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# *Calceolaria nivalis* subsp. *lanatifolia*, a new subspecies of Calceolariaceae from Northern Peru

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## Abstract

A new subspecies of *Calceolaria nivalis*, *C. nivalis* subsp. *lanatifolia* is described and illustrated. The new subspecies was collected in Uchumarca district, department of La Libertad, Peru, between 2300–3850 m elevation. *Calceolaria nivalis* subsp. *lanatifolia* is characterized by the lanate indumentum in the lower surface of the leaves, villous petioles, peduncles, and pedicels, and sepals with a strigose margin internally.

## Resumen

Una nueva subespecie de *Calceolaria nivalis*, *C. nivalis* subsp. *lanatifolia* es descrita e ilustrada. La nueva subespecie fue colectada en el distrito de Uchumarca, departamento de La Libertad, Perú, entre los 2300–3850 m de elevación. *Calceolaria nivalis* subsp. *lanatifolia* se caracteriza por el indumento lanoso en el envés de sus hojas, pecíolos, pedúnculos y pedicelos vellosos, y sépalos con un borde estrigoso en el margen interior.

## Introduction

*Calceolaria* Linnaeus (1770: 286) is the largest genus of family Calceolariaceae with over 250 species distributed from Central Mexico to Tierra del Fuego in Argentina (Molau 1988). The most species-rich area of the genus is in the Middle Division of the Andes, near the Huancabamba deflection in Northern Peru, the lowest section of the central Andean Range. There have been over 125 species of *Calceolaria* reported for Peru (Molau 1988, Brako & Zarucchi 1993, Puppo 2010), with ca. 39% of those occurring in the northern part of the country, especially in the departments of Amazonas and Cajamarca (Puppo 2010). And new species are still being discovered for the country (Molau 2003, Puppo 2008, Romero-Hernández *et al.* 2017).

*Calceolaria* is a genus easy to identify due to its characteristic flower morphology. The flowers are yellow, bilabiate with a saccate lower lip, and they have 2 stamens. Most species offer oil as reward to pollinators. This oil is produced by a patch of trichomes located in an infold of the lower lip of the corolla known as elaiophore (Vogel 1974). Only one species, *C. triandra* Vahl (1804: 181) has 3 petals and 3 stamens.

In the last taxonomic treatment of the genus, Molau (1988) subdivided *Calceolaria* into 22 sections within 3 subgenera, *Calceolaria*, *Cheiloncos* (Wettst.) Pennell (1945: 145), and *Rosula* (Descole & Borsini) Molau (1988: 287). Recent molecular analyses have proven all three subgenera polyphyletic (Frankel *et al.* 2022) so a comprehensive taxonomic revision for the genus is needed to redefine the infrageneric limits, as observed in other critical plant groups especially in territories with high plant biodiversity (e.g. Wagensommer *et al.* 2014, 2016, Kasana *et al.* 2021, Fu *et al.* 2022, Perrino *et al.* 2022).

In this paper, I describe a new subspecies of *Calceolaria nivalis* Kunth (1818: 381) from La Libertad department, Peru. This new subspecies was collected in the District of Uchumarca in Bolívar, a poorly explored region in Northern Peru where several other new species have been described in recent years (Hoxey 2014, Al-Shehbaz 2016, Romero-Hernández *et al.* 2019), including new *Calceolaria* species (Romero-Hernández *et al.* 2017).

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## Material and methods

During general identifications at the Missouri Botanical Garden Herbarium (MO) in 2022, I detected some unusual *Calceolaria* specimens from Peru. After consulting the last taxonomic revision for the genus (Molau 1988) and other relevant literature (Molau 1979, 2003, Puppo 2010, Romero-Hernández *et al.* 2017), and comparing the specimens to closely related species in the MO collection, I here describe them as a new subspecies of *Calceolaria nivalis*.

## Taxonomic treatment

***Calceolaria nivalis*** Kunth subsp. ***lanatifolia*** Puppo, *subsp. nov.* (Fig. 1)

**Diagnosis:**—*Calceolaria nivalis* subsp. *lanatifolia* is similar to *C. nivalis* subsp. *cerasifolia* but differs from it by having the lower surface of the leaves densely lanate (vs. glabrous) with light yellowish brown trichomes, villous peduncles and pedicels (vs. villous or lanate with ferruginous hairs), sepals with a strigose margin internally (vs. tomentose), and stamens with filaments 0.5 mm long (vs. 1–1.5 mm long).

**Type:**—PERU. La Libertad: Bolívar, Uchumarca, upper slopes of Cerro Filo de Andonsa, 3830 m, 07°06’46’’S, 077°49’29’’W, 31 May 2015, *Carlos Vega Ocaña, Rainer W. Bussmann & Narel Paniagua Zambrana 401* (Holotype, MO (MO-3147316)!; Isotypes, HAO, MUHW).

**Paratypes:**—PERU. La Libertad: Bolívar, Distr. Uchumarca, curso Las Quinas a Uchumarca, 2300 m, 07°01’46’’S, 077°47’02’’W, 17 May 2011, *Narel Paniagua Zambrana, Rainer W. Bussmann, Carlos Vega Ocaña & F. Días Vega 8378* (MO!); Distr. Uchumarca, Collpacucho, 3850 m, 07°04’17’’S, 077°48’43’’W, 7 November 2013, *Rainer W. Bussmann, Narel Paniagua Zambrana, Carlos Vega Ocaña & Carolina Téllez 17894* (MO!).

**Description:**—Erect shrub 0.5–2 m tall; stems glabrous or sparsely villous, purple. Leaves decussate, petiolate; blades coriaceous, lanceolate, 5–8.5 × 1.4–3 cm, attenuate, rounded at base, the margins serrate with mucronulate teeth slightly revolute; upper surface green, glabrous, sparsely villous on the midvein; lower surface reticulate-venose, densely lanate with light yellowish brown trichomes; petioles 6–10 mm long, densely villous. Inflorescence terminal, composed of several cymes; primary peduncles 2.5–3.8 cm long, villous; pedicels 8–18 mm long, villous; cyme bracts present. Sepals entire, ovate, attenuate, 4–5 × 3–4 mm, externally glutinous, internally with a strigose margin. Corolla yellow or bicolor with a patch of long sericeous white hairs near the base of the stamens; upper lip white, pale yellow, or yellow, flattened, 7–10 mm high and 7.5–12 mm wide; lower lip dark yellow, upcurved 10–13 mm, elaiophore present. Anthers pale yellow, glabrous, 2–3 mm long, dehiscent throughout; thecae equal, divaricate; filaments 0.5 mm long. Style 2 mm long. Capsules conical, 5–6 mm long, glutinous.

**Phenology:**—The new subspecies has been recorded flowering and fruiting from May to November.

**Distribution and ecology:**—Only known from Uchumarca district, La Libertad department, Peru, growing on sandstone cliffs or rocky areas between 2300–3850 m elevation.

**Etymology:**—The subspecies epithet refers to the lanate indumentum on the lower surface of the leaves.

**Conservation status:**—Data Deficient – DD (IUCN 2012). Since *C. nivalis* subsp. *lanatifolia* is only known from three collections, there is not enough information to accurately assess its conservation status.

**Taxonomic relationships:**—*C. nivalis* is distributed from central Ecuador to northern Peru between 1700–4200 m elevation. Two subspecies have been recognized in previous taxonomic treatments separated by the Huancabamba deflection (Molau 1979, 1988). *Calceolaria nivalis* subsp. *nivalis* occurs north, in Ecuador and in the northernmost part of Peru in the department of Piura. This subspecies is characterized by the pinnate venation of the lower surface of the leaves, and dorsally tomentose petioles. *Calceolaria nivalis* subsp. *cerasifolia* Molau (1979: 36) occurs south of the Huancamamba deflection, in northern and central Peru. This subspecies is characterized by the reticulate venation (sometimes pinnate) of the lower surface of the leaves and a denser pubescence on the petioles, ranging from villous to lanate. Other than the pubescence of the petioles, both subspecies have glabrous leaf blades. The new subspecies described here, seems to be an extreme pubescent form of *C. nivalis*, having the lower surface of the leaves lanate with dense yellowish-brown trichomes, and villous petioles, peduncles, and pedicels. This pubescence in the leaves is so far unique to Sect. *Salicifolia* (Benth.) Kraenzl. in Engler (1907: 110) (sensu Molau 1988) as species in this section are usually glabrous. Other differences between *C. nivalis* subsp. *lanatifolia* and the other two subspecies is that subsp. *nivalis* and subsp. *cerasifolia* have sepals with a tomentose margin internally and filaments 1–1.5 mm long while in subsp. *lanatifolia* the sepals have a strigose margin, and the filaments are 0.5 mm long.

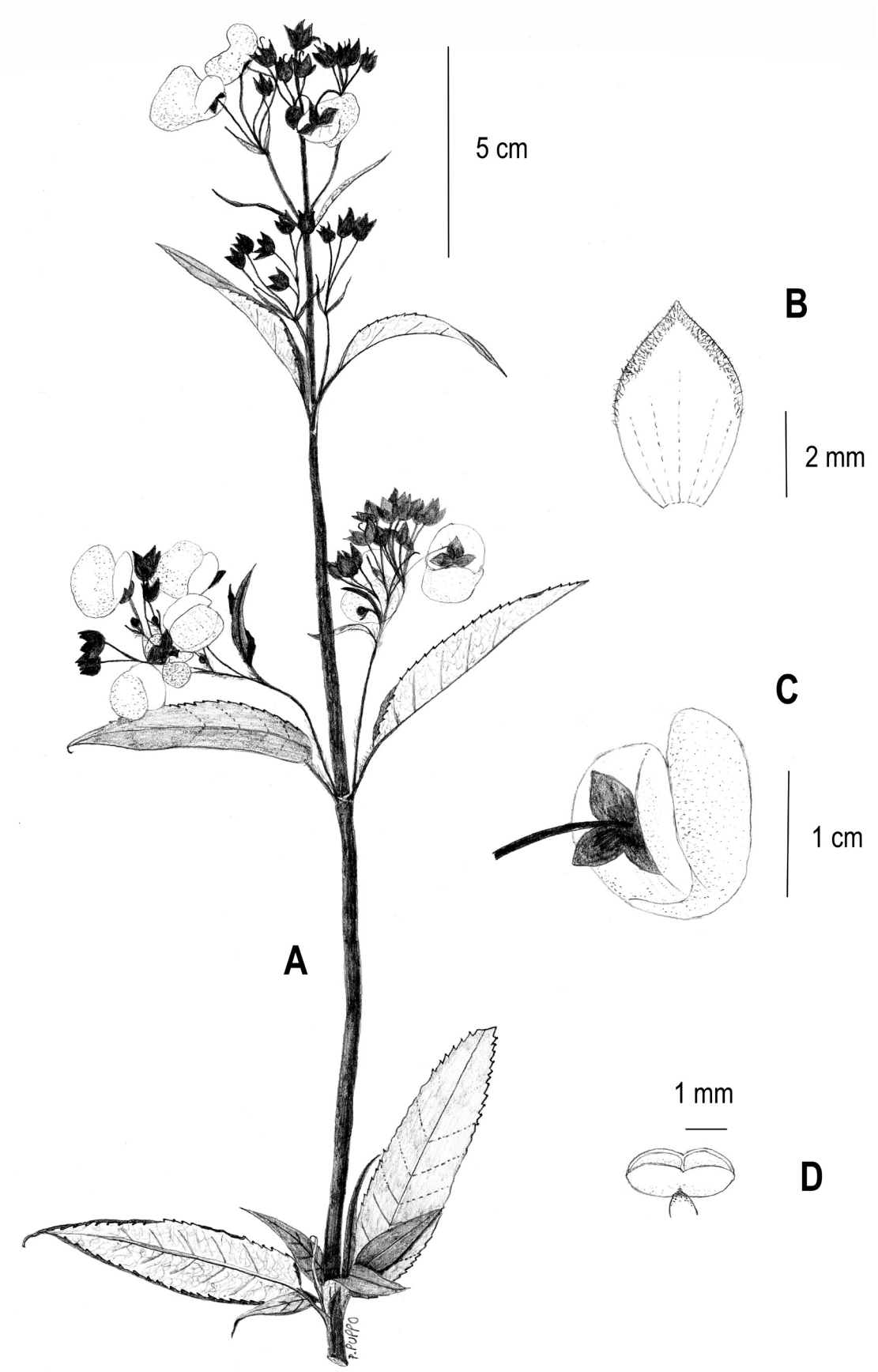


**FIGURE 1.** *Calceolaria nivalis* subsp. *lanatifolia* flowering branch (A), sepal, abaxial (B), flower, side view (C), and stamen (D). Drawn by P. Puppo from *Vega Ocaña et al. 401* (MO).

*Calceolaria nivalis* subsp. *lanatifolia* shares several characteristics with the other two subspecies that justifies the recognition of this taxon as a subspecies of *C. nivalis*. Namely: leaves lanceolate, serrate, upper lip of the corolla rounded and flattened, lower lip of the corolla saccate and upcurved, and pale yellow, divaricate anthers.


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**Representative specimens examined**

***Calceolaria nivalis* subsp. *nivalis*:**—ECUADOR. Azuay: Cuenca to Loja, km 30 from outskirts of Cuenca, km 14 from road junction Giron-Cuenca-Loja, 3100 m, 03°08'S, 079°02'W, 7 April 1996, *Gwilym P. Lewis & Bente B. Klitgaard 2222* (MO). Chimborazo: just above highway from Riobamba to Guayaquil, ca. 1/3 of the way down Andes, 4 km NNE of (above) Juan de Velasco (near km 116), 2500 m, 01°48'S, 078°52'W, 22 July 1977, *Hugh H. Iltis & Iltis, André E-566* (MO). Loja: New road Loja to Catamayo (La Toma), km 11, 2400–2500 m, 04°00'S, 079°15'W, 31 March 1996, *Gwilym P. Lewis & Bente B. Klitgaard 2191* (MO). Zamora-Chinchipe: Along road between Zamora and Loja; ca. 16 km W of Estación Científica San Francisco, 0.4 km from border (east of border with Loja Province), 2770 m, 03°59'48''S, 079°08'40''W, 25 July 2004, *Thomas B. Croat 92116* (MO). PERU. Piura: Huancabamba, Between Tambo and Canchaque, 2000–2600 m, 18 September 1964, *Paul C. Hutchinson & J. Kenneth Wright 6657* (MO).

***Calceolaria nivalis* subsp. *cerasifolia*:**—PERU. Amazonas: Chachapoyas, Leymebamba–Balsas road, Kms 412–421, 2450–2900 m, 14 March 1978, *James L. Luteyn & Maria Lebron-Luteyn 5560* (MO); Pasando Lasachupas, carretera Balsas-Leimebamba, 3100 m, 06°46'47''S 077°54'32''W, 26 June 2007, *Pamela Puppo, Felipe Zapata & J. Pérez 129* (MO, USM); 3404 m, 06°45'34''S 077°53'23''W, 26 June 2007, *Pamela Puppo, Felipe Zapata & J. Pérez 133* (MO, USM); 3207 m, 06°42'51''S 077°51'08''W, 26 June 2007, *Pamela Puppo, Felipe Zapata & J. Pérez 135* (MO, USM). Ancash: Yungay Prov., Huascarán National Park, Quebrada Ranicuray, 3650–3900 m, 8°59'S, 77°34'W, 17 April 1985, *D. N. Smith, Reno Valencia & Alfredo Gonzales 10340* (MO).

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