotype” by Cabrera and Freire (1999: 1245)), *syn. nov.*

Description. Suffruticose plant, forming clumps of erect stems (rarely dense mats). **Rhizomes** 4–10 × 0.3–0.7 cm, horizontal to oblique, glabrescent. **Stems** 2–15 cm tall, simple or branched, arachnoid, usually with functional green leaves restricted to the upper part. **Leaves** imbricate, extending into a sheath-like base that bears arachnoid trichomes; leaf laminae 2.5–7.1 × 0.5–1.1 mm, linear, rounded to truncate or 2 to 3-notched at the apex (usually white callous-tipped), entire, rather terete in cross section, glabrous, unobviously nerved on both faces, fleshy, matte; leaf lobes (when present) 0.6–1.5 × 0.3–0.4 mm, rounded to truncate, usually white callous-tipped. **Capitula** radiate, erect, sessile. **Involucre**s (3.3–)5.6–8 × (2.7–)3–5.3 mm, narrowly cupuliform; involucre bracts 8 to 9, (1.1–)1.6–3.9 × 0.7–2.1 mm, acute to obtuse at the apex, greenish to partially dark-purplish. **Ray florets** 8 to 11; corollas 3.6–8.9 × 0.5–1.2 mm, 4-veined (sometimes unobvious), subentire to 3-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** 7 to 18; corollas 3.2–5.9 mm long, whitish to creamy (rarely purplish); style branches truncate with a crown of sweeping trichomes, purplish. **Achenes** 2.8–2.9 × 0.7–0.8 mm, cylindrical, ca. 7-ribbed, glabrous; pappus (2.3–)4.1–5 mm long, barbellate, whitish to partially rose-colored. Figs 18, 19B.

Additional iconography. Cabrera (1978: 473, fig. 200I, J, sub *Werneria poposa*); Freire and Ariza-Espinar (2014: 227, sub *X. incisum* var. *pubescens* A–H, 228, *X. poposa* A–G); Beltrán (2016: 358, fig. 2D, as photo, 359, fig. 3E, sub *X. incisum*, as photo).

Distribution and habitat. Central Peru to northwestern Argentina. Argentina (Catamarca, Jujuy, La Rioja, Salta, Tucumán), Bolivia (Oruro, Potosí), Chile (Antofagasta, Arica-Parinacota, Tarapacá [expected]), Peru (Arequipa, Ayacucho, Cusco, Junín, Lima, Moquegua, Puno [expected], Tacna). It grows in rocky outcrops, grasslands, exposed slopes, and flat sandy pampas of the subhumid, dry, and desertic puna ecoregions, between elevations of (2600–)3000–5200 m (Fig. 20).

Phenology. Flowering nearly all year round.

Etymology. The epithet *poposa* is the vernacular name of this plant as Philippi (1891) stated in the protologue “ubi *Poposa* vocabatur” [called poposa]. He also added “infusum plantae contra dolores colicos propinant” [for relieving stomach cramps and colic] referring to its medicinal properties. It is important to underline that *poposa* is a noun in apposition not to be declined. The correct epithet is, therefore, *poposa* instead of the widely misapplied *poposum* (Funk 1997a; Freire and Ariza-Espinar 2014; Beltrán 2016).

Notes. *Xenophyllum poposa* forms clumps of erect stems (rarely dense mats) characterized by having arachnoid indumentum. When the stems are very short and barely

protrude from the soil, then, it tends to develop a mat-forming habit. The leaves are rather terete with the sheath-like base weakly broadened at the base. The leaf apex is usually undivided, rounded to truncate, and callous-tipped, however, plants having 2 to 3-notched apex are also found. It has 8 to 9 involucre bracts, 8 to 11 ray florets (with white corollas surpassing the involucre), 7 to 18 disc florets, and glabrous achenes. It is noteworthy that we observed a few ray florets with staminodes (Fig. 18G).

The type material of this species shows plants with clearly truncate and callous-tipped leaf apex, which probably led Rockhausen (1939) to relate a collection displaying notched leaf apex to *X. incisum* and describe it as *Werneria incisum* var. *pubescens* Rockh. He differentiated the new variety from the typical one by the longer leaves and the pubescent-lanate sheath-like bases. A detailed study of the lectotype (CORD-00005636) reveals that the stem bears arachnoid indumentum and that the sheath-like bases are not conspicuously broadened. These characters are distinctive of *X. poposa* rather than *X. incisum*. Moreover, this latter species is restricted to the edges of salt lagoon edges and desert plains with a certain humidity. The type material of Rockhausen's variety was collected in the upper part of the Famatina Range (La Rioja, Argentina), which better matches the habitat of *X. poposa* (exposed slopes). On this basis, and because we believe that the glabrousness is a diagnostic character of *X. incisum*, we do not follow Rockhausen's treatment as previous botanists did (Cabrera 1948; Freire and Ariza-Espinar 2014). Otherwise, we consider it appropriate to recognize *W. incisum* var. *pubescens* as part of the variability encompassed by *X. poposa*. Our decision is also supported by the fact that we studied further specimens corresponding to *X. poposa* that display notched leaf apex. These populations appear very scattered from southern Peru to northwestern Argentina, namely in Moquegua, Oruro, Potosí, Tucumán, Catamarca, and La Rioja. In Moquegua some specimens are strikingly tiny, barely protruding from the soil, and exhibit 2 to 3-notched leaf apex (*Beltrán* 7736, USM; *Funk et al.* 13155, US, USM). Due to field work in this region we can state that these forms grow mixed with plants displaying undivided, rounded to truncate leaf apex. It also deserves to be underlined that the different leaf morphologies can even be found within the same individual. The specimen *Funk et al.* 13155 (US), for example, has undivided, 2-notched, and 3-notched leaves. In Potosí (Bolivia), we visited another population composed of midsize plants showing 3-notched leaves where each lobe can be, in turn, 2-notched (*Calvo & Zárate* 7869, BOLV, LPB; *Cárdenas* 362, US [see Fig. 19B]). No individuals with undivided leaves were found there. On the other hand, the specimens from Famatina (La Rioja, Argentina) are quite robust plants having stems 11–13 cm long and 2 to 3-notched leaves. Based on the study of herbarium specimens, we also can conclude that the populations having notched leaf apex from Oruro, Tucumán, and Catamarca grow mixed with or close to the typical plants. All these examples demonstrate that a great intrapopulation and interpopulation variability exists in terms of both leaf apex and habit. Our efforts for trying to propose an infraspecific classification in pursuit of recognizing the distinct morphologies failed because of the intermediate forms and the lack of defined distribution patterns. Therefore, we believe that *X. poposa* should be treated as a highly variable species.

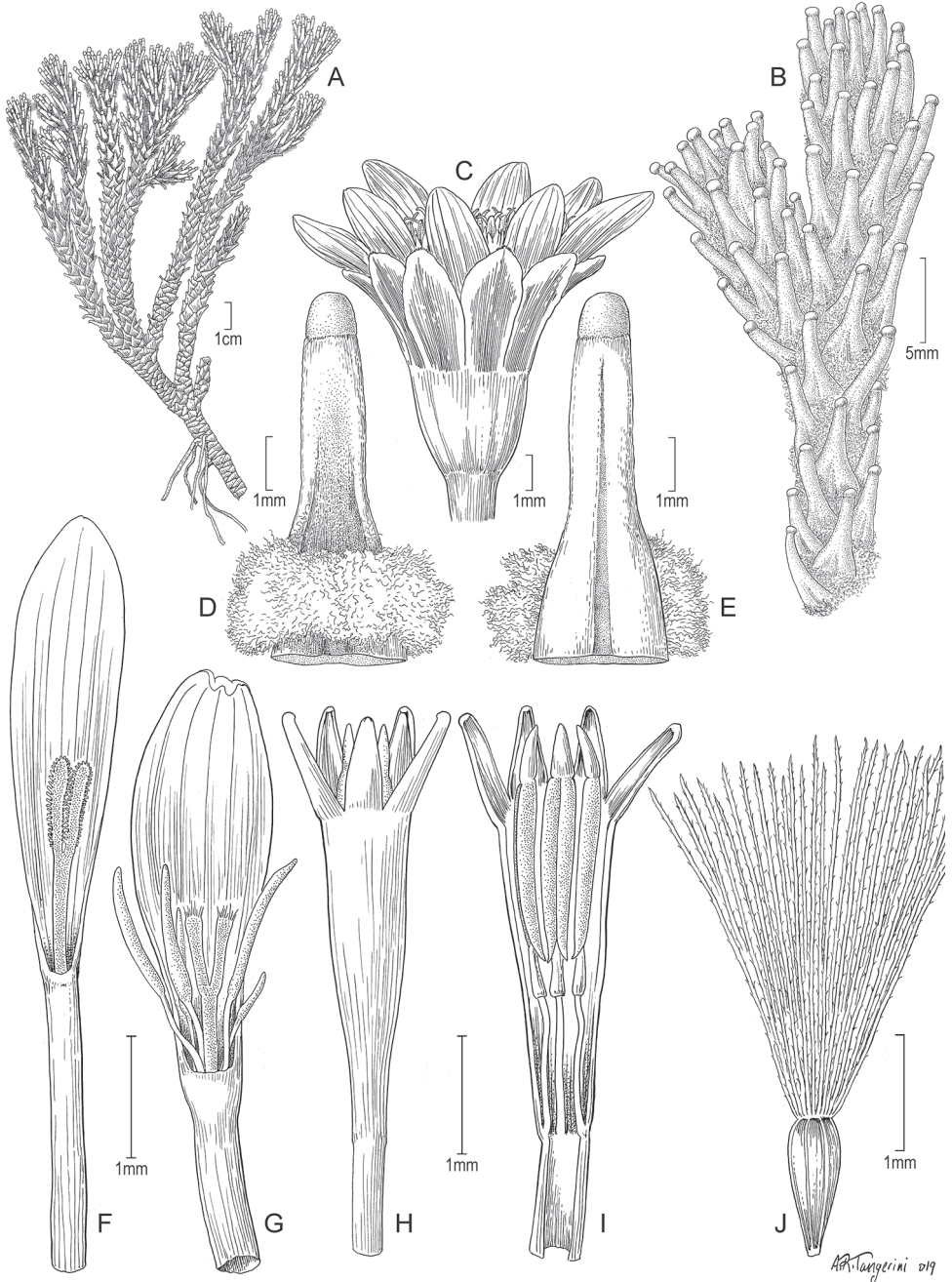


Figure 18. *Xenophyllum poposa* **A** habit **B** stem apical part **C** capitulum **D** adaxial leaf surface **E** abaxial leaf surface **F** ray corolla and style **G** ray corolla and style (notice staminodes) **H** disc corolla **I** disc corolla and stamens (vertically sectioned, style removed) **J** achene with pappus. All details drawn from *Funk et al. 13138* (US) except for A, B, D (drawn from *Venturi 2964*, US). Illustration by Alice Tangerini.

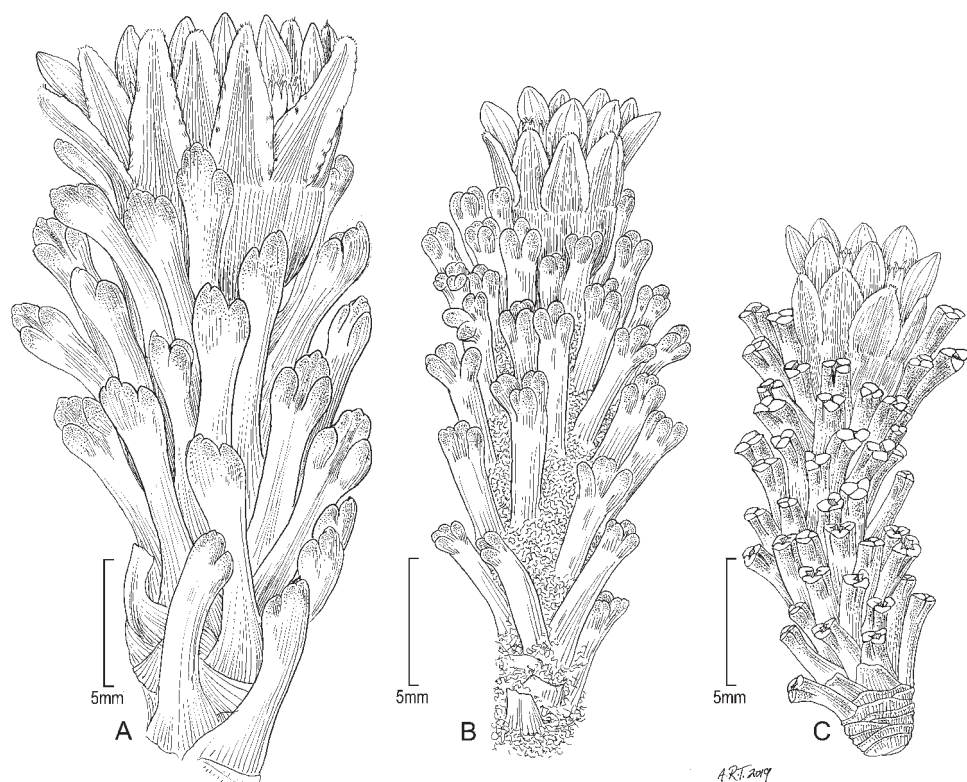


Figure 19. Detail of leaves and capitulum **A** *Xenophyllum lorochaqui*, drawn from *Castellanos s.n.* (BA) **B** *X. poposa*, drawn from *Cárdenas 362* (US) **C** *X. incisum*, drawn from *Funk et al. 13078* (US). Illustration by Alice Tangerini.

The distribution area of this species partially overlaps with that of *X. incisum* in the region comprised between Antofagasta (Chile), Potosí (Bolivia), Salta, and Jujuy (Argentina). However, they occur in different ecological niches as already mentioned above. The morphological differences between them are commented under *X. incisum*. Likewise, *X. poposa* might be confused with *X. lorochaqui* (see notes under it).

Regarding nomenclatural issues, it is noteworthy that Funk's typification of the name *Werneria poposa* Phil. has been narrowed to a single specimen because two duplicates of the same gathering were found at SGO (Turland et al. 2018, ICN Art. 9.17). The specimen SGO-000006433 has therefore been selected as the second-step lectotype because it is most complete and best preserved.

The original material of *Werneria lorentziana* Hieron. comprises the syntypes *Stübel 107* and *Stübel 117*, both apparently destroyed. Rockhausen (1939) designated as "typus" the collection *Stübel 117* but indicated the locality that in the protologue corresponds to the number *Stübel 107*. Since these specimens are not extant anymore and we did not find pictures of them at F, such mismatch cannot be elucidated. Later, Freire and Ariza-Espinar (2014) misguidedly designated as lectotype the specimen *Lorentz & Hi-*

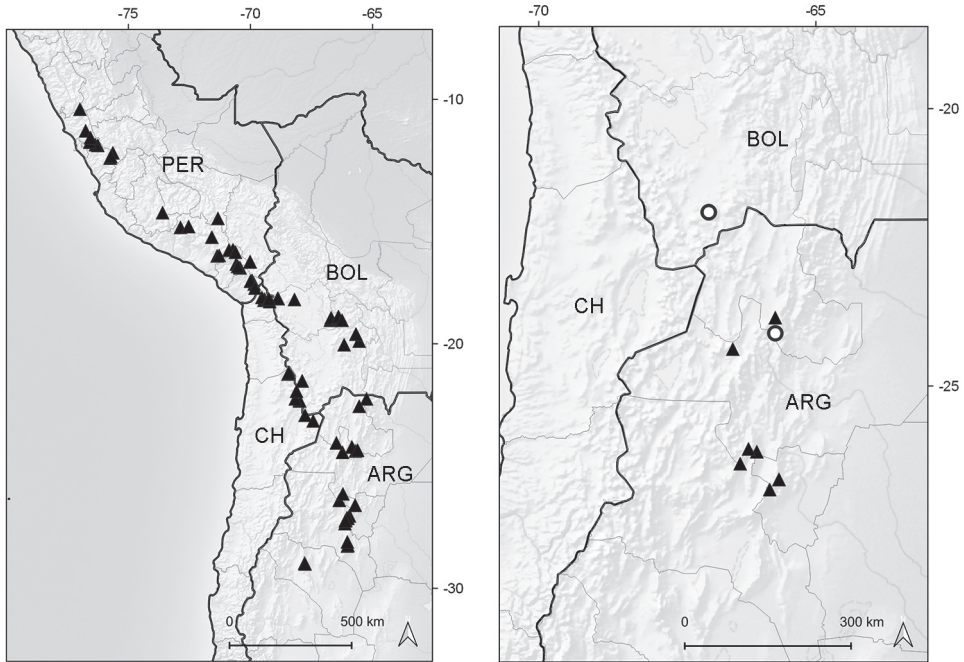


Figure 20. Distribution map of *Xenophyllum poposa* (left hand), *X. lorochaqui* (right hand, closed triangle), and *X. rosenii* (right hand, open circle).

eronymus 117 (CORD). Although the collector number coincides with one of the syntypes, this element is not part of the original material and has to be treated as a neotype.

The typification of *W. incisa* var. *pubescens* should be attributed to Cabrera and Freire (1999) although they used the term “isotipo”. With this action the authors presumed that a duplicate was kept at B but the specimen probably was destroyed during the Second World War. On this basis, the term isotype is corrected to lectotype (Turland et al. 2018, ICN Art. 9.10). Accordingly, the later lectotypification by Freire and Ariza-Espinar (2014) becomes superfluous.

Additional specimens examined. ARGENTINA. Catamarca: El Cajón, Negroara, 26°24'S, 66°22'W, 17 Jan 1914, *L. Castellón* 3360 (LE, LIL); Andalgala, quebrada de los Cazadores, 27°21'S, 66°8'W, 23 Nov 1948, *R. Filipovich* 61 (LIL); Ambato, sierra de Ambato (falda E), el crestón del cerro Manchado, en los alrededores de La Mancha, 28°14'S, 66°1'W, 28 Mar 1968, *A.T. Hunziker & A.E. Cocucci* 20019 (RB); Cerrillos, 1 Mar 1944, *T. Meyer* 8282 (LIL); Sierra de Ambato, Portezuelo de Joyango, 28°6'S, 66°2'W, 15 Feb 1910, *L. Roger* s.n. (LIL); Andalgala, co. Pabellón (Aconquija), 27°13'S, 66°6'W, 19 Feb 1942, *E. Rohmeder* s.n. (LIL); Andalgala, cerro Pabellón, 27°13'S, 66°6'W, 16 Feb 1942, *E. Rohmeder* s.n. (LIL); cerro Tesoro, 27°7'S, 66°3'W, 7 Sep 1950, *F. Vervoorst* 749 (LIL); **Jujuy:** Susques, cerro Tuzgle, 24°3'S, 66°29'W, 2 Mar 1944, *A.L. Cabrera* 8370 (CONC); Yavi, cerro Negro, 22°33'S, 65°33'W, 25 Feb 1940, *T. Meyer* 18476 (LIL); Tumbaya, Piedra Sonada, 24°21'S, 65°37'W, 19 Sep 1948, *S.A.*

Pierotti 7508 (LIL); Yavi/Sta. Victoria, cerro Poposayo, cumbre, 22°15'S, 65°15'W, 1 Feb 1953, *H. Sleumer* 3684 (LIL); **La Rioja:** Famatina, Sierra de Famatina, mina La Mejicana, 29°0'S, 67°46'W, 27 Apr 1951, *B. Sparre* 8827 (LIL); Sierra de Famatina, 1 May 1903, *T. Stuckert* 13110 (LIL); **Salta:** abra el Acay, 24°26'S, 66°14'W, 20 Feb 2007, *S. Cuella* 154 (LIL); Rosario de Lerma, Piedra Sonada, 24°21'S, 65°37'W, 19 Sep 1948, *S.A. Pierotti* 7496 (LIL); Nevado del Cajón, 26°8'S, 66°13'W, 1 Mar 1914, *D. Rodríguez* 1383 (BA); Caldera, subida al Nevado del Castillo cerca de Tres Lagunas, 24°13'S, 65°51'W, 16 Mar 1952, *H. Sleumer & F. Vervoorst* 3015 (LIL); **Tucumán:** Tafi del Valle, cerro Alto de la Mina, cumbres Calchaquies, 26°36'S, 65°43'W, 19 Feb 1990, *H. Ayarde* 369 (LIL); cerro de las Ánimas, 27°2'S, 65°57'W, 3 Jan 1914, *L. Castellón* 3302 (LIL); cerro Muñoz, 26°52'S, 65°50'W, Jan 1916, *L. Castellón s.n.* (BR [mixed with *X. lorochaqui*]); ladera NE del Chimbería, circo del Cochuna, 27°14'S, 66°7'W, 26 Jul 1984, *A. Grau s.n.* (LIL); Tafi, cerro de las Ánimas, 27°2'S, 65°57'W, Dec 1914, *M. Lillo s.n.* (LIL); Tafi, Calchaquies, morro de la Mina, 26°36'S, 65°43'W, 9 Mar 1952, *B. Sparre* 9734 (LIL); Chichigasta, estancia Las Pavas-Sierras Altas, 27°8'S, 66°1'W, 12 Mar 1924, *S. Venturi* 2964 (CONC, LIL, US); Chichigasta, cumbre alta del Pueblo Viejo, 15 Dec 1925, *S. Venturi* 4643 (LIL); Tafi, sierra del Cajón, Los Chuscos, 7 Feb 1926, *S. Venturi* 6646 (US). **BOLIVIA. Oruro:** Sajama, cerro Jasasuni, 18°9'S, 68°52'W, 27 Mar 2005, *S.G. Beck* 31142 (LPB); Sajama, S side of nev. Sajama just below snowline on E side of río Sururia, N walk up from 4300 m where rd. circles nev., 18°8'S, 68°53'W, 19 Apr 1995, *V.A. Funk* 11351 (LPB, US); Sebastián Pagador, valley above and E of pueblo of Condo, S of Challapata and E of Huari, 19°0'S, 66°40'W, 21 Apr 1995, *V.A. Funk & M. Estévez* 11360 (LPB); Eduardo Abaroa, Challapata, localidad Livichuco, camino a cerro Toro, arriba de la laguna K'asiri, 18°57'S, 66°24'W, 29 Feb 2016, *I. Jiménez et al.* 7981 (LPB, USM); Eduardo Abaroa, Challapata, localidad Livichuco, camino a cerro Toro, arriba de la laguna K'asiri, 18°57'S, 66°24'W, 29 Feb 2016, *I. Jiménez et al.* 7989 (LPB); Eduardo Abaroa, Azanaque, 18°56'S, 66°42'W, 3 Mar 2016, *I. Jiménez & R. Villegas* 8127 (LPB); Sajama, Turco, 18°11'S, 68°12'W, 1993, *J. Mallea* 22 (LPB); altiplano central, commune de Condo, 19°2'S, 66°44'W, 7 Apr 1989, *L. Naessany* 15 (LPB, US); Cruce Culta, 19°2'S, 66°15'W, 23 Feb 2016, *F. Zenteno* 16550 (USM); Avaroa, Livichuco, K'asiri, en línea recta a 6.93 km al SSE, Ayllu Qaqachaca, 18°56'S, 66°24'W, 29 Feb 2016, *F. Zenteno et al.* 16836 (USM); **Potosí:** cordillera Kari Kari, aprox. 3.3 km arriba de la laguna San Sebastián, 19°36'S, 65°41'W, 13 Feb 2019, *J. Calvo & M. Zárate* 7869 (BOLV, LPB); cerro of Potosí, Mar 1933, *M. Cárdenas* 362 (US); Antonio Quijarro, Vilacollo, loma cerca al lago K'asilla, 22 Dec 2005, *S. Condo Klaus* 15 (LPB); prov. Quijarro, Yura, 20°2'S, 66°10'W, Apr 1973, *E.T. de Sahonero s.n.* (US); Sud Lípez, cerro Tapaquillcha, 21°31'S, 67°53'W, 11 Apr 1980, *M. Liberman* 152 (LPB); José M. Linares Lizarazu, comunidad Alkatuyo, cerro Ichurata, 53 km SE de Potosí, 17.3 km al N de la escuela de Alkatuyo, 19°53'S, 65°33'W, 20 May 1993, *F. Marino* 183 (LPB); Sud Lípez, Tapaquillcha, 21°31'S, 67°53'W, 2 Oct 2001, *B.J. Ruthsatz* 10570 (LPB); SE de Uyuni, 5 May 1993, *M. Sauvain* 828 (LPB); Tomás Frías, serranía Kari-Kari, alrededores de lagunas de Kari-Kari, 19°36'S, 65°41'W, 28 Feb 2006, *M. Zárate* 2212 (BOLV). **CHILE. Antofagasta:** El

Loa, quebrada del Inca, cerro Aucanquilcha, 21°14'S, 68°28'W, 2 Apr 1985, *M. Arroyo* 85-595 (CONC); El Loa, camino a portezuelo del Cajón, cerro Toco, ladera N, 22°55'S, 67°46'W, 3 Apr 1997, *M. Arroyo, L. Cavieres & A. Humaña* 97022 (CONC); El Loa, sector géiser del Tatio, hacia al E, casi en el límite con Bolivia, 22°20'S, 67°59'W, 19 May 1997, *M. Baeza, P. Aqueveque & G. Kottirsch* 588 (CONC); Chiu Chiu, Inacaliri, cerros de Colana, 21°56'S, 68°7'W, 15 May 2018, *J. Calvo* 7731 (CONC, SGO); Loa, Toconao, cordón S de los cerros de La Pacana, 23°9'S, 67°26'W, 4 Mar 2019, *J. Calvo* 7909 (SGO); Ollagüe, volcán Aucanquilcha, ladera NE, cerca del campamento Aucanquilcha, 21°11'S, 68°26'W, 23 Apr 2019, *J. Calvo & A. Moreira-Muñoz* 7935 (SGO); El Loa, Toconce, 22°15'S, 68°10'W, Apr 1993, *L. Loyola* 93-4 (CONC); **Arica-Parinacota**: Parinacota, cerro Guane Guane, 18°10'S, 69°15'W, 18 Apr 1980, *M. Arroyo, C. Villagrán & J. Moreno* 2622 (CONC); Parinacota, cerro Choquelimpie, 18°16'S, 69°13'W, 19 Apr 1984, *M. Arroyo* 84-913 (CONC); Parinacota, Guane Guane, 18°10'S, 69°15'W, 7 Apr 1988, *E. Belmonte* 88090 (CONC); bajando desde Portezuelo Taapacá hacia Putre, en el límite comunal, 18°6'S, 69°32'W, 20 Oct 2012, *A. Moreira-Muñoz et al.* 2038 (SGO); Las Cuevas, Chaku Vilañuñumani, 18°11'S, 69°26'W, 20 Mar 2015, *A. Moreira-Muñoz & F. Luebert* 2469 (SGO); Las Cuevas, antes del Chaku, 18°11'S, 69°25'W, 20 Mar 2015, *A. Moreira-Muñoz & F. Luebert* 2471 (SGO); arriba de Las Cuevas, cerro Milagro, 18°13'S, 69°27'W, 19 Jun 2015, *A. Moreira-Muñoz* 2500 (SGO); Aguas Calientes, Tacora, 17°43'S, 69°49'W, 17 Sep 1955, *M. Ricardi* 3370 (CONC). **PERU. Arequipa**: Castilla, Orcopampa, minas de Poracota, alrededor de laguna Tintarcocha, 15°12'S, 72°32'W, 20 Apr 2011, *H. Beltrán* 7102 (USM); La Unión, Cotahuasi, 15°14'S, 72°52'W, 30 Jun 2002, *F. Cáceres* 2807 (HUSA, USM); Caylloma, 15°38'S, 71°35'W, 19 Mar 2006, *F. Cáceres* 5508 (HUSA); dist. Chiguata, 16°24'S, 71°22'W, 29 Jun 2006, *F. Cáceres* 5732 (HUSA); Chiguata, faldas del nevado Pichu Pichu, 16°23'S, 71°17'W, 25 Apr 2004, *V. Quipuscoa et al.* 2947 (HSP); Castilla, Tapay, cerro Blanco, Apacheta, 17 Sep 2011, *N. Vega* 1785 (USM); **Ayacucho**: Coracora, Parinacochas, Alqaywacho, Hurayhuma, 14°38'S, 73°36'W, 13 May 2000, *F. Pietrellini* 193 (USM); **Cusco**: Espinar, hda. Kachcachi (Uchupata), 14°52'S, 71°20'W, 22 Jun 1956, *C. Vargas* 11222 (CUZ, LPB, US); **Junín**: cordilleras entre Huancayo y Yauyos, 12°11'S, 75°38'W, [without date], *A. Weberbauer s.n.* (MOL); **Lima**: Huarochirí, Huachupampa, 11°43'S, 76°33'W, 28 Aug 1993, *J. Albán & G. Yarupaitán* 8094 (USM); Yauyos, Laraos, camino Jalcacha a Palca, 12°20'S, 75°43'W, 25 May 1995, *H. Beltrán* 1715 (USM); Yauyos, Laraos, camino de Jalcacha a Palca, 12°24'S, 75°45'W, 4 Nov 1992, *H. Beltrán* 414 (USM); Huarochirí, Huillpa, 11°51'S, 76°21'W, [without date], *I. Espinoza* 70 (USM); Huarochirí, San Damián, Chanape, 11°53'S, 76°15'W, 5 Jul 2013, *P. Gonzáles & B. Brito* 2642 (USM); Huarochirí, San Pedro de Casta, 11°45'S, 76°35'W, Dec 1982, *A. Holzapfel* 17 (USM); Auquimarca, 10°24'S, 76°59'W, Jan 1949, *A. Peraldo* 3794 (LIL); Canta, Mishquipuquio, cerca a Canta, 11°34'S, 76°33'W, Aug 1949, *S. Sánchez* 36 (USM); Canta, Lachaqui, Cieneguilla por el camino a Tararhua, 22 Jul 2001, *G. Vilcapoma* 5540 (USM); Canta, Huascay, 11°17'S, 76°45'W, 27 Oct 1974, *P. Waechter s.n.* (USM); Huarochirí, San Juan de Iris, 11°41'S, 76°31'W, 18 Aug 1993, *G. Yarupaitán & J. Al-*

bán 1065 (USM); Huarochirí, Huachupampa, lugar conocido como Armas, 11°43'S, 76°33'W, 4 Jul 1993, *G. Yarupaitán & J. Albán* 954 (USM); **Moquegua:** Mariscal Nieto, Carumas, cerca a un acueducto, 16°50'S, 70°31'W, 15 Jun 2013, *H. Beltrán* 7736 (USM); across the carretera-binacional from laguna Suches, 9 km to the W from the turn off to laguna Suches, 16°53'S, 70°26'W, 12 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin* 13147 (US, USM); across the carretera-binacional from laguna Suches, 9 km to the W from the turn off to laguna Suches, 16°53'S, 70°26'W, 12 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin* 13148 (US, USM); across the carretera-binacional from laguna Suches, 9 km to the W from the turn off to laguna Suches, 16°53'S, 70°26'W, 12 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin* 13149 (USM); across the carretera-binacional from laguna Suches, 10 km to the W from the turn off to laguna Suches, 16°53'S, 70°26'W, 12 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin* 13150 (US); across the carretera-binacional from laguna Suches, 10 km to the W from the turn off to laguna Suches, 16°53'S, 70°26'W, 12 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin* 13151 (US); area between the carretera-binacional and the interoceanica sur, on unpaved road that connects the two main roads and borders a large bofedal, 16°50'S, 70°32'W, 12 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin* 13155 (US, USM); near unpaved road in mining concession, 16°39'S, 70°1'W, 15 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin* 13167 (US, USM); above unpaved mining road that is high above the valley [pr. Paripiña, according to coordinates], 16°38'S, 70°1'W, 15 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin* 13168 (USM); General Sánchez Cerro, Ubina, cumbre nevada del cerro Pirhuani Querala, 16°9'S, 70°43'W, 7 Apr 2011, *D. Montesinos* 3098 (HSP, USM); General Sánchez Cerro, Yunga, Choco-Choco, 16°15'S, 70°37'W, 11 Sep 2012, *D. Montesinos* 3933 (USM); General Sánchez Cerro, Ubina, Chacaya, parte baja del cerro Chacaya, 16°10'S, 70°53'W, 14 Sep 2005, *D. Montesinos* 549 (USM); Mariscal Nieto, Calacoa, faldas Ticsani, SE, 16°44'S, 70°35'W, 4 Mar 2018, *D. Montesinos & J. Calvo* 6004 (HSP); **Tacna:** Tarata, Poma, carretera Tarata-Puno, 17°25'S, 69°56'W, 4 Dec 1997, *A. Cano* 7944 (USM); Tarata, Poma, carretera Tarata-Puno, 17°25'S, 69°56'W, 4 Dec 1997, *A. Cano* 7953 (USM); 32 km N of Tarata, ca. 50 km S of abra Livini (Puno), road from Tarata to Mazo-Cruz (Puno), rd. 36, 17°26'S, 69°57'W, 11 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin* 13138 (US, USM); rd. from Tarata to abra Livini (Puno), 0.5 km before intersection with rt. 36, 17°25'S, 69°56'W, 11 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin* 13142 (US); Tarata, cordillera del Barroso, carretera Alto Perú-Palca, 17°33'S, 69°51'W, 7 Dec 1997, *J. Roque* 559 (USM [mixed with *X. juniperinum*]); bajando de Livini hacia Tarata, 17°26'S, 70°0'W, 28 Nov 1959, *C. Vargas* 13016 (CUZ, LPB, US).

14. *Xenophyllum lorochaqui* J. Calvo & V.A. Funk, *PhytoKeys*: 139: 34. 2020.

Type. Argentina. Catamarca: El Cajón, Negroara, 15 Jan 1914, *L. Castellón* 3365 (holotype: LIL-26677!; isotypes: BM s.n.!, BR s.n.!, US-00622893!, W-334!).

Description. Suffrutescent plant, forming clumps of erect stems. **Rhizomes** 5–10 × 0.6–0.8 cm, horizontal to oblique, glabrous. **Stems** 10–20 cm tall, branched, glabrous, usually with leaves restricted to the upper part. **Leaves** imbricate, extending into a sheath-like base glabrescent or with evanescent arachnoid trichomes; leaf lamina 7.9–11.5 × 2.3–2.7 mm, linear, broadened at the apex, 3-notched at the apex, with the central lobe longer than lateral ones, entire, curved forwards in cross section, glabrous, unconspicuously nerved on both faces, fleshy, matte; central leaf lobe 1–1.6 mm long (lateral ones 0.5–0.8 mm long), 1.3–1.6 mm wide at the maximum width point, entire or barely notched, obtuse. **Capitula** radiate, erect, sessile. **Involucres** 10.3–10.9 × 6.6–8.7 mm, cupuliform; involucre bracts ca. 13, 5.9–7 × 1.4–2.5 mm, obtuse at the apex, greenish. **Ray florets** 26 to 39; corollas 8.3–9.2 × 1.1–1.4 mm, 4-veined, subentire to 3-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** 40 to 57; corollas 4.2–5.5 mm long, yellowish; style branches truncate with a crown of sweeping trichomes, yellowish. **Achenes** 2.5–3.1 × 0.7–0.9 mm, cylindrical, 8 to 9-ribbed, glabrous; pappus 4.3–6.1 mm long, barbellate, whitish. Chromosome number unknown. Figs 19A, 21.

Distribution and habitat. Endemic to Argentina (Catamarca, Jujuy, Salta, Tucumán). This species grows in exposed rocky slopes and on bare soils of the dry puna ecoregion, between elevations of 3500–5000 m (Fig. 20).

Phenology. Flowering from January to March.

Etymology. The epithet *lorochaqui* is the vernacular name of this plant and it means parrot's foot ("loro" from Spanish: parrot; "chaqui" from Quichua: foot). It probably responds to the resemblance of the leaves with a parrot's foot.

Notes. *Xenophyllum lorochaqui* can be identified by the glabrous erect stems 10–20 cm tall (usually only bearing leaves in the upper part), leaf lamina 7.9–11.5 mm long, leaf apex 3-notched with the central lobe entire or barely notched and longer than the lateral ones, involucre with ca. 13 involucre bracts, and by displaying 26 to 39 ray florets with white corollas.

This species shows morphological affinities with *X. incisum*, *X. dactylophyllum*, and *X. poposa*. The differences against *X. incisum* are the leaf lamina length (3.2–7.3 mm vs. 7.9–11.5 mm in *X. lorochaqui*), the length of the leaf apex lobes (similar among them vs. central lobe longer than lateral ones in *X. lorochaqui*), the involucre length (6.4–8.3 mm vs 10.3–10.9 mm in *X. lorochaqui*), the involucre bract number (8 to 9 vs. ca. 13 in *X. lorochaqui*), and the ray floret number (8 to 13 vs. 26 to 39 in *X. lorochaqui*). With regard to *X. dactylophyllum*, the leaf apex is at least 9-divided (finger-like) with the primary division extending deeper than the subsequent ones, whereas in *X. lorochaqui* the leaf apex is 3-notched with the central lobe longer than lateral ones. From *X. poposa*, the distinguishable characters are the stem indumentum (arachnoid in *X. poposa* vs. glabrous in *X. lorochaqui*), the leaf lamina length (2.5–7.1 mm in *X. poposa* vs. 7.9–11.5 mm in *X. lorochaqui*), the involucre bract number (8 to 9 in *X. poposa* vs. ca. 13 in *X. lorochaqui*), and the ray floret number (8 to 11 in *X. poposa* vs. 26 to 39 in *X. lorochaqui*). Among these species, the distribution area of *X. lorochaqui* partially overlaps with that of *X. incisum* and *X. poposa*.

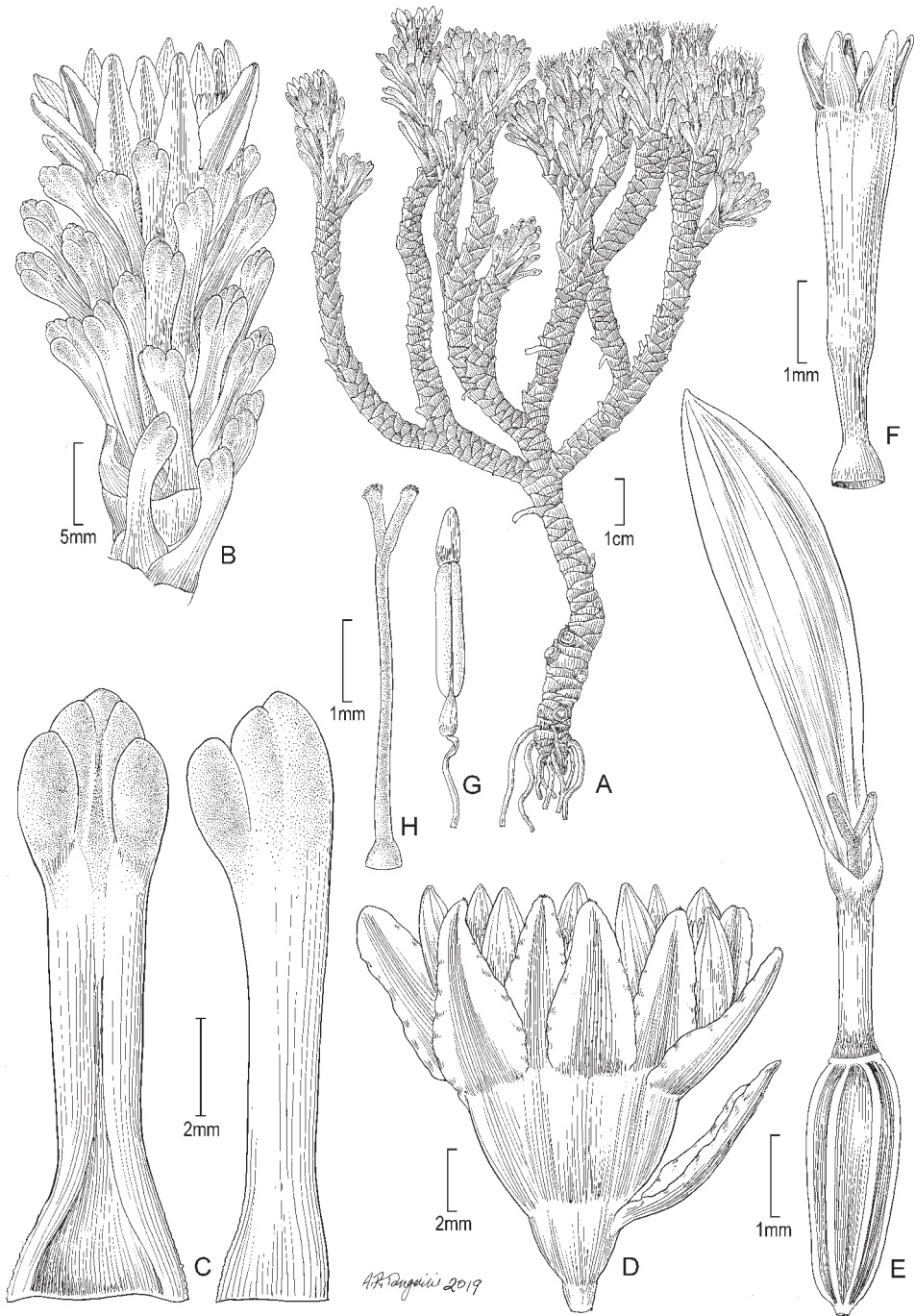


Figure 21. *Xenophyllum lorochaqui* **A** habit **B** stem apical part and capitulum **C** adaxial leaf surface (left hand) and vertical leaf profile (right hand) **D** capitulum **E** ray floret (pappus removed) **F** disc corolla **G** stamen **H** style. All details drawn from *Castellanos s.n.* (BA) except for **A**, **B** (drawn from *Díaz s.n.*, GH). Illustration by Alice Tangerini.

Additional specimens examined. **ARGENTINA. Jujuy:** Tumbaya, cerro Moreno, 23°46'S, 65°44'W, 7 Feb 1929, *S. Venturi* 9289 (US); **Salta:** Cafayate, sierra de los Quilmes, 26°11'S, 66°4'W, 28 Jan 1943, *A. Castellanos s.n.* (BA); abra del Gallo, ca. 40 km al SW de S. Antonio de los Cobres, en el camino a Pastos Grandes, 24°20'S, 66°30'W, 17 Dec 1946, *A. Krapovickas* 3215 (LIL, SI); nevado del Cajón, 26°8'S, 66°13'W, 1 Mar 1914, *D. Rodríguez* 1382 (BA, BR); **Tucumán:** cerro Muñoz, 26°52'S, 65°50'W, Jan 1916, *L. Castellón s.n.* (BR [mixed with *X. poposa*]); Tañi, cumbres de San José (La Mina), 26°41'S, 65°40'W, Mar 1933, *Díaz s.n.* (GH, LIL); Tañi, cumbre de Chasquivil, 26°41'S, 65°40'W, 12 Jan 1945, *D. Olea* 252 (LIL); Chicligasta, estancia Las Rosas, 15 Jan 1927, *S. Venturi* 6342 (US); Tañi, sierra del Cajón, Los Chuscos, 7 Feb 1926, *S. Venturi* 6647 (US).

15. *Xenophyllum rosenii* (R.E.Fr.) V.A.Funk, Novon 7(3): 240. 1997.

Werneria rosenii R.E.Fr., Nova Acta Regiae Soc. Sci. Upsal., ser. 4, 1(1): 90. 1905 ["Rosenii"]. Type. Argentina. Jujuy: nevado de Chañi, 5200 m, 29 Nov 1901, *R.E. Fries* 862 (lectotype: Fries' collection at UPS as the first-step lectotype, designated as "holotype" by Funk (1997a: 240); UPS-V-833144 (digital image!) as the second-step lectotype, designated here; isoelectotypes: CORD-00005639 (digital image!), P-02088549 (digital image!), S-R-6527 (digital image!), UPS-V-833133 (digital image!), US-00037307!).

Description. Suffrutescent plant, forming clumps of erect stems. **Rhizomes** 6–10 × 0.4–0.5 cm, horizontal to oblique, glabrous. **Stems** 4–8 cm tall, simple or branched, glabrous, usually with leaves restricted to the upper part. **Leaves** imbricate, extending into a glabrous sheath-like base; leaf laminae 7–11 × 3–4.5 mm, linear-spatulate (broadened upwards), 2-forked at the apex (incision depth ca. 1/3 of the total length), entire, flat to elliptic or almost terete upwards in cross section, glabrous, 1-nerved above (barely visible), 1-nerved beneath, fleshy, matte; leaf lobes 2.3–4.5 × 1–1.5 mm, acute to obtuse. **Capitula** radiate, erect, sessile. **Involucres** 11–13.2 × 8–10 mm, cupuliform; involucral bracts 11 to 12, 5.6–7.2 × 1.9–3.2 mm, rather acute at the apex, greenish, purple-edged. **Ray florets** ca. 18; corollas ca. 9.2 × 1.7 mm, 3 to 4-veined, subentire to 3-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** ca. 50; corollas 5–5.1 mm long, yellowish; style branches penicillate, purplish. **Achenes** ca. 3.5 × 0.9 mm, cylindrical, 6 to 8-ribbed, glabrous; pappus 8–10 mm long, barbellate, whitish. Chromosome number unknown.

Iconography. Cabrera (1948: 52, fig. 2, sub *Werneria rosenii*).

Distribution and habitat. Restricted to northwestern Argentina and southwestern Bolivia. Argentina (Jujuy, Salta [expected]), Bolivia (Potosí). It grows in wet meadows and rocky places of the dry puna ecoregion, between elevations of 4600–5200 m (Fig. 20).

Xenophyllum rosenii is hitherto known from very few gatherings, i.e., the type locality in Jujuy (Argentina) plus two collections from southern Sur Lípez (Bolivia). Jør-

gensen (2014) also indicated this species from Oruro (Bolivia) on the basis of a misidentified collection that actually corresponds to *X. digitatum* (Lieberman 352, LPB).

Phenology. Collected in flower in March and November.

Etymology. It is named after Eric von Rosen (1879–1948), a Swedish aristocrat, explorer, and ethnographer.

Notes. *Xenophyllum rosenii* is unique in the genus by its 2-forked leaves. The species has been confused with *X. digitatum* (e.g., *Meneses* 5446, LPB; *Treviño* 761, HSP; *Tupayachi* 736, US). A detailed study of the leaves highlights that these species can be straightforwardly discriminated from one another by the leaf apex (2-forked in *X. rosenii* vs. 3-forked in *X. digitatum*). The other characters appear to be useless because of a significant overlapping among them.

Since two specimens of the gathering *Fries* 862 were found at UPS, the lectotypification has been further narrowed to a single specimen by way of a second-step lectotype (UPS-V-833144).

Additional specimens examined. **BOLIVIA. Potosí:** Sur López, San Antonio de López, 21°52'S, 66°56'W, 1966, *A.F.G. Cope s.n.* (K, US); Sud López, 5.5 mi SW of San Antonio de López (Viejo) on road towards Quetena Grande, 21°52'S, 66°56'W, 20 Mar 1993, *P.M. Peterson, R.J. Soreng & S. Laegaard* 13040 (US).

16. *Xenophyllum digitatum* (Wedd.) V.A.Funk, *Novon* 7(3): 239. 1997.

Werneria digitata Wedd., *Chlor. Andina* 1: 86. 1856. Type. Bolivia. Potosí: del nivel de las nieves de la quebrada de las lagunas de Potosí, Mar [without year], *A. d'Orbigny* 1407 (lectotype: P-02088550 (digital image!), designated by Funk (1997a: 239); isolectotypes: BR s.n.!, F-102321 (fragment!), P-02088551 (digital image!)).

Werneria digitata var. *lanata* Rockh., *Bot. Jahrb. Syst.* 70: 287. 1939. Type. Peru. Junín: An der Lima-Oroya-Bahn, hacienda San Florenzi bei Yauli, 4700 m, ["Jan 1902" according to the protologue], *A. Weberbauer* 356 (lectotype: G-00237251 (digital image!), designated here), syn. nov.

Description. Suffrutescent plant, forming clumps of erect stems. **Rhizomes** 5–12 × 0.5–0.9 cm, horizontal to oblique, glabrous. **Stems** 10–13 cm tall, simple or branched, glabrous, usually with leaves restricted to the upper part. **Leaves** imbricate, extending into a glabrous sheath-like base; leaf laminas 7.7–11.5 × 2.8–6.7 mm, linear-spatulate (broadened upwards), 3-forked at the apex (incision depth 1/3–1/2 of the total length), entire, usually with some minute cilia in the lower half, flat to elliptic or almost terete upwards in cross section, glabrous or arachnoid above (evanescent), 1-nerved above (barely visible), 1-nerved beneath, fleshy, matte; leaf lobes 3.6–5.9 × 0.8–1.2 mm, entire or 2(–3)-divided, acute to obtuse, sometimes mucronate. **Capitula** radiate, erect, sessile to subsessile. **Involucres** 12.1–16.7 × 9.8–15.7 mm, cupuliform; involucral bracts 12 to 13, 6.3–9.3 × 2.4–3.9 mm, obtuse at the apex, greenish, purple-edged. **Ray florets** 21 to 36; corollas 9.2–14.1 × 1.4–1.9 mm, 4 to 5-veined, subentire to

3-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** 49 to 63; corollas 5.5–7.2 mm long, yellowish; style branches penicillate, purplish. **Achenes** 3.5–3.9 × 1–1.1 mm, cylindrical, 7 to 8-ribbed, glabrous; pappus 6.7–8.9 mm long, barbellate, whitish to partially rose-colored. Chromosome number $2n = 104(\pm 4)$ (Diers 1961). Fig. 2D.

Additional iconography. Weddell (1856: pl. 17D, sub *Werneria digitata*); Ricardi and Marticorena (1966: 26, fig. 6, sub *W. pseudodigitata*); Beltrán (2016: 359, fig. 3B, as photo); Gonzáles et al. (2016: 169, fig. 1H, I, sub *X. pseudodigitatum*, as photo).

Distribution and habitat. Central Peru to northern Chile. Bolivia (Oruro, Potosí), Chile (Antofagasta, Arica-Parinacota, Tarapacá), Peru (Apurímac [expected], Arequipa, Ayacucho, Cusco, Huancavelica, Junín, Lima, Moquegua, Puno). It grows in wet rocky outcrops, marsh and stream edges, and on cryoturbated soils of the puna ecoregion, between elevations of 3700–5300 m (Fig. 23).

Phenology. Flowering nearly all year round.

Etymology. The adjective *digitatus -a -um* refers to the shape of the leaves, which have divisions arranged like those of a bird's foot (3-forked).

Notes. *Xenophyllum digitatum* is characterized by its 3-forked leaves, where each lobe can be, in turn, 2 to 3-divided. The depth of the primary division reaches 1/3–1/2 of the total leaf length and the leaf margin usually have some cilia in the lower half. It has quite large involucre (12.1–16.7 × 9.8–15.7 mm) with 12 to 13 involucre bracts, 21 to 36 ray florets (with white corollas conspicuously surpassing the involucre), 49 to 63 disc florets, and glabrous achenes.

It is a variable species mainly concerning leaf lobe shape and leaf indumentum. Typical forms have entire leaf lobes but some specimens display 2-divided lobes (*Meneses* 5446, LPB; *Yager* 4697, LPB), or even 3-divided (*Humbert* 30793, USM; *Hutchinson* 1212, CONC, F, GH, LE, NY, UC, US, USM). The leaf lobe apex is acute to obtuse, although populations with clearly mucronate apex also exist such as those from Ausangate in Cusco (e.g., *Humbert s.n.* [Vargas 12143], US, CUZ). The leaf lamina is usually glabrous but specimens with evanescent arachnoid indumentum on the adaxial surface are also found. Based on this latter character, Rockhausen (1939) described the plants with indumentum as *Werneria digitata* var. *lanata* Rockh. We consider it as part of the variability encompassed by *X. digitatum*, and accordingly, Rockhausen's name is treated as a heterotypic synonym.

This species has been confused with *X. pseudodigitatum* (Rockh.) V.A.Funk and *X. rosenii*. For details on their morphological differences see the comments under the respective species.

Additional specimens examined. **BOLIVIA. Oruro:** Sajama, ladera E del río Sururra, 18°13'S, 68°54'W, 7 May 1981, *M. Liberman* 352 (LPB); Sajama, al sur del volcán Sajama, 18°7'S, 68°52'W, 1 May 1993, *M. Sauvain* 827 (LPB); Avaroa, Cruce Ventilla, Tirani, en línea recta a 13.1 km al W, Ayllu Puraca, 19°4'S, 66°19'W, 26 Feb 2016, *F. Zenteno* 16686 (USM); **Potosí:** cordillera Kari Kari, aprox. 3.3 km arriba de la laguna San Sebastián, 19°36'S, 65°41'W, 13 Feb 2019, *J. Calvo & M. Zárate* 7871 (BOLV); Sud López, cerro Tapaquillcha, ladera S, 21°31'S, 67°53'W, 13 Apr 1980, *M. Liberman*

191 (LPB); Tomás Frías, aprox. 4 km saliendo por carretera Potosí-Tarija, cordillera de la ciudad de Potosí, 19°36'S, 65°41'W, 28 Feb 2006, *M. Zárate* 2216 (BOLV, LPB).

CHILE. Antofagasta: El Loa, el Tatio, 22°20'S, 68°1'W, 20 Oct 1976, *M. Castillo s.n.* (CONC); El Tatio, quebrada cerca del campamento de la CORFO, 22°22'S, 68°0'W, 26 Apr 1969, *M. Mahu* 4108 (SGO); El Loa, Ujina, 20°58'S, 68°37'W, 17 Jan 1943, *E. Pisano & J. Venturelli* 1724 (CONC, SGO); **Arica-Parinacota:** Parinacota, cerro Guane Guane, 18°10'S, 69°15'W, 20 Apr 1980, *M. Arroyo, C. Villagrán & J. Moreno* 2660 (CONC); Parinacota, quebrada Cataguanchuta, 18°14'S, 69°31'W, 17 Dec 1988, *E. Belmonte* 88668 (CONC); Portezuelo de Chapiquiña, faldeos al lado norte del campamento, 18°19'S, 69°30'W, 10 Feb 1964, *C. Marticorena, O. Matthei & M. Quezada* 110 (CONC); quebrada Ancochallane, 18°15'S, 69°24'W, 18 Jun 2015, *A. Moreira-Muñoz* 2495 (SGO); Portezuelo de Chapiquiña, 18°19'S, 69°30'W, 26 Mar 1961, *M. Ricardi, C. Marticorena & O. Matthei* 201 (B, CONC); **Tarapacá:** Iquique, Collaguasi, quebrada La Represa, 20°59'S, 68°38'W, 22 Jan 1993, *S. Teillier* 3011 (CONC). **PERU. Arequipa:** Castilla, Orcopampa, minas de Poracota, cerca a quebrada Faculla, 15°14'S, 72°33'W, 20 Apr 2011, *H. Beltrán* 7111 (USM [mixed with *X. ciliolatum*]); Castilla, Orcopampa, minas de Poracota, cerca a quebrada Faculla, 15°14'S, 72°32'W, 20 Apr 2011, *H. Beltrán* 7114 (USM); Condesuyos, Salamanca, bofedal de Tintarcocha, 15°13'S, 72°30'W, 26 Mar 2012, *I. Treviño* 761 (HSP); **Ayacucho:** Huamanga, Ocollo, hacia abra Apacheta, 13°29'S, 74°28'W, 26 Jun 2010, *A. Cano et al.* 19873 (USM); **Cusco:** Anta, Mollepata, 13°24'S, 72°43'W, 12 May 2013, *H. Beltrán* 7672 (USM); cordillera de Vilcanota, camino al cerro Orqo Q'ocha, 13°45'S, 71°4'W, Mar 2008, *C. García* 86 (LPB); cordillera de Vilcanota, camino al cerro Orqo Q'ocha, 13°45'S, 71°4'W, Mar 2008, *C. García* 87 (LPB); Paucartambo, hacienda Churu, Jan 1926, *F.L. Herrera* 1033 (CONC, F, GH, MO, NY); Quispicanchi, Paucartambo, hacienda Ccapana, 13°34'S, 71°25'W, Apr 1926, *F.L. Herrera* 1056 (F); Quispicanchi, Paucartambo, hacienda Ccapana, 13°34'S, 71°25'W, Apr 1926, *F.L. Herrera* 1081 (BM, CONC, F, GH, MA, NY); cordillera del Auzangate, paso de Hualla-Hualla, 13°38'S, 71°6'W, 28 May 1958, *H. Humbert et al.* 30793 (USM); Quispicanchi, laguna Ampatuni [Ampatune], 13°35'S, 71°10'W, 29/30 May 1958, *H. Humbert s.n.* [C. Vargas 12143] (CUZ, US); cordillera de Vilcanota, cuenca de la laguna Sibinacocha, cerro Rititica, 13°45'S, 71°4'W, 5 Apr 2012, *R.I. Meneses et al.* 5446 (LPB); cordillera de Vilcanota, cuenca de la laguna Sibinacocha, cerro Orqo Q'ocha, 13°45'S, 71°4'W, 7 Apr 2012, *R.I. Meneses et al.* 5467 (LPB); Urubamba, laguna de Kellococha, proximidades de los nevados Balcunniyuc e Yllahumán, 13°12'S, 72°15'W, 20 Aug 1988, *A. Tupayachi* 736 (US); cordillera de Vilcanota, Sibinacocha, 13°45'S, 71°4'W, 12 Mar 2008, *K. Yager* 4697 (LPB); **Huancavelica:** Huaytará, Pilpichaca (abra Apacheta), 13°20'S, 74°44'W, 4 Jul 2010, *A. Cano, W. Mendoza & A. Delgado* 19686 (USM); Huaytará, Pilpichaca (abra Apacheta), 13°20'S, 74°43'W, 4 Jul 2010, *A. Cano, W. Mendoza & A. Delgado* 19734 (USM); Angaraes, Ccochaccasa, 12°56'S, 74°47'W, 4 Apr 2014, *A. Cano, B. Britto & N. Valencia* 21926 (USM); Huaytará, alrededores de abra Apacheta, 13°18'S, 74°41'W, 3 Sep 2013, *P. Gonzáles et al.* 2781 (USM); Huachocolpa, alrededores de la unidad minera Caudalosa, 13°4'S, 75°0'W, 23 Mar 2015,

P. Gonzáles 3559 (USM); Huachocolpa, alrededores de la unidad minera Caudalosa, 13°4'S, 75°0'W, 23 Mar 2015, *P. Gonzáles 3562* (USM); nevado Ajchi, Aug 1961, *O. Tovar 3423* (USM); **Junín**: Anticona pass, ca. 140 km E of Lima, 11°35'S, 76°11'W, 21 Dec 1978, *M. Dillon & B.L. Turner 1478* (USM); Lima-La Oroya highway, cumbre at top of divide, above Morococha, 11°36'S, 76°8'W, 29 Jun 1982, *A. Gentry & R. Tredwell 37301* (USM); Yauli, paso de Ticlio, carretera Lima-Oroya, 11°35'S, 76°11'W, 6 Dec 1960, *E. Pallardelly 1* (USM); abra de Ticlio, 11°35'S, 76°11'W, Dec 1986, *S. Rivas et al. s.n.* (USM); Anticona, abajo entre Casapalca y Oroya, 11°35'S, 76°11'W, 26 Jun 1954, *O. Tovar & L. Constance 9194* (USM-29378 [mixed with *X. ciliolatum* and *X. decorum*], USM-29379, USM-34159); Yauli, Ticlio, 11°35'S, 76°11'W, 28 Jun 1999, *G. Yarupaitán 1690* (US); **Lima**: Yauyos, Laraos (zona de Pacocha e Ipillo), 12°20'S, 75°43'W, 20 Nov 1996, *H. Beltrán 2579* (USM); Huarochirí, paso de Anticona, 11°35'S, 76°11'W, 1 May 1999, *H. Beltrán & E. Li 3305* (USM); Yauyos, Laraos, Viscollo, 12°25'S, 75°36'W, 12 May 2001, *H. Beltrán 4193* (USM); Anticona, límite entre Lima y Junín, 11°27'S, 76°13'W, 24 Jan 2004, *H. Beltrán 5863* (USM); Huarochirí, Chicla, abra Anticona (Ticlio), 11°36'S, 76°11'W, 29 Apr 2017, *H. Beltrán, S. Castillo & M. Arakaki 7964* (USM); Huarochirí, Chicla, abra Anticona (Ticlio), 11°35'S, 76°11'W, 29 Apr 2017, *H. Beltrán, S. Castillo & M. Arakaki 7989* (USM); límite con dpto. Junín, entre Casapalca y Ticlio, 11°35'S, 76°11'W, 1 Dec 1977, *S. Castroviejo, M. Costa & E. Valdés-Bermejo 1120* (MA); puerto de Ticlio, entre Casapalca y Morococha, 11°35'S, 76°11'W, 6 Mar 1979, *A. Ceballos et al. 8* (MA); Huarochirí, Ticlio, 11°35'S, 76°11'W, 5 Mar 1966, *E. Cerrate, C. Acleto & J. Gómez 4289* (USM); La Oroya, Anticona, 11°35'S, 76°10'W, 25 Apr 1971, *E. Cerrate et al. 4907* (USM); Ticlio, top of divide between Lima and La Oroya, 11°35'S, 76°11'W, 29 Jan 1983, *A. Gentry et al. 39749* (USM); Huarochirí, San Damián, Chanape, 11°53'S, 76°15'W, 5 Jul 2013, *P. Gonzáles & B. Brito 2629* (USM); Huarochirí, Ticlio, canyon of the río Rimac, on the carretera central, 11°35'S, 76°11'W, 19 Aug 1957, *P.C. Hutchison 1212* (CONC, F, GH, LE, NY, UC, US [all specimens mixed with *X. decorum*], USM); Anticona, 11°35'S, 76°14'W, 5 Aug 2012, *E. Linares & A. Galán 3099* (USM); Anticona, 11°35'S, 76°11'W, 4 Aug 2012, *E. Linares & A. Galán 3100* (USM); Ticlio, 11°35'S, 76°11'W, Feb 1974, *O. Tovar 7191* (USM); Huarochirí, Ticlio, 11°35'S, 76°11'W, Nov 1975, *F. Weberling 5891* (USM); Huarochirí, San Juan de Iris, bajando por la cumbre de Tres Cruces, 11°41'S, 76°31'W, 18 Aug 1993, *G. Yarupaitán & J. Albán 1063* (USM); Huarochirí, San Juan de Iris, bajando de la cumbre de Tres Cruces, 11°41'S, 76°31'W, 18 Aug 1993, *G. Yarupaitán & J. Albán 1067* (USM); Huarochirí, paso de Anticona, Ticlio, 11°35'S, 76°11'W, 29 Oct 1994, *G. Yarupaitán 1501* (USM); **Moquegua**: above unpaved mining road that is high above the valley [pr. Paripiña, according to coordinates], 16°38'S, 70°1'W, 15 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin 13169* (US, USM); near former bofedal that is now mostly dead as a result of the mining operation [pr. Paripiña, according to coordinates], 16°39'S, 70°1'W, 15 Mar 2014, *V.A. Funk, M. Diazgranados & E. Cochachin 13171* (US, USM); Mariscal Nieto, Calacoa, pr. Achacalane, 16°41'S, 70°33'W, 4 Mar 2018, *D. Montesinos & J. Calvo 5999* (HSP); **Puno**: Carabaya, Quelcaya, 13°58'S,

70°50'W, 15 Feb 2009, *E. Mondragón & J. Postigo* 90 (USM); San Antonio de Esquilache, 16°6'S, 70°17'W, 18 May 1937, *D. Stafford* 748 (BM, F, K).

17. *Xenophyllum pseudodigitatum* (Rockh.) V.A.Funk, *Novon* 7(3): 240. 1997.

Werneria pseudodigitata Rockh., Bot. Jahrb. Syst. 70: 288. 1939. Type. Argentina. Salta: Umgebung des Nevado del Castillo, 3050–4570 m, 19/23 Mar 1873, *P.G. Lorentz & G. Hieronymus* 96 (lectotype: GOET s.n., designated by Funk (1997a: 240); isoelectotypes: CORD-00005638 (digital image!), K s.n.).

Werneria castillensis Hieron., *nom. nud. in sched.* (Turland et al. 2018, ICN Art. 38.1).

Description. Suffrutescent plant, forming clumps of erect stems. **Rhizomes** 5–8 × 0.4–0.6 cm, horizontal to oblique, glabrous. **Stems** 5–12 cm tall, simple or branched, glabrous, usually with leaves restricted to the upper part. **Leaves** imbricate, extending into a glabrous sheath-like base; leaf laminae 6–9.6 × 2–3.8 mm, linear-spatulate (broadened upwards), 3-forked at the apex (incision depth 1/8–1/7 of the total length), entire, sometimes with some minute cilia in the lower half, flat to elliptic or almost terete upwards in cross section, glabrous, 1-nerved above (barely visible), 1-nerved beneath, fleshy, matte; leaf lobes 1.3–2.6 × 1–1.6 mm, acute to mucronate (rarely notched). **Capitula** radiate, erect, sessile. **Involucre** 7–8.4 × 5.2–8 mm, cupuliform; involucre bracts 10 to 11, 3.4–3.9 × 2–2.8 mm, obtuse at the apex, greenish. **Ray florets** 20 to 25; corollas 7.1–8.2 × 1–1.2 mm, 3 to 4-veined, subtire to 3-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** 29 to 33; corollas 4.2–5.1 mm long, yellowish; style branches penicillate, purplish. **Achenes** 2.3–2.5 × 0.5–0.7 mm, cylindrical, 7 to 9-ribbed, glabrous; pappus 5.2–7.1 mm long, barbellate, whitish. Chromosome number unknown. Fig. 22.

Additional iconography. Cabrera (1978: 473, fig. 200A–F, sub *Werneria pseudodigitata*); Funk (1997a: 237, fig. 1C); Freire and Ariza-Espinar (2014: 228, *X. pseudodigitatum* A–E).

Distribution and habitat. Endemic to Argentina (Jujuy, Salta). It grows in rocky slopes on rather wet soils of the dry puna ecoregion, between elevations of 3700–5125 m (Fig. 23).

Phenology. Flowering from January to May.

Etymology. The epithet *pseudodigitatum* refers to the resemblance between this species and *X. digitatum*. It probably responds to the fact that both species have 3-forked leaves.

Notes. *Xenophyllum pseudodigitatum* is characterized by its 3-forked leaves. The leaf lobes are 1.3–2.6 mm long, which represents 1/8–1/7 of the total leaf length, and they are acute to mucronate at the apex (rarely notched); on living plants, they are noticeably spread out. The involucre length ranges from 7 to 8.4 mm and has 10 to 11 involucre bracts. The radiate capitula are composed of 20 to 25 ray florets and 29 to 33 disc florets.



Figure 22. *Xenophyllum pseudodigitatum* **A** habit **B, C** capitula at different stages of development **D** leaf **E** leaf apex variability **F** ray floret (frontward bristles removed) **G** ray floret (pappus removed) **H** disc floret (frontward bristles removed) **I** stamen **J** style. All details drawn from *Ellenberg 4295* (US) except for **B, C, F** (drawn from *Petersen & Hjerting 159*, C). Illustration by Alice Tangerini.

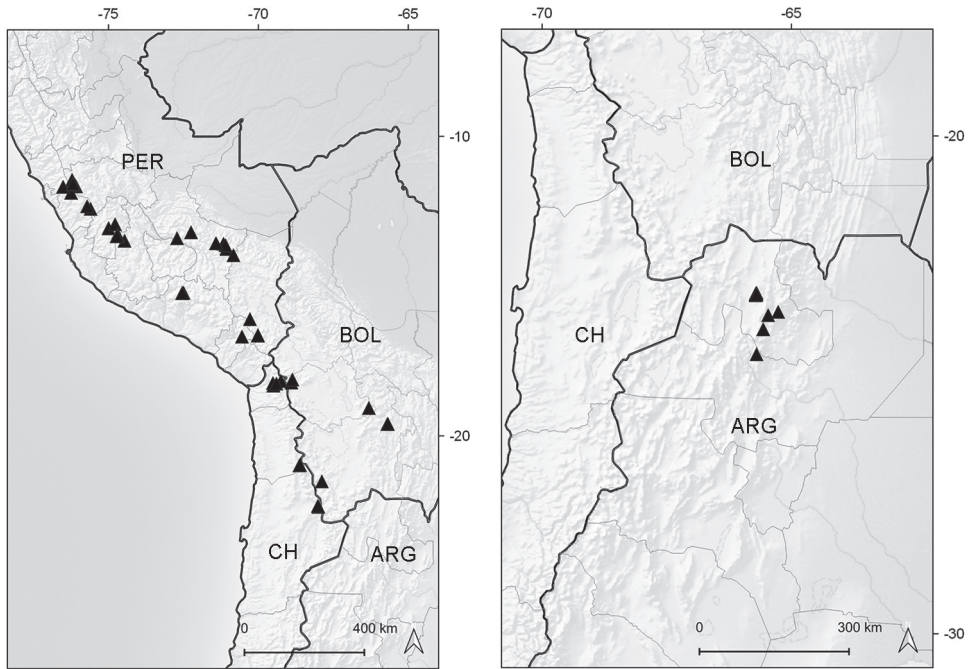


Figure 23. Distribution map of *Xenophyllum digitatum* (left hand) and *X. pseudodigitatum* (right hand).

This is a narrow endemic species to northwestern Argentina that has erroneously been reported from northern Chile (Ricardi and Marticorena 1966; Freire and Ariza-Espinar 2014; Moreira-Muñoz et al. 2016) and southern Peru (González et al. 2016). All these records are confusions with *X. digitatum*. In order to avoid further misidentifications, the following characters should be studied: leaf lobe length (1.3–2.6 mm in *X. pseudodigitatum* vs. 3.6–5.9 mm in *X. digitatum*), involucre length (7–8.4 mm in *X. pseudodigitatum* vs. 12.1–16.7 mm in *X. digitatum*), number of involucre bracts (10 to 11 in *X. pseudodigitatum* vs. 12 to 13 in *X. digitatum*), ray corolla length (7.1–8.2 mm in *X. pseudodigitatum* vs. 9.2–14.1 mm in *X. digitatum*), and number of disc florets (29 to 33 in *X. pseudodigitatum* vs. 49 to 63 in *X. digitatum*). Their distribution areas do not overlap.

Additional specimens examined. ARGENTINA. Jujuy: Humahuaca, mina Aguilar, 23°12'S, 65°43'W, 11 Jan 1968, *A.L. Cabrera et al.* 19009 (SI); mina Aguilar, abra Aguilar, 23°9'S, 65°42'W, 19 Feb 1969, *A.L. Cabrera, J. Crisci & R. Kiesling* 19843 (C); Volcán, abra del Córdoba, 23°53'S, 65°34'W, Feb 1922, *L. Castellón* 1761 (LIL); Estación Volcán, 23°53'S, 65°34'W, Feb 1920, *L. Castellón* 7140 (A, F); El Aguilar, oberhalb, 5° E. Hochandine Polsterflur, 23°11'S, 65°42'W, 1 Feb 1971, *H. Ellenberg* 4295 (US); Tilcara, subida a la abra de Remate, 23°32'S, 65°16'W, 15 Feb 1953, *A. Fiebrig s.n.* (LIL); near mina La Esperanza, just before entrance to town of El Aguilar, side rd. to mina La Esperanza, 23°10'S, 65°43'W, 9 Mar 1993, *V.A. Funk & L. Katinas* 11157 (US); rd. to mina La Esperanza, 23°10'S, 65°43'W, 9 Mar 1993, *V.A. Funk & L. Katinas* 11169 (US); Humahuaca, mina Aguilares, arriba de la mina, 23°11'S,

65°43'W, 29 Mar 1952, *E. Petersen & J.P. Hjerting* 159 (C, LIL); Humahuaca, subida al cerro Aguilar, 23°11'S, 65°43'W, 17 Jan 1953, *H. Sleumer* 3448 (LIL); Humahuaca, cerro Aguilar, cumbre, 23°11'S, 65°43'W, 17 Jan 1953, *H. Sleumer* 3452 (LIL); Tilcara, cumbre del cerro, 23°36'S, 65°28'W, 3 May 1927, *S. Venturi* 6254 (US).

18. *Xenophyllum decorum* (S.F.Blake) V.A.Funk, Novon 7(3): 239. 1997.

Werneria decora S.F.Blake, J. Washington Acad. Sci. 18: 491. 1928. Type. Peru. Lima: Casapalca, 4725 m, 21 May 1922, *J.F. Macbride & W. Featherstone* 849 (holotype: F-517377!; isotypes: G-00237250 (fragment, digital image!), GH s.n.!, S-R-6523 (digital image!), US-00037303!).

Description. Suffrutescent plant, forming clumps of erect stems. **Rhizomes** 4–10 × 0.4–0.5 cm, horizontal to oblique, glabrous. **Stems** 11–19 cm tall, usually branched, glabrous, usually with leaves restricted to the upper part. **Leaves** imbricate, extending into a glabrous sheath-like base; leaf laminas 7.2–16 × 2.2–3.7 mm, linear-oblong, slightly broadened towards the apex, 3-notched at the apex, with the lateral lobes wider than central one, entire and shortly ciliate (cilia ca. 0.3 mm long), flat to slightly curved forwards in cross section, glabrous, 1-nerved above (barely visible), 1-nerved beneath, somewhat fleshy, matte; leaf lobes 0.6–1.5 × 1–1.6 mm (central one significantly smaller), rounded to subtruncate. **Capitula** radiate, erect, sessile. **Involucre**s 10–12.6 × 8–10 mm, cupuliform; involucre bracts 13 to 14, 5.2–8 × 2–2.9 mm, acute to obtuse at the apex, greenish. **Ray florets** 20 to 21; corollas 10.4–11.9 × ca. 1.5 mm, 3-veined, subentire to 2-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** 37 to 58; corollas 6–7 mm long, yellow; style branches truncate with a crown of sweeping trichomes or slightly penicillate, purplish. **Achenes** 4.8–5.4 × 1–1.2 mm, cylindrical, 7 to 8-ribbed, glabrous; pappus 8.7–9.8 mm long, barbellate, whitish. Chromosome number unknown.

Iconography. Blake (1928: 496, fig. 1D, E sub *Werneria decora*); Beltrán (2016: 359, fig. 3C, as photo).

Distribution and habitat. Endemic to Peru (Ancash, Ayacucho, Huancavelica, Huánuco [expected], Junín, Lima). It grows in rocky outcrops, scree slopes, and on cryoturbated soils of the subhumid and humid puna ecoregions, between elevations of 3850–5000 m (Fig. 24).

Phenology. Flowering from February to September.

Etymology. The adjective *decorus* -a -um means handsome, elegant, decorous. Indeed, Blake (1928) pointed out in the protologue that it is “an attractive and very distinct species”.

Notes. This is a distinctive species due to the shortly ciliate leaf margin and the 3-notched leaf apex (the lateral lobes being conspicuously larger than the central one). The leaf lamina is glabrous, linear-oblong, slightly broadened towards the apex, flat in cross section but tending to be curved forwards. It has 13 to 14 involucre bracts, 20 to 21 ray florets with white corollas, 37 to 58 disc florets, and glabrous achenes.

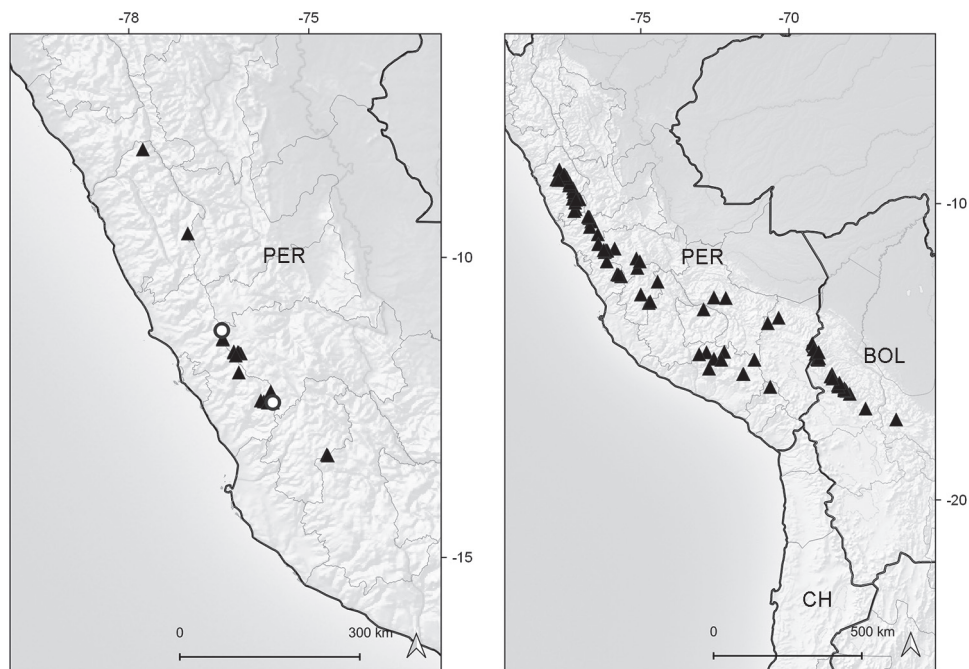


Figure 24. Distribution map of *Xenophyllum decorum* (left hand, closed triangle), *X. amblydactylum* (left hand, open circle), and *X. dactylophyllum* (right hand).

Xenophyllum decorum has the leaf apex somewhat similar to that of *X. incisum*, however, their distribution areas are geographically very distant. In addition, these species differ in the leaf length (7.2–16 mm in *X. decorum* vs. 3.2–7.3 in *X. incisum*), leaf margin (shortly ciliate in *X. decorum* vs. not ciliate in *X. incisum*), number of involucre bracts (13 to 14 in *X. decorum* vs. 8 to 9 in *X. incisum*), number of ray florets (20 to 21 in *X. decorum* vs. 8 to 13 in *X. incisum*), and length of ray corollas (10.4–11.9 mm in *X. decorum* vs. 6.2–8.9 mm in *X. incisum*).

It has to be noted that we had problems in identifying Beltrán 7987 (USM). This specimen exhibits the characteristic flat and ciliate leaves of *X. decorum* but has the leaf apex strongly divided (ca. 2.5 mm deep) with each lobe entire or divided once again. It might be treated as an intermediate form between *X. decorum* and *X. dactylophyllum* or *X. digitatum* since these species co-occur in the region where Beltrán's specimen was collected.

Additional specimens examined. **PERU. Ancash:** Huari, San Marcos, altura del km 111–112 de la carretera al campamento minero Antamina, 9°36'S, 77°1'W, 26 Mar 2004, *A. Cano et al.* 14168 (USM); Pallasca, Pampas, cordillera Pelagatos, 8°12'S, 77°46'W, 18 Apr 2011, *A. Cano et al.* 20203 (USM); collado encima río Pumapampa, 18 Mar 1983, *O. Tovar et al.* 9710 (USM); **Ayacucho:** Cangayllo-Huaytará, Paras-Pilpichaca, alrededor del abra Apacheta, 13°17'S, 74°42'W, 23 Aug 2014, *P. Gonzáles et al.* 3329 (USM); **Huancavelica:** Huaytará, alrededores de abra Apacheta, 13°18'S, 74°41'W, 3 Sep 2013, *P. Gonzáles et al.* 2783 (USM); **Junín:** Anticona pass, ca. 140 km

E of Lima on Hwy. to La Oroya, 11°35'S, 76°11'W, 16 Dec 1978, *M. Dillon & B.L. Turner* 1308 (USM); Lima-La Oroya highway, cumbre at top of divide, above Morococha, 11°36'S, 76°8'W, 29 Jun 1982, *A. Gentry & R. Tredwell* 37301 (USM); Ticlio, 11°35'S, 76°11'W, 11 Jul 1982, *B. Maass* 575 (USM); Yauli, Anticona arriba, 11°35'S, 76°10'W, 24 Mar 1979, *O. Tovar, S. Rivas & Sáenz* 7806 (USM); Anticona, abajo entre Casapalca y Oroya, 11°35'S, 76°11'W, 26 Jun 1954, *O. Tovar & L. Constance* 9194 (USM-29378 [mixed with *X. ciliolatum* and *digitatum*]); **Lima:** Huarochirí, paso de Anticona, 11°35'S, 76°11'W, 1 May 1999, *H. Beltrán & E. Li* 3306 (USM); Yauyos, Laraos, pampas de Quiray cerca a la laguna de Huinso, 12°23'S, 75°48'W, 4 Feb 2000, *H. Beltrán* 3418 (USM); Yauyos, Laraos, estancia de Quiray, 6 horas de camino al pueblo, 12°24'S, 75°45'W, 11 May 2001, *H. Beltrán* 4059 (USM); Yauyos, Laraos, Viscollo, 12°25'S, 75°36'W, 12 May 2001, *H. Beltrán* 4188 (USM); Huarochirí, desvío de carretera central hacia Chinchán y Marcapomacocha, 11°34'S, 76°15'W, 23 Sep 2014, *H. Beltrán & W. Aparco* 7740 (USM); Huarochirí, Chicla, abra Anticona (Ticlio), 11°35'S, 76°11'W, 29 Apr 2017, *H. Beltrán, S. Castillo & M. Arakaki* 7988 (USM); Yauyos, Tomas, abra Chaucha, 12°14'S, 75°38'W, 10 Aug 2017, *H. Beltrán* 8469 (USM); Huarochirí, Ticlio, 11°35'S, 76°11'W, 8 Aug 1982, *K. Biegan* s.n. (USM); Yauyos, Laraos, camino a Mina, 12°25'S, 75°41'W, 14 Apr 2012, *A. Cano & H. Trinidad* 20646 (USM); Huarochirí, San Damián, Chanape, 11°55'S, 76°10'W, 7 Jul 2013, *P. Gonzáles & B. Brito* 2655 (USM); Huarochirí, Ticlio, canyon of the río Rimac, on the carretera central, 11°35'S, 76°11'W, 19 Aug 1957, *P.C. Hutchison* 1212 (CONC, F, GH, LE, NY, UC, US [all specimens mixed with *X. digitatum*]); Anticona, 11°35'S, 76°15'W, 5 Aug 2012, *E. Linares & A. Galán* 3101 (USM); Canta, La Viuda (km 165 carretera Lima-cerro de Pasco), 11°21'S, 76°26'W, 7 Aug 1964, *I. Meza* 227 (USM); Canta, Cullhuay, laderas de la laguna de Chuchún, 11°22'S, 76°26'W, 17 Aug 1996, *G. Vilcapoma* 4461 (USM).

19. *Xenophyllum amblydactylum* (S.F.Blake) V.A.Funk, Novon 7(3): 238. 1997.

Werneria amblydactyla S.F.Blake, J. Washington Acad. Sci. 18: 490. 1928. Type. Peru. Junín: Andes, Peru, Alpamarca, [without date], *Capt. Wilkes Expedition* s.n. (holotype: US-00037297!; isotype: GH s.n.).

Description. Suffrutescent plant, forming clumps of erect stems. **Rhizomes** 10–12 × ca. 0.5 cm, horizontal to oblique, glabrous. **Stems** 4–7 cm tall, rather branched, glabrous, usually with leaves restricted to the upper part. **Leaves** subimbricate, extending into a sheath-like base that bears evanescent archnoid trichomes; leaf laminas 4.3–10 × 1.3–1.4 mm, linear, barely broadened at the apex, 3-notched at the apex, entire, usually with some minute cilia near the base, flat to obtusely triangular in cross section, with evanescent archnoid trichomes above, 1-nerved above (barely visible), 1-nerved beneath, somewhat fleshy, matte; leaf lobes 0.8–1.4 × 0.6–1 mm, obtuse. **Capitula** radiate, erect, sessile. **Involucre** 8.8–9.8 × 5.5–7 mm, cupuliform; involucre bracts 10 to 13, 4.9–5.4 × 1.2–1.8 mm, acute at the apex, greenish. **Ray florets** ca. 11; corol-

las 9–10.2 × ca. 1.2 mm, 4-veined, subentire to 2-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** ca. 22; corollas 5.4–6 mm long, yellowish; style branches truncate with a crown of sweeping trichomes or slightly penicillate, yellowish. **Achenes** cylindrical, glabrous (immature); pappus ca. 5.6 mm long, barbellate, whitish. Chromosome number unknown.

Iconography. Blake (1928: 496, fig. 1B, C sub *Werneria amblydactyla*).

Distribution and habitat. Endemic to Peru (Junín, Lima). It grows in rocky outcrops of the puna ecoregion, at elevations of ca. 4600 m (Fig. 24).

Phenology. Collected in flower in May.

Etymology. The epithet *amblydactylum* means having blunt fingers (“ambly-”: blunt, obtuse; “dactyl-”: finger). It refers to the leaf apex lobes of this species.

Notes. *Xenophyllum amblydactylum* forms clumps of erect stems 4–7 cm tall that bear linear, 4.3–10 mm long leaves. The leaf apex is 3-notched and the lobes are small (0.8–1.4 × 0.6–1 mm) and connivent. The leaf lamina has arachnoid trichomes on the adaxial surface that are quickly evanescent. The involucre is 8.8–9.8 mm long and it is composed of 10 to 13 involucre bracts. The capitula are radiate and display ca. 11 ray florets with white corollas.

This is a poorly known and collected species. Aside from the type material, we only studied one collection from southeastern Lima Department (*Beltrán 4174*, USM) and a specimen that was bought as medicinal in a farmers market in the city of Lima (*Yarupaitán 1499b*, USM). Further collections are required in order to improve the understanding of its variability and properly describe the achenes.

It might be confused with *X. dactylophyllum* because their distribution areas overlap. However, several characters let anyone discriminate them from one another, i.e., leaf apex (3-notched in *X. amblydactylum* vs. at least 9-divided in *X. dactylophyllum*), leaf lobe length (0.8–1.4 mm in *X. amblydactylum* vs. primary division 2–3 mm in *X. dactylophyllum*), involucre length (8.8–9.8 mm in *X. amblydactylum* vs. 10.8–12.8 mm in *X. dactylophyllum*), ray floret number (ca. 11 in *X. amblydactylum* vs. 17 to 22 in *X. dactylophyllum*).

Additional specimens examined. PERU. Lima: Yauyos, Laraos, Carhuanisho, 12°25'S, 75°36'W, 12 May 2001, *H. Beltrán 4174* (USM); [without locality, bought as medicinal in the farmers market in ave. Aviación, La Victoria, Lima, 29 Oct 1994], *G. Yarupaitán 1499b* (USM).

20. *Xenophyllum dactylophyllum* (Sch.Bip.) V.A.Funk, *Novon* 7(3): 239. 1997.

Werneria dactylophylla Sch.Bip., *Bonplandia* (Hannover) 4: 53, 55. 1856. Type. Peru. Puno: pr. Agapata [Ayapata] ad nives eternas, 4875 m, Jun 1854, *W. Lechler 1807* (lectotype: G-00305680 (digital image!)), designated by Funk (1997a: 239); isolecotypes: BR s.n.!, GH s.n.!, GOET s.n.!, K-000527745 (digital image!), LE s.n.!, LL-00374330 (digital image!), NY s.n.!, P-02088571 (digital image!), P-02088572 (digital image!), P-02088573 (digital image!), P-02088575 (digital image!), S-R-6522 (digital image!), W s.n.!).

Werneria dactylophylla f. *glabriuscula* Rockh., Bot. Jahrb. Syst. 70: 286. 1939. Type. Bolivia. San Francisco-Tal, Ancohuma, 5000 m, 3 Jul 1928, *C. Troll* 2076 (lectotype: M-0147065 (digital image!), designated here; isolectotype: B s.n., CONC-80182!). *Xenophyllum oscartovarii* E.Linares, J.Campos, Nauray, Vicente Orell. & A.Galán, Arnela 17(1): 104. 2010 ["oscartovari"]. Type. Peru. Arequipa: Caylloma, sector Derivación, 19L 0179145 8636313 [erroneous, ca. 15°00'S, 72°11'W], 4740 m, 4 Feb 2009, *E. Linares* & *A. Galán* 2354 (holotype: USP n.v.; isotype: AQP n.v.), syn. nov.

Description. Suffruticose plant, forming clumps of erect stems or cushions. **Rhizomes** 5–15 × 0.5–0.8 cm, horizontal to oblique, glabrous. **Stems** 11–24 cm tall, branched, glabrous, usually with leaves restricted to the upper part. **Leaves** imbricate, extending into a sheath-like base glabrous or with long silky trichomes; leaf laminae 5.7–9.9 × 2.4–4.1 mm, spatulate (finger-like at the apex), at least 9-divided at the apex, with the primary division extending deeper than the subsequent ones, entire, sometimes with some minute cilia, elliptical to terete upwards in cross section, glabrous or floccose-lanate, 1-nerved above (barely visible), 1-nerved beneath, somewhat fleshy, matte; primary division 2–3 mm long, 3 to 6 divided, rounded to truncate, sometimes with some scattered cilia on the margin. **Capitula** radiate, erect, sessile. **Involucres** 10.8–12.8 × 8.2–9.5 mm, cupuliform; involucre bracts 11 to 20, 6.6–7.6 × 1.9–2 mm, obtuse at the apex, greenish, sometimes purple-edged. **Ray florets** 17 to 22; corollas 9.2–11 × 1.3–1.6 mm, 4-veined, subentire to 3-toothed at the apex, conspicuously surpassing the involucre, white. **Disc florets** 37 to 50; corollas 5.3–6.3 mm long, yellowish; style branches truncate with a crown of sweeping trichomes or slightly penicillate, purplish. **Achenes** 3.1–4.8 × 0.9–1.3 mm, cylindrical, 7 to 9-ribbed, glabrous; pappus 8.1–8.9 mm long, barbellate, whitish. Chromosome number $2n = 108(\pm 4)$ (Diers 1961). Fig. 25.

Additional iconography. Linares et al. (2010: 102, fig. 1, sub *X. oscartovarii*, as photo); Beltrán (2016: 359, fig. 3A, as photo).

Distribution and habitat. Central Peru to central Bolivia. Bolivia (Cochabamba, La Paz, Potosí [n.v.]), Peru (Ancash, Apurímac, Arequipa, Ayacucho, Cusco, Huanacavelica, Huánuco, Junín, Lima, Moquegua, Pasco, Puno). This species grows in rocky outcrops, scree slopes, cryoturbated soils, and exposed grasslands of the subhumid and humid puna ecoregions, between elevations of (2800–)3400–5500 m (Fig. 24).

Xenophyllum dactylophyllum has been reported from the Bolivian department of Potosí on the basis of the collection *Steinbach s.n.* (Jørgensen 2014; Tropicos 2020). This material, which has not been located, was collected nearby Andacaba, a locality ca. 30 km south of the city of Potosí. If the identification is confirmed, it would represent the southern distribution limit of this species. The specimen US-00974139 most likely corresponds to a mislabeling because both the locality (San Carlos de Bariloche, Río Negro Province, Argentina) and the elevation (600 m) do not correspond to the known distribution area and altitudinal rank of this species.

Phenology. Flowering nearly all year round.

Etymology. The epithet *dactylophyllum* means finger-like leaves and it refers to the resemblance between the leaves of this plant and a hand.

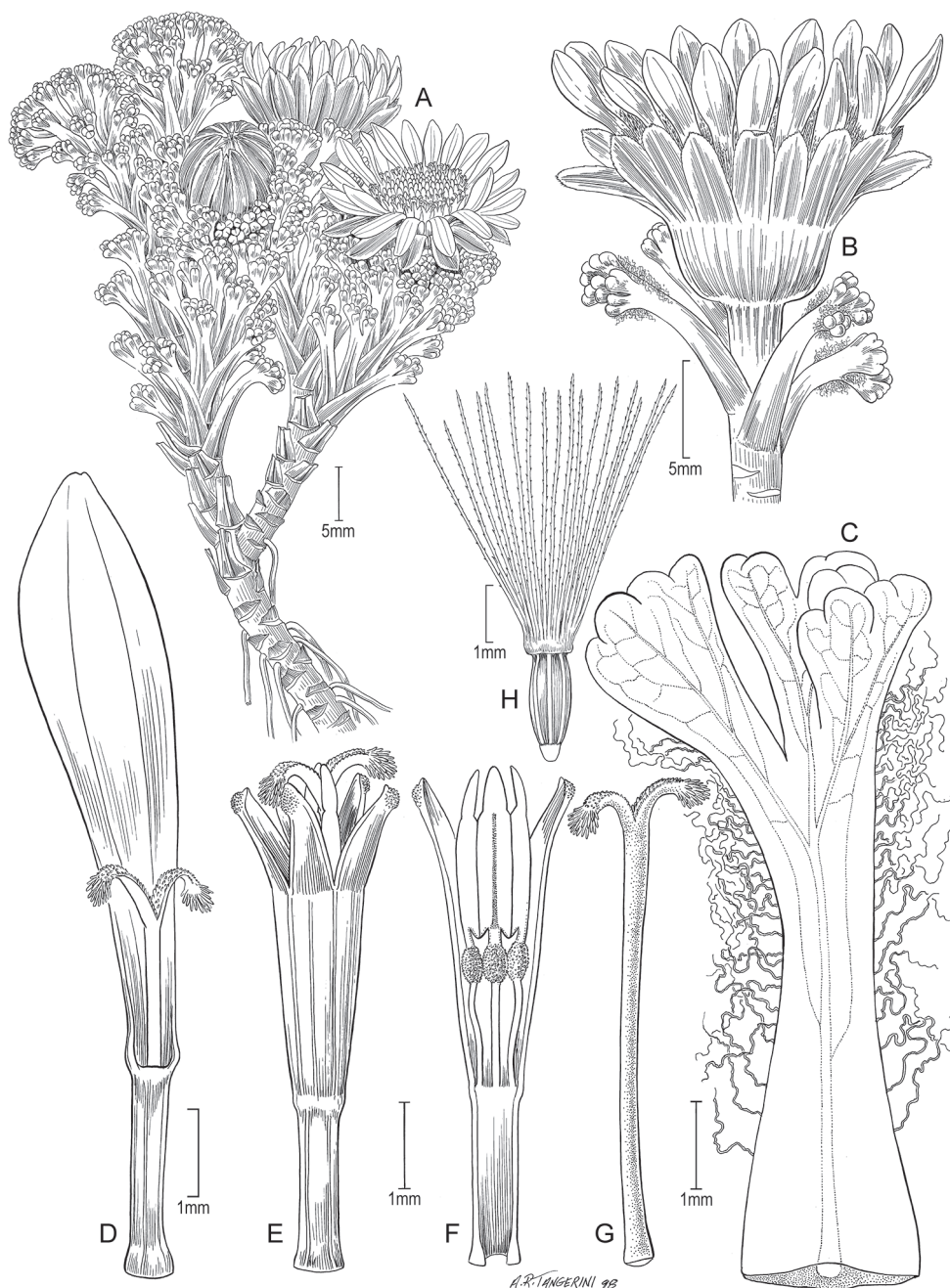


Figure 25. *Xenophyllum dactylophyllum* **A** habit **B** stem apical part and capitulum **C** leaf **D** ray corolla and style **E** disc corolla and style branches **F** disc corolla and stamens (vertically sectioned, style removed) **G** style **H** achene with pappus. All details drawn from Funk & González-Quint 11372 (US). Illustration by Alice Tangerini.

Notes. *Xenophyllum dactylophyllum* is characterized by having glabrous or floccose-lanate finger-like leaves, with at least 9 divisions at the apex. The divisions are usually arranged in multiples of three, the primary one extending deeper than the subsequent ones. The capitula are radiate, erect, with 17 to 22 ray florets with white corollas conspicuously surpassing the involucre.

Another species with finger-like leaves is *X. staffordiae*, which has occasionally been confused with *X. dactylophyllum*. They can be readily differentiated by the habit (11–24 cm tall in *X. dactylophyllum* vs. 30–60 cm tall in *X. staffordiae*), leaf divisions (at least 9-divided, with the primary division extending deeper than the subsequent ones in *X. dactylophyllum* vs. at least 12-divided, with all divisions similar in length in *X. staffordiae*), capitulum position (erect in *X. dactylophyllum* vs. rather nodding in *X. staffordiae*), and length and color of the ray corollas (9.2–11 mm, surpassing the involucre, white in *X. dactylophyllum* vs. 6.4–8.3 mm, not surpassing the involucre, pale yellow in *X. staffordiae*). Their distribution areas overlap from central to southern Peru. Other morphologically similar species are *X. amblydactylum* and *X. lorochaqui* (see comments under these species).

Our efforts in locating the type material of *X. oscarovarii* E.Linares, J.Campos, Nauray, Vicente Orell. & A.Galán were unfruitful. Due to the original description and the pictures included in the publication (Linares et al. 2010), we believe that it fairly corresponds to *X. dactylophyllum*. Oddly, this latter species was not mentioned in the taxonomic discussion of the presumed new species. In addition, we studied several specimens of *X. dactylophyllum* collected close to the type locality of *X. oscarovarii*.

Additional specimens examined. **BOLIVIA. Cochabamba:** im Geröll des Cerro Tunari, 17°17'S, 66°23'W, May 1911, *T. Herzog 2094* (S n.v.; locality confirmed by M. Zárate *in litt.*); **La Paz:** Murillo, Huayna Potosí, 29 Apr 1977, *S.G. Beck 1* (LPB); Bautista Saavedra, 1 km antes de la cumbre, donde hay desvíos por Charazani, Ulla Ulla y Amarete, 3 Aug 1985, *S.G. Beck 11347* (LPB); Inquisivi, cordillera Tres Cruces, al pie de glaciar Atoroma, 16°55'S, 67°25'W, 23 Dec 1978, *S.G. Beck 183* (LPB); Murillo, Milluni 11 km hacia Tuní, pie del glaciar Huayna Potosí y María Lloco, 5 Jan 1980, *S.G. Beck 2425* (LPB); Murillo, subiendo el valle Khallapa (hacia Hampaturi), entrando al valle lateral del río Palcoma y subiendo hacia la serranía Murillo, 16°25'S, 67°57'W, 6 May 2012, *S.G. Beck 33940* (LPB); Murillo, fin del valle Kaluyo pasando el pueblo de Chacaltaya, Pampalarama, 150 m por debajo del glaciar, 16°19'S, 68°4'W, 14 Mar 2013, *S.G. Beck, D. Ibáñez & C. Beck 34084* (LPB); Larecaja, cumbre, arriba del abra hacia mina Fabulosa, 16°3'S, 68°18'W, 10 Mar 2016, *S.G. Beck 35111* (LPB); La Fabulosa, 16°3'S, 68°18'W, 26 Apr 1950, *W.M. Brooke 6322* (CONC); Murillo, en las faldas del cerro Huayna Potosí, camino a Tuní Condoriri, 28 Jun 1991, *V. Camacho & M. Rendon 1* (LPB); Loayza, sierra de Tres Cruces, 22 Feb 1979, *A. Ceballos et al. 472* (COL); Bautista Saavedra, camino entre Escoma y Charazani, zona del ANMI Apolobamba, 15°15'S, 69°2'W, 4 Oct 2005, *N. de la Barra et al. 1026* (BOLV, LPB); Humasani, 15 Jun 1974, *Essel 23* (LPB); Bautista Saavedra, Pumazani, am Beginn der Strabe nach Amarete, 15°13'S, 68°59'W, 25 May 1980, *T. Feuerer 4228* (LPB); Muriillo, Zongo-Tal, am Lago Zongo, 16°17'S, 68°7'W, 1 Jun 1980, *T. Feuerer 4335a* (LPB);

Los Andes, an der Strabe zur Mine Fabulosa, 10 Feb 1980, *T. Feuerer* 8472 (LPB); valle de Zongo, 1.5 km avant la cumbre, 16°16'S, 68°7'W, 24 Apr 1988, *A. Fournet* 815 (BOLV); Bautista Saavedra, Amarka, cerca del límite occidental del ANMI Apolobamba, 15°15'S, 69°2'W, 4 Sep 2004, *A. Fuentes* & *C. Aldana* 6721 (BOLV, LPB); Murillo, nev. Huayna Potosí, E slopes above rd., 16°17'S, 68°8'W, 12 Apr 1995, *V.A. Funk* & *N. Bernal* 11282 (LPB); Murillo, nev. Charquini, above aqueduct on N facing slope, 16°17'S, 68°6'W, 12 Apr 1995, *V.A. Funk* & *N. Bernal* 11287 (LPB); Los Andes, Hichu-Kkota valley, 20 km from base of lgn. Khara Kkota along rd. to mina Fabulosa, 16°10'S, 68°20'W, 25 Apr 1995, *V.A. Funk* & *C. González-Quint* 11371 (LPB, US); Los Andes, Hichu-Kkota valley, 21 km from base of lgn. Khara Kkota along rd. to mina Fabulosa, near the pass, 16°10'S, 68°20'W, 25 Apr 1995, *V.A. Funk* & *C. González-Quint* 11372 (LPB, US); Los Andes, above cumbre (pass) on rd. through Hichu-Kkota valley on rd. to mina La Fabulosa, 21 km from base of lag. Khara Kkota, 16°10'S, 68°20'W, 29 Apr 1995, *V.A. Funk* 11408 (LPB); Bautista Saavedra, Charazani, pampa de Ulla-Ulla, cerca de la estancia Medallani, 15°4'S, 69°6'W, 4 May 1993, *P. Gutte* & *B. Herzog* 702 (LPB); Franz Tamayo, Ulla Ulla, cordillera Apolobamba cerca al pueblo de Pelechuco 17 km NE, 14°55'S, 69°10'W, 22 Aug 1986, *P. Holt* 15A (LPB); José M. Camacho, 60 km al E de Ulla Ulla, arriba del paso Osipal, 29 Jul 1993, *P. Holt* 2 (LPB); José M. Camacho, 60 km al E de Ulla Ulla, arriba de Osipal, 29 Jul 1993, *P. Holt* 3 (LPB); Murillo, cerro Charquini, a 1h 20min del centro de La Paz, 16°17'S, 68°6'W, Jun 2015, *A. Huon* & *R.I. Meneses* 1 (LPB); Murillo, Huayna Potosí, 29 Apr 1977, *E. Jordan* 1 (LPB); Bautista Saavedra, división camino Amarete-Charazani-Ulla Ulla, 15°14'S, 69°3'W, 14 Jun 1997, *M. Kessler et al.* 10144 (LPB); Murillo, Zongo pass, slope up towards Huayna Potosí, 16°14'S, 68°8'W, 6 Aug 1991, *M. Kessler* 2840 (LPB); Humasani, 17 Jun 1975, *R. Lara* 1499 (LPB); Larecaja, viciniis Sorata, prope Anilaya, ad lacum Yuriguana, 15°45'S, 68°33'W, Mar/May 1858, *G. Mandon* 101 (LE, RB, W); Bautista Saavedra, abra Pumasani, 15°15'S, 69°2'W, 20 Apr 1982, *X. Menhofer* 1108 (LPB); Murillo, nevado Huayna Potosí, 14 Jul 1982, *X. Menhofer* 1420 (LPB); Franz Tamayo, lado E de la cordillera de Apolobamba, camino de Pelechuco a Sorata, cerca de la mina abandonada de Sunchuli, 15°1'S, 69°0'W, 25 May 1984, *X. Menhofer* 2344 (LPB); Franz Tamayo, lado E de la cordillera de Apolobamba, camino de Pelechuco a Sorata, cerca de la mina abandonada de Sunchuli, 15°1'S, 69°0'W, 25 May 1984, *X. Menhofer* 2345 (LPB); Omasuyos, Hichu Cota, subiendo a la cumbre, 16°7'S, 68°21'W, 28 Apr 1985, *M. Moraes* 150 (LPB); Los Andes, Hichu-Kkota, 26 Jan 1984, *C. Ostria* 119 (LPB); Los Andes, valle de Hichu Kkota, 17 Nov 1983, *C. Ostria* 48 (LPB); Inquisivi, cordillera Tres Cruces, 13 Sep 2001, *B.J. Ruthsatz* 10533 (LPB); Murillo, 4.5 km N of Milluni on road to Zongo pass (ca. 3 km S of pass), 16°18'S, 68°8'W, 7 Feb 1985, *J.C. Solomon* 13210 (LPB); Murillo, pass at the head of valle del Zongo, 16°17'S, 68°8'W, 6 Mar 1983, *J.C. Solomon* 9785 (LPB); Larecaja, Sorata, laguna glacial nevado Illampu, 15°49'S, 68°33'W, 20 Jul 1996, *J.R.I. Wood* 11255 (BOLV, HSB, LPB); Bautista Saavedra, on road between Escoma and Charazani, ca. 3 km before descent to Charazani, 15°16'S, 69°1'W, 10 Jun 2000, *J.R.I. Wood* & *C. Wendleburger* 16400 (LPB); Larecaja, Sorata, zona de la laguna glacial ne-

vado Illampu, 15°50'S, 68°36'W, 7 Apr 2004, *J.R.I. Wood* 20663 (LPB); Murillo, cordillera Huayna Potosí, base de la cordillera de Huayna Potosí, 16°16'S, 68°7'W, 27 Mar 2007, *M. Zárate* 2440 (BOLV, LPB); Franz Tamayo, Pelechuco, al N en línea recta a 3.8 km del campamento Chocollo, 14°43'S, 69°13'W, 25 Nov 2017, *F. Zenteno, D. Villalba & L. Mamani* 21277 (LPB). **PERU. Ancash:** abra Yanashalla, 9°51'S, 77°4'W, 25 May 2013, *C. Aedo & J. Molina* 20440 (MA); Huaylas, Macate, cerro al norte de la laguna Capalo, 21 May 2000, *A. Cano, A. Ramírez & C. Cáceres* 10549 (USM); Asunción, Chacas, debajo de la punta Olímpica, entre las lagunas, 9°8'S, 77°30'W, 24 Apr 2004, *A. Cano, M.I. La Torre & W. Mendoza* 14536 (USM); Asunción, Chacas, alrededores de la laguna Lebrón, 9°12'S, 77°29'W, 20 May 2009, *A. Cano et al.* 19378 (USM); Huari, Rajupampa, laderas hacia el nevado Santa Rosa, 9°29'S, 77°17'W, 7 Oct 2012, *A. Cano et al.* 21319 (USM); Huaylas, Riurín, alturas de Pueblo Libre y alrededores, cerro Huachoc Qocha y cerro Gallu Huaqanan, 9°12'S, 77°47'W, 19 May 1999, *A. Cano et al.* 9252 (USM); Huaylas, Ocshapampa (Oxapampa), 9°11'S, 77°51'W, 11 Oct 1999, *A. Cano et al.* 9733 (USM); Bolognesi, Pariac Punta, pampa de Lampas, Chiquián, 10°11'S, 77°12'W, 4 May 1952, *E. Cerrate* 1513 (USM); Bolognesi, Ticllos, paso de Chonta, 10°15'S, 77°15'W, 29 Apr 1956, *E. Cerrate* 2651 (USM); Bolognesi, Chilcas, laguna de Quitcka, 25 Nov 1981, *E. Cerrate, B. León & J. Campos* 8400 (USM); near top of divide over cordillera Blanca, upper slopes of Huascarán, above lagunas Llanganuco, 9°1'S, 77°35'W, 10 Jul 1982, *A. Gentry et al.* 37431 (USM); Asunción-Chacas, laguna Librón, 9°12'S, 77°29'W, 13 Aug 2008, *B. Roca Ramos* 1 (USM); Asunción-Chacas, laguna Librón, 9°12'S, 77°29'W, 13 Aug 2008, *B. Roca Ramos* 2 (USM); Asunción-Chacas, laguna Atlanta, a 2 km de la laguna Atlanta o Azulcocha, 9°3'S, 77°33'W, 12 Aug 2008, *B. Roca Ramos* 3 (USM); Huari, camino Olteros a Chavín, desde el abra hasta el lado oriental de la cordillera Blanca, 9°36'S, 77°17'W, 21 Oct 1999, *J. Roque & K. Young* 1221 (USM); Recuay, Huascarán N.P., pass between nevado Pasto Ruri and nevado Raria, río Pachacoto drainage, 9°52'S, 77°11'W, 31 Mar 1985, *D.N. Smith & F. Escalona* 10207 (USM); Yungay, Huascarán N.P., Llanganuco sector, quebrada Demanda, W of Chacaraju base camp, 9°1'S, 77°36'W, 13 Apr 1985, *D.N. Smith & V. Cautivo* 10290 (USM); Recuay, Huascarán N.P., quebrada Quenua Ragra, 9°58'S, 77°13'W, 10 May 1985, *D.N. Smith, R. Valencia & A. Gonzales* 10700 (LPB, USM); Recuay, Huascarán N.P., camino de herradura passing over Cahuish tunnel, 9°41'S, 77°15'W, 10 Jul 1985, *D.N. Smith & M. Buddensiek* 11126 (USM); Carhuaz, Huascarán N.P., quebrada Ishinca, side valley to laguna Ishinca, 9°23'S, 77°25'W, 16 Jul 1985, *D.N. Smith & M. Buddensiek* 11208 (USM); Huari, Huascarán N.P., just crossing the Ulta pass, 9°7'S, 77°30'W, 28 Jul 1985, *D.N. Smith* 11304 (USM); Carhuaz, Huascarán N.P., quebrada Honda, from pass towards valley bottom, N-side of valley, 9°18'S, 77°24'W, 3 Oct 1985, *D.N. Smith, M. Buddensiek & R. Valencia* 11644 (USM); Recuay, Huascarán N.P., lateral valley of quebrada Queshque, toward río Pachacoto drainage, 9°50'S, 77°18'W, 19 Mar 1986, *D.N. Smith, R. Valencia & M. Torres* 11900 (USM); Yungay, Huascarán N.P., between lake Llanganuco and Portachuelo, 9°3'S, 77°36'W, 16 Aug 1984, *D.N. Smith* 8258 (USM); Huaylas, Huascarán N.P., pass between quebrada Los Cedros and Ha-

tuncocha, 8°51'S, 77°45'W, 12 Mar 1985, *D.N. Smith & R. Valencia* 9963 (USM); Huaylas, sector denominado Huiripunta, 6 Sep 1994, *G. Yarupaitán & E. Salas* 1482 (USM); **Apurímac**: Abancay, Ampay, 13°34'S, 72°53'W, Aug 1937, *C. Vargas & Santander* 514 (CUZ); **Arequipa**: pr. Chivay, ladera S del nevado Huarancante, 15°45'S, 71°32'W, 1 Apr 2005, *C. Aedo & A. Galán* 11037 (MA, USM); Caylloma, pasando la cumbre Chucura, 15°45'S, 71°33'W, 16 Jan 1999, *S.G. Beck* 26468 (LPB); Castilla, Orcopampa, minas de Poracota, cerca a quebrada Faculla, 15°14'S, 72°32'W, 20 Apr 2011, *H. Beltrán* 7115 (USM); Ramón Castilla, Orcopampa, alrededores de Cia. Minera Ares, 15°16'S, 72°17'W, 31 Mar 2000, *A. Cano & N. Valencia* 10106 (USM); La Unión, Huaynacotas, Sarajorepampa, 15°1'S, 72°47'W, 18 Mar 2011, *D. Montesinos* 2951 (HSP, MOL); Castilla, Tapay, cerro Blanco, Apacheta, 17 Sep 2011, *N. Vega* 1782 (USM); Condesuyos, nevado de Coropuna, 15°34'S, 72°42'W, Jun 1976, *M. Weibel s.n.* (USM); **Ayacucho**: Cangallo, Paras, abra Apacheta, 13°21'S, 74°44'W, 25 Jun 2001, *J. Roque & C. Arana* 3289 (USM); Páucar del Sara Sara, Oyolo, a 15 km al NO de Pampamarca, camino a Sayla, 15°5'S, 73°2'W, 14 Sep 2013, *C. Tejada* 233 (HSP); **Cusco**: Urubamba, Machupijchu, 13°10'S, 72°32'W, Nov 1982, *B. Peyton* 97 (CUZ); Espinar, al oeste del poblado de Condoroma, a 1 km de la carretera, 15°16'S, 71°10'W, 30 Sep 2009, *W. Ramírez* 585 (USM); Urubamba, Pumahuanca, 13°11'S, 72°8'W, 8 Jun 1991, *A. Tupayachi* 1515 (CUZ); **Huancavelica**: Huaytará, alrededores de abra Apacheta, 13°18'S, 74°41'W, 3 Sep 2013, *P. Gonzáles et al.* 2780 (USM); Huachocolpa, alrededores de la unidad minera Caudalosa, 13°4'S, 75°0'W, 23 Mar 2015, *P. Gonzáles* 3528 (USM); paso de Chonta, 12°38'S, 74°26'W, 8 May 1958, *O. Tovar* 2948 (USM); **Huánuco**: Lauricocha, Cauri, alrededores de las lagunas Tinkicocha, Lauricocha, Tauricocha y Patarcocha, 10°27'S, 76°44'W, 8 Sep 2012, *P. Gonzáles & N. Valencia* 1921 (USM); Dos de Mayo, entre Lauricocha y Otuto, [without date], *A. Raimondi* 1589 (USM); Lauricocha, San Miguel de Cauri, campamento Raura, laguna artificial antes de ingresar a Niñococha bajo, 10°27'S, 76°45'W, 7 May 2004, *F. Salvador, S. Ríos & E. Arias* 735 (USM); Lauricocha, San Miguel de Cauri, a 100 m de puesto de control Santa Rosa (campamento Raura), ladera abajo, 11°35'S, 76°11'W, 13 May 2004, *F. Salvador, S. Ríos & E. Arias* 944 (USM); **Junín**: Huancayo, Pucará, Raquina, 12°10'S, 75°7'W, [without date], *D. Barrón* 57 (USM); Yauli, paso de Anticonona, cumbre más alta de la carretera central, 11°35'S, 76°11'W, 17 Dec 1951, *E. Cerrate* 998 (USM); Anticonona pass, ca. 140 km E of Lima on Hwy. to La Oroya, 11°35'S, 76°11'W, 16 Dec 1978, *M. Dillon & B.L. Turner* 1300 (USM); cercanías de Morococha, 11°35'S, 76°8'W, 13 Nov 1863, *J. Isern* 404 (MA); La Oroya, 11°31'S, 75°53'W, 15 Jun 1915, *K. Maisch* 150 (USM); Huaytapallana, 11°57'S, 75°2'W, 4 May 1961, *O. Tovar* 3386 (USM); Yauli, Ticlio, 11°35'S, 76°11'W, Feb 1974, *O. Tovar* 7187 (USM); Yauli, Milloc, camino del desvío de Casapalca, 20 Mar 1983, *M.A. Vargas* 77 (USM); Jauja, al pie del nevado de Tullujuto, Aug 1920, *A. Weberbauer s.n.* (USM); Huancayo, Quilcas, Tunacorrall, 11°51'S, 75°9'W, 5 Apr 1994, *G. Yarupaitán, E. Olivera & R. Canto* 1355 (USM); **Lima**: cordillera Raura, pr. mina Raura, 10°29'S, 76°44'W, 30 May 2013, *C. Aedo & J. Molina* 20538 (MA); Huarochirí, paso de Anticonona, 11°35'S, 76°11'W, 1 May 1999, *H. Beltrán & E. Li* 3307 (USM); Yauyos, Laraos, pampas de

Quiray cerca a la laguna de Huinso, 12°23'S, 75°48'W, 4 Feb 2000, *H. Beltrán* 3415 (USM); Yauyos, Laraos, estancia de Quiray, 6 horas de camino al pueblo, 12°24'S, 75°45'W, 11 May 2001, *H. Beltrán* 4059 (USM); Yauyos, Laraos, camino de Jalcacha a Palca, 12°24'S, 75°45'W, 4 Nov 1992, *H. Beltrán* 406 (USM); Yauyos, Laraos, Malpaso, 12°27'S, 75°40'W, 12 May 2001, *H. Beltrán* 4204 (USM); Oyón, compañía minera Iscaycruz, 10°47'S, 76°43'W, 30 May 2008, *H. Beltrán* 6509 (USM); Huarochirí, desvío de carretera central hacia Chinchán y Marcapomacocha, 11°34'S, 76°15'W, 23 Sep 2014, *H. Beltrán & W. Aparco* 7737 (USM); Huarochirí, desvío de carretera central hacia Chinchán y Marcapomacocha, 11°34'S, 76°15'W, 23 Sep 2014, *H. Beltrán & W. Aparco* 7749 (USM); Oyón, encima de mina Uchuchacua, parte más alta por carretera, 10°36'S, 76°40'W, 5 Apr 2015, *H. Beltrán & W. Aparco* 7771 (USM); Huarochirí, Chicla, abra Anticona (Ticlio), 11°36'S, 76°11'W, 29 Apr 2017, *H. Beltrán, S. Castillo & M. Arakaki* 7965 (USM); límite con dpto. Junín, entre Casapalca y Ticlio, 11°35'S, 76°11'W, 1 Dec 1977, *S. Castroviejo, M. Costa & E. Valdés-Bermejo* 1118 (MA); Huarochirí, arriba de Chumpicocha, 11°57'S, 76°9'W, 28 May 1953, *E. Cerrate* 2011 (USM); Anticona nevado, 11°35'S, 76°10'W, 8 Aug 1987, *M. Chanco, O. Tovar & A. Galán* 1220 (USM); Huarochirí, lago Aguascocha, near mina Caprichosa, above Casapalca, 11°38'S, 76°13'W, 1 Mar 1964, *P.C. Hutchison & O. Tovar* 4270 (USM); subida al puerto de Piedra Parada, camino de Lima a Tarma, 26 Sep 1863, *J. Isern* 434 (MA); Canta, La Viuda, 11°21'S, 76°26'W, 7 Aug 1964, *I. Meza* 228 (USM); Morococha, 11°35'S, 76°8'W, [without date], *A. Raimondi* 8389 (USM); Cajatambo, Raura, 10°26'S, 76°47'W, 15 Apr 1988, *S. Rivas et al. s.n.* (USM); Canta, Cullhuay, alrededores de la laguna de Chuchún, 11°22'S, 76°26'W, 17 May 2003, *G. Vilcapoma* 6070 (USM); **Moquegua**: General Sánchez Cerro, Yunga, Sura-Perusa, 16°11'S, 70°38'W, 13 Apr 2012, *D. Montesinos* 3789 (HSP, USM); General Sánchez Cerro, Yunga, Sura, 16°11'S, 70°38'W, 3 Mar 2018, *D. Montesinos & J. Calvo* 5938 (HSP); **Pasco**: abra Uchuchacua, 10°36'S, 76°40'W, 31 May 2013, *C. Aedo & J. Molina* 20584 (MA); Pasco, Huarón, 11°2'S, 76°27'W, Nov 1956, *H. Macedo s.n.* (USM); **Puno**: Carabaya, Corani, Minaspatá, 14°2'S, 70°43'W, 15 Oct 2016, *P. González* 3829 (USM).

21. *Xenophyllum staffordiae* (Sandwith) V.A.Funk, *Novon* 7(3): 240. 1997.

Werneria staffordiae Sandwith, Hooker's Icon. Pl. 35: tabula 3424. 1940. Type. Peru. Puno: San Antonio de Esquilache, 4725 m, 14 May 1937, *D. Stafford* 734 (lectotype: K-000527744 (digital image!)), designated as "holotype" by Funk (1997a: 240); isoelectotypes: K s.n.!, BM s.n.!, F-1508962!).

Description. Shrubby plant. **Rhizomes** ca. 6 × 0.7–1 cm, horizontal to oblique, glabrous. **Stems** 30–60 cm tall, branched, glabrous, with leaves restricted to the upper part. **Leaves** imbricate, extending into a sheath-like base glabrous or with long silky trichomes; leaf laminae 6.8–9.3 × 3.2–3.7 mm, spatulate (finger-like at the apex), at least 12-divided at the apex, with all divisions similar in length, entire, elliptical to terete

upwards in cross section, glabrous or floccose-lanate, 1-nerved above (barely visible), 1-nerved beneath, somewhat fleshy, matte; divisions ca. 1.5 mm long, rounded to truncate. **Capitula** radiate, rather nodding, subsessile to shortly pedunculate (up to 5 mm long, sometimes bearing 1 to 2 oblong bracts that reach the involucre). **Involucre** 8.6–10.5 × 8.2–10 mm, cupuliform; involucre bracts 11 to 20, 4.3–5 × 2.5–2.8 mm, obtuse at the apex, greenish to slightly purplish. **Ray florets** 15 to 28; corollas 6.4–8.3 × 0.8–1.1 mm, unobscurely veined, subentire to 3-toothed at the apex, not surpassing the involucre, pale yellow. **Disc florets** 36 to 81; corollas 7.4–9.2 mm long, yellowish; style branches truncate with a crown of sweeping trichomes, yellowish. **Achenes** 3.3–3.6 × 0.9–1 mm, cylindrical, 7 to 9-ribbed, glabrous; pappus 8.2–14.2 mm long, barbellate, whitish. Chromosome number unknown. Fig. 26.

Additional iconography. Sandwith (1940: tabula 3424, sub *Werneria staffordiae*); Beltrán (2016: 359, fig. 3D, as photo).

Distribution and habitat. Endemic to Peru (Arequipa, Cusco, Huánuco, Lima, Moquegua, Puno). It grows in rocky outcrops, scree slopes, and exposed grasslands of the subhumid puna ecoregion, between elevations of 3900–5200 m (Fig. 27).

Xenophyllum staffordiae is known from central and southern Peru, however, a remarkable gap exists between these two distribution centers. No collections were studied from Apurímac, Ayacucho, and Huancavelica.

Phenology. Flowering from March to December.

Etymology. The epithet *staffordiae* honors the English field botanist Dora Stafford, who collected in Peru in the 1930s.

Notes. This is a shrub with 30–60 cm tall stems that have glabrous or floccose-lanate finger-like leaves, with at least 12 divisions at the apex. The divisions are similar in length, ca. 1.5 mm deep. It is characterized by its capitula that tend to be nodding as the plant ages, with 15 to 28 ray florets with pale yellow corollas that do not surpass the involucre. As in the case of *X. poposa*, we observed a few ray florets with staminodes (Fig. 26E). It only might be confused with *X. dactylophyllum* (see comments under it).

It should be mentioned that the elevation indicated on the isoelectotype at F is 16000 feet, which slightly differs from that indicated on the lectotype (15500 feet). We believe that such mismatch is not a major reason for excluding it from the type material.

Additional specimens examined. **PERU. Arequipa:** La Unión, Cotahuasi, 15°14'S, 72°52'W, 30 Jun 2002, *F. Cáceres* 2806 (HUSA); Caylloma, Chivay, bajada a Chivay, 15°42'S, 71°35'W, 25 Oct 1988, *E. Linares* 260 (CUZ, USM); La Unión, entre Solimana y Ccoropuna, base, 15°27'S, 72°46'W, 25 Apr 1967, *C. Vargas* 19541 (CUZ, US); Castilla, Tapay, cerro Blanco, Apacheta, 13 Sep 2011, *N. Vega* 1734 (USM); **Cusco:** Espinar, Yauri, 14°48'S, 71°24'W, 20 Jun 1944, *C. Vargas* 4382 (CUZ, F); **Huánuco:** Huánuco viejo, 9°52'S, 76°49'W, 4 Oct 1968, *I. Meza s.n.* (USM); **Lima:** Huarochirí, cordillera de Carampoma, 11°39'S, 76°31'W, Dec 1929, *N. Esposto s.n.* (MOL, USM); Huarochirí, San Damián, abra entre Chanape y la comunidad Checca, 11°55'S, 76°15'W, 14 Jul 2013, *P. Gonzáles & B. Brito* 2667 (USM); Canta, Lachaqui, más arriba de la laguna de Quinán, camino hacia Carampoma (Huarochirí), 11°35'S, 76°34'W, 20 May 1995, *A. Granda* 1496 (MOL, US); Canta, cerca a Canta Mishquipuquio,

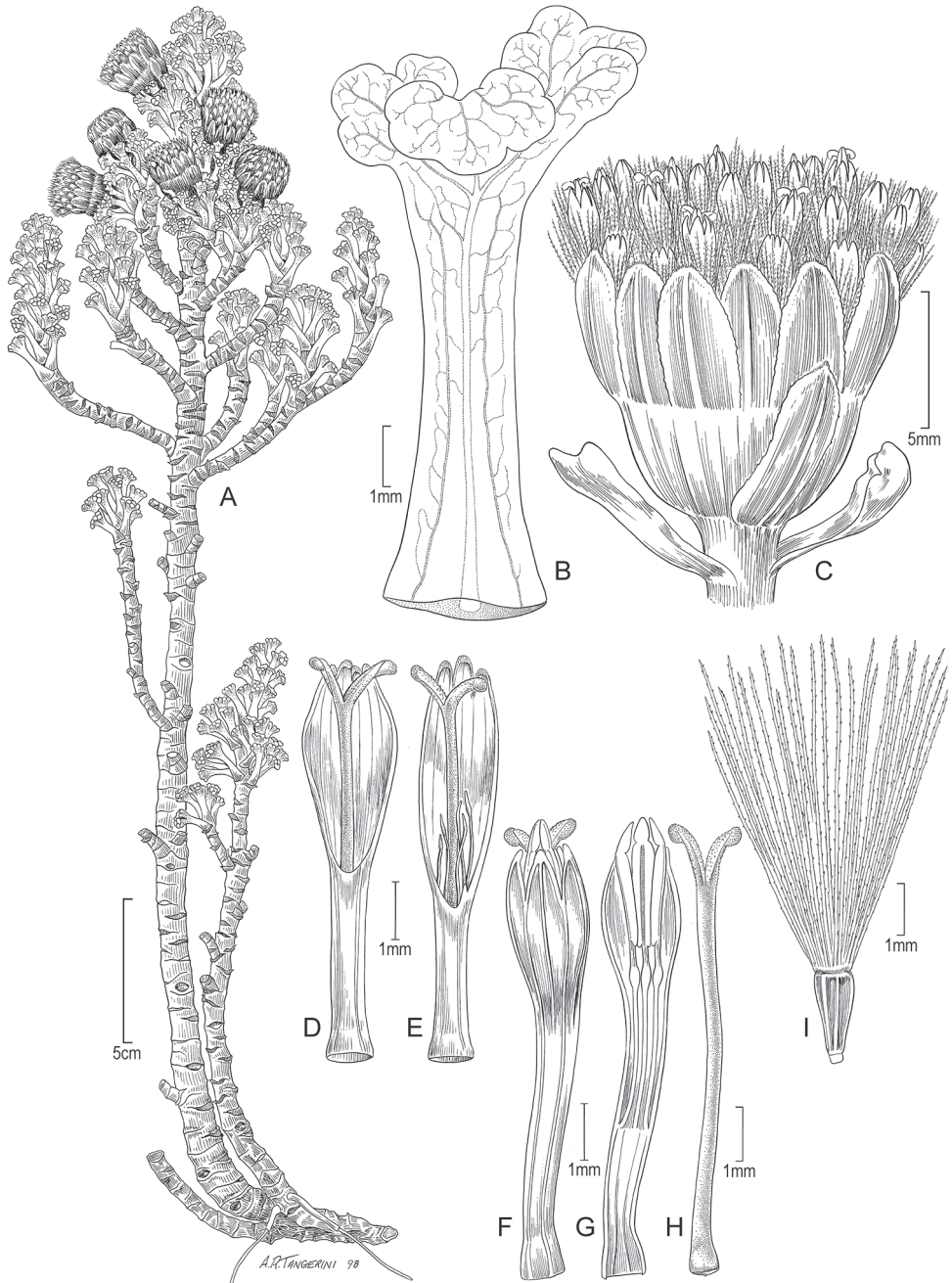


Figure 26. *Xenophyllum staffordiae* **A** habit **B** leaf **C** capitulum **D** ray corolla and style **E** ray corolla and style (notice stamens) **F** disc corolla and style branches **G** disc corolla and stamens (vertically sectioned, style removed) **H** style **I** immature achene with pappus. All details drawn from *Oliver & Pearson 86* (US) except for **A** (drawn from *Stafford 734*, K). Illustration by Alice Tangerini.

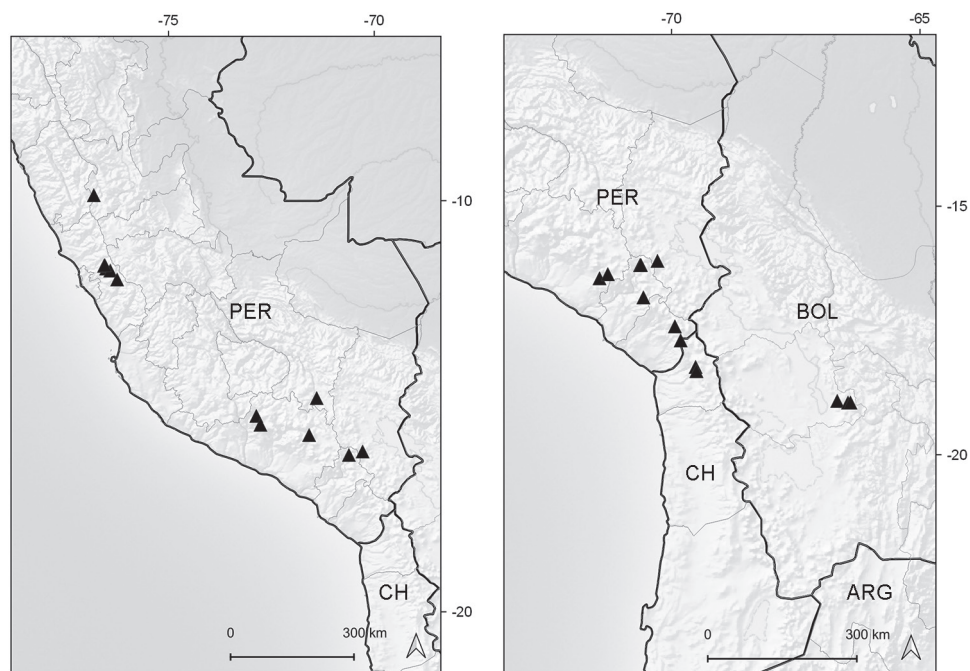


Figure 27. Distribution map of *Xenophyllum staffordiae* (left hand) and *X. esquilachense* (right hand).

11°34'S, 76°33'W, 10 Aug 1949, *S. Sánchez* 44 (USM); Canta, Lachaqui, arriba de laguna Quinan, 11°35'S, 76°34'W, 30 Jun 2000, *G. Vilcapoma* 5194 (USM); Huarochirí, San Juan de Iris, alrededores de Tuktochocha, 11°42'S, 76°25'W, 18 Aug 1993, *G. Yarupaitán* & *J. Albán* 1012 (US, USM); **Moquegua:** General Sánchez Cerro, Yunga, Perusa, 16°11'S, 70°37'W, 3 Mar 2018, *D. Montesinos* & *J. Calvo* 5957 (HSP); **Puno:** cerro Ichuasi, Caccachara, ca. 50 miles SW of Ilave, 18 Nov 1946, *P. Oliver* & *A. Pearson* 86 (US); Crestón, San Antonio [de Esquilache], 1 Jul 1937, *T.G. Tutin* 1201 (BM).

22. *Xenophyllum esquilachense* (Cuatrec.) V.A.Funk, *Novon* 7(3): 239. 1997.

Werneria esquilachensis Cuatrec., *Brittonia* 8: 192. 1956. Type. Peru. Puno: San Antonio de Esquilache, 4725 m, 12 May 1937, *D. Stafford* 716 (holotype: K s.n.).
Senecio pfisteri Ricardi & Martic., *Gayana, Bot.* 11: 25. 1964. Type. Chile. Arica-Parinacota: Arica, Portezuelo de Chapiquiña, faldeos al lado norte del campamento, 4400 m, 10 Feb 1964, *C. Marticorena*, *O. Matthei* & *M. Quezada* 116 (holotype: CONC-29863!; isotype: CONC s.n.).

Description. Suffruticose plant, forming clumps of erect or decumbent stems. **Rhizomes** 4–8 × 0.1–0.2 cm, horizontal to oblique, glabrous. **Stems** 5–10 cm tall, branched, glabrescent, usually with leaves restricted to the upper part. **Leaves** somewhat distantly

arranged, abruptly narrowed at the base; leaf laminae $11.2\text{--}15.5 \times 3.3\text{--}4.6$ mm, broadly spatulate, 3-forked at the apex, entire and scabrous-ciliate (cilia ca. 0.17 mm long), flat in cross section, glabrous, 1-nerved above (barely visible), 1-nerved beneath, somewhat fleshy, matte, papillose; leaf lobes $2.4\text{--}3.9 \times 0.7\text{--}1$ mm, with 2 to 3 rough mucronate teeth up to 1.4 mm long. **Capitula** disciform, erect, sessile to subsessile. **Involucres** $10.4\text{--}15.1 \times 6.5\text{--}7.4$ mm, cupuliform; involucre bracts 8 to 12, $5.4\text{--}7.2 \times 1.3\text{--}2.5$ mm, acute to obtuse at the apex, greenish, sometimes purple-edged. **Peripheral florets** ca. 10, pistillate; corollas reduced to a vestigial tube ca. 2.1 mm long or without corolla. **Disc florets** ca. 15; corollas $6\text{--}10.6$ mm long, purplish; style branches truncate with a crown of sweeping trichomes, purplish. **Achenes** cylindrical, glabrous (immature); pappus ca. 11.3 mm long, barbellate, whitish. Chromosome number unknown.

Iconography. Calvo et al. (2018: 289, fig. 1, as photo).

Distribution and habitat. Southern Peru to central-western Bolivia. Bolivia (Oruro), Chile (Arica-Parinacota), Peru (Arequipa, Moquegua, Puno, Tacna). It grows in rocky outcrops, steep volcanic slopes, and open shrublands of the subhumid and dry puna ecoregions, between elevations of 3700–4950 m (Fig. 27).

Phenology. Flowering from February to June.

Etymology. It is named after the Peruvian village of San Antonio de Esquilache (western Puno), where the type material was collected in 1937 by Dora Stafford.

Notes. This is the unique species within the genus displaying disciform capitula. They have ca. 10, peripheral, pistillate florets with a corolla reduced to a vestigial tube ca. 2.1 mm long or without corolla, and therefore, the style is exsert in its whole length or almost so. Another distinctive feature is the morphology of the leaves; they are 3-forked, abruptly narrowed at the base, and marginally scabrous-ciliate. Each lobe usually has 2 to 3 rough mucronate teeth. Any confusion with the other members of the genus is unlikely.

See Calvo et al. (2018) for further details on the type material of the name *Senecio pfisteri* Ricardi & Martic.

Additional specimens examined. **BOLIVIA. Oruro:** Challapata, Livichuco, Tarpata, estribaciones del cerro Toro en el collado antes de las lagunas, $18^{\circ}57'S$, $66^{\circ}24'W$, 15 Feb 2019, *J. Calvo & M. Zárate* 7877 (BOLV); prov. Eduardo Abaroa, Challapata, comunidad Churacani, $18^{\circ}55'S$, $66^{\circ}40'W$, 1 Apr 2018, *M. Guzmán* 124 (LPB); Abaroa, Challapata, cerro Toro Ichurata, en línea recta a 34.38 km al E, $18^{\circ}57'S$, $66^{\circ}27'W$, 27 Feb 2016, *F. Zenteno, L. Moya & D. Villalba* 16745 (LPB). **CHILE. Arica-Parinacota:** quebrada Cataguanchuta, $18^{\circ}14'S$, $69^{\circ}31'W$, 17 Dec 1988, *E. Belmonte* 88644 (CONC); pasado azufrera Tacora, $17^{\circ}42'S$, $69^{\circ}49'W$, 17 Mar 2015, *A. Moreira-Muñoz & F. Luebert* 2407 (SGO); Portezuelo de Chapiquiña, $18^{\circ}19'S$, $69^{\circ}30'W$, 26 Mar 1961, *M. Ricardi, C. Marticorena & O. Matthei* 207 (CONC). **PERU. Arequipa:** Chiguata, faldas del nevado Pichu Pichu, $16^{\circ}27'S$, $71^{\circ}27'W$, 20 Jun 2004, *V. Quipuscoa et al.* 2949 (HSP); Chiguata, ca. 2 km arriba del túnel del Simbral, carretera a Salinas, $16^{\circ}22'S$, $71^{\circ}17'W$, 15 Apr 2018, *V. Quipuscoa & M. Balvin* 7541 (HSP); **Moquegua:** Mariscal Nieto, Carumas, cerca a un acueducto, $16^{\circ}50'S$, $70^{\circ}34'W$, 15 Jun 2013, *H. Beltrán* 7734 (USM); General Sánchez Cerro, Yunga, Sura-Perusa, $16^{\circ}11'S$, $70^{\circ}38'W$, 13 Apr

2012, *D. Montesinos* 3804 (HSP); General Sánchez Cerro, Yunga, Perusa, 16°11'S, 70°37'W, 3 Mar 2018, *D. Montesinos* & *J. Calvo* 5958 (HSP); **Tacna:** Tarata, Poma, carretera Tarata-Puno, 17°25'S, 69°56'W, 25 Mar 1998, *A. Cano* 8139 (USM).

Unverified names

Werneria dactylophylla var. *glanduloso-denticulata* Rockh., Bot. Jahrb. Syst. 70: 286. 1939. Type. Peru. Lima: [“Cajatambo, Conta auf der schwarzen Cordillera über Ocos, 4500–4800 m, Apr 1903, *Weberbauer* 2820” according to the *ind. loc.*] (B, destroyed) = *Xenophyllum dactylophyllum* (Sch.Bip.) V.A.Funk

Acknowledgements

We are grateful to the curators and staff of the herbaria mentioned in the text. We would like to express our gratitude to the late Vicki Funk (US) for research support and for sharing worthy information and material that she compiled over a long period of time. Special thanks are also addressed to Carol Kelloff (US) for herbarium assistance, Alice Tangerini (US) for the nice illustrations, and Carlos Aedo (MA) for advice on taxonomic issues. We are indebted to Luvo Magoswana and to another anonymous reviewer for their insightful comments during the review process. The first author was a Short-Term Visitor Program Fellow at the Smithsonian Institution and was granted the Robinson Award of its Department of Botany. This work has been funded by FONDECYT from Chile by means of a postdoctoral fellowship to the first author (project N°3170270) and supported by the project N°1180211 of the second author.

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Appendix I

Index to the taxonomic names treated, with the currently accepted names indicated in bold type.

Oresigonia Willd. ex Less.

brevifolia Willd. ex Rockh. = ***Xenophyllum humile***

pycnophylla Willd. ex Rockh. = ***Xenophyllum rigidum***

Senecio L.

pfisteri Ricardi & Martic. = ***Xenophyllum esquilachense***

Werneria Kunth

- acerosa* Cuatrec. = *Xenophyllum acerosum*
amblydactyla S.F.Blake = *Xenophyllum amblydactylum*
articulata S.F.Blake = *Xenophyllum humile*
castillensis Hieron. = *Xenophyllum pseudodigitatum*
ciliata Wedd. ex Sch.Bip. = *Xenophyllum ciliolatum*
ciliolata A.Gray = *Xenophyllum ciliolatum*
crassa f. *minor* Cuatrec. = *Xenophyllum crassum* subsp. *orientale*
crassa S.F.Blake = *Xenophyllum crassum*
crassa subsp. *orientalis* Cuatrec. = *Xenophyllum crassum* subsp. *orientale*
dactylophylla f. *glabriuscula* Rockh. = *Xenophyllum dactylophyllum*
dactylophylla Sch.Bip. = *Xenophyllum dactylophyllum*
dactylophylla var. *glanduloso-denticulata* Rockh. [unverified]
decora S.F.Blake = *Xenophyllum decorum*
decumbens Hieron. = *Xenophyllum weddellii*
digitata var. *lanata* Rockh. = *Xenophyllum digitatum*
digitata Wedd. = *Xenophyllum digitatum*
esquilachensis Cuatrec. = *Xenophyllum esquilachense*
fontii Cuatrec. = *Xenophyllum humile*
humilis f. *articulata* (S.F.Blake) Rockh. = *Xenophyllum humile*
humilis Griseb. ex Hieron. = *Xenophyllum poposa*
humilis Kunth = *Xenophyllum humile*
humilis var. *angustifolia* Cuatrec. = *Xenophyllum humile*
humilis var. *fontii* Cuatrec. = *Xenophyllum humile*
humilis var. *lindenii* Wedd. = *Xenophyllum humile*
humilis var. *rosea* (Hieron.) Rockh. = *Xenophyllum roseum*
humilis var. β Wedd. = *Xenophyllum humile*
incisa Phil. = *Xenophyllum incisum*
incisa var. *pubescens* Rockh. = *Xenophyllum poposa*
juniperina Hieron. = *Xenophyllum juniperinum*
lehmannii Hieron. = *Xenophyllum humile*
lehmannii Klatt = *Hypochaeris sessiliflora*
leucobryoides S.F.Blake = *Xenophyllum sotarense*
lorentziana Hieron. = *Xenophyllum poposa*
lycopodioides S.F.Blake = *Xenophyllum juniperinum*
marcida S.F.Blake = *Xenophyllum marcidum*
poposa Phil. = *Xenophyllum poposa*
pseudodigitata Rockh. = *Xenophyllum pseudodigitatum*
purpurea Spruce ex Rockh. = *Xenophyllum roseum*
rigida Kunth = *Xenophyllum rigidum*
rosea Hieron. = *Xenophyllum roseum*
rosenii R.E.Fr. = *Xenophyllum rosenii*
 sect. *Aciculares* Rockh. = *Xenophyllum*
 sect. *Digitifoliae* Rockh. = *Xenophyllum*

sedoides S.F.Blake = ***Xenophyllum marcidum***
sotarense Hieron. = ***Xenophyllum sotarense***
staffordiae Sandwith = ***Xenophyllum staffordiae***
 subg. *Euwerneria* Rockh. = ***Xenophyllum***
weddellii Phil. = ***Xenophyllum weddellii***

Xenophyllum V.A.Funk

acerosum (Cuatrec.) V.A.Funk
amblydactylum (S.F.Blake) V.A.Funk
ciliolatum (A.Gray) V.A.Funk
crassum (S.F.Blake) V.A.Funk
crassum* subsp. *crassum
crassum* subsp. *orientale (Cuatrec.) J.Calvo
dactylophyllum (Sch.Bip.) V.A.Funk
decorum (S.F.Blake) V.A.Funk
digitatum (Wedd.) V.A.Funk
esquilachense (Cuatrec.) V.A.Funk
fontii (Cuatrec.) V.A.Funk = ***Xenophyllum humile***
funkianum J.Calvo
humile (Kunth) V.A.Funk
incisum (Phil.) V.A.Funk
incisum var. *pubescens* (Rockh.) Cabrera & S.E.Freire = ***Xenophyllum poposa***
juniperinum (Hieron.) J.Calvo
lorochaqui J.Calvo & V.A.Funk
lycopodioides (S.F.Blake) V.A.Funk = ***Xenophyllum juniperinum***
marcidum (S.F.Blake) V.A.Funk
oscartovarrii E.Linares, J.Campos, Nauray, Vicente Orell. & A.Galán = ***Xenophyl-***
lum dactylophyllum
poposa (Phil.) V.A.Funk
pseudodigitatum (Rockh.) V.A.Funk
rigidum (Kunth) V.A.Funk
rosenii (R.E.Fr.) V.A.Funk
roseum (Hieron.) V.A.Funk
sotarense (Hieron.) V.A.Funk
staffordiae (Sandwith) V.A.Funk
weddellii (Phil.) V.A.Funk

Appendix II

List of exsiccatae. *Xenophyllum* specimens are listed alphabetically by collector, followed by collection number or date when a collection number was not assigned. Specimens without collection number and date are not listed. The number in parentheses corresponds to the number of the accepted species in the treatment.

Acosta, C.E. 12 (2), 13 (2); *Aedo, C.* 6968 (11); *Aedo, C. & A. Galán* 11037 (20), 11103 (9); *Aedo, C. & J. Molina* 20440 (20), 20538 (20), 20584 (20); *Aguirre, J. & A.M. Cleef* 880 (7b); *Albán, J. & G. Yarupaitán* 8094 (13); *André, E.* 3281 (2); *Ángel, M. et al.* 9 (2); *Anthony, H.E. & G.H.H. Tate* 316 (6); *Arancio, G.* 92-341 (12), 92-454 (11), 10676 (12), 10697 (12); *Argomedeo, M.* 9 (11); *Arroyo, M.* 84-728 (11), 84-857 (10), 84-912 (10), 84-913 (13), 85-595 (13); *Arroyo, M., L. Cavieres & A. Humaña* 97022 (13), 97217 (12), 97276 (12), 97315 (12), 97373 (12), 97463 (12); *Arroyo, M., C. Villagrán & J. Armesto* 85-394B (10); *Arroyo, M., C. Villagrán & J. Moreno* 2622 (13), 2623A (10), 2660 (16); *Asplund, E.* 7819 (2), 8391 (6), 8612 (2), 17334 (6); *Ávila, F.* 2232 (7a), 2236 (7a), 2247 (2), 2252 (2), 2259 (2), 2272 (2); *Ayarde, H.* 369 (13).

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Díaz, A. 28 Dec 1999 (2); Díaz, (?) Mar 1933 (14); Díaz Ibarra, S.L. 2087 (2); Díaz-Piedrahita, S. 1131 (2); Díaz-Piedrahita, S. & R. Jaramillo 1798 (2), 1918 (7a); Díaz-Piedrahita, S., H. Valencia & R. Jaramillo 19700 (7a); Díaz-Piedrahita, S. et al. 2792 (2); Diers, L. 940 (8); Dillon, M. & B.L. Turner 1300 (20), 1308 (18), 1478 (16); Dorr, L.J. & L.C. Barnett 6035 (2); Dorr, L.J. & I. Valdespino 6474 (5); Downey, C. 131 (2); Duque, A. 559 (2).

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