

Two new species of *Werneria* from Peru and re-circumscription of *W. weberbaueriana* (Compositae, Senecioneae)

Authors: Calvo, Joel, Trinidad, Huber, and Beltrán, Hamilton

Source: *Willdenowia*, 50(1) : 5-12

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: <https://doi.org/10.3372/wi.50.50101>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non-commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

JOEL CALVO^{1*}, HUBER TRINIDAD² & HAMILTON BELTRÁN³

Two new species of *Werneria* from Peru and re-circumscription of *W. weberbaueriana* (*Compositae*, *Senecioneae*)

Version of record first published online on 21 February 2020 ahead of inclusion in April 2020 issue.

Abstract: Two new species of *Werneria* (*Compositae*, *Senecioneae*) are described from the highlands of central Peru on the basis of morphological evidence, namely *W. huascarana* and *W. rockhauseniana*. In addition, the misinterpreted taxonomic entity *W. weberbaueriana* is properly circumscribed according to the protologue. A neotype is designated for the name *W. weberbaueriana*. A key to the *Werneria* species occurring in the Peruvian department of Ancash is also presented. When data are certain, conservation status is assessed.

Key words: Andes, *Asteraceae*, *Compositae*, new species, Peru, *Senecioneae*, taxonomy, typification, *Werneria*

Article history: Received 11 July 2019; peer-review completed 29 October 2019; received in revised form 4 and 14 November 2019; accepted for publication 20 November 2019.

Citation: Calvo J., Trinidad H. & Beltrán H. 2020: Two new species of *Werneria* from Peru and re-circumscription of *W. weberbaueriana* (*Compositae*, *Senecioneae*). – *Willdenowia* 50: 5–12. doi: <https://doi.org/10.3372/wi.50.50101>

Introduction

The first comprehensive taxonomic revision of the Neotropical genus *Werneria* Kunth (*Compositae*, *Senecioneae*) was published in 1939 by German biologist E. F. M. Rockhausen, carried out within the frame of his dissertation under the supervision of F. L. E. Diels and R. K. F. Pilger (Rockhausen 1939). Rockhausen recognized 37 species; however, the circumscription of the genus was significantly narrowed after segregating several species that were placed within the new genera *Xenophyllum* V. A. Funk and *Misbrookea* V. A. Funk (see Funk 1997a, 1997b).

Following this criterion, the genus *Werneria* embraces rosetiform or scapiform perennial herbs, without genuine stems. These species display involucre bracts usually fused at the base (strongly partite in a few species), capitula radiate or discoid (disciform in one species), ray florets white or yellow when present, filament collar balusterform, and style branches truncate with a crown of sweeping hairs. Although two species bear supplementary bracts at the base of the involucre, their absence should be considered as another characteristic feature of the genus. They are mainly distributed through the Andean highlands from southern Argentina and Chile to western Venezuela. Only one species, *W. nubigena* Kunth, occurs

1 Instituto de Geografía, Facultad de Ciencias del Mar y Geografía, Pontificia Universidad Católica de Valparaíso, Avenida Brasil 2241, 2362807 Valparaíso, Chile; *e-mail: calvocasas@gmail.com (author for correspondence).

2 Laboratorio de Florística, Departamento de Dicotiledóneas, Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Av. Arenales 1256, Apartado 14-0434, Lima, Peru.

3 Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Av. Arenales 1256, Apartado 14-0434, Lima, Peru.

also in Central America northward to Tacaná Volcano in southern Chiapas (Mexico). Recent studies estimate the number of *Werneria* species at 27 (Calvo unpublished data).

The present work is part of ongoing studies on the genus *Werneria* (e.g. Beltrán 2017; Beltrán & Leiva 2018; Calvo & Beltrán 2019; Calvo & Meneses 2019; Calvo & Moreira-Muñoz 2019). Herein, we present a clarification of the taxonomic entity *W. weberbaueriana* and describe two new species on the basis of morphological evidence. These are known only from central Peru, two of them putative endemics of the Cordillera Blanca in Ancash Department (Fig. 3). A key to the *Werneria* species occurring in this department is also provided.

Material and methods

This contribution is the result of an intensive review of the published bibliography, field work in Peru, and the revision of herbarium specimens kept at F, LPB, MO, QCNE, US, and USM; herbarium codes follow Thiers (2019+).

Results and Discussion

1. *Werneria weberbaueriana* Rockh. in Bot. Jahrb. Syst. 70: 323. 1939.

– Type: Peru, Ancash, [“Cordillera Blanca bei Huaraz, 4300–4500 m a.s.l., May 1903, A. Weberbauer 2984” according to the *ind. loc.*] (B, destroyed). – **Neotype (designated here)**: Peru, Ancash, Huari [Asunción], Huascarán N.P., just crossing the Ulta pass, 4870 m a.s.l., 09°07'S, 77°30'W, 28 Jul 1985, D. N. Smith 11303 (US barcode US-00622845; isoneotypes: F accession no. 1960115, MO accession no. 3316165, USM accession no. 69993). – Fig. 1, 2B.

Description — Rhizomatous herb, rosetiform, forming mats, 2–2.5 cm tall. *Rhizome* 4–7 cm long, 0.3–0.6 cm in diam., horizontal to oblique, glabrous. *Leaves* simple, alternate, pseudopetiolate; leaf lamina spatulate to flabellate, 2–2.5 mm long, 2.5–3.5 mm wide, entire, truncate, thickened, 5–7-notched at apex, attenuate to cuneate at base, strongly conduplicate upward in cross-section, glabrous, 1-nerved above (barely conspicuous), 1-nerved beneath, fleshy, matte, papillose-verrucose near apex; pseu-



Fig. 1. *Werneria weberbaueriana* – A: habit; B: detail of leaves and capitulum. – Peru, Ancash, Asunción, surroundings of laguna Lebrón, 20 May 2009, photographed by A. Cano.

dopetiole 6.5–7.5 mm long, with scattered short marginal trichomes 0.05–0.1 mm long. *Capitulum* radiate, solitary, terminal, sessile to subsessile. *Involucre* 10–12 mm long, 7–8 mm wide, cupuliform, with bracts fused at base, glabrous; involucre bracts c. 11, c. 5 mm long, c. 2 mm wide at base, obtuse at apex, purplish; supplementary bracts absent. *Ray florets* 11–12, 7–8.1 mm long, c. 1 mm wide, 3-veined, subentire to 3-toothed at apex, not surpassing involucre, white. *Disc florets* c. 29, 5–5.5 mm long, 5-lobed, white with lobes purple-tipped; style branches truncate with a crown of sweeping-hairs, white. *Achenes* 2.7–2.8 mm long, 0.6–0.8 mm wide, cylindrical, 7- or 8-ribbed, glabrous, papillose; pappus 3.5–6.6 mm long, barbellate, whitish. *Chromosome number* unknown.

Phenology — Collected in flower from May to July.

Distribution and ecology — Endemic to Peru (Ancash). Known only from the central part of the Cordillera Blanca

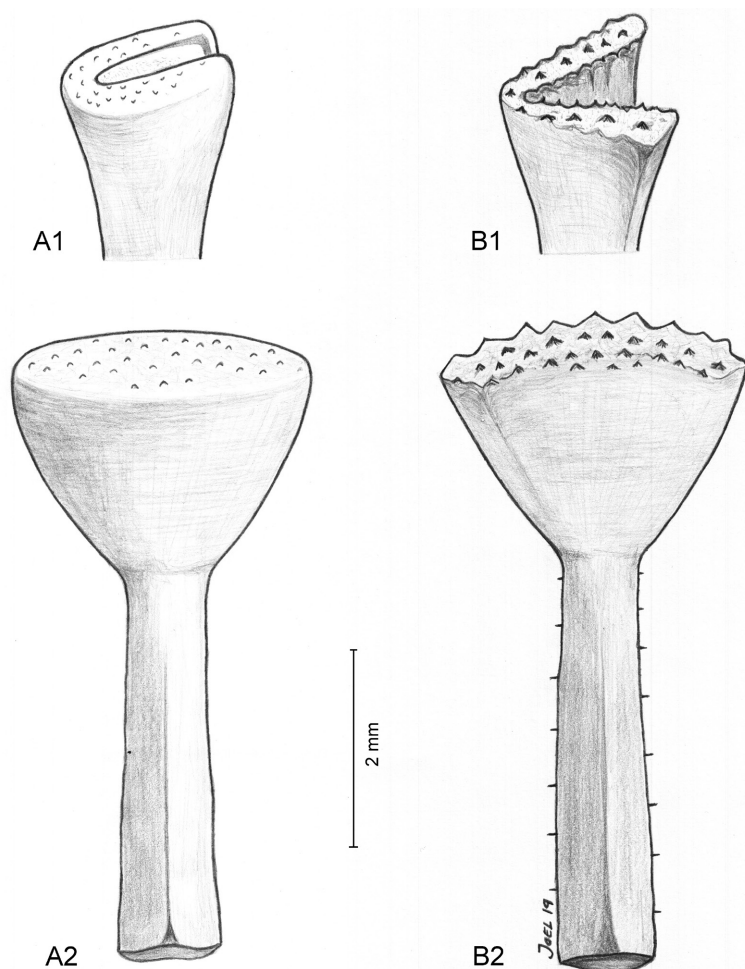


Fig. 2. A: *Werneria rockhauseniana*; A1: leaf apex; A2: leaf apex lower surface (flattened); drawn from *Smith & Valencia 9950*. – B: *W. weberbaueriana*; B1: leaf apex; B2: leaf apex lower surface (flattened); drawn from *Smith 11303*. – Drawings by J. Calvo.

(Fig. 3B). The species grows on exposed rocky slopes and cryoturbated soils around the upper limit of vegetation, at elevations of 4400–4870 m a.s.l. Some species observed in the same habitat are: *Draba depressa* Hook. f. (*Cruciferae*), *Gentianella weberbaueri* (Gilg) Fabris (*Gentianaceae*), and *Nototriche coccinea* A. W. Hill. (*Malvaceae*).

Etymology — The specific epithet honours the German botanist A. Weberbauer (1871–1948), who devoted part of his life to the study of the Peruvian flora.

Conservation status — The category Data Deficient (DD) is assigned because data are inadequate to determine a threat category (IUCN 2012). Further collections are needed in order to firmly assess its conservation status.

Remarks — Little is known about Rockhausen except that, as he stated himself (Rockhausen 1939), he received some guidance from A. Weberbauer (1871–1948), an outstanding German botanist who greatly contributed

to the knowledge of the Peruvian flora. In recognition for this help, Rockhausen named a new species from Peru in his honour, i.e. *Werneria weberbaueriana*.

As stated in the protologue, this species was described based on one collection from the Cordillera Blanca in Ancash previously misidentified as *Werneria aretioides* Wedd., a species distributed in southern Peru, western Bolivia, northern Chile, and northwestern Argentina. Rockhausen (1939) separated the new species from *W. aretioides* by the absence of a denticulate leaf margin, the leaf lamina being distally papillose-verrucose, and the style branches not being purple coloured.

Since the publication of *Werneria weberbaueriana* in 1939, few botanists focused their interest on this species. Recently, in the framework of a synopsis of the Peruvian *Werneria* species, Beltrán (2017) highlighted the papillose-verrucose leaves and yellow ray florets as diagnostic characters of this species. The striking inconsistency on the ray floret colour, which was originally described as white, led to our interest to this matter. After studying the *Werneria* material kept at USM, we realized that two distinct taxonomic entities were interchangeably identified as *W. weberbaueriana*. Indeed, an important character to discriminate one from the other is the colour of the ray florets but significant differences were also found in the leaf morphology (discussed below). Although the type material of *W. weberbaueriana* was

apparently destroyed at B in 1943, the detailed description provided in the protologue clearly corresponds to the species displaying white ray florets and a notched leaf apex. In order to remove any uncertainty surrounding the application of this name, we consider it appropriate to designate a neotype. The selected specimen is a collection by D. N. Smith from a locality not far from the type locality indicated in the protologue. It is a suitable collection because the label explicitly indicates that the ray florets are white. On the other hand, the taxonomic entity with yellow ray florets is described as a new species (see below).

Additional specimen examined — PERU: Ancash, Asunción, Chacas, alrededores de laguna Lebrón, 09°12'S, 77°29'W, 20 May 2009, A. Cano & al. 19373 (USM accession no. 299010).

2. *Werneria rockhauseniana* H. Beltrán, Trinidad & J. Calvo, **sp. nov.** – Fig. 2A, 4.

Holotype: Peru, Ancash, Huaylas, Huascarán N.P.,

pass between quebrada Los Cedros and Hatuncocha, 08°51'S, 77°45'W, 4600–4850 m a.s.l., 12 Mar 1985, D. N. Smith & R. Valencia 9950 (USM accession no. 68139; isotypes: F accession no. 1962951, LPB s.n., MO accession no. 3316189, QCNE accession no. 58168, US barcode US-00622663).

Diagnosis — The new species differs from *Werneria weberbaueriana* by having the leaf lamina plainly entire at the apex, the ray florets, disc florets, and style branches yellow, and the pseudopetioles glabrous.

Description — Rhizomatous herb, rosetiform, forming mats, 2–2.5 cm tall. *Rhizome* 3–6 cm long, 0.2–0.3 cm in diam., horizontal to oblique, glabrous. *Leaves* simple, alternate, pseudopetiolate; leaf lamina spatulate, 2.4–2.6 mm long, 2.2–2.5 mm wide, entire, truncate, thickened at apex, attenuate to cuneate at base, strongly conduplicate upward in cross-section (sometimes nearly tubular when young), glabrous, 1-nerved above (barely conspicuous), 1-nerved beneath, fleshy, matte, papillose near apex (rarely without papillae); pseudopetiole 4.8–12.1 mm long, glabrous. *Capitulum* radiate, solitary, terminal, sessile to subsessile. *Involucre* 7.4–8.2 mm long, 5.7–6.5 mm wide, cupuliform, with bracts fused at base, glabrous; involucre bracts 11–13, 3.6–4.8 mm long, 1.6–1.7 mm wide at base, obtuse at apex, greenish to purplish; supplementary bracts absent. *Ray florets* 11–20, 5.5–5.6 mm long, 0.6–1 mm wide, 3- or 4-veined, subentire to 3-toothed at apex, not surpassing involucre, yellow. *Disc florets* 32–33, 4.6–4.9 mm long, 5-lobed, yellow; style branches truncate with a crown of sweeping-hairs, yellow. *Achenes* 2.4–2.7 mm long, 0.6–0.7 mm wide, cylindrical, 6- or 9-ribbed, glabrous, papillose; pappus 3.5–4.5 mm long, barbellate, whitish. *Chromosome number* unknown.

Phenology — Flowering nearly all year round.

Distribution and ecology — Endemic to Peru (Ancash, Huánuco [expected], Lima). It is distributed through the Cordillera Blanca and Cordillera Huayhuash (Fig. 3C).

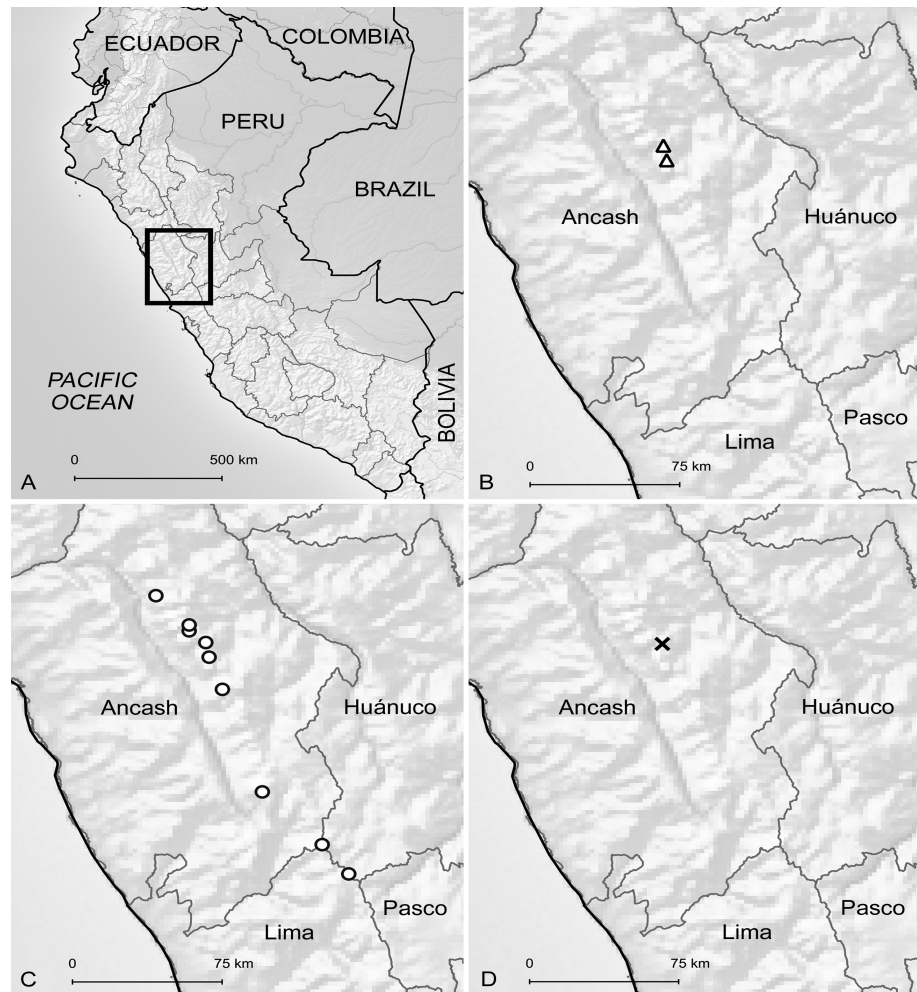


Fig. 3. A: Peru and adjacent countries; rectangle showing area of distribution maps B–D; B: *Werneria weberbaueriana* (Δ); C: *W. rockhauseniana* (\circ); D: *W. huascarana* (\times).

The species grows on exposed rocky slopes around the upper limit of vegetation, at elevations of 4200–6040 m a.s.l. In the same habitat the following species were observed: *Azorella pulvinata* Wedd. (*Umbelliferae*), *Bomarea dulcis* (Hook.) Beauverd (*Alstroemeriaceae*), *Chersodoma ovopedata* (Cuatrec.) Cuatrec., *Chuquiraga spinosa* Less., *Senecio burkartii* Cabrera, *Senecio canescens* (Bonpl.) Cuatrec., *Senecio collinus* DC., *Senecio culcitoides* Sch. Bip., *Werneria orbignyana* Wedd., and *Xenophyllum dactylophyllum* (Sch. Bip.) V.A. Funk. (all *Compositae*).

Etymology — The specific epithet honours the German biologist E. F. M. Rockhausen (1911–?), who published the first comprehensive revision of the Neotropical genus *Werneria*.

Conservation status — Based on the information available to us, this species does not meet the criteria to be considered as Vulnerable (VUL) because the number of known locations is more than ten (collections and observations) and most populations grow in protected areas, i.e. Huascarán National Park and Cordillera Huayhuash

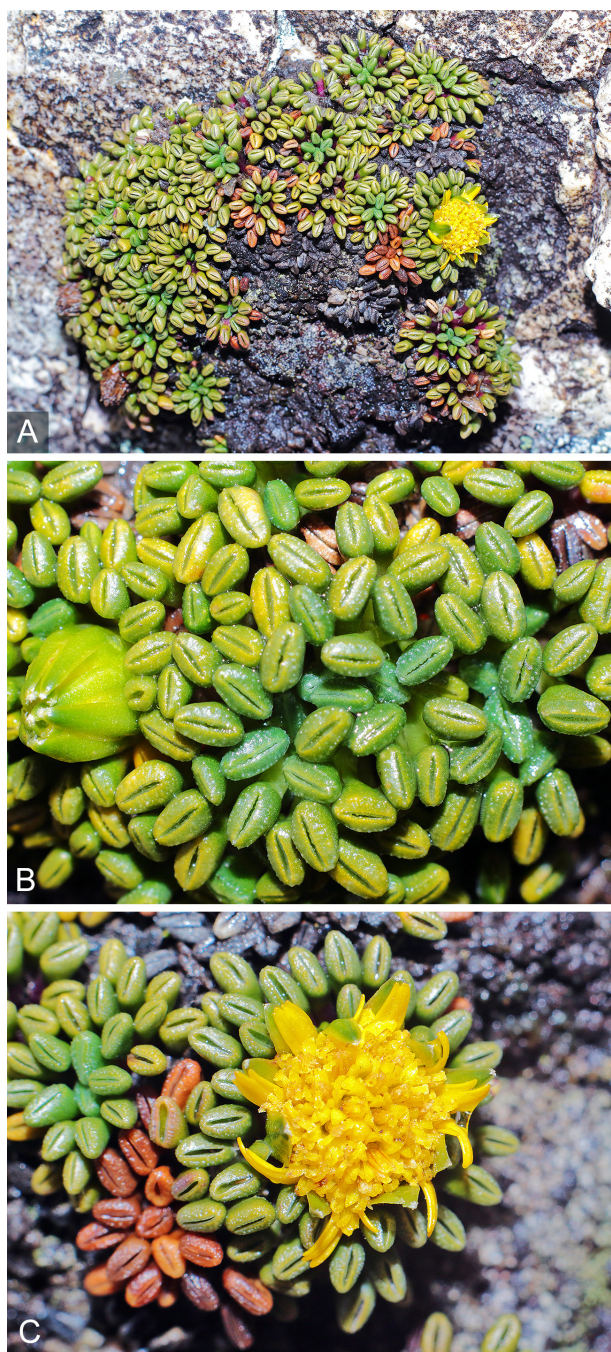


Fig. 4. *Werneria rockhauseniana* – A: habit; B: leaves; C: capitulum. – Peru, Lima, Cajatambo, 16 Oct 2017, photographed by H. Trinidad.

Reserved Zone. Consequently, *Werneria rockhauseniana* is preliminarily assigned to the category Near Threatened (NT) according to IUCN Red List categories and criteria (IUCN 2012).

Remarks — *Werneria rockhauseniana* has been confused with *W. weberbaueriana* (Beltrán 2017), with which it partially overlaps in distribution area. They can be differentiated by the colour of the ray florets (yellow in *W. rockhauseniana* [Fig. 4C] vs. white in *W. weberbaueriana* [Fig. 1B]), colour of the disc florets (yellow in *W.*

rockhauseniana vs. white with lobes purple-tipped in *W. weberbaueriana* [Fig. as above]), colour of the style branches (yellow in *W. rockhauseniana* vs. white in *W. weberbaueriana* [Fig. as above]), and leaf lamina apex (plainly entire in *W. rockhauseniana* [Fig. 2A, 4B] vs. 5–7-notched in *W. weberbaueriana* [Fig. 1B, 2B]). Moreover, *W. rockhauseniana* has glabrous pseudopetioles, whereas in *W. weberbaueriana* they bear short, scattered, marginal trichomes.

Additional specimens examined — PERU: Ancash, Bolognesi, Pacllón, sector Jahuacocho, Cordillera Huayhuash, cumbre del Nevado Rasác, 10°16'S, 76°55'W, 15 Jun 2004, *C. Callupe s.n.* (USM accession no. 235163); Huaylas, 19 May 2000, *A. Cano & al.* 10475 (USM accession no. 161429); Asunción, Chacas, alrededores de la laguna Lebrón, 09°12'S, 77°29'W, 20 May 2009, *A. Cano & al.* 19372 (USM accession no. 299009); near top of divide over Cordillera Blanca, upper slopes of Huascarán, above lagunas Llanganuco, 09°01'S, 77°35'W, 10 Jul 1982, *A. Gentry & al.* 37441 (MO accession no. 3100003, USM accession no. 57498); Recuay, Huascarán N.P., mouth of quebrada Quenua Ragua, 09°58'S, 77°13'W, 10 May 1985, *D. N. Smith, R. Valencia & A. Gonzales* 10655 (MO accession no. 3316191, USM accession no. 69032); Carhuaz, Huascarán N.P., quebrada Ishinca, side valley to laguna Ishinca, 09°23'S, 77°25'W, 16 Jul 1985, *D. N. Smith & M. Buddensiek* 11213 (F accession no. 1960571, MO accession no. 3316192, USM accession no. 166000); Carhuaz, Huascarán N.P., quebrada Ulta, near Ulta pass, 09°07'S, 77°30'W, 28 Jul 1985, *D. N. Smith* 11309 (F accession no. 1960118, MO accession no. 3316190, USM accession no. 69999); Yungay, Huascarán N.P., Llanganuco sector, quebrada Ancosh at portachuelo, 09°03'S, 77°35'W, 31 Dec 1984, *D. N. Smith & K. Goodwin* 8893 (F accession no. 1962952, MO accession no. 3316188, USM accession no. 66982). Lima, Cajatambo, Raura, 10°26'S, 76°47'W, 15 Apr 1988, *S. Rivas & al. s.n.* (USM accession no. 165997).

3. *Werneria huascarana* J. Calvo, H. Beltrán & Trinidad, sp. nov. – Fig. 5.

Holotype: Peru, Ancash, Carhuaz, Huascarán National Park, quebrada Ulta, near Ulta pass, 09°07'S, 77°30'W, 4870 m a.s.l., 28 Jul 1985, *D. N. Smith* 11308 (USM accession no. 69998; isotype: MO n.v.).

Diagnosis — *Werneria huascarana* differs from the other species of the genus by the combination of the following characters: rhizomes covered by long silky trichomes and leaf-base remnants, leaf lamina narrowly elliptic, glabrous, 6.5–12 mm long, supplementary bracts absent, ray florets yellow.

Description — Rhizomatous herb, rosetiform, forming lax clumps, 2–3 cm tall. *Rhizome* 6–8 cm long, 0.2–0.3 cm in diam., horizontal to oblique, covered by long silky trichomes and leaf-base remnants. *Leaves* simple, alternate,

prolonged into a sheath-like base bearing long silky trichomes; leaf lamina narrowly elliptic, 6.5–12 mm long, 1.5–2.5 mm wide, entire, acute, callous-tipped at apex, attenuate at base, flat in cross-section, glabrous, 1-nerved above (barely conspicuous), 1-nerved beneath (barely conspicuous), somewhat fleshy, matte. *Capitulum* radiate, solitary, terminal, sessile to subsessile. *Involucre* 10–11 mm long, 7–8 mm wide, cupuliform, with bracts fused at base, glabrous; involucre bracts c. 13, 4–4.5 mm long, 1.5–2 mm wide at base, acute at apex, greenish; supplementary bracts absent. *Ray florets* c. 10, 10–11 mm long, 1.8–2.1 mm wide, 4- or 5-veined, 3-toothed at apex, conspicuously surpassing involucre, yellow. *Disc florets* c. 60, 6–6.5 mm long, 5-lobed, yellow; style branches truncate with a crown of sweeping-hairs, yellow. *Achenes* cylindrical, glabrous (immature); pappus c. 5 mm long, barbellate, whitish. *Chromosome number* unknown.

Phenology — Collected in flower from April to July (also seen in flower in November).

Distribution and ecology — Endemic to Peru (Ancash). Until now, *Werneria huascarana* is known only from the surroundings of the Ulta pass, located between the cities of Carhuaz and Chacas in the central part of the Cordillera Blanca (Fig. 3D). The species grows on rock outcrops and scree slopes around the upper limit of vegetation, at elevations of 4700–4900 m a.s.l. It occurs along with *Brayopsis calycina* (Desv.) Gilg & Muschl. (*Cruciferae*), *Chersodoma ovopedata*, *Lachemilla tanacetifolia* Rothm. (*Rosaceae*), *Senecio comosus* Sch. Bip., *Senecio scrobicarioides* DC. (both *Compositae*), *Urtica echinata* Benth. (*Urticaceae*), and *Xenophyllum dactylophyllum*.

Etymology — The specific epithet refers to the Huascarán National Park, from where this species is known.

Conservation status — Data are inadequate to determine a threat category, and therefore the category Data Deficient (DD) is assigned (IUCN 2012).

Remarks — Among the species displaying yellow ray florets, *Werneria huascarana* may be confused with *W. canaliculata* Sch. Bip., *W. cornea* S.F. Blake, and *W. pumila* Kunth. The leaf characters are useful to discriminate it from *W. canaliculata*, i.e. shape (narrowly elliptic vs. linear in *W. canaliculata*), length (6.5–12 mm long vs. 8–37 mm long in *W. canaliculata*), venation of the lower surface (midrib barely conspicuous vs. midrib remark-



Fig. 5. *Werneria huascarana*. – A: habit; B: detail of leaves and capitulum. – Peru, Ancash, Asunción, abra de punta Olímpica, 15 Nov 2006, photographed by A. Cano.

ably prominent and usually canaliculate in *W. canaliculata*, and texture (somewhat fleshy vs. rather coriaceous in *W. canaliculata*). The distribution area of *W. canaliculata* ranges from Huancavelica (Peru) to La Paz (Bolivia), and therefore the distribution areas of this and *W. huascarana* do not overlap. *Werneria huascarana* can be readily differentiated from *W. cornea* by the leaf shape (narrowly elliptic vs. linear, somewhat falcate in *W. cornea*) and leaf apex (acute, callous-tipped vs. obtuse in *W. cornea*). Moreover, *W. cornea* has rather coriaceous leaves with a remarkably thickened margin. Both species occur in Ancash Department. *Werneria huascarana* differs from *W. pumila* in the leaf shape and length (narrowly elliptic, 6.5–12 mm long vs. linear-oblongate, 18–85 mm long in *W. pumila*), number of involucre bracts (c. 13 vs. 19–21 in *W. pumila*), and absence of supplementary bracts (12–16 in *W. pumila*). Their distribution areas do not overlap.

The habit and leaves of *Werneria huascarana* also show some morphological similarities to those of *W. pygmaea* Gillies ex Hook. & Arn., especially in Ancash Department, where this species displays narrowly oblan-

ceolate leaves wider than typical forms. However, any confusion is unlikely because *W. pygmaea* has white ray florets.

Additional specimen examined — PERU: Ancash, Asunción, Chacas, abra de punta Olímpica, 09°07'S, 77°30'W, 24 Apr 2004, A. Cano, M. I. La Torre & W. Mendoza 14507 (USM accession no. 210736).

Key to the species of *Werneria* recorded from Ancash Department, Peru

In the framework of an exhaustive floristic work carried out by Smith (1988) in the Huascarán National Park (Ancash Department), twelve *Werneria* species were recorded from this region, plus six unidentified species. Several of these species are nowadays accepted as members of other related genera (e.g. *W. dactylophylla* Sch. Bip. [= *Xenophyllum dactylophyllum*]) or correspond to misidentifications (i.e. *W. aretioides*). Therefore, the number of species cited in Smith's work is six according to the current delimitation of *Werneria*. The key presented below includes fifteen species and it is based on the monograph of *Werneria* that the first author is undertaking.

1. Capitulum discoid or disciform 2
 - Capitulum radiate 3
2. Capitulum disciform; leaf lamina entire
 - *W. carnulosa* A. Gray
 - Capitulum discoid; leaf lamina pinnatifid to pinnatisect *W. heteroloba* Wedd.
3. Leaf lamina marginally denticulate or ciliate 4
 - Leaf lamina entire 6
4. Leaf lamina denticulate; involucre bracts 6.4–18.2 mm long *W. orbignyana*
 - Leaf lamina ciliate; involucre bracts 3.2–5 mm long 5
5. Leaf lamina linear-oblong, with cilia scattered and limited to distal part
 - *W. castroviejoi* J. Calvo & H. Beltrán
 - Leaf lamina narrowly spatulate to clearly spatulate, with cilia regularly distributed along whole margin *W. pectinata* Lingelsh.
6. Leaf apex truncate, strongly conduplicate upward; well-developed ray florets not surpassing involucre 7
 - Leaf apex aristate to obtuse, not strongly conduplicate upward; well-developed ray florets conspicuously surpassing involucre 8
7. Ray florets yellow; leaf apex plainly entire
 - *W. rockhauseniana*
 - Ray florets white; leaf apex 5–7-notched *W. weberbaueriana*
8. Ray florets yellow 9
 - Ray florets white 11

9. Involucre with supplementary bracts; involucre bracts 6.8–10.9 mm long; ray florets 19–20
 - *W. villosa* A. Gray
 - Involucre without supplementary bracts; involucre bracts 4–6.5 mm long; ray florets 10–13 10
10. Leaf lamina linear (somewhat falcate), obtuse at apex; involucre bracts 4.8–6.5 mm long; disc florets 33–35 *W. cornea*
 - Leaf lamina narrowly elliptic, acute, usually callous-tipped; involucre bracts 4–4.5 mm long; disc florets c. 60 *W. huascarana*
11. Leaf apex aristate (at least in young leaves) 12
 - Leaf apex apiculate to obtuse 13
12. Leaf lamina graminoid, (8–)12–25 mm long, flat in cross-section; involucre bracts 13–20
 - *W. caespitosa* Wedd.
 - Leaf lamina fleshy, 2.5–5.7 mm long, elliptic to terete in cross-section; involucre bracts 8–13
 - *W. microphylla* H. Beltrán & S. Leiva
13. Involucre bracts 12–27, 6.7–30 mm long; ray florets (12–)16–27, (13.7–)27–55 mm long ... *W. nubigena*
 - Involucre bracts 8–14, 3–6.4 mm long; ray florets 8–18, 6.4–12.5 mm long 14
14. Leaf lamina flat, graminoid to subcoriaceous, rather shiny; sheath-like leaf base sclerified and with long silky trichomes *W. apiculata* Sch. Bip.
 - Leaf lamina elliptic to terete, somewhat fleshy, rather matte; sheath-like leaf base barely sclerified and with arachnoid-lanate trichomes *W. pygmaea*

Acknowledgements

We are grateful to the curators and staff of the herbaria mentioned in the text. Special thanks are due to Asunción Cano (USM) for kindly sharing the pictures of *Werneria huascarana* and *W. weberbaueriana*. Cano's collections were made under the following permits: 42-99-INRENA-DGANPFS-DANP, 074-2004-INRENA-IFFS-DCB, and 079-2016-SERFOR/DGGSPFFS. Our thanks are extended to an anonymous reviewer for insightful comments. This work has been funded by FONDECYT from Chile by means of a postdoctoral fellowship of the first author (project No. 3170270).

References

- Beltrán H. 2017: Sinopsis del género *Werneria* (Asteraceae: Senecioneae) del Perú. – *Arnaldoa* **24**: 45–62.
- Beltrán H. & Leiva S. 2018: *Werneria microphylla* (Asteraceae, Senecioneae), a new species from the Andean marshes of Peru. – *Phytotaxa* **372**: 296–300.
- Calvo J. & Beltrán H. 2019: Contributions to the Andean Senecioneae (Compositae) – I. Two new species of *Werneria*. – *Phytotaxa*: **408**: 136–142.

- Calvo J. & Meneses R. I. 2019: Contributions to the Andean *Senecioneae* (*Compositae*) – II. *Werneria lanatifolia*, a new species from central Andes. – *Phytotaxa*: **422**: 201–205.
- Calvo J. & Moreira-Muñoz A. 2019: Re-circumscription of *Werneria cochlearis* (*Compositae*): nomenclature, taxonomic notes, and new synonyms. – *Brittonia* **71**: 172–176.
- Funk V. A. 1997a: *Xenophyllum*, a new Andean genus extracted from *Werneria* s.l. (*Compositae: Senecioneae*). – *Novon* **7**: 235–241.
- Funk V. A. 1997b: *Misbrookea*, a new monotypic genus removed from *Werneria* s.l. (*Compositae: Senecioneae*). – *Brittonia* **49**: 110–117.
- IUCN 2012: IUCN Red List categories and criteria. Version 3.1, ed. 2. – Gland & Cambridge: IUCN.
- Rockhausen M. 1939: Verwandtschaft und Gliederung der Compositen-Gattung *Werneria*. – *Bot. Jahrb. Syst.* **70**: 273–342.
- Smith D. N. 1988. Flora and vegetation of the Huascarán National Park, Ancash, Peru: with preliminary taxonomic studies for a manual of the flora. – Iowa State University, Retrospective Theses and Dissertations. – Published at <https://doi.org/10.31274/rtd-180813-8885> [accessed 1 Nov 2019].
- Thiers B. 2019+ [continuously updated]: Index herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's virtual herbarium. – Published at <http://sweetgum.nybg.org/science/ih/> [accessed 15 Jun 2019].

Willdenowia

Open-access online edition bioone.org/journals/willdenowia



Online ISSN 1868-6397 · Print ISSN 0511-9618 · 2018 Journal Impact Factor 1.156

Published by the Botanic Garden and Botanical Museum Berlin, Freie Universität Berlin

© 2020 The Authors · This open-access article is distributed under the CC BY 4.0 licence