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The genus *Echeveria* in Bolivia. Part 1

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Summary

This article reviews the genus *Echeveria* in Bolivia. As of 2026, we recognize seven species: *E. whitei* (1925), *E. buchtienii* (1934), *E. chilonensis* (originally described as *Sedum* in 1893, reclassified to *Echeveria* in 1935), *E. rauschii* and *E. vanvlietii* (both described in 1969), *E. bakeri* (1991), and *E. krahnii* (2009). In 1972, *E. buchtienii* was considered a synonym of *E. whitei*; subsequently, *E. vanvlietii* was synonymized with *E. chilonensis* and *E. rauschii* with *E. whitei* in 2003. However, these two latter taxa have since been reinstated as separate species. In this article we clarify that *E. buchtienii* remains a distinct species. Comprehensive descriptions and illustrations of all seven currently accepted species are provided, along with an identification key.

Key words: Bolivia, *Crassulaceae*, *Echeveria,* South America.

Resumen

Este artículo revisa el género *Echeveria* en Bolivia. Hasta 2026, reconocemos siete especies: *E. whitei* (1925), *E. buchtienii* (1934), *E. chilonensis* (originalmente descrita como *Sedum* en 1893, reclasificada como *Echeveria* en 1935), *E. rauschii* y *E. vanvlietii* (ambas descritas en 1969), *E. bakeri* (1991) y *E. krahnii* (2009). En 1972, *E. buchtienii* fue considerada sinónimo de *E. whitei*; posteriormente, *E. vanvlietii* fue sinonimizada con *E. chilonensis* y *E. rauschii* con *E. whitei* en 2003. Sin embargo, estos dos últimos taxones han sido restablecidos como especies separadas. En este artículo aclaramos que *E. buchtienii* sigue siendo una especie distinta. Se proporcionan descripciones e ilustraciones completas de las siete especies actualmente aceptadas, junto con una clave de identificación.

Palabras clave: Bolivia, *Crassulaceae*, *Echeveria,* Sudamérica.

Introduction

The family Crassulaceae of the order Saxifragales includes the genus *Echeveria*, which was described by De Candolle in 1828. This genus is endemic to the Americas and has a distribution that spans from Texas in the United States all the way south to Argentina (Thiede and Eggli, 2007). Although most *Echeveria* species are found in Mexico, there are several species in South America (van Keppel, 1972) where recent explorations—especially in Peru—have led to a dramatic increase in recognized taxa, rising from just five species in this country reported by Macbride (1938) to 26 taxa according to Bischofberger's listing (2026).

Bolivia is characterized by a variety of ecosystems in the Andes mountain range where different plant species live (Kesler & Beck, 2001). Plant diversity and endemism are found in the yungas, dry forests, sub-Andean Amazon forests (Ibisch et al., 2003), and the eastern slopes of the Andes mountain range (Beck, 2014). The genus *Echeveria* is characterized by herbaceous perennial plants with succulent leaves forming a rosette, lateral inflorescence with cylindrical to pentagonal flowers, 5 petals of white, yellow or red color (Thiede & Eggli, 2007). In Bolivia there are currently 6 accepted species of *Echeveria* (Jørgensen et al., 2014). The geographical, climatic and ecological characteristics of the Bolivian - Tucumán forest, with deep valleys in "U" or "V" shape with steep slopes and dry deciduous forests with varied microclimates are factors that allow the development and diversity of *Echeveria* in Bolivia.

In the case of Bolivia, the first *Echeveria* to be discovered was *E. chilonensis* (Kuntze) Walther, in 1892 by the German botanist Carl Ernst Otto Kuntze, but it was initially described one year later as a member of the genus *Sedum* and reassigned later to *Echeveria* by Walther (1935). *E. whitei* Rose was discovered by the American botanist Orland E. White in 1921, at Quime, near La Paz and described in 1925 by Rose. Later, in 1932, *E. buchtienii* was found by German botanist Otto Buchtien closer to La Paz, and described two years later by German Botanist Karl von Poellnitz, but it was reduced as a synonym of *E. whitei* Rose by Walther (1972). In 1968, both *E. rauschii* and *E. vanvlietii* were discovered in department Chuquisaca and they were described the next year by Dutch botanist Johannes (Joop) Cornelis van Keppel. In 1991 Kimnach described *E. bakeri* which had been discovered by William Baker in 1983 near Cochabamba. In 2003 Kimnach synonymized *E. vanvlietii* with *E. chilonensis* and *E. rauschii* with *E. whitei*, and in 2009 he finally published *E. krahnii*, discovered by Wolfgang Krahn in Incahuasi, Santa Cruz. *E. rauschii* has been reinstated as a distinct species (Bischofberger, 2017). However, the six currently recognized species—namely [*E. bakeri*, *E.chilonensis*, *E. krahnii, E. rauschii*, *E. vanvlietii*, and *E. whitei*]—remain not well defined, poorly described, and not illustrated.

Material and Methods

A compilation of information on the descriptions of the species of *Echeveria* from Bolivia was carried out. Herbarium sheets of Bolivian (BOLV, HSB, LPB, USZ) and international herbaria (B, HNT, K, MO, NHA, NY, PH, US, USM) were examined (Acronyms according to Thiers, 2019). Plants collected for this study were deposited at HSB, registered as Scientific Institute at national

level (ICA), through resolution N° 026/09 of the Plurinational State of Bolivia, that enabled the collection. The project: "Taxonomical and Phylogenetic revision of genus *Echeveria* in Bolivia" was approved by the Ministry of Planification of Development and Environment through authorization MPDyMA/VMABCCGDF/DGBAP/UGCE-NE 00485/2026 to be conducted by San Francisco Xavier University. Field trips were conducted by Hibert Huaylla since 2015, by John Carr since 1998, especially in 2015 and 2023, William Ale in 2022 and by Daniel Marquiegui in 2022, 2023 and 2026. Collections made by James Solomon during 1984–1987 and E. Saravia in 1994 as well as observations of Martin Lowry from 1999 to 2024 are worthy to be mentioned. Morphological and floral characteristics were analyzed in their natural habitat and in the laboratory, and a collection of photographs was assembled. The preliminary categorization of the species of Bolivian *Echeveria* was carried out according to the IUCN categories and criteria (2024). Photos were made by Guillermo Pino except otherwise mentioned (DM = Daniel Marquiegui, HH = Hibert Huaylla).

Results

1. *Echeveria bakeri* Kimnach, *Cactus and Succulent Journal* (US) 63(5): 254. fig. 1–4. (1991). Fig. 1a–k.

Type : **Bolivia, Dept. Cochabamba, Prov. Quillacollo [Tapacarí],** ca 30 km W of Cochabamba on road to Oruro, ca. 3350 m asl., Feb 1983, *W. Baker 5159* (Holotype: HNT 49862!, Isotypes: LPB, MO, US3496531!, Barcode: 03775596).

Amended description: A succulent glabrous **herb** 5–10 cm tall, 20–45 (–90) cm tall in blossom. **Stem** buried, erect, 1.8–3 cm diam, 2–10 cm long, light grayish brown, 1–3 branches from base, also branching from apex. **Roots** 4–8, as primary and secondary taproots gradually tapering from the base, 15–24 cm long, 0.4–0.6 cm diam. at base. **Rosettes** one at the end of stem or branch, 9–15 (–20) cm diam. **Leaves** 14–18, obovate to lanceolate when young, then narrowly obovate to suboblong, in some leaves subrhomboidal, sessile, strongly attached, straight, ascending to incurved, 2–7.8 (–11) cm long, 0.4–1.7 cm wide at base, 0.75–1.9 cm wide at proximal third, 1.3–2.5 (–3) cm wide at middle, 0.8–2 cm wide at distal third, 3–6 mm thick, upper side flat to convex basally, slightly canaliculate on distal half, faceted 2–4 mm from margin in distal half, color light blue to whitish, strongly pruinose in mature leaves, light olive green to light mauve beneath wax, lower side convex to obtusely carinate, same color, apex obtuse to acute when young, later obtuse to cuspidate with a 1.5–2 mm mucro, base hyaline whitish.

Flowering stem 1–2 oblique lateral subterminal racemes, rachis (15–) 30–60 cm long, 6–8 mm diam. at base, 4–6 mm diam. at apex, light blue-glaucous or pink. **Peduncular bracts** 10–20, permanent, at proximal half of stem, inserted every 0.8–1.5 cm, oblong-elliptical to narrowly ovate, erect or up to 30º, 1.5–5.5 × 0.5–2 cm, 2–6 mm thick, inner side flat, outer side convex, light blue-glaucous, apex acute to cuspidate, base hyaline with a 2 mm spur. **Flowers** (10–)18–40, 2–1.6–2 cm long and 1–1.1 cm diam., present at distal half of the scape. **Pedicels** 0.2–2.2 cm long, 2–3 mm diam., first erect, then recurvate, glaucous pink to red and pruinose, sometimes with a

small bracteole at base, similar to sepal but 1.5–1.8 cm long × 0.25–0.4 cm wide. **Calyx** lobes united at base, sepals unequal, oblong to ovate or triangular, ascending or at a very acute angle, sometimes adpressed, (4–) 8–13 mm long, 3–5 mm wide, 2–3 mm thick, glaucous to pink, covered with white 0.2 mm diam. dots of pruinescence, apex acute, apex and margins reddish. Flower buds ovoid, 1.3–1.5 cm diam. × 1.2–1.5 cm long, light coral red, entirely covered by pruinescence. **Corolla** prismatical to subpyramidal, 0.9–1 cm thick near base, 0.7–0.8 cm thick near apex, petals oblong to elliptical, apex subacute to obtuse, 1.5–2 cm long, 4–5.5 mm wide, outer surface keeled, light coral red due to pruinescence, with a coral red central stripe lacking pruinescence along keel, sometimes yellowish towards the base, apex slightly recurving, inner surface coral orange to coral red, redder near apex. Stamens 10, the 5 epipetalous 0.5–0.7 cm long, the antesepalous 0.9–1.1 cm long, filaments cream, 0.8–1.2 mm thick at base, gradually tapering to 0.3 mm. Anthers ellipsoid to ovoid, yellow, 2–3.5 mm long × 1–1.3 mm diam. Gynoecium ovoid, 8–9 mm long, 6–8 mm thick. Carpels 5, cream. Styles parallel, almost touching each other, 3–4 mm long, reddish towards apex. Stigma lighter or reddish in color. Nectaries lunate, white, 2.5–3 × 0.8–0.9 mm.

Distribution and habitat: *Echeveria bakeri* is endemic to Bolivia and only known from the road from Cochabamba to Oruro. It grows in the Andean zone between 3350 and 3750 m asl., at the head of valleys of the Bolivian– Tucumán forest and Mesophytic Puna, together with *Polylepis subtusalbida* (Bitter) M. Kessler & Schmidt-Leb., *Crassula connata* (Ruiz & Pav.) A.Berger, *Puya herzogii* Wittm., *Begonia baumannii* Lemoine, *Hemionitis pruinata* (Kaulf.) Christenh. *Cystopteris fragilis* (L.) Bernh., *Alonsoa acutifolia* Ruiz & Pav., *Stevia tunariensis* Hieron, *Calceolaria parviflora* Gillies ex Benth. and *Peperomia* sp. subg. *Tildenia*.

Phenology: It flowers later than other species at the end of the rainy season from April to May.

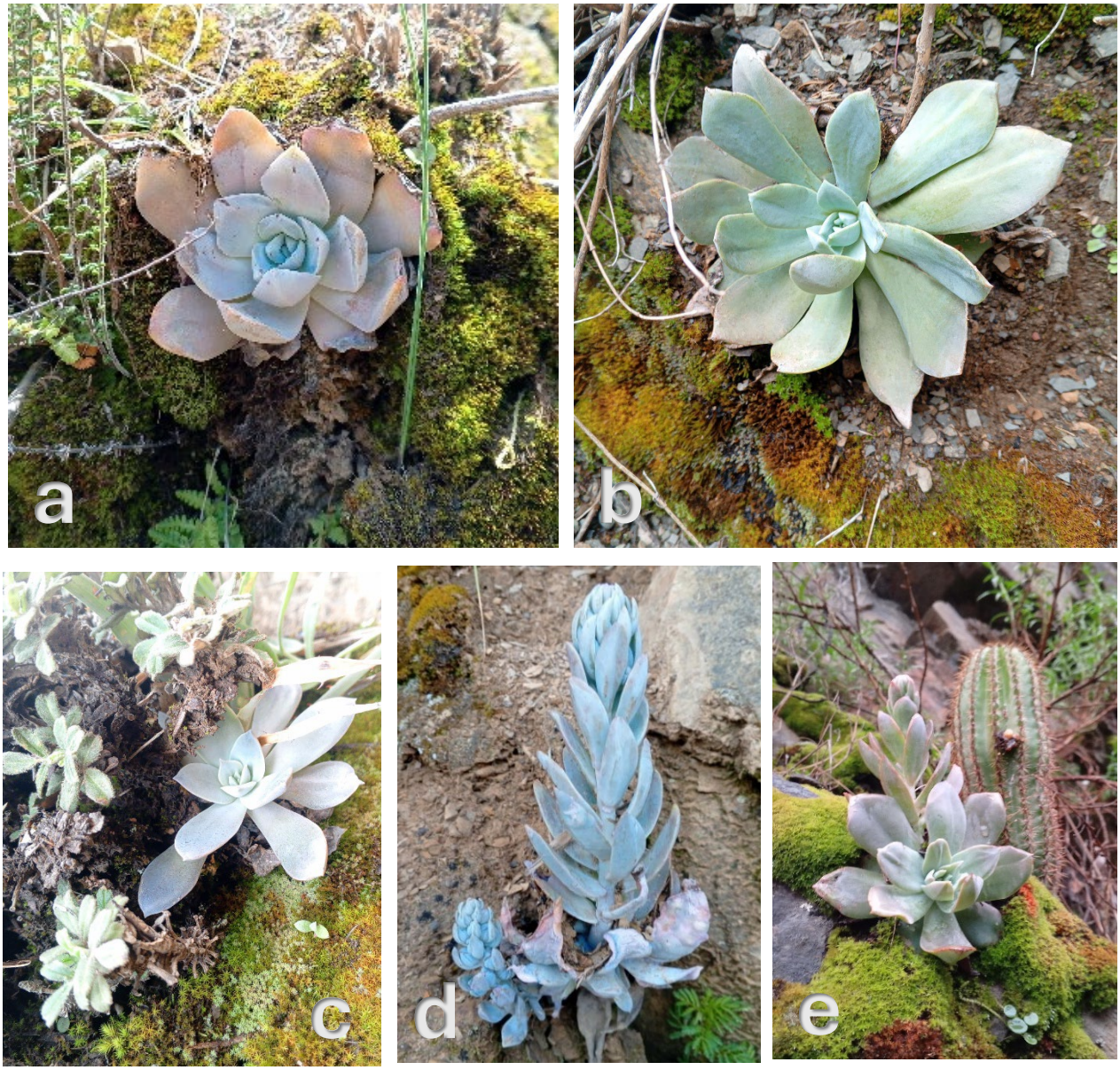
Conservation status: This species is only known from one small locality on the way from Cochabamba to Oruro, populations with few juvenile plants are observed to disperse. The habitat where the species grows is an unstable area with frequent landslides. Therefore, it should be classified as critically endangered (CR), according to the IUCN. The exact locality is not detailed here to protect the species.

Other specimens examined: **Bolivia, Dept. Cochabamba, Prov. Tapacarí, Munic. Tapacarí,** road from Cochabamba to Oruro, 3750 m, 23 Feb 2026, *H. Huaylla, D. Marquiegui & G. Pino 5197* (HSB 000-12438)*;* road from Cochabamba to Oruro, 3680 m, 23 Feb 2026, *H. Huaylla, D. Marquiegui & G. Pino 5198* (HSB 000-12439, USM 363363).

Etymology: Named for William Warren "Bill" Baker (1947–2009), nursery man, plant collector and landscape designer from Reseda (Tarzana), California, USA, who made several plant-hunting excursions into Central and South America.

Taxonomical notes: *E. bakeri* was discovered in 1983 and never seen again in 43 years until Daniel Marquiegui found it. The precise location is intentionally omitted to safeguard the plant, given its limited population size. This area has extensively been explored but all that was found

were plants similar to *E. whitei* Rose. *E. bakeri* is clearly distinguishable from all other Bolivian species by the size of its leaves, rosettes and bracts, all light blue-glaucous because of pruinescence. In the protologue Kimnach mentions a sample (*Mario Arandia 485*) but it is not *E. bakeri*. Chromosomes of *E. bakeri* are ca. 160 according to Uhl (2007).



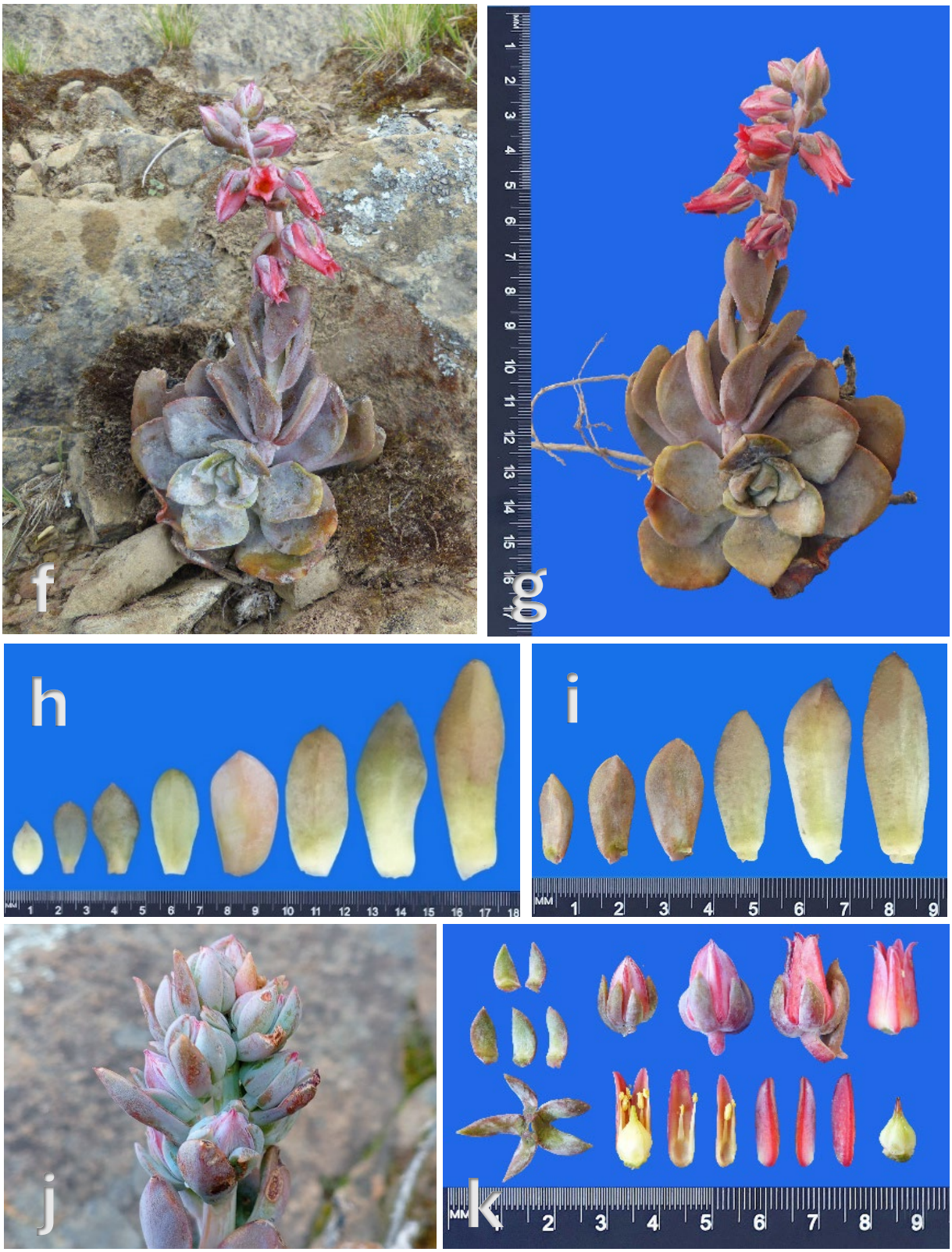

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Fig. 1 a. Young *Echeveria bakeri* in habitat (DM). **b**. Adult plant in habitat before anthesis (DM). **c.** Small colony in habitat (DM). **d.** Plant in habitat starting to produce scapes (DM). **e.** Detail of the apex of the flowering stem**. f.** Adult plant in blossom in habitat. (HH) **g.** Plant *ex situ*. **h.** Details of the leaves. **i.** Details of the bracts. **j.** Details of flower buds of plant in habitat (DM). **k.** Details of the flower.

2. *Echeveria buchtienii* von Poellnitz, *Repert. Spec. Nov. Regni Veg.* 36: 193–194 [not illustrated] (1934). Fig. 2 a–h.

Type : **Bolivia, Dept. La Paz, Prov. Pedro Murillo [Munic. La Paz]**, slopes near Obrajes, 3450 m, 22 Apr 1933, *Otto Buchtien s.n.* (Lectotype [designated here, according to art. 9.3 ICN]: B 10 0242095!).

Diagnosis: *Echeveria buchtienii* von Poellnitz is close to *Echeveria whitei* Rose from which it differs by the following characters: The plants are taller (55 cm *vs.* 30 cm), the stems are longer and partially aerial and not totally buried (20 cm *vs.* 2–5 (–10) cm), thicker in diameter (1.1–2.3 cm *vs.* 0.3–0.8 cm), the rosettes are larger (8–15 cm *vs.* 2.8–9 cm diameter) and the leaves are longer (3–8.7 cm *vs.* 2.1–4.5 cm) and wider (1.3–1.6 cm *vs.* 0.8–1.4 cm at the middle). They are acute with a 1–2 mm wide reddish mucro, compared to the cuspidate, small mucronate apex of *E. whitei.* The leaf color is more frequently purplish. The scape is longer (27–50 cm *vs.* 10–12 cm) with more flowers per scape: 8–16 compared to 3–12, with longer bracts (1.6–3 cm *vs*. 0.7–1.4 cm long) which are ovate, not lanceolate, pedicels are not very different in length (0.45–1.45 cm *vs.* 0.8–1.6 cm) but they are terete instead of funnel-shaped, sepals are narrowly ovate or oblong, acuminate or mucronate compared to the ovate to oblong or triangular, acute sepals of *E. whitei*, and much larger (5–12 mm long, 2.8–5 mm wide *vs.* 4–8 mm long, 1.8–3 mm wide). Petals are also longer (1.7–1.9 cm *vs.* 1.15–1.35 cm long) and wider (3–5 mm *vs.* 2.5–3 mm wide), scarlet red, lighter at borders and inside, never yellow, compared to the crimson red to orange, more opaque petals of *E. whitei*.

Amended description: A succulent glabrous **herb** 3.5–8 cm tall, up to 30–55 cm tall in blossom. **Stem** semiburied, erect to decumbent, 1.1–2.3 cm diam, up to 20 cm long, light grayish brown, with annular scars of fallen leaves, seldom branching from base. **Roots** 1–4, as primary and secondary taproots gradually tapering from the base, 6.5–12 cm long, 0.35–0.7 cm diam. at base. **Rosettes** one at the end of stem or branch, 8–15 cm diam. **Leaves** 12–24, very narrowly obovate to narrowly spatulate, sessile, loosely attached, mostly recurved, 3–8.7 cm long, 0.7–1.23 cm wide at base, 0.75–1.25 cm wide at proximal third, 1.3–1.6 cm wide at middle, 1–2 cm wide at distal third, 5–8 mm thick, upper side flat to slightly channeled, light olive green, tinged purplish distally when exposed, lower side convex to subcarinate, light olive green to bright green, sometimes dotted purplish, apex acute or with a 1–2 mm wide mucro, reddish or purplish, base hyaline whitish.

Flowering stem an oblique lateral subterminal raceme, rachis 27–50 cm long, 4.5–5 mm diam. at base, 2.5–3.5 mm diam. at apex, light olive green at base, sometimes orangish, more pronounced

distally. **Peduncular bracts** 12–30, deciduous, at proximal two thirds of stem, narrowly ovoid, inserted oblique upwards, 1.6–3 × 0.6–1.15 cm, 3–4.5 mm thick, inner side flat, outer side convex, light olive green to purplish, apex acuminate, reddish. **Flowers** 8–16, present at distal third or fourth of the scape, 2–2.4 cm long and 1.2–1.3 cm diam. **Pedicels** 0.45–1.45 cm long, 1.4–2.2 mm diam., pink-orangish, sometimes with a small bracteole at base, similar to sepal. **Calyx** lobes united at base, sepals unequal, narrowly ovate or oblong or triangular, acuminate, erect, concave inside, convex outside, 5–12 mm long, 2.8–5 mm wide, light olive green, apex mucronate reddish. Flower buds ovoid, 0.7 cm diam. × 1–1.5 cm long, light green. **Corolla** subprismatical to urceolate, 0.8–1.1cm thick near base, 0.25–0.6 cm thick near apex, petals oblong, acute, 1.7–1.9 cm long, 3–5 mm wide, outer surface keeled, scarlet red to slightly orangish, slightly lighter at borders, apex slightly recurving, inner surface pink at proximal half, orangish red at distal half. Stamens 10, the 5 epipetalous 5–7 mm long, the antesepalous 11–12 mm long, filaments cream, 0.9–1.1 mm thick at base, gradually tapering to 0.3 mm. Anthers ovate, yellow, 1.6–2 × 0.9–1.1 mm. Gynoecium ovoid, 7–10 mm long, 5.5–7 mm thick. Carpels 5, cream. Styles 3–4 mm long, parallel, almost touching each other, olive green to dark red. Stigma lighter or reddish in color. Nectaries reniform, light cream to greenish yellow, 0.9–1 × 2–2.2 mm. **Fruit** a dehiscent polyfollicle, 1.1– 1.4 cm long, 1.3–1.4 cm diam., dark brown.

Distribution and habitat: *E. buchtienii* is endemic to Bolivia and recorded in the department of La Paz, in the localities of Mallasa, Obrajes, La Florida, Calacoto, Aranjuez and Mecapaca between 2450 –3300 m asl., It grows in the valleys of La Paz in the inter-Andean dry forests with the following species: *Austrocylindropuntia shaferi* (Britton & Rose) Backeb., *Corryocactus melanotrichus* (K. Schum.) Britton & Rose, *Berberis boliviana* Lechl., *Proustia cuneifolia* D. Don, *Pyrolirion boliviense* (Baker) Sealy, *Hippeastrum cybister* (Herb.) Benth. ex Baker, *Puya meziana* Wittm., *Mutisia orbignyana* Wedd. and *Vasconcellea quercifolia* A. St. Hil.

Phenology: It blooms in the rainy season from January to March.

Conservation Status: This species is known from six localities very close to the city of La Paz, growing meters away from houses. Obrajes could be considered a city itself. Therefore, we propose it to be considered as Near Threatened (NT) following the IUCN Red List.

Other specimens examined: Bolivia, Dept. La Paz, Prov. Pedro Murillo, **Munic. Nuestra Señora de La Paz,** slopes near Obrajes, 3450 m, 23 Apr 1932, *Otto Buchtien 9208* (B, probably lost, this may be the original Type); same place, on a mountain face near Obrajes, 23 Apr 1934. *Otto Buchtien 9208* (HBG 505735); Macrodistrito Mallasa. Mallasa-Wichuichu, valley with steep slopes, on rocky slope, scarce, 16°35'19.6"S, 68°04'58.3"W, 3253 m, 22 Feb 2020, *H. Huaylla 4435,* (HSB); Calacoto, before Mallasa, 16°33'17.2"S, 68°05'43.3"W, 2900 m, 18 Jan 2022, *G.Pino, D. Marquiegui & W. Ale 3352* (USM 363344); same place, 29 Jan 2026, *H. Huaylla, D. Marquiegui & G.Pino 5184* (HSB 000-12431, USM 363359); near La Paz, 3050 m, *M. Bang 1890/148* (GH Barcode 01987712, MO 571, PH, US 1418423, Barcode: 03775666, 03775665); under Obrajes, 3300 m, Mar 1920, *O. Buchtien 6188* (US 1177516, Barcode: 03775663); La

Florida, bridge across Río La Paz, 16°33'S, 68°06'W, 3250 m, semi-arid shrubland, with *Baccharis*, *Puya, Verbesina,* 5 [26] Mar 1984, *J.C. Solomon & B.A. Stein 11629*, (LPB, MO 3752079); same place, 16°33'S, 68°06'W, 3250 m, 26 Mar 1984, *J.C. Solomon & B.A. Stein 12109*, (LPB, MO 5891994, 5794783); near Aranjuez, Amor de Dios, open material on rocky slope, 16°33'S, 68°08'W, 3300 m, 11 Mar 2001, *St. G. Beck 24959* (LPB); between Següencoma and Aranjuez (road to Lipari), [16°33'S 68°05'W, 3200 m], 30 Mar 1957, *J.Cañigueral 421* (LPB); La Paz, 22 km downstream, Mecapaca (end of the road), slope with shrubs and Bromeliads, 3070 m, 25 Apr 1980, St. G. Beck 3557, (MO); outskirts of La Paz, suburb of Florida, on steep slopes along Río La Paz, growing with *Echinopsis bridgesii* and *Trichocereus bridgesii*, flowers orange, leaves red edged, August 1985, (cultivated as 52916) *M. Kimnach et al.* 2480 (HNT 6911); same collection, collected from cultivation, July 1987, (cultivated as 52916) *M. Kimnach et al.* 2480 (HNT 8058); **Munic. Mecapaca,** Hacienda Huajchilla, 18 Km SE of Florida (La Paz), along the Río La Paz, semi-arid thorn scrub with *Prosopis*, *Ephedra* and *Caesalpinia*, 16°38'S, 68°02'W, 3100m, 4 Jun 1985, *J.C. Solomon & B.A. Stein 13821*, (LPB, MO 3752078); Hacienda Huajchilla, ca. 13 km SE of Calacoto, along Río La Paz, semi-arid thorn scrub with *Prosopis*, *Ephedra* and *Caesalpinia*, 16°39'S, 68°04'W, 3000 m, 30 Jan 1983, *J.C. Solomon 9461*, (MO 3529255); Huajchilla, deciduous scrub, open, about 1 m tall, with *Kageneckia*, 3100 m, 09 May 1995, *M. Kessler & S. Hohnwald 4184* (LPB). **Munic. Palca**, Cotaña, near Illimani Mountain, [16°43'S, 67°43'W,] 2450 m, Nov 1911, *O. Buchtien 4575* (US 1158188, Barcode: 03775664).

Etymology: It is named after the collector, Otto Buchtien (1859–1946), a German orchidologist from Rostock who emigrated to South America in 1893, first to Chile, and then to Bolivia, (1907–1935) to organize the Museum of Natural History of Bolivia and create the National Herbarium.

Taxonomical notes: Buchtien was living in La Paz when he collected the type of this plant (in 1932, according to the protologue), and he may well have made more collections, *i.e.* in 1933 and 1934. In the protologue, von Poellnitz apparently mentioned 3 specimens, two with the n. 9208 (1932 and 1934 specimens), and one without a number, the 1933 specimen. This suggests that there once existed a type specimen from 1932, possibly at B. Still extant are the specimens from 1933 and 1934. Thiede (1990) made an annotation on the 1934 specimen at HBG indicating it as "typus", but he did not publish it. As the type of 1932 has not been found, we designate here the most representative sheet (B 10 0242095) as lectotype according to ICN (Turland et al., 2025).

In 1957 Eric Walther determined B 10 0242095 as "*Echeveria chiloense* (Kuntze) Walther (*sic*), and he added he considered it as a synonym of *E. whitei* Rose. He misspelled "*chilonensis*" without an "n" and the adjective is in neuter (ending -e), not in feminine (ending -is). In his book, Walther (1972) lists *Echeveria buchtienii* as a synonym of *E. whitei* Rose, mentioning that the most important difference indicated by Poellnitz is the length of the pedicels. If we compare the original descriptions of these last two species, it is true we will find no important differences between them. However, comparing the amended descriptions provided in this study, we found several differences that support the idea that they should be considered as separate species again (we provide a diagnosis). Also, the populations are disrupted and located almost 100 km away from each other.


a
b
c
d

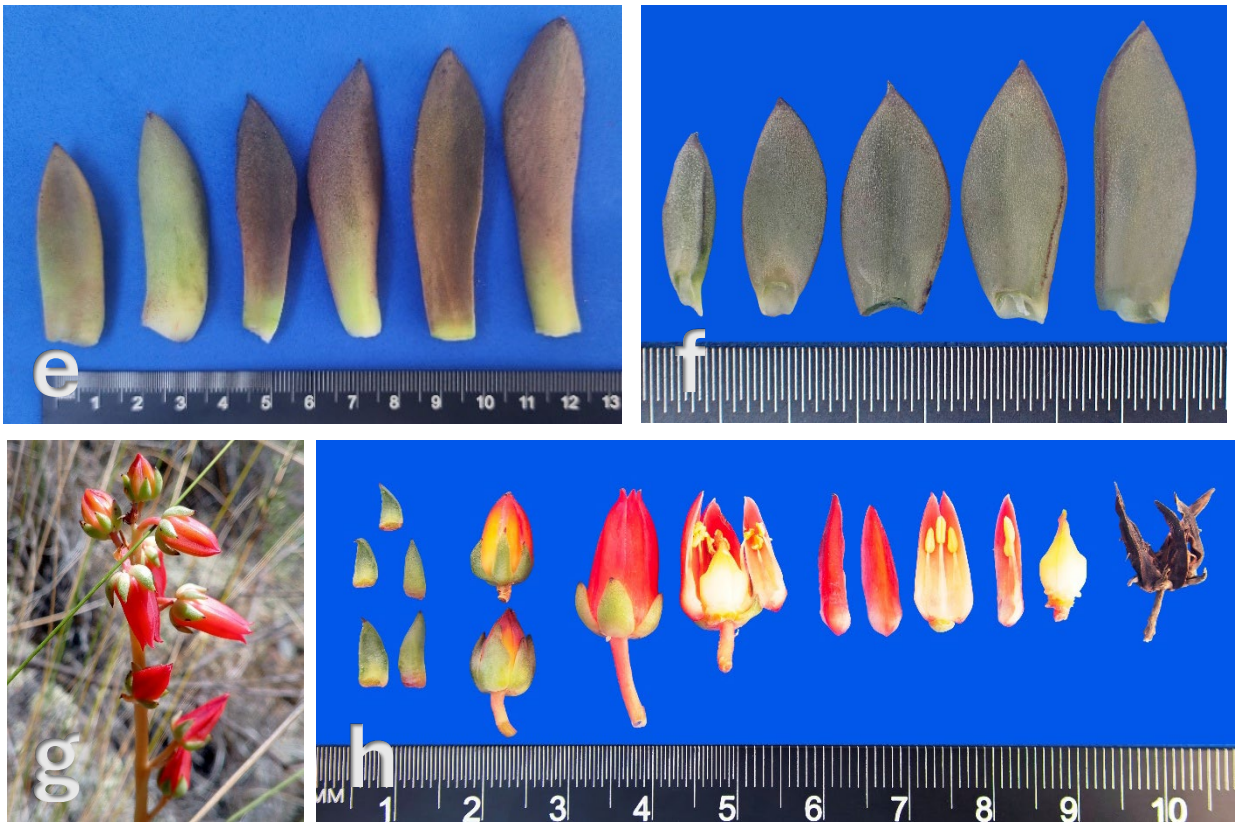


Fig. 2 a. *Echeveria buchtienii* in habitat at Mallasa (HH). **b**. Details of flowers in habitat (HH). **c.** Plants in habitat in the dry season (DM). **d**. Plant *ex situ*. **e.** Details of the leaves. **f.** Details of the bracts. **g.** Detail of the inflorescence in habitat (HH) **h.** Details of the flower.

3. ***Echeveria chilonensis*** **(Kuntze) Walther,** ***Cactus and Succulent Journal (US) 7(3)*****: 40. [not illustrated], (1935). Fig. 3 a–h**
Basionym: *Sedum chilonense* O. Kuntze, *Revisio generum plantarum 3(3)*: 83. (1893) [not illustrated].

Type : **Bolivia, Dept. Sierra de Santa Cruz, Prov. Manuel María Caballero, Munic. Saipina,** Chilón, May 1892, *O. Kuntze s.n.* (NY 277868!)

Amended description: A succulent glabrous **herb** 3–7 cm tall, up to 26–38 cm in blossom. **Stem** buried, erect, stumpy, rarely branched from the base, 1.2–2.7 cm diam., 3–10 cm long, light brownish gray. **Rosettes** one at the end of stem, 7–15 cm diam. **Leaves** 10–28, obovate, obtuse with a 1 mm reddish mucro when young, then narrowly obovate to narrowly oblong or

subrhomboidal, sessile, closely attached, mostly at right angle or oblique upwards, 2.3–8.5 cm long, 0.4–1.2 cm wide at base, 0.7–1.3 cm wide at proximal third, 0.9–1.9 cm wide at middle, 1.2–2.2 cm wide at distal third, 2.5–3.5 mm thick, upper side flat to canaliculate, light green, lower side subcarinate, paler light green, apex acute, not mucronate in old leaves, sometimes slightly caudate, base hyaline whitish.

Flowering stem an oblique lateral subterminal raceme, erect, rachis 15–30 cm long, 4–5 mm diam. at base, 1.5–3 mm diam. at apex, light green, somewhat pinkish. **Peduncular bracts** 12–15, deciduous, at proximal two thirds of stem, oblong, inserted oblique upwards every 1.6–2.5 cm, 1.4–2.7 × 0.5–1 cm, 3–5 mm thick, inner side flat, outer side slightly convex to subcarinate, light green, apex acute, mucronate, reddish. **Flowers** 5–10, present at the distal third of the scape, 1.15–1.8 cm long and 0.65–0.95 cm diam. **Pedicels** ascending, 0.7–2.6 cm long, 1.6–2.7 mm diam., pinkish to reddish green, with 1–2 bracteoles, similar to bracts, one at the base and the other sometimes at the middle of pedicel, 3.5–17 mm long, 2.5–3 mm wide. **Calyx** lobes united at base, sepals unequal, oblong to lanceolate, spreading at acute angle, not adpressed, convex both sides, 6–12 mm long, 3–4.5 (–12) mm wide, bright green, apex subacute to obtuse, slightly incurvate. Flower buds ovoid, 0.75–0.95 cm diam. × 1–1.5 cm long, coral red. **Corolla** subprismatical, 0.7–0.9 cm thick near base, 0.4–0.65 cm thick near apex, petals oblong, acute, 1.1–1.55 cm long, 2.5–5 mm wide, outer surface keeled, golden yellow to coral orange, apex slightly recurving, inner surface pale orange. Stamens 10, the 5 epipetalous 6–8 mm long, the antesepalous 7–11 mm long, filaments cream, 0.8–1 mm thick at base, gradually tapering to 0.3 mm. Anthers ellipsoid, yellow, 1.3–2 × 0.7–0.9 mm. Gynoecium ovoid, 6.5–9 mm long, 5–6 mm thick. Carpels 5, white. Styles 2.5–4 mm long, parallel, almost touching each other, white. Stigma reddish. Nectaries reniform, white, 0.5–0.7 × 1.6–2 mm. **Fruit** a dehiscent campanulate polyfollicle, 1.2– 1.3 cm long, 0.6 – 0.8 cm diam., brown.

Distribution and habitat: *Echeveria chilonensis* grows in the valley of Comarapa with the presence of species of the Bolivian-Tucumán forest formation on the slopes such as: *Alnus acuminata* Kunth*, Myrcianthes callicoma* McVaugh*, Clethra sp.* and *Prunus tucumanensis* Lillo.

Phenology: It blooms in the rainy season from January to February.

Conservation status: Following the criteria of the Red List, it is considered a critically endangered species (CR), for it is known only from two localities.

Other specimens examined: **Bolivia, Dept. Sierra de Santa Cruz, Prov. Manuel María Caballero, Munic. Comarapa,** road from Comarapa to Cochabamba, 3 km NW of Comarapa. 17°54'04.4"S, 64°33'52.2"W, 2115 m, 27 Jan 2026, *H. Huaylla, D. Marquiegui & G. Pino 5182* (HSB 000-12419, USM 363358).

Etymology: Named for the habitat of the type, the town of Chilón in Province Santa Cruz, where plants have not been found recently, but plants are abundant at Comarapa, only 4 km to the NE.

Taxonomical notes: It was first described by O. Kuntze in 1893 in a small note as a species of *Sedum,* considering it in the section *Aizoon*. *Sedum aizoon* L. (now *Phedimus aizoon* (L.) 't Hart) is an Asian species with long oblanceolate leaves to 9 cm long, commonly dentate (a character that distinguishes it from the entire leaves of any *Echeveria*, included *E. chilonensis*, as Kuntze comments) and it has a determinate inflorescence (Kuntze states it is corymbose). The type sheet has only one leaf attached, several loose leaves and six flowers, half of which are detached. In 1935, Walther makes a new combination for it as *Echeveria* and adds a description. According to Bischofberger (ICN) Walther made a description of *E. chilonensis* from a plant of unknown origin in cultivation in Victor Reiter's garden, so we agree this is completely useless. The amended description we present should be considered instead. In 2003 Kimnach erroneously included *E. vanvlietii* van Keppel in *E. chilonensis* (Kuntze) Walther (see under *E. vanvlietii*).

The closest species is *E. krahnii* Kimnach, but plants of *E. chilonensis* are taller: (38 cm *vs.* 20 cm in blossom), the stems are of similar length but thicker in diameter (1.2–2.7 cm *vs*.0.8–1 cm). Rosettes are larger (7–15 cm *vs.* 6–12 cm diameter). Leaves are similar in shape, narrowly obovate, slightly longer (2.3–8.5 cm *vs.* 1.7—8 cm), but relatively wider and more spatulate or rhomboidal in *E. krahnii*. The scape is of similar length with less flowers per scape: 5–10 compared to 8–18, pedicles are longer (0.7–2.6 cm *vs.* 0.45–1.7 cm), both funnel-shaped. Sepals are erect, inserted at an acute angle, slightly recurvate but not attached to corolla in *E. chilonensis,* and spreading, horizontal, inserted at a right angle and totally separate from petals in *E. krahnii*. Petals are similar in size, but in *E. chilonensis* flower buds are very red, then petals become lighter when mature, sometimes coral to apricot orange and even golden yellow but never pale, while in *E. krahnii* flower buds are light greenish yellow to orangish and when mature flowers are pale yellow to orange, including the same apricot orange hue as in *E. chilonensis*, but reddish flowers have not been observed.


a
b
c
d

Fig. 3 a. *Echeveria chilonensis* with reddish buds at Comarapa (DM). **b**. Plants with orange-yellow flowers from the same locality (DM). **c.** Detail of the plant in habitat (DM). **d**. Plant *ex situ* with orange flowers (HH). **e.** Comparison of different scapes of plants from the same locality (HH). **f.** Details of the leaves. **g.** Details of the bracts. **h**. Details of the flowers of fig.e: Above: red petals, below: orange petals, right: yellow flower.

4. *Echeveria krahnii* Kimnach, *Avonia 27 (2)*: 42, fig. 1–4, (2009). Fig. 4 a–h.

Type : **Bolivia, Dept. Chuquisaca [Santa Cruz], Prov. Azero [Cordillera, Munic. Camiri],** Cañón de Incahuasi, S 20°00.81', W 63°32.89', 1200 [810] m, (wrong coordinates and altitude, see under notes), 8 Oct 2004. *Wolfgang Krahn, Carmen Krahn, Raul Lara, Martín Cárdenas* 1078 (Holotype: HNT, Isotype: LP).

Amended description: A succulent glabrous **herb** forming mats**,** 10–20 cm tall, up to 30 cm in blossom. **Stem** semiburied, erect, then decumbent, many branched from the base, 0.5–1.2 cm diam., up to 10 cm long or more, greenish brown in buried portion, then light green. **Rosettes** one at the end of stem or branch, 4–12 cm diam. **Leaves** 12–18, ovate when young, then narrowly obovate to spatulate or subrhomboidal, sessile, loosely attached every 0.4–0.6 cm, mostly at right angle, (1.7–) 3.5–8 cm long, 0.6–0.9 cm wide at base, 1–1.2 cm wide at proximal third, 1.8–2.3 cm wide at middle, 1.3–1.8 cm wide at distal third, 2.5–4.5 mm thick, upper side flat, light yellowish green, lower side convex to subcarinate, light yellowish green, apex acute or with a 1 mm wide mucro, base hyaline whitish.

Flowering stem an oblique lateral subterminal raceme, decumbent, rachis 15–20 (–30) cm long, 2.5–3.5 mm diam. at base, 1.8–2 mm diam. at apex, light green pinkish to red. **Peduncular bracts** 12–15, persistent, at proximal half of stem, narrowly obovate, inserted oblique upwards at every 0.6–2 cm, 0.6–2×1.2–3 cm, 0.35–1 cm wide, 2–3 mm thick, inner side flat, outer side slightly convex to subcarinate, light green, apex acute. **Flowers** 6–18, present at distal half of the scape, 1–1.3 cm long and 0.5–0.7 cm diam. **Pedicels** ascending, 0.45–1.7 cm long, 1.2–1.5 mm diam., slightly infundibuliform, pinkish, with 1–3 bracteoles, similar to bracts, 8–12 mm long, 1.8–2 mm wide. **Calyx** lobes united at base, sepals unequal, narrowly oblong, spreading at right angle, both sides convex, 5–11 mm long, 2–4 mm wide, light green, apex acute. Flower buds ovoid, 0.5 cm diam. × 0.8–0.9 cm long, light greenish yellow to orangish. **Corolla** subprismatical to subpyramidal, 0.55–0.75 cm thick near base, 0.4–0.6 cm thick near apex, petals oblong, acute, 1–1.5 cm long, 2.5–3 mm wide, outer surface keeled, yellow to light orange, apex slightly recurving, inner surface pale yellow. Stamens 10, the 5 epipetalous 4–7 mm long, the antesepalous 7–11 mm long, filaments cream, 0.3–0.6 mm thick at base, gradually tapering to 0.2 mm. Anthers ellipsoid, yellow, 1–1.4 × 0.5–0.6 mm. Gynoecium ovoid, 7–9 mm long, 3.5–5 mm thick. Carpels 5, cream. Styles 3–3.5 mm long, parallel, almost touching each other, white to reddish. Stigma greenish or reddish. Nectaries reniform, yellowish, 0.5–0.8 × 1.4–2 mm. **Fruit** a dehiscent campanulate polyfollicle, 0.9– 1 cm long, 1–1.2 cm diam., light reddish brown.

Distribution and habitat: *Echeveria krahnii* grows on steep slopes of the dry deciduous forest of the Bolivian–Tucumán forest and Chaco Serrano of the departments of Santa Cruz and Chuquisaca between 1300 and 1950 m asl.

Phenology: It blooms in January and February in the rainy season.

Conservation status: This species has a distribution in the department of Santa Cruz: provinces Cordillera (municipality Lagunillas) and Florida (municipalities Mairana and Samaipata), and department Chuquisaca: province Luis Calvo (municipality Villa Vaca Guzmán). It should be considered of Least Concern (LC) according to the IUCN red list.

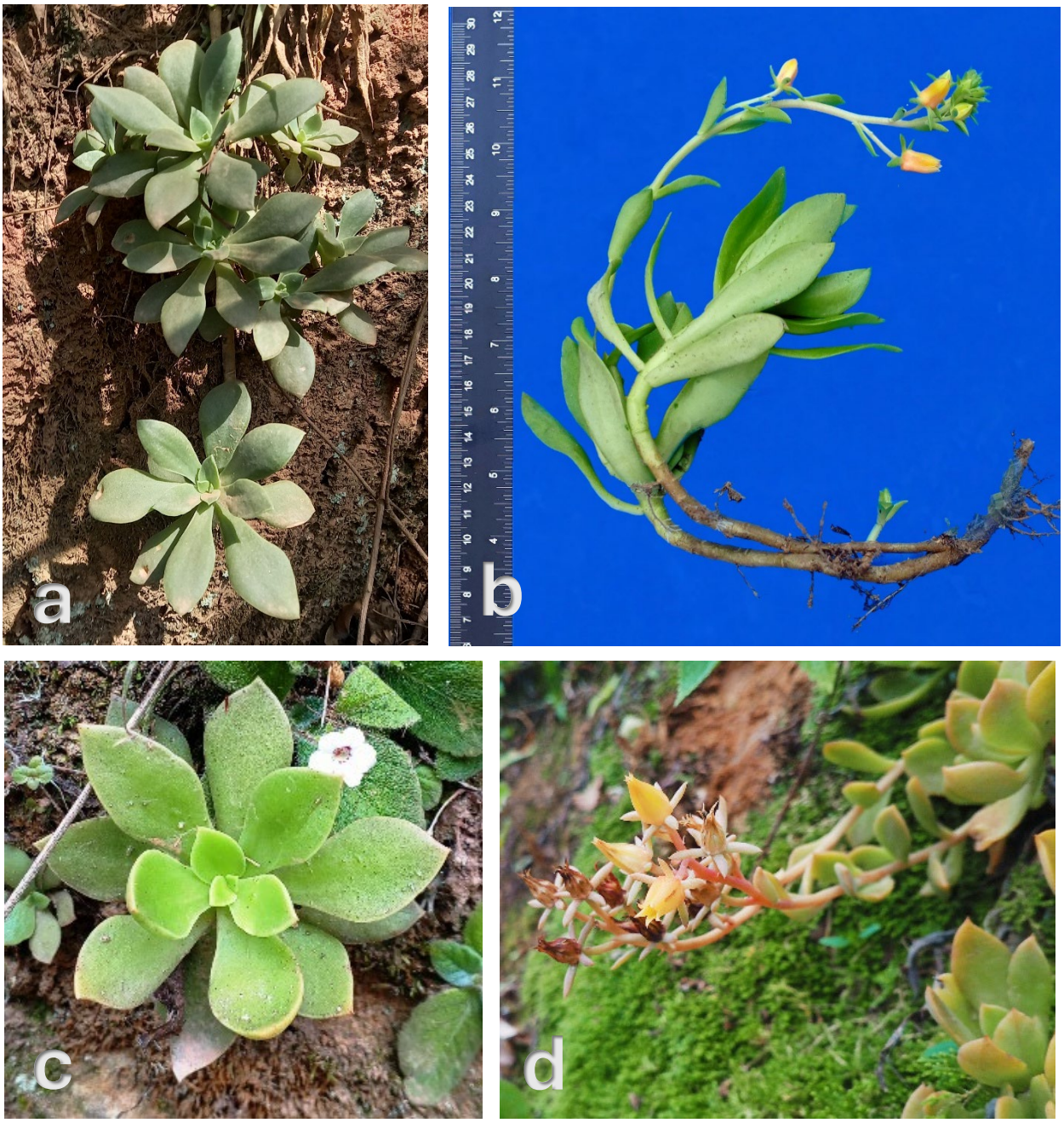
Other specimens examined: **Bolivia, Dept. Santa Cruz, Prov. Cordillera, Munic. Lagunillas,** Cañón de Incahuasi, before the sanctuary of the Virgin of Urkupiña, 19°48'30.8"S, 63°42'03.5"W,

1342 m, 22 Jan 2023 *G. Pino, D. Marquiegui, J. Carr & B. Bates 3736;* about 5 km from entrance of Tunnel Incahuasi towards Caparicito, 19°48'13.4"S, 63°41'35.6"W, 1193 m, 21 Jan 2026, *H. Huaylla, D. Marquiegui & G. Pino 5177* (HSB 000-12415); Tunnel of Incahuasi, Caparicito, 19°48'30.9"S, 63°42'51.7"W, 1370 m, 21 Jan 2026, *H. Huaylla, D. Marquiegui & G. Pino 5178* (HSB 000-12416, USM 363355); **Prov. Florida, Munic. Mairana,** La Yunga de Mairana, (8 km North of Mairana, Trail 2 km northwards by the path towards La Quebrada, 18°05'42" S, 63°54'55" W, 1950 m, 28 Jun 1996, *I. Vargas & L. Rioja 4552* (MO 04910483, USZ); Mairana, Trail to "El Descanso del Tigre", 2.5 km NE of town of Mairana, 18°05'36.0"S, 63°57'03.0"W, 1560 m, Feb 8, 2026, *H. Huaylla, D. Marquiegui & G. Pino 5187* (HSB 000-12423)*;* **Munic. Samaipata,** Codo de los Andes, 5 km SE Samaipata, 18°14'04.8"S 63°45'02.4"W, 1600 m, Feb 9, 2026, *H. Huaylla, D. Marquiegui & G. Pino 5185* (HSB 000-12421); **Dpto. Chuquisaca, Prov. Luis Calvo, Munic. Villa Vaca Guzmán,** near Allangua, 19°49'45.4"S, 63°43'34.6"W, 1524 m, 22 Jan 2023 *G. Pino, D. Marquiegui, J. Carr & B. Bates 3742;* same road, near Villa Vaca de Guzmán, 19°51'30.9"S, 63°44'00.5"W, 1524 m, 22 Jan 2023 *G. Pino, D. Marquiegui, J. Carr & B. Bates 3743.*

Etymology: It is named after Wolfgang Krahn (1939–2023), German explorer from Stuttgart, who also ran an insurance company. He conducted expeditions to the Peruvian and Bolivian Andes between 1964 and 2004 to study cacti and *Peperomia* species.

Taxonomic notes: Kimnach reported that in May 2005 he received a cutting from Helmut Regnat of Ottobrunn, who in turn had received a Bolivian *Echeveria* from Wolfgang Krahn, collected by him while he was visiting the type locality of *Acanthorhipsalis incahuasina* Cárdenas. The plant flowered in July 2007 and Kimnach described it in 2009. The Department and Province of Bolivia mentioned in the article by Kimnach in the protologue are totally wrong. The Canyon of Incahuasi and coordinates mentioned are in Santa Cruz, not in Chuquisaca. The location is also wrong, because it does not belong to the place where the photos were taken, but to a locality west of the town of Camiri (20°00'48.6"S, 63°32'53.4"W). We have explored Camiri and surroundings, which are lower and warmer than the rest of localities but did not find the plant there. Finally, we found the same rock wall of the photo of the protologue where W. Krahn set up his tripod, and we could record the type locality's coordinates (19°48'13.4"S, 63°41'35.6"W). *E. krahnii* is the most recently described species of *Echeveria* in Bolivia. It occurs at lower elevations (1300–1950 m), making it comparatively easier to cultivate. The closest species is *E. chilonensis*. Both species can be readily identified by their long, obovate, leaves, more rhomboidal in *E. krahnii*; mature yellow to orange flowers, lighter in *E. krahnii*, and elongated erect funnel-shaped pedicels, thick, biconvex sepals

separate from the petals and spreading at an acute angle in *E. chilonensis* and at right angles in *E. krahnii* (see above in *E. chilonensis*).



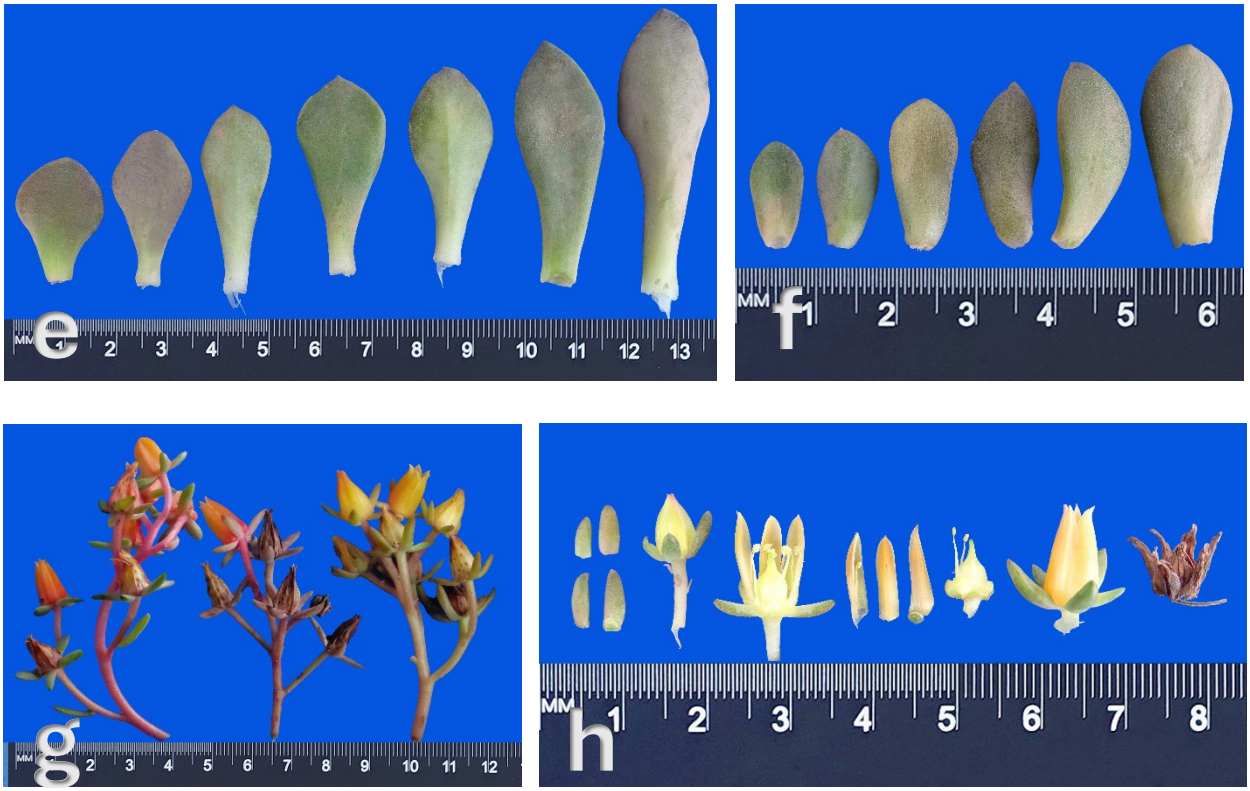


Fig. 4 a. *Echeveria krahnii* in habitat in the dry season. (DM). **b**. Plant *ex situ* with orange flowers (DM). **c.** Detail of the plant in habitat (DM). **d**. Plant in habitat with flowers (DM). **e.** Details of the subrhomboidal leaves. **f.** Details of bracts. **g.** Details of the inflorescences. **h.** Details of the flowers.

5. *Echeveria rauschii* Van Keppel, *National Cactus & Succulent Journal Great Britain* 24 : (4) : 91, fig. 2, (1969). Fig. 5 a–j.

Type : **Bolivia, Dept. Chuquisaca, Prov. Oropeza, [Munic. Poroma],** 15 km NW from Sucre, Bolivia, near Los Alamos, 2800 m, May 29, 1968, *Van Vliet nr. 8 (van Keppel 6852)* (K!).

Amended description: A succulent glabrous **herb** 4–9 cm tall, up to 45 cm tall in blossom. **Stem** buried, erect, 0.8–2.2 cm diam., 2–10 cm long, dark grayish brown, with annular scars of fallen leaves, branching readily from base. **Rosettes** one at the end of stem or branch, 4–13 cm diam. **Leaves** 8–16, obovate when young, then narrowly obovate to oblong or subspatulate, sessile, loosely attached, straight, 3.5–6.8 cm long, 0.4–1 cm wide at base, 0.6–1.2 cm wide at proximal third, 1.1–1.8 (–2.2) cm wide at middle, 1–1.6 cm wide at distal third, 3–4 mm thick, upper side flat to slightly convex, light olive green to brownish mauve, lower side convex to subcarinate, olive green, apex cuspidate with a small light green 1.5 mm mucro, base hyaline whitish.

Flowering stem an oblique lateral subterminal raceme, rachis 12–18 (–45) cm long, 3.5–5.5 mm diam. at base, 1.5–4 mm diam. at apex, light green to lavender, pink towards apex. **Peduncular**

bracts 10–24, deciduous, at proximal half of stem, narrowly obovate, erect, 0.6–3.7 × 0.6–1.2 cm, 1–2 mm thick, inner side flat, outer side convex, light olive green to mauve, apex acute to acuminate. **Flowers** 8–18, present at distal half or third of the scape, 1.3–1.8 cm long and 0.7–0.9 cm diam. **Pedicels** 0.8–2 cm long, 1.5–2.5 mm diam., inserted at 45º, straight to recurvate, very light green to orange or pink, 1–2 bracteoles at base similar to sepal when present. **Calyx** lobes united at base, sepals unequal, ovate to oblong, oblique ascending, both sides convex, 4.5–10 mm long, 1.8–4 mm wide, light green, reddish distally and at base, acute to minutely mucronate. Flower buds ovoid, 0.7 cm diam. × 1 cm long, light green. **Corolla** subprismatical, 0.8–0.9 cm thick near base, 0.7–0.8 cm thick near apex, petals oblong, subacute, 1.1–1.6 cm long, 3.5–5 mm wide, outer surface keeled, coral red or orange with yellow edges, in some plants yellow, apex slightly recurving, inner surface yellow. Stamens 10, the 5 epipetalous 0.45–0.7 cm long, the antesepalous 0.75–1 cm long, filaments cream, 0.7–0.8 mm thick at base, gradually tapering to 0.3 mm. Anthers ellipsoid, yellow, 1.8–2 × 0.6–0.7 mm. Gynoecium ovoid, 7–8.5 mm long, 4.3–6 mm thick. Carpels 5, light green. Styles 3.4–4 mm long, parallel, almost touching each other, light green to pink. Stigma green. Nectaries reniform, light cream to greenish yellow, 1.5–2.2 × 0.5–0.8 mm. **Fruit** a dehiscent polyfollicle, 0.9– 1.5 cm long, 0.9–1 cm diam., light brown.

Distribution and habitat: The species is restricted to the provinces of Oropeza (Chuquisaca) and Chayanta (Potosí) between 2800 and 3860 m asl. It grows in reddish sandstone rock with humid puna vegetation at the head of valleys, together with *Polylepis tomentella* Wedd*., Polylepis besseri* Hieron*, Roupala fiebrigii* Perkins*, Brachyotum microdon* (Naudin) Triana*, Puya humilis* Mez*, Puya herzogii* Wittm. and *Echinopsis tarijensis* (Vaupel) H.Friedrich & G.D.Rowley on mountain slopes.

Phenology: It flowers during the rainy season from January to March.

Conservation status: This species has a dispersed distribution on the Chataquila hill and on the way to the Incamachay cave paintings that are protected by the community of Chataquila. It is considered of Least Concern (LC) according to the IUCN.

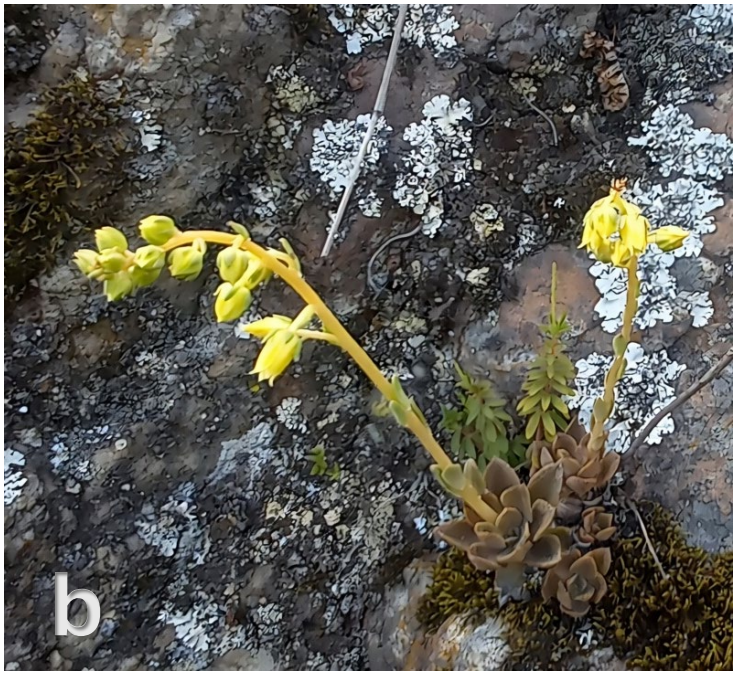
Other specimens examined: **Bolivia, Dept. Chuquisaca, Prov. Oropeza, Munic. Sucre,** entering path towards rock paintings, 1 km from main road to Chaunaca, head of valley, sandy soil with steep slopes, grows among rocks, locally frequent, 18°59'15.7"S, 65°24'29.0"W, 3568 m, 24 Feb 2018, *H. Huaylla 3858* (HSB 000-12413) (coral red to orange flowers); Chataquila ruins, 18°59'18.1"S, 65°24'28.3"W, 3590 m, 10 Jan 2023, *G. Pino, D. Marquiegui & J. Carr 3748* (USM 363348) */3749* (yellow/red flowers)*;* same place, 4 Feb 2026, *H. Huaylla, D. Marquiegui, G. Pino & B. Bates 5189* (HSB 000-12432)*;* Chataquila, head of valley with rocky outcrops, grassland with disperse *Polylepis,* 18°58'29"S, 65°24'40"W, 3751 m, 04 Jan 2013, *H. Huaylla 3712* (HSB); **Munic. Poroma,** Cullku, north of Sucre, 18°53'48.4"S, 65°19'54.1"W, 2964 m, 11 Jan 2023, *G. Pino, D. Marquiegui & J. Carr 3751;* same place, 18°53'29.5"S 65°20'00.1"W 12 Mar 2026, *H. Huaylla, D. Marquiegui & G. Pino 5206,* (HSB 000-12440, orange flowers); road to Los Alamos,

before Cullku, 18°55'12.2"S, 65°20'07.0"W, 2860 m, 12 Mar 2026, *H. Huaylla, D. Marquiegui & G. Pino 5207* (HSB 000-12441); Ancarani, north of Sucre heading to Poroma, interandean valleys with crops, 18°51'06"S, 65°17'04"W, 2982 m, 6 Nov 2015, *J. Carrs.s.n*., (HH 402, yellow flowers); Atocani, 18°47'17.0"S 65°24'10.0"W, 2740 m, 10 Jan 2023, *G. Pino, D. Marquiegui, J. Carr & B. Bates 3750* (yellow flowers); **Dept. Potosí, Prov. Chayanta, Munic. Ravelo,** Toroca, 18°47'09.0"S, 65°23'51.0"W, 2890 m, 10 Jan 2023, *G. Pino, D. Marquiegui, J. Carr & B. Bates 3750a.*

Etymology: Named for Walter Rausch (1928-2022), Austrian *Lobivia* and *Rebutia* specialist.

Taxonomical notes: *Echeveria rauschii* was described in 1969 and remained as a separate species until 2003, when Kimnach stated it was a synonym of *Echeveria whitei* Rose. Bischofberger (2017) noticed this was a mistake because Charles Uhl had published different chromosome numbers for them: *E. whitei,* n=150 ± 4, *E. rauschii,* n=~100 and ~120 (Uhl, 2007), and because of the different flower colors: *E. whitei* has red flowers while those of *E. rauschii* are orange to orange-red. She reinstated *E. rauschii* as a separate species. Here we compare the original description with our findings: We found plants with longer stems, similar rosettes, leaf and bract sizes. Leaves could be light green to brownish mauve, we did not find the red edges mentioned in the description and in other papers (Van Keppel, 1972). We found the scape longer (– 45 cm) but with fewer flowers, similar length of sepals, longer, narrower petals with colors similar as described, but we also found plants with lighter petals. Color varies according to populations, but generally western localities are redder, while the eastern localities are paler orange and even yellow. Flowering time was indicated from September to October, but we found plants flowering in the southern summer. We agree with Bischofberger (2017) in the main differences between *E. rauschii* and *E. whitei*: Taller plants (45 cm *vs.* 30 cm tall) with thicker stems (0.8–2.2 cm *vs.* 0.3–0.8 cm diam.), rosettes larger in diameter (4–13 cm *vs.* 2.8–9 cm), leaves narrowly obovate to oblong compared to the very narrowly obovate or very narrowly oblong leaves of *E. whitei*, longer (3.5–6.8 *vs.* 2.1–4.5 cm long) and wider (1.1–2.2 cm *vs.* 0.8–1.4 cm wide at middle), light olive green to brownish mauve instead of bright to olive green, apex with a larger mucro (1.5 *vs.* 0.5 mm). The scape is longer (12–45 cm *vs.* 10–12 cm), with narrowly obovate olive green to lavender bracts compared to the lanceolate, light green bracts of *E. whitei*. Flowers are very different, pedicels are longer (2 cm *vs.* 1.6 cm), recurvate instead of erect, sepals are similar and petals are longer (1.1–1.6 cm *vs.* 1.15–1.35 cm long) and wider (3.5–5 mm *vs.* 0.25–3 mm wide), coral red (Chaunaca) or orange with yellow edges (Cullku), in some plants yellow (Chataquila), compared to the crimson red to orange petals of *E. whitei*.


a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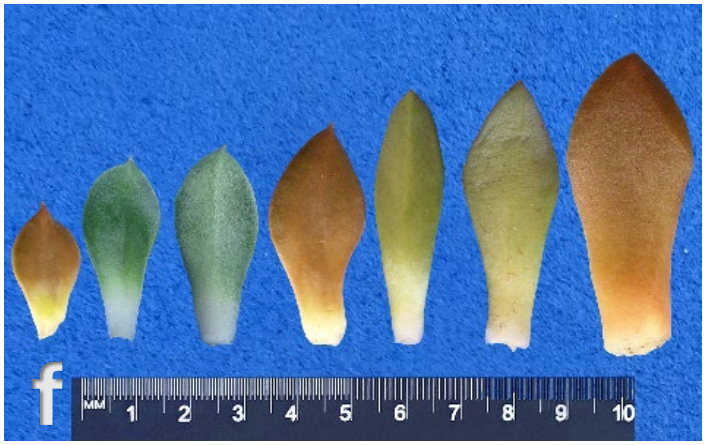
e


f
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g


h
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i


j
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Fig. 5 a. *Echeveria rauschii* in habitat with orangish flowers near Los Alamos (HH). **b.** Plant in habitat at Ancarani with yellow flowers (DM). **c.** Plants in habitat with red flowers (DM). **d.** Plants in habitat in the shade with leaves of a dark green color (DM). **e.** Exposed plant in habitat with strong reddish color (DM). **f.** Details of the leaves. **g.** Plants *ex situ*. **h.** Details of the bracts. **i.** Very shaded plants in habitat in Chaunaca (HH). **j.** Details of the flowers: Above: Alamos/ Below: Atocani.

6. *Echeveria vanvlietii* Van Keppel, *National Cactus & Succulent Journal Great Britain* 24 : (4) : 90, fig. 1 (1969). Fig. 6 a–i.

Type : **Bolivia, Dept. Chuquisaca, Prov. Yamparáez**, **[Munic. Yamparáez]**, north-east of Yamparaez, ca. 12 km SE of Sucre, on steep slopes, [19°08'S 65°09'W], 2800 m asl., 19 May 1968. *D. van Vliet 5* (*van Keppel 6849*), (K!).

Amended description: A succulent glabrous **herb** 4–6 cm tall, up to 20–25 cm tall in blossom. **Roots** tuberous, 0.3–0.5 cm diameter, conical. **Stem** semiburied, erect, 0.9–1.4 (–2) cm diam., up to 15 cm long, bright brown, with annular scars of fallen leaves, branching from base. **Rosettes** one at the end of stem or branch, 3.5–12 cm diam. **Leaves** 10–14, young leaves deltoid, mature leaves lanceolate to narrowly ovate or oblong and even triangular, firmly attached, straight, 2.2–8 cm long, 0.4–0.9 cm wide at base, 0.55–1.2 cm wide at proximal third, 1–1.5 cm wide at middle, 0.6–1 cm wide at distal third, 2.5–3.5 mm thick, upper side flat to slightly channeled, olive green to bright brown, lower side convex to subcarinate, olive green, sometimes purplish, apex acute or with a 1 mm mucro, reddish, base hyaline whitish, margin sometimes light green.

Flowering stem an oblique lateral subterminal raceme, rachis 6–25 cm long, 4–5.5 mm diam. at base, 0.2–0.35 mm diam. at apex, pink to orange, light green distally. **Peduncular bracts** 13–20, patent, all along the stem, narrowly ovate to narrowly oblong, inserted oblique upwards or perpendicular, 0.5–3 × 0.4–0.7 cm, 2–4 mm thick, both sides convex, olive green to bright brown towards the apex, apex acute to 1 mm mucronate, reddish. **Flowers** 6–14, present at distal third of the scape, 1.3–1.7 cm long and 0.75–0.9 cm diam. **Pedicels** 0.3–0.5 cm long, 2–2.5 mm diam., whitish, sometimes with a bracteole at base, similar to sepal. **Calyx** lobes united at base, sepals unequal, narrowly ovate or oblong, acute, erect or inserted at a very acute angle, sometimes incurving, concave inside, convex outside, 4–9 mm long, 2–3.3 mm wide, light green, apex acute reddish. Flower buds ovoid, 0.6–0.8 cm diam. × 0.8–1cm long, greenish white. **Corolla** subprismatical, 0.8–0.9 cm thick near base, 0.9–1 cm thick near apex, petals oblong, acute, (1–) 1.25–1.6 cm long, 3.2–3.8 mm wide, outer surface keeled, pure white, translucent, apex strongly recurving, inner surface totally white. Stamens 10, the 5 epipetalous 6–7 mm long, the antesepalous 10–11 mm long, filaments white, 1–1.1 mm thick at base, gradually tapering to 0.3 mm. Anthers ellipsoid, light yellow, 3–3.5 × 1–1.1 mm. Gynoecium ovoid, 5–9 mm long, 4–5 mm

thick. Carpels 5, greenish white. Styles 3–4 mm long, parallel, almost touching each other, greenish white. Stigma light green. Nectaries reniform, light green to white, 0.4–0.5 × 1–1.1 mm. **Fruit** a dehiscent polyfollicle, 1.2– 1.3 cm long, 0.9–1.1 cm diam., dark brown.

Distribution and habitat: It is recorded in the department of Chuquisaca, in the province of Oropeza in the hills of Sica Sica and Siete Cascadas, and in the province of Yamparaez in Talahuanca, Lamboya and Viscachani, in the department of Potosí in the province of Linares. It grows on steep slopes of the inter-Andean valleys and the head of valleys and Xerophytic Puna between 2500 and 3500 m asl. with the presence of *Schinus molle* L.*, Colletia spinosissima* J.F. Gmel.*, Vachellia caven* (Molina) Seigler & Ebinger*, Baccharis dracunculifolia* DC.*, Acanthostyles buniifolium* (Hook. & Arn.) R.M.King & H. Rob. and *Puya sp*.

Phenology: It blooms in the rainy season from December to May.

Conservation status: According to the IUCN this species is considered to be of least concern (LC)

Other specimens examined: **Bolivia, Dept. Chuquisaca, Prov. Oropeza,** Mountain Chica Chica, south of Sucre, 2500 m asl., 19 May 1968. *D. van Vliet 6* (*van Keppel 6850*), (K); south of Sucre, Cerro Sica Sica, western slopes, 19°03'26.4"S, 65°14'42.8"W, 3105 m, 29 Dec 2010, *Steffen Janke 10527;* Siete Cascadas, right side of the waterfall, 15 km north of Sucre, 18°58' 0.9"S, 65°16' 22.1"W, 2760 m, 30 Dec 2010, *Steffen Janke 10535;* Cerro Sika Sika, 19°03'21.3"S, 65°14'43.1"W, 3463 m, 11 Jan 2022, *G. Pino, D. Marquiegui & W. Ale 3349;* same locality*,* 19°03'13.6"S, 65°14'46.9"W, 9 Jan 2023*, G. Pino, D. Marquiegui & J. Carr 3747*; **Prov. Yamparáez**, **Munic. Yamparáez**, Yamparáez, Talahuanca, 19°08'21.6"S, 65°09'47.5"W, 3040 m, 9 Jan 2023 *G. Pino, D. Marquiegui, J. Carr & B. Bates 3746* (USM 363347); same place, 23 Jan 2026*, H. Huaylla, D. Marquiegui & G. Pino 5179* (HSB 000-12417, USM 363356); between Lamboya and Viscachani, 19°05'08.8"S, 64°49'22.2"W, 2780 m, 08 Jan 2023, *G. Pino, D. Marquiegui, J. Carr & B. Bates 3745* (USM 363346); same place, 05 Mar 2026*, H. Huaylla, D. Marquiegui & G. Pino 5203* (HSB 000-12430); **Dept. Potosí, Prov. Linares, Munic. Puna**, Cerro Pucará, 2600 m, *Hansjörg Jucker 1393*; **Prov. Saavedra, Munic. Tacobamba,** Wila Kkota, 2728 m, *Hansjörg Jucker 1259.*

Etymology: Named for the collector of the plant, the Dutch Dirk Jan van Vliet, (1924–2017), authority of genus *Notocactus* and *Parodia*, who together with W. Rausch explored South America in 1968.

Taxonomical notes: It was described in 1969 by van Keppel. According to Bischofberger (ICN) it remained as a separate species until Kimnach (2003), failing to consult the description of *E. chilonensis,* erroneously included *E. vanvlietii* van Keppel in *E. chilonensis* (Kuntze) Walther, not considering that these are two quite different species : *E. vanvlietii* has lanceolate to narrowly ovate or oblong leaves compared to the narrowly obovate to narrowly oblong or subrhomboidal leaves of *E. chilonensis*. Both have similar length, but its width is different: *E. chilonensis* leaves get

wider at the middle than those of *E. vanvlietii*, (1.9 cm *vs.* 1.5 cm) and at the distal third (1.2–2.2 cm *vs.* 0.6–1 cm) due to the spatulate or rhomboidal versus narrowly ovate or subtriangular shape of the leaves. The color of *E. chilonensis* is bright light green compared to the olive green to bright brown, sometimes purplish color of *E. vanvlietii*. The most striking difference is the golden yellow to coral orange color of the petals of *E. chilonensis* compared to the pure white to cream seen in *E. vanvlietii*. While the purest white forms of *E. vanvlietii* are located around the city of Sucre, one of the localities to the East (*G. Pino et al. 3745)* has some flowers with different colors all together(orange, yellow and white), but the plants otherwise match the description of the species. Another collection made very southernly, (*HJ 1393*), produced yellow flowers in cultivation. These may represent only phenotypes of the species. According to Uhl (2007) its cytology is n = 120.

Fig. 6 a. *Echeveria vanvlietii* in habitat starting anthesis. (DM). **b**. Plant in situ from type locality with white flowers (DM). **c.** Plant from Lamboya with yellow flowers (DM). **d**. Detail of the aerial stems in HJ 1393. **e.** Plant in habitat from Lamboya with orange flowers (DM). **f.** Plant *ex situ*. **g.** Details of the leaves. **h.** Details of the bracts (HH). **i.** Details of the flowers.

7. *Echeveria whitei* Rose, *Addisonia* 10 (3): 47–48, pl. 344, fig. 1–3, (1925). Fig. 7 a–i

Type : **Bolivia, Dept. La Paz, Prov. Inquisivi**, **Munic. Quime,** near Quime, 15 Jul 1921, *O.E. White 220,* cultivated at the conservatory of Brooklyn Botanical Garden in 1923, collected Mar 25 1924, *R.S. Williams 52217* (Holotype: NY 00127098!).

Amended description: A succulent glabrous **herb** 3–8 cm tall, up to 16–30 cm tall in blossom. **Stem** buried, erect to decumbent, 0.3–0.8 cm diam., 2–5 (–10) cm long, light grayish brown, with annular scars of fallen leaves, branching readily from base. **Rosettes** one at the end of stem or branch, 2.8–9 cm diam. **Leaves** 13–26, very narrowly obovate to narrowly oblong or subspatulate, sessile, loosely attached, mostly incurved, 2.1–4.5 cm long, 0.5–0.7 cm wide at base, 0.6–0.9 cm wide at proximal third, 0.8–1.4 cm wide at middle, 0.95–1.35 cm wide at distal third, 1–2 mm thick, upper side flat to convex, olive green, tinged purplish distally when exposed, lower side convex to subcarinate, olive green, sometimes dotted purplish, apex obtuse to cuspidate with a small same colored 0.5 mm mucro, rarely acute, base hyaline whitish.

Flowering stem an oblique lateral subterminal raceme, rachis curved, 10–30 cm long, 2.5–5 mm diam. at base, 1.4–2 mm diam. at apex, pinkish light green. **Peduncular bracts** 10–20, permanent, at proximal half of stem or two thirds, lanceolate, slightly recurved, inserted oblique upwards, 0.7–1.4 × 0.35–0.6 cm, 1–2 mm thick, inner side flat to canaliculate, outer side convex, light olive green to pink, apex acute. **Flowers** 3–6 (–12), present at distal fourth of the scape, 1.1–1.3 cm long and 0.55–0.75 cm diam. **Pedicels** 0.8–1.6 cm long, 1–1.2 mm diam., infundibuliform, same color as scape, bracteole at base similar to sepal when present. **Calyx** lobes united at base, sepals unequal, ovate to oblong or triangular, acute, erect, flat inside, convex outside, 4–8 mm long, 1.8–3 mm wide, bright olive green to glaucous, reddish at the base. Flower buds ellipsoid, 0.5 cm diam. × 0.6 cm long, light green. **Corolla** subprismatical, 0.6–0.7 cm thick near base, 0.3–0.45 cm thick near apex, petals oblong, acute, 1.15–1.35 cm long, 0.25–0.3 mm wide, outer surface keeled, light red to crimson red, orangish towards the base, apex slightly recurving, inner surface orange red. Stamens 10, the 5 epipetalous 4–5 mm long, the antesepalous 7–9 mm long, filaments cream, 0.6–0.8 mm thick at base, gradually tapering to 2 mm. Anthers ovate, yellow, 1.1–1.2 × 0.6–0.7 mm. Gynoecium ovoid, 5–6 mm long, 4–5 mm thick. Carpels 5, cream. Styles 3–3.5 mm long, parallel, almost touching each other, pink. Stigma reddish. Nectaries reniform, light cream to greenish yellow, 1–1.4 × 0.7–0.8 mm. **Fruit** a dehiscent polyfollicle, 0.9– 1 cm long, 0.7–0.8 cm diam., light brown.

Distribution and habitat: Endemic species of Bolivia from the Inquisivi province, it is recorded in Quime, growing on steep slopes in rocky areas in the Humid Montane Forest of the Peruvian-Bolivian Yungueña Province, between 2800 and 2950 m asl., associated with *Polylepis pacensis* M. Kessker & Schmidt-Leb., *Clusia sp*. *Puya sp*. and *Eryngium sp*.

Phenology: It blooms in the rainy season in January and February.

Conservation status: To date only two localities near the population of Quime are known, populations with few juvenile plants that grow on cliffs of difficult access are observed, so we consider them Critically Endangered (CR) according to the IUCN category.

Other specimens examined: **Bolivia, Dept. La Paz, Prov. Inquisivi**, **Munic. Quime**. near Quime, very common on a dry hillside above Quime River, in dry rocky clay soil, herb 4–8 inches high, flowers vivid scarlet, foliage bluish, 9000 ft. [2740 m], 15 Jul 1921, *O.E. White 220* (US 1111971, Voucher 03775662, US 1319935, Voucher 00096781, GH 00042498, NY 04107227); 2 km NE of Quime on road to Inquisivi, 16°57'39.48"S, 67°,19'09.35"W, 2835 m, 22 Jan 2023, *G. Pino, D. Marquiegui & J. Carr 3755* (USM 363350); same road, Irupaya Gorge, 16°57'17.7"S, 67°12'22.8"W, 2932 m, 28 Jan 2026, *H. Huaylla, D. Marquiegui & G. Pino 5183* (HSB 000-12420); road to Quime, 400 m, 27 Jan 1981, *L. Besse, C. Luer, J. Luer, R. Vásquez 627*, (MO 4072797); along the slope below the Quime-Inquisivi road and the Río Khatu between the mouths of the Río Irupaya and the Río Titi Amaya, *ca.* 3–4.5 km from Quime, 16°57' S, 67°12' W, 2850 m, 14 Feb 1989, *Marko Lewis 35222* (LPB, MO, NY 04107164).

Etymology: Named for Orland Emile White, (1885–1972), plant geneticist, collector of this plant during the Mulford Exploring Expedition to South America headed by H.H. Rusby in 1921–1922 and curator at the Brooklyn Botanic Gardens, where he cultivated this plant.

Taxonomical notes: The original description by Rose is very meager and lacks details and exact measures. We compared it with ours and found some differences in leaf shape (narrowly obovate to oblong *vs.* spatulate in the description), leaf length (2.1–3.6 cm vs. 3.8–5.1 cm in the description), and leaf color (pale green to bluish, sometimes with a blush *vs.* olive green, tinged purplish distally). Scape length in the description is mentioned both as flowering stems with 30.5 cm and as inflorescence as 10.2 cm long, (we found 10–30 cm), but the rest coincides. Although the collections of *White 220* were deposited in US, GH and NY with the intention to be declared as the type set, in the protologue Rose does not designate a holotype, but he presents plate 344 and he indicated it was drawn from a cultivated plant of the Brooklyn Botanical Garden, collected in 1924 by Robert S. Williams and deposited in NY with a note indicating it was used for colored illustrations in Addisonia. Therefore, this sheet is considered the holotype in www.gbif.org and www.tropicos.org. Walther (1972) designated US 1111971 as “type”, ignoring the sheet in NY. He also gives a more detailed description than Rose, but according to Bischofberger (ICN), it is not valid because it is based on plants of unknown origin (locally cultivated plants, probably not the same as the plant of the holotype). In this publication, Walther also places *Echeveria buchtienii* von Poellnitz (1934) and *E. rauschii* both as synonyms of *E. whitei* (see the differences with *E. buchtienii* and *E. rauschii* above). We suggest using the amended description of *E. whitei* here provided for any comparison. According to Bischofberger (ICN), even though its cytology is: n = 150 ± 4 (Uhl, 2007), Kimnach (2003) indicated the cytology as n = ± 96, but he did not use a plant

at or near the type locality but a plant cultivated at Les Cèdres (Monaco) from “Cochabamba-Chidro” (Uhl, 2007), a locality which cannot be traced.

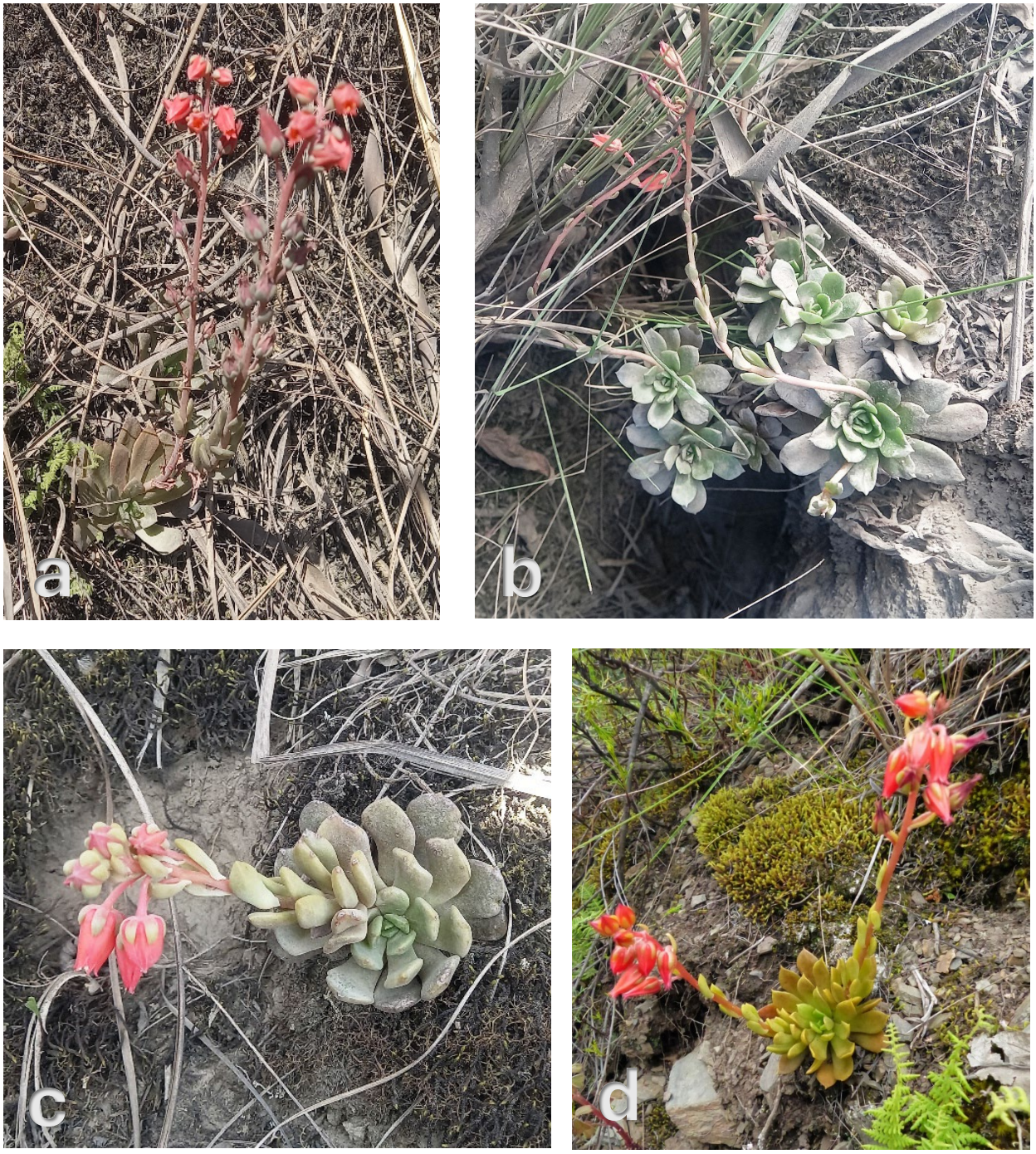


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Fig. 7 a. *Echeveria whitei* in habitat at Quime (DM). **b**. Plant in habitat (DM) **c.** Plant in habitat with thick leaves (DM). **d**. Plant in habitat in a humid gorge (HH). **e.** Detail of flowers in habitat (DM). **f.** Details of the leaves. **g.** Plant *ex situ*. **h.** Details of the bracts. **i.** Plant *ex situ* **j.** Details of the flowers.

Key to the species of the genus *Echeveria* in Bolivia

1. Plants strongly covered with pruinescence……..……. ***Echeveria bakeri*** Kimnach.
– Plants glabrous or only slightly pruinose……...**2**

2. Leaf apex acute ……..…..…….…….…..…**3**
– Leaf apex obtuse to cuspidate …….....**6**

3. Plants almost completely purplish.....**4**
– Plants bright to dull green.....**5**

4. Leaves narrowly obovate, red flowers, La Paz.....…...***Echeveria buchtienii* von** Poellnitz.
– Leaves lanceolate to narrowly ovate, white flowers, SE of Sucre……..……***Echeveria vanvlietii*** Van Keppel.

5. Stem erect, short, stumpy, 1.2–2.7 cm diam., leaves more oblong, sepals spreading in acute angle or ascending.....***Echeveria chilonensis*** (Kuntze) Walther.
– Stems decumbent, long, very branched, 0.5–1.2 cm. diam., leaves more spatulate to rhomboidal, sepals widely spreading at right angle…….……***Echeveria krahnii*** Kimnach.

6. Plants larger, rosettes 4–13 cm diam., leaves 3.5–6.8 cm long, light olive green to brown, scape 12–45 cm long.....***Echeveria rauschii*** Van Keppel
– Plants smaller, rosettes 2.8–9 cm diam., leaves 2.1–4.5 cm long, bright to olive green, scape 10–30 cm long.…….……..……..…***Echeveria whitei*** Rose

Conclusions: We hereby present, describe and illustrate the seven original species of *Echeveria* described in Bolivia up to 2025. *E. vanvlietii* was considered a synonym of *E. chilonensis* and this was clarified by Bischofberger (ICN), here we ratify it is a separate species. *E. rauschii* was considered a synonym of *E. whitei*, until Bischofberger (2017) demonstrated the opposite. According to POWO (2026), *E. buchtienii* is still a synonym of *E. whitei*, here we reinstall it as a separate species. In three of the seven species, flowers can have different colors, even in the same population (red, orange and yellow in *E. chilonensis* and *E. rauschii,* and white, yellow and orange in *E. vanvlietii*). All species found seem to belong to series *Racemosae* (Baker) Berger.

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