



3a. A colony of *Echeveria ostolazae* in habitat near Tantará. (D.M.)

3. *Echeveria ostolazae* Pino, Alcalá & Marquiegui **sp. nova**

Holotype: PERU: Dept. Huancavelica, Prov. Castrovirreyna, Dist. Tantará, Road from Tantará to Chinchá, growing with *Trichocereus peruvianus* subsp. *puquiensis*, 2,708 m, S 13°06'13.04", W 75°39'30.92", Jan 19 2021, G. Pino, A. Alcalá & D. Marquiegui 3269. (USM 324182) (Fig. 3a)

In 2002, Carlos Ostolaza and Félix Soldevilla visited the basin of the San Juan River, which flows from the slopes of the western Andes in province Castrovirreyna, department Huancavelica, to the coastal province Chinchá, department Ica, not far from the southern border of department Lima, Peru. This expedition was partially supported by the BCSS Conservation Fund, mainly aimed to assess the status of endangered cacti in the gorges that feed this river. (Ostolaza, 2002) In the Tantará gorge, on shaded, rocky walls at 1,950 m, near the small town of San Juan de Castrovirreyna, Ostolaza found a dry *Echeveria* without inflorescence growing together with *Peperomia galioides* on dry mosses, took a photo of it and provisionally determined it as *E. aff. chilensis*, the geographical closest species. The photo, published in his article,



3b. *Echeveria ostolazae* in the dry season near Arma. (S.Z.)

3c. Young *Echeveria ostolazae* showing tuberous roots.



3d. Ex-situ plant showing detail of aerial stem.

the road from Chinchá to Villa de Arma together with Santiago Zambrano Godoy, who took a picture exactly like Ostolaza's (Fig. 3b), and on the way from Villa de Arma to Aurahuá. In 2017 he made a presentation at the Peruvian National Cactus Congress in Ayacucho (CONACYS) with the title "Cactáceas de la cuenca del río San Juan", where he also showed a slide of the yet unidentified *Echeveria*. And in 2019 he and Natividad Martínez found it again at a locality closer to Chinchá, so they suspected that it could also be present in the department of Ica.

As most of these explorations had happened in the dry period, we decided to assess the status of flowering plants in the rainy season, profiting from the partial easing of the pandemic lockdown in January.

Description: A succulent glabrous, solitary herb, very rarely forming clusters, growing on moss or between rocks. **Primary roots** in young plants 5–8, tuberous, 3–6 cm long, 8–10 mm diam., slightly tapering to 2–3 mm diam., light brownish yellow, born from a disc at the base, (1–) 2–3 cm diam., that gradually develops into the stem, secondary roots fibrous from sides of tuberous roots or stem, 3–15 cm long, 0.5–1 mm diam. (Fig. 3c). **Stem** conspicuous, erect, semiburied to aerial, up to 20 cm long, (1–) 1.5–3(–4) cm diam., annularly constricted with scars of fallen leaves and inflorescences, light grayish brown when exposed, dark brown when moist inside moss (Fig. 3d).

Rosettes terminal, usually one, (8–) 12–20(–35) cm diam. **Leaves** in young plants 6–8, obovate, subacute-mucronate, upper side slightly concave to flattened 2 mm near blunt margins, lower side subcarinate, bright dark green (Fig. 3e). In mature plants (10–) 12–16(–18) leaves, the peripheral ones narrowly obovate

shows lilac deltoid-leaved plants with a thick semi-buried stem and persistent dry leaves. In Pino et al. 2018, we considered this plant as part of the distribution of *Echeveria deltoidea* because it matched exactly its leaf shape in dormancy, but two doubts remained: the structure of the inflorescence and more than 200 km distance and six valleys between the known-occurrence of *E. chilensis* and the new locality. In Peru it is considered almost a rule that a species grows only in two to five adjacent valleys. Also, in the respective article the first author erroneously wrote that Tantará is close to the border with Lima, while he should have said close to the border with Ica.

In 2015, together with Carlos Montalva Grimaldi, the second author, Andrés Alcalá Bacigalupo, initiated a series of explorations to assess cacti in the same area. He also found this *Echeveria* in two places: On



3e. Detail of the leaves of young *Echeveria ostolazae* showing almost horizontal attachment.

to suboblong, incurved or recurved from distal half, central ones slightly rhombic and incurved, sessile, (5–) 8–14 (–20) cm long, (1–) 1.2–1.6 (–2) cm wide at base, 1.5–2 (–4) cm wide at proximal third, 2.2–3.2 (–4.5) cm wide at middle, (1.6–) 2–3.4 (–4.8) cm wide at distal third, 3–6 mm thick, upper side concave to canalicate, central nerve depressed, apex subacute or acute with a 1.5×2.5 mm mucro, in the dry period lilac, in the rainy period bright dark green, lighter in color, sometimes with a light reddish/brownish hue in distal half or near margins and keel, base hyaline, lighter in color (Fig. 3f).

Flowering stem 1–2 erect racemes, dry scapes persistent, **rachis** (20–)30–50(–70) cm long, 1–1.2 cm diam. at base, tapering to 2–2.5 mm diam. at apex, light green, slightly reddish in full sun, terete or slightly sulcate due to decurrent pedicels (Fig. 3g). **Peduncular** bracts 16–26, spaced evenly 1.5–3 cm along the stem, sometimes paired at the base, larger at proximal half, spreading at 45° , slightly recurved, oblong to narrowly obovate or ovate, slightly recurved, 2–4.5 cm long, 0.5–1.4 cm wide, 3.5–4 mm thick, upper side flat to convex or subcanalicate, lower side convex, both sides same color as leaves, tips acute to mucronate, sometimes reddish, base hyaline (Fig. 3h). **Flowers** (10–) 13–22 (–28), appearing from February to April, crowded at distal half of the scape, 1.2–1.8 cm long and 7–8 mm diam. **Pedicels** erect or in acute angle to the axis, 0.5–2 cm long, 1–1.5 mm diam., slightly redder than flowering stem, with a small 1–2 cm long, 2.5–4 mm wide bracteole at base, lanceolate, incurved. **Calyx lobes** united at base, sepals unequal, oblong to very narrowly ovate acute, spreading at $45\text{--}90^\circ$, both sides convex, 7–12 mm long, 2–2.5 mm wide, light green. **Flower buds** ovoid, 0.8–1 cm long, 0.5–0.7 cm diam., yellow at base, reddish at apex. **Corolla** subpentagonal, 1.1–1.7 cm long, 7–8 mm diam. along all



3f. Detail of the leaves of mature *Echeveria ostolazae*.

its length. **Petals** narrowly oblong, acute, 0.9–1.4 cm long, 3–4 mm wide, light red to salmon orange, apex markedly recurving, inner surface red 1 mm near margins and distal end, yellowish at the middle. **Stamens** 10, the 5 epipetalous 7–8 mm long, the antesealous 10–11 mm long, **filaments** cream, 0.7–1 mm thick at base, gradually tapering to 0.3 mm. **Anthers** ovate, yellow, 1.5–2 mm long and 0.8–1 mm wide. **Gynoeceum** turbinate, 10–11 mm long, 5–6 mm thick. **Carpels** 5, greenish white. **Styles** 3–4 mm long, parallel, almost touching each other, greenish, stigma reddish (Fig. 1g). **Nectaries** inconspicuous, white to very light greenish, 0.6×1.2 mm. **Fruit** a dehiscent capsule made of five follicles, 1.2–1.3 cm long, 1.5–1.8 cm diam. (spreading dry sepals), dark brown (Fig. 3i).

Other localities: Dept. Huancavelica, Prov. Castrovirreyna, Dist. Arma, Road from Chinchá to Villa de Arma, after Palca, growing with *Trichocereus peruvianus* ssp. *puquiensis*, *Loxanthocereus acanthurus*, *Loxanthocereus pachycladus* and *Weberbauerocereus rauhii*, 1,937 m, S $13^\circ 13' 12''$, W $75^\circ 35' 38''$, Jan 19, 2021, G. Pino, A. Alcalá & D. Marquiegui 3248. (USM 324172). Same road, some kilometers after (very large plants), growing with same species of Cacti, *Sedum xerophyllum*, *Tillandsia* sp. and *Peperomia galioides*, 1,963 m,



3h. Detail of the bracts of *Echeveria ostolazae*.

from Villa de Arma to Aurahuá, before Aurahuá, growing with *Austrocylindropuntia floccosa* and *Matucana haynei*, 4,150 m, S 13°03'42", W 75°34'15", Jan 19 2021, G. Pino, A. Alcalá & D. Marquiegui 3257. (USM 324177). **Dist.** Chupamarca, Road from Aurahuá to Tantará, before Chupamarca, at the second waterfall, growing with *Trichocereus peruvianus* subsp. *puquiensis*, 3,210 m, S 13°01'59", W 75°36'03", Jan 19 2021, G. Pino, A. Alcalá & D. Marquiegui 3266. (USM 324180). **Dist.** Tantará, Road from Aurahuá to Tantará, before Tantará, 2,847 m, S 13°04'03", W 75°38'42", Jan 19 2021, G. Pino, A. Alcalá & D. Marquiegui 3267. Road from Tantará to Chinchá, after Tantará, 2,762 m, S 13°05'41", W 75°39'36", Jan 21 2021, G. Pino, A. Alcalá & D. Marquiegui 3268. (USM 324181). **Dept.** Ica, Prov. Chinchá, Dist. San Pedro de Huacarpána. Tambo, detour coming from Chupamarca to enter Tantará, growing with *Trichocereus peruvianus* subsp. *puquiensis*, 2,984 m, S 13°03'25.84", 75°38'06.6", Jan 21 2021, G. Pino, A. Alcalá & D. Marquiegui 3266a (Observed)

Etymology: The name of this *Echeveria* honors its discoverer, Carlos Ostolaza. He is a Medical Doctor, General Surgeon and Botanist, national expert and authority of Cacti in Peru, member of IOS, Fellow of the CSSA, founder/past-president of the Peruvian

3g. Detail of the leaves of mature *Echeveria ostolazae*.

S 13°13'06", W 75°35'33", Jan 19 2021, G. Pino, A. Alcalá & D. Marquiegui 3249. (USM 324173, Fig. 3j). Same road, growing with same species and *Mila caespitosa* subsp. *densiseta*, *Opuntia pestifer*, *Armatoocereus matucanensis*, *Jatropha* sp. and *Portulaca* sp., 2,003 m, S 13°12'57", W 75°35'27", Jan 19 2021, G. Pino, A. Alcalá & D. Marquiegui 3254 (USM 324175). Close to Villa de Arma, growing with *Trichocereus peruvianus* subsp. *puquiensis*, *Opuntia ficus indica*, *Tillandsia* sp. and *Agave cordillerensis*, 2,514 m, S 13°10'26", W 75°33'51", Jan 19 2021, G. Pino, A. Alcalá & D. Marquiegui 3256. (USM 324176). **Dist.** Aurahuá, Road



3i. From left to right: *Echeveria ostolazae* flower buds (2), flower, sepals (4), petals (3), sectioned flower showing gynoecium, gynoecium, premature fruit, dry fruit.

Table 1. Comparison of all taxa of *Echeveria* found in the department of Huancavelica and related species. Measurements obtained from the present study and from the first author's descriptions (Pino 2002, 2005, 2006, 2009; Pino et Vilcapoma 2018; Pino & Kamm 2018), updated with additional field data and from cultivated plants.

		<i>Echeveria ostolazae</i>	<i>E. deltoidea</i>	<i>E. cerrateana</i>	<i>E. incaica</i>	<i>E. oreophila</i>	<i>E. intiwayta</i>
Stems	Number, presentation, length	1, semiburied to aerial, erect up to 20 cm.	1, rarely branched, buried, short.	1, scarcely buried to aerial, erect, 2–3 (–6) cm.	1, aerial, shortly decumbent at base and then erect. 3–15 (–45) cm.	1, rarely up to 4 shortly decumbent at base and then erect 9–30 cm.	1, sometimes up to 4, branching from the base, aerial, erect, 1.5–5 cm.
	Diameter at base (cm)	(1–) 1.5–3 (–4)	0.5–3.5	2–2.5 (–3.2)	0.8–2.2 cm	1.5–2.5	0.8–1.2
Rosette diam.		8–35 cm	(10–) 15–25 cm	3–18 cm	12–15 cm	11–25 cm	4.5–8.5 cm
Leaves per rosette		10–18	17–27	12–24	13–25	22–28	14–27
Leaf color		Bright dark green both sides, lilac in winter.	Light green, slightly redder at keel, light blue to glaucous in winter, purplish in outer leaves.	Dark green, dark red brownish in winter.	Dark to yellowish green, brownish red near margins, lower side light or olive green–brownish/purplish in distal 2/3 or near margins and keel.	Light green to glaucous or dull green, reddish or purplish near margins, lower side reddish-violet.	Glaucous, dark reddish to purplish near margins or distal third, lower side dark to bright reddish or the whole surface glaucous.
Leaf shape	Young	Obovate.	Triangular or mitriform to rhomboid obovate.	Broadly ovate triangular then narrowly triangular.	Ovate.	Widely obovate.	Obovate.
	Mature	Narrowly obovate to suboblong.	Narrowly triangular to narrowly oblong-lanceolate.	Narrowly obovate to oblong.	Obovate in central leaves, orbicular to subspathulate in peripheral ones, narrowly obovate in large plants.	Narrowly obovate to subspathulate.	Obovate in central leaves, very narrowly obovate in peripheral ones.
Leaf size (cm)	Length	8–14	(4–)10–15(–20)	4–10	4.5–9	4.5–6.5 (–12)	3–5
	Width at base	1.2–1.6	2.5–3.5	0.8–1–1.5	0.5–0.8	0.9–1	0.7–0.9
	Width at proximal third	1.5–4	3–5	1–1.4	0.8–1.4 cm	2.4–3.6	0.9–1.2
	Width at middle	2.2–4.5	4–6	1–1.6	2–3	2.2–3.1	1.4–2.3
	Width at distal third	2–4.8	3–5	(0.7–)1–1.2	2–2.8	2.4–3.6	2.4–3.6
	Thickness (mm)	3–6	3–5	3–7	0.6–10	3–7	4–5
Scope	Number, length (cm)	1–2, 30–50	1, 30–45 (–80)	1–2, (25–) 35–45 (–60)	1(–2) erect, 18–25	1–2, 12–30 or more	1(–2) erect, slightly incurved, 12–18
	Diameter at base (cm)	1–1.2	0.7–1.0	0.4–0.6	0.4–0.7	0.5–0.8	0.38–0.5
	Color	Light green or pink.	Light glaucous green to pink.	Light green to yellowish or pink.	Light green at first or in shade, bright red in full sun.	Light green or pink.	Light green to dark red.
Bracts	Number, shape	16–24, oblong to narrowly obovate.	18–26, oblong to lanceolate.	22–30, narrowly ovoid-oblong to lanceolate.	12–22, obovate to narrow obovate.	15–28, oblong to narrowly obovate.	10–18, oblong to very narrowly obovate.
	Length × width (cm) × thickness (mm)	2–4.5 × 0.5–1.4 × 3.5–4	2–6 (–9) × 1.2–1.8 × 5–6	2–3.5 × 0.5–1.4 × 4–7	2.2–4.5 × 0.9–2.2 × 3.5–6, longer than flowers.	1.2–2.5 × 0.4–0.7 × 3–4, shorter than flowers.	2.2–3 × 0.8–1.5 cm × 3–4
Flowers, arrangement		(10–) 13–22(–28), subpentagonal.	22–30, pyramidal.	(12–)16–19, urceolate, subpyramidal.	12–22, subpentagonal.	12–15, subpentagonal.	8–14, subpentagonal.
Pedicels		Ascending or in acute angle to the axis, 0.5–2 cm long, red.	Horizontal and short (1–2 mm) in distal flowers, oblique in lower flowers, up to 1.2 cm long.	Horizontal or in 45°, 0.4–1.8 cm long.	In right angle or recurved, 2–5 mm long.	Ascending or in 45° to the axis, 4–5 (–12) mm long, reddish.	In right angle or recurved, 1–6 mm long.
Sepals	Shape, presentation	Oblong to very narrowly ovate acute, 45–90°	Narrowly ovate acute, spreading in right angle	Narrowly ovate or oblong acute ascending or recurved,	Oblong to subtriangular, ascending, slightly incurved,	Deltoid ovate, subacute, spreading in 60–90°,	Oblong to narrowly ovate acute, ascending or spreading in 30°, both sides convex
	Length × width (mm)	7–12 × 2–2.5	5–8 × 3–4	6–10 × 1.5–2.5	6–8 × 3–4	6–8 × 2.5–4	7–9 ×, 2.5–4.5
	Color	Light green.	Light olive green.	Light green.	Reddish olive green.	Reddish green.	Intense red.
Petals	Length (cm) × width (mm)	0.9–1.4 × 3–4	1.8–2 × 5–6	1.2–1.4 × 3.5–4, apex slightly recurving.	1.4–1.6 × 5–6	1.3–1.6 × 4–5	1–1.3 × 4.5–6
	Outer surface color	Light red to salmon orange, apex recurved,	Salmon red, apex slightly recurving,	Yellow with minute red lines,	Light red to orangish yellow, redder at keel, apex intense red and recurving,	Dull pink, keeled,	Keeled, dark red, pruinose, proximal half sometimes orangish, apex slightly recurving, redder,
	Inner surface color	Red near margins and distal end, yellowish at the middle.	Red near margins and distal end, yellowish at the middle.	Yellow, pinkish at margins and tip.	Yellow, reddish near apex.	Light cream proximal 2/3, reddish distal third.	Light red, orangish in proximal half.



3j. A large rosette of *Echeveria ostolazae* ca. 35 cm diam., growing with *Oxalis* sp. and *Peperomia galioides*, close to Arma. (D.M.)

Cactus Society (SPECS) and author of many books and articles.

Distribution: To date, *E. ostolazae* has been found in the San Juan River basin, department Huancavelica, province Castrovirreyna, where it is abundant in districts Tantará, Aurahuá and Arma and in a single locality of the neighboring highlands of province Chíncha, in the department of Ica, Peru. We explored later the adjacent southern valley of Huaytará but failed to find it there.

Differential diagnosis: This new taxon was taken by its discoverer for *E. chilensis* var. *chilensis*, (Pino, 2002) geographically the closest species that grows only 200 km to the north. Young plants are almost indistinguishable, but when mature the latter develops more leaves, which are dull green to purplish, almost half as wide, and slightly thicker, bracts are likewise narrower, flowers are longer and of a different color pattern (see Table 1). The first author determined it as *E. deltoidea* without flowers, (Pino et al. 2018) but the new species is less branched and tends to form longer aerial stems. In *E. deltoidea*, rosettes are larger, leaves are more triangular and wider, lighter in color, however in winter the two species can be confused because of the purplish or grayish color. The flowers of *E. deltoidea* are longer, pyramidal instead of prismatic, although their color is similar. The structure of the stem and the tuberous roots of *E. ostolazae* is reminiscent of *E. cerateana*, (Pino & Kamm, 2018), but leaves of the latter are shorter and not as wide, straight, harsher in surface, narrowly triangular, turning very dark red or brown in winter. Flowers have a bulged base, they are subpyramidal instead of prismatical and have a different color pattern. The leaves of *E. ostolazae* also remind of *E. andicola* (Pino, 2005), but this species has shorter, intense red flowers.