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## *Euphorbia mayfieldii*, a New Species of Section *Poinsettia* from Bolivia

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**Abstract**—*Euphorbia* section *Poinsettia* contains approximately 25 species native to the Americas. This taxon is sometimes treated as an independent genus or as a subgenus of *Euphorbia*, but it is currently placed within the recently recircumscribed subgenus *Chamaesyce*. Four species of *Poinsettia* have been previously reported from Bolivia, and a fifth species, *Euphorbia mayfieldii*, is herein described. This new species is a narrow endemic currently known from three collections made in the department of Santa Cruz, where it occurs on grassy cliff faces in tropical forest at elevations from 645–700 m. Flowering occurs at least from July to September. It is probably an attractive and conspicuous plant by virtue of the white pigmentation of the subcyathial leaves. *Euphorbia mayfieldii* is distinctive due to the combination of glabrous stems and leaves, in addition to cauline leaves that are opposite to rarely in whorls of three with an unlobed and mostly entire blade. Within section *Poinsettia*, strictly opposite leaves are otherwise known only from *Euphorbia dentata* Michx. and relatives. *Euphorbia mayfieldii* is distinguished from these in being a glabrous perennial herb with nearly entire leaves; the others are pubescent annuals with coarsely dentate or serrate leaves. A dichotomous key is provided to separate the Bolivian members of section *Poinsettia*.

**Keywords**—Bolivia, *Euphorbia*, Euphorbiaceae, new species, section *Poinsettia*.

According to its most recent revision (Mayfield 1997), *Euphorbia* L. section *Poinsettia* (Graham) Baill. comprises 24 species indigenous to the Americas but with a few also occurring adventitiously in the Old World. An additional species, *Euphorbia chersonesa* Huft., was shown to belong to the section by Steinmann and Porter (2002). The taxon reaches its greatest diversity in Mexico, where 20 species occur, and most of these are endemic to the country; in contrast, only eight species are found in South America (Mayfield 1997). The best-known representative of the section is the widely cultivated *Euphorbia pulcherrima* Willd. ex Klotzsch, the “Christmas Poinsettia” or “Noche Buena” as it is commonly known in Spanish. The section was first described in 1836 as an independent genus, *Poinsettia* Graham, and occasionally has been treated as such in modern times (e.g. Dressler 1962; Webster and Burch 1967; Proctor 1984). It has also been treated as subgenus *Poinsettia* (Graham) House (e.g. Wheeler 1943; McVaugh 1961; Webster 1967; Mayfield 1997). However, following the broad concept of *Euphorbia* proposed as a result of recent phylogenetic studies (Steinmann and Porter 2002; Bruyns et al. 2006; Park and Jansen 2007; Zimmermann et al. 2010; Horn et al. 2012), *Poinsettia* is here retained within *Euphorbia* and treated as a section. This is because the subgenera of *Euphorbia* have recently been recircumscribed to correspond to the four major monophyletic lineages within the genus (Bruyns et al. 2006), and the rank of section is used for smaller taxonomic assemblages within these four subgenera. All of the phylogenetic studies cited above strongly support that section *Poinsettia* belongs to subgenus *Chamaesyce*.

As discussed by Webster (1967), section *Poinsettia* is not strictly defined by morphological features. Although it is generally recognizable by a suite of characters, not all of its species possess every trait. Furthermore, some of these characteristics are found in species outside the section. Certainly the most distinctive and defining feature is the unappendaged involucre with elongated glands that are deeply cupped at the apex. Such glands are restricted to section *Poinsettia* and occur in all species except for *Euphorbia chersonesa*, in which the glands are merely concave at the apex. With the exception of a few species, the involucres have only one or two glands and the

cyathia are in congested cymes at the ends of the primary branches. Tuberculate seeds occur in all species, but they are also present in many other sections of *Euphorbia*. Some species possess conspicuously pigmented subcyathial leaves, but again this trait is not restricted to *Poinsettia*. Despite these morphological ambiguities, molecular phylogenetic studies strongly support the monophyly of section *Poinsettia* (e.g. Steinmann and Porter 2002; Park and Jansen 2007).

Mayfield (1997) documented three members of section *Poinsettia* for Bolivia: *Euphorbia kurtzii* Subils, a relatively uncommon species also found in Argentina and Paraguay; *E. pentadactyla* Griseb., another uncommon species that also occurs in Argentina; and the pervasive *E. heterophylla* L. The widespread *E. cyathophora* Murr. was subsequently reported by Subils (1999). During revisionary studies of herbarium material of South American species of *Euphorbia* in association with the *Euphorbia* Planetary Biodiversity Inventory project, a fifth species of section *Poinsettia* was encountered from Bolivia. It does not correspond to any described species and is newly proposed here.

### TAXONOMIC TREATMENT

***Euphorbia mayfieldii*** V. W. Steinm., sp. nov.—TYPE: BOLIVIA. Santa Cruz: prov. Andrés Bañez, mpio. Porongo, Monumento Natural Espejillos, 17°54'04"S, 63°26'17"W, 16 June 2007, I. Linneo et al. 1053 (holotype: MO!; isotype: USZ, not seen).

Herba perennis, erecta vel ascendens, usque ad 60 cm alta, caulibus glabris, internodia 0.7–2.5 mm longa, teretia. Folia opposita, stipulae glandiformes, fuscatae, 0.2–0.3 mm longae, petioli 2–3 mm longi, glabri, laminae lineares vel anguste ellipticae, 4.5–12.5 cm longae, 0.6–1.5 cm latae, apice acuto, basi attenuata, margo integer, serrulatus vel crenulatus, supra glabra, infra glabra; cyathia 10–12 in capitulis densis terminalibus, involucra infundibuliformia, 3.4–4.2 longa, 2.6–3.0 lata, glabra, lobis fimbriatis 0.7–0.9 mm longis, glandula unica, bilabiata, complanata, substipitata, 0.8–1.2 mm alta, 0.3–0.4 mm longa (tangentialiter), 1.3–1.8 mm lata (radialiter), glabra; flores staminati 30–40; ovarium subglobosum, glabrum,

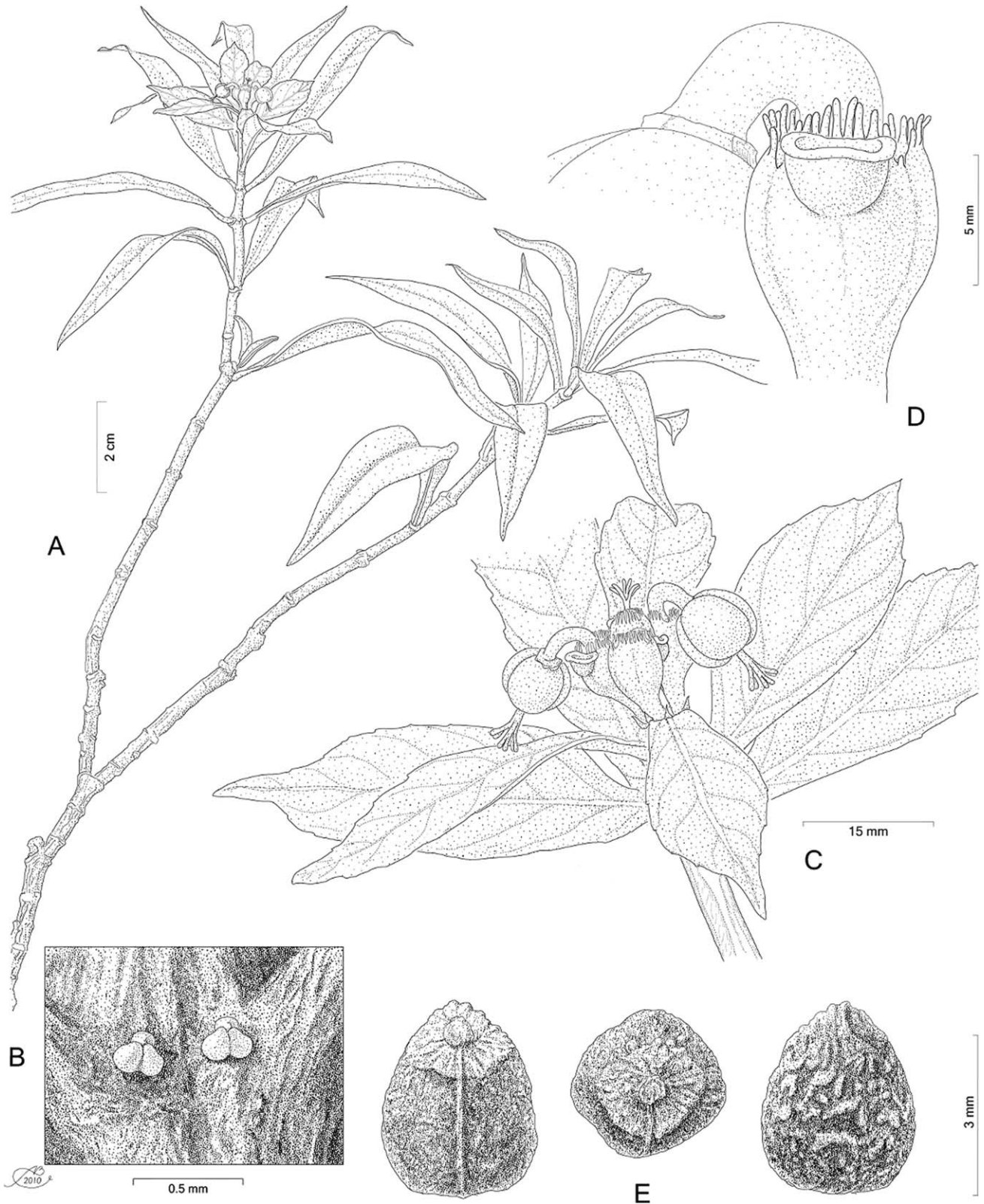


FIG. 1. *Euphorbia mayfieldii* (all from Solomon & S. Urcullo 14131, MO). A. Habit. B. Stipules. C. Inflorescence. D. Cyathium. E. Seed, ventral, apical, and dorsal views.

leniter 3-lobatum, styli 1.5–1.8 mm longi, glabri, bifidi; capsula oblata, 3-lobata, 4.7–5.5 mm longa, 5.7–6.2 mm lata, glabra, columella 4.8–5.1 mm longa; semina ovoidea, 3.9–4.1 mm longa, 2.6–2.8 mm lata, tuberculata, carunculata, caruncula 0.4 mm longa, 0.5 mm lata.

Perennial herb, woody towards the base, from an elongated, highly lignified root stock to 1.5 cm in diameter; stems erect to ascending, to 60 cm tall, terete, glabrous, internodes 0.7–2.5 cm long, bearing conspicuous elevated leaf scars towards the base. Cauline leaves opposite or rarely in whorls



of three; lateral stipules present at the base of the petiole, conical, glanduliform, 0.2–0.3 mm long, dark, glabrous; petiole not well defined, 2–3 mm long, glabrous; blade linear to narrowly elliptic, 4.5–12.5 cm long, 0.6–1.5 cm wide, subcoriaceous, apex acute, base attenuate, margin mostly entire, sometimes shallowly crenulate to serrulate, both surfaces glabrous, pinnately veined with 4–6 pairs of strongly ascending secondary veins. Subcyathial leaves forming a whorl at the end of the primary branches, similar to the cauline leaves but relatively shorter and broader, sometimes ovate, white at least towards the base. Cyathia 10–12 in a dense, congested dichasial cyme, subtended by hyaline deltoid bracts 0.7–1.5 mm long; peduncle stout, 1.5–2.7 mm long, glabrous. Involucre infundibuliform, 3.4–4.2 mm long (excluding the lobes and gland), 2.6–3.0 mm wide, glabrous on the outer and inner surfaces, each lobe margin with 4 or 5 linear to subulate segments, 0.7–0.9 mm long, puberulent, appendages lacking; gland 1, compressed, deeply cupped, substipitate, bilabiate with a transversely oblong opening, 0.8–1.2 mm tall, 0.3–0.4 mm long (tangentially), 1.3–1.8 mm wide (radially), glabrous. Staminate flowers approximately 30–40 per involucre. Ovary subglobose, shallowly 3-lobed, glabrous; styles 3, united in the lower 1/4–1/3, free above, narrowly cylindrical, 1.5–1.8 mm long, bifid, glabrous; gynophore exerted to 7.3 mm long in fruit, glabrous. Capsule oblate, 3-lobed, 4.7–5.5 mm long, 5.7–6.2 mm wide, glabrous; columella 4.8–5.1 mm long. Seeds ovoid in distal view, nearly rounded in cross-section, 3.9–4.1 mm long, 2.6–2.8 mm wide, apex bluntly pointed, base rounded to truncate, dorsal keel present but not strongly defined, blackish with conspicuous gray tubercles; caruncle present, 0.4 mm long, 0.5 mm wide. Figure 1.

**Additional Specimens Examined**—BOLIVIA. Santa Cruz: prov. Ichilo, Parque Nacional Amboró, ca. 15 km (SE) up the Río Pitasma from the Río Surutú, 17°44'S, 63°40'W, 700 m alt., 28 Aug 1985, J. C. Solomon & S. Urcullo 14131 (F, MO); prov. Andrés Babiñez, Monumento Natural Espejillos, 17°54'03.4"S, 63°26'53.3"W, 645 m alt., 16 July 2007, G. A. Parada, I. Linneo & A. Molina 122 (KSU, USZ not seen).

**Distribution and Habitat**—*Euphorbia mayfieldii* is apparently a narrow endemic, and the three known collections are from the department of Santa Cruz, Bolivia, and occur within approximately 30 km (airline) of each other. It has been encountered on grassy cliff faces in tropical forest at elevations from 645–700 m. I have not conducted any fieldwork to determine its local abundance or conservation status, but the

collections are from designated protected areas, one in the Parque Nacional Amboró, the other in the Monumento Natural Espejillos.

**Phenology**—Flowering occurs from May to September. It is probably an attractive and conspicuous plant by virtue of the white pigmentation of the subcyathial leaves.

**Etymology**—The specific epithet honors Mark H. Mayfield in recognition his contributions on New World *Euphorbia*, including the revision of *Euphorbia* section *Poinsettia*.

#### DISCUSSION

A number of traits support the placement of *Euphorbia mayfieldii* within *Euphorbia* section *Poinsettia*. These include the possession of pigmented subcyathial leaves, cyathia in congested cymes terminating the primary branches, unappendaged involucre with a single deeply cupped gland, and tuberculate seeds. This species is distinctive due to the combination of glabrous stems and leaves, in addition to cauline leaves that are opposite to rarely in whorls of three with an unlobed and mostly entire blade. Within section *Poinsettia*, strictly opposite cauline leaves are otherwise known only from the *Euphorbia dentata* alliance, a group containing six species that is distributed in both North and South America (Mayfield 1997), and all other species of section *Poinsettia* possess alternate cauline leaves. Within the *Euphorbia dentata* alliance, *Euphorbia mayfieldii* is distinguished by being a glabrous perennial herb with mostly entire leaves; the rest of the species are pubescent annuals with coarsely dentate or serrate leaves.

In a recent phylogenetic study of subgenus *Chamaesyce*, 16 of the 25 species of section *Poinsettia* were analyzed (Yang et al. 2012). The results support that the *Euphorbia dentata* alliance forms a monophyletic group nested within section *Poinsettia*, and although the sample is limited (three of the six previously described species of the alliance), *E. mayfieldii* comes out within this group and is sister to *E. pentadactyla*. In addition to the perennial habit and glabrous stems and leaves of *E. mayfieldii*, these two species can be readily separated on the basis of their styles. In *E. mayfieldii* they are 1.5–1.8 mm long and bifid, whereas in *E. pentadactyla* they are 4.0–5.5 mm long and undivided. The following key will separate *E. mayfieldii* from the other members of *Euphorbia* section *Poinsettia* in Bolivia.

#### KEY TO THE BOLIVIAN SPECIES OF *EUPHORBIA* SECTION *POINSETTIA*

1. Styles undivided, 4.0–5.5 mm long ..... *Euphorbia pentadactyla*
1. Styles bifid, 0.8–1.8 mm long ..... 2
  2. Stems and leaves glabrous; cauline leaves opposite or rarely in whorls of three ..... *Euphorbia mayfieldii*
  2. Stems and leaves pubescent; cauline leaves mostly alternate, rarely opposite at a few nodes ..... 3
    3. Glands cylindrical, the opening circular ..... *Euphorbia heterophylla*
    3. Glands compressed and bilabiate, the opening transversely oblong ..... 4
      4. Subcyathial leaves pink towards the base ..... *Euphorbia cyathophora*
      4. Subcyathial leaves uniformly green ..... *Euphorbia kurtzii*

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