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CANTUA DENDRITICA (POLEMONIACEAE), A NEW SPECIES FROM PERU, AND TWO NEW *CANTUA* NAMES

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ABSTRACT

Cantua dendritica is described as new. This species is apparently restricted to the region around Paucartambo, Department of Cusco, Peru. Related to, and frequently identified as, *Cantua flexuosa*, this new species differs in its glandular calyx, highly branched trichomes on the margin of the corolla lobes, and its softly herbaceous, glandular pilose leaves. In addition, two new names are proposed in *Cantua* for the two species of *Huthia* that have been transferred to *Cantua*, ***C. volcanica*** (formerly *Huthia caerulea*), and ***C. mediamnis*** (formerly *H. longiflora*).

Key words: *Cantua*, *Huthia*, Peru, Polemoniaceae.

Ongoing revisionary and taxonomic studies of *Cantua* Juss. ex Lam., coupled with recent field observations, have revealed several issues in this small, yet complex, genus. The examination of herbarium collections and direct observation reveal that some populations previously referred to as *Cantua flexuosa* (Ruiz & Pav.) Pers. represent a new species. This species appears to be restricted to the Paucartambo region of the Department of Cusco, Peru (Fig. 1–2). In addition, legitimate names have not been established for two species recently transferred to *Cantua* from *Huthia* Brand.

Cantua is a small genus of about 12 species of woody shrubs and trees of Polemoniaceae, restricted to the Andes of Ecuador, Peru, and Bolivia (Brand 1907; Infantes Vera 1962; Gibson 1967; Porter and Johnson 2000). The genus was characterized by Brand (1907) as having an achlorophyllous embryo with ovate-cordate cotyledons, flattened seeds, loculicidal capsules, and woody habit. Grant (1959) noted that *Cantua* is also characterized by radially symmetric calyces and corollas, and capsules that are longer than the calyces; however, these two traits vary in the genus. Many of these features cannot distinguish *Cantua* from other genera of Polemoniaceae. This genus is distinguished from other genera by possession of the following combination of traits: woody stems of 2–10 (or more) m; alternate, herbaceous leaves; large corollas with short tubes and very deep throats; and pantoporate pollen with reticulate exine, with large insulae (verrucae).

No authors have accurately described the remarkable morphological diversity exhibited in this small genus. All members of Polemoniaceae are described as having a disk-like nectary gland subtending the ovary. Some species of *Cantua* have such a glandular disk (e.g., *C. bicolor* Lem.), but others have a fluted, cup-shaped gland surrounding the lower ovary (e.g., *C. quercifolia* Juss.), or the gland is completely fused to the carpel walls and is not evident (e.g., *C. flexuosa*). The family is also characterized by a tubular calyx bearing five lobes, but in *Cantua* the calyx varies from three- or four-lobed (e.g., *C. pyrifolia* Juss. ex Lam.) to five-lobed (*C. buxifolia* Juss. ex Lam.). Similarly, the entire family is characterized by having epipetalous stamens, but in *C. flexuosa* the filaments are jointly fused to the carpel/nectary and base of the corolla tube. Given the lack of attention to *Cantua* in general, and its tropical distribution, it is not surprising that an undescribed species is now being discovered.

The new species is morphologically similar to *C. flexuosa*, and has been identified as such by most field biologists. Like *C. flexuosa*, it has a dense cymose (or corymbose) inflorescence (Fig. 1), the filaments are jointly fused to the proximal corolla tube and the glandular region of the carpels (Fig. 3A), and the nectary gland is entirely fused to the carpel wall (Fig. 3B). These latter two features are very unusual within Polemoniaceae and provide compelling morphological evidence for immediate common ancestry between *C. dendritica* and *C. flexuosa*. The new species is distinguished by having glandular pilose calyces and pedicels and calyces that are mostly 11–12 mm long; while *C. flexuosa* has calyces and pedicels that are villous to glabrescent, with eglandular trichomes, and calyces that are mostly 6.5–10.5 mm long (Fig. 4). Although both species have ciliate corolla lobes, in *C. dendritica* (Fig. 5–8) these trichomes are dendritic (Fig. 7). Branched trichomes are exceedingly rare in Polemoniaceae, making this a noteworthy feature. The new species also differs from *C. flexuosa* in several rather cryptic features of the leaves. Although similar in outline (Fig. 9), the young leaves are softly herbaceous, bearing long eglandular trichomes (Fig. 6) and somewhat shorter glandular hairs (Fig. 5). The young leaves of *C. flexuosa* are stiffly coriaceous, with trichomes that are similar in type, but much shorter and much less dense.

Cantua dendritica J.M.Porter & Prather, sp. nov.—TYPE: Peru. Cusco: ca. 3 km N of Paucartambo, ca. 2900 m, 9 Jul 1982, *M. Black & L. MacHen 13456* (holotype RSA; isotypes MSC, CUZ, USM), Fig. 1–9.

Cantua flexuosa (Ruiz & Pav.) Pers. affinis, sed calyce glandulosis differt.

Erect, branching shrub or small tree, 2–5 m tall, stem diameter up to 4.7(–5.0) cm, 3–12 branches at the base, glandular pilose when young but soon developing a papery, light brown bark. Leaves alternate and occasionally appearing

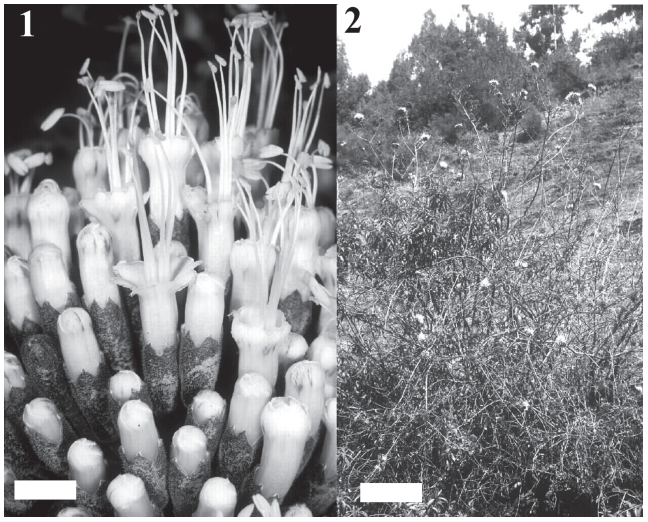

Fig. 1–2. Floral morphology and habit of *Cantua dendritica*.—1. Inflorescence; scale = 5 mm.—2. Habit of plant, growing adjacent to road, 3 km N of Paucartambo, Dept. Cusco, Peru; scale = 50 cm.

fascicled on short axillary shoots, usually soft and pliable when young, sub-coriaceous in age, variable in size, 2–7(–9) cm long, 1–3.6(–4) cm broad, elliptic, oblong or lanceolate, tapering to the base, petiolate; petioles 2–20 mm long, blades entire or dentate, particularly toward the acute to obtuse apex, generally densely glandular pilose; glandular trichomes 0.07–0.22 mm long, with 2–5 stalk cells, terminating in a unicellular, globose gland cell; eglandular trichomes 0.22–1.12 mm long, 3–15 cells long, the terminal cell short and attenuate. Inflorescences composed of many-flowered, dense, cymose corymbs, mostly terminating lateral shoots; peduncles variable in length, 4–25 mm long, erect, glandular. Calyx herbaceous, tubular-campanulate, 1.0–1.5 cm long, somewhat bilaterally symmetric, tube 8–11 mm long, 4–5 mm in diameter, lobes 5,

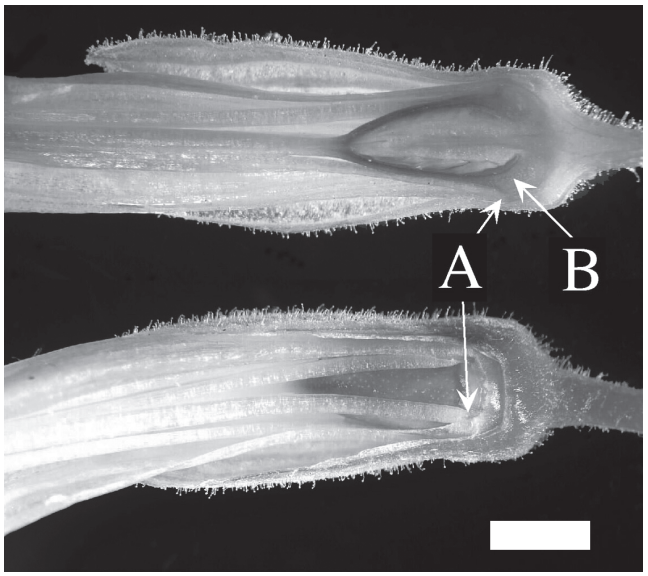

Fig. 3. Floral and nectary gland morphology of *Cantua dendritica*, represented in sectioned and dissected flowers: A. the region of joint fusion of the filament, corolla, and ovary base; B. glandular tissue, fused to the carpels and receptacle; scale = 3 mm.

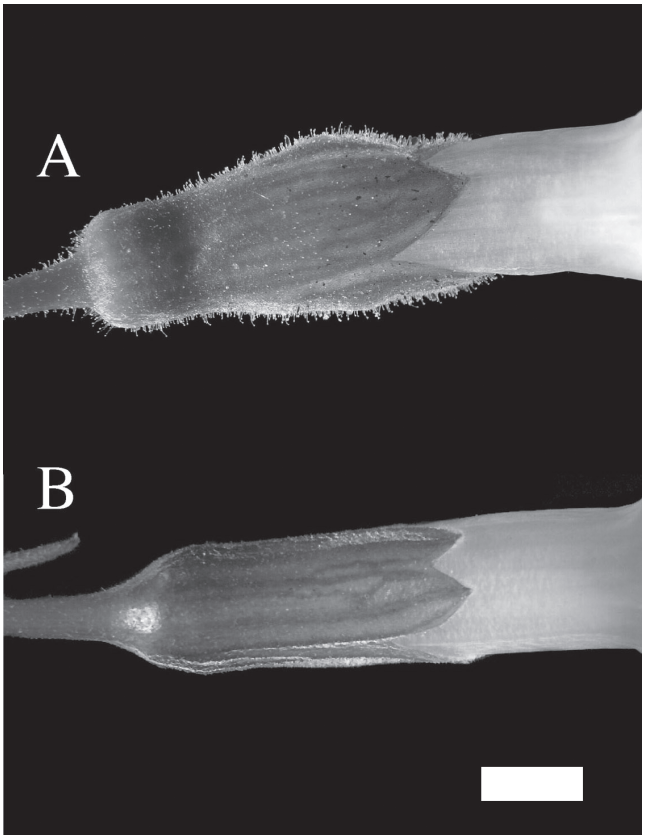

Fig. 4. Comparative calyx morphology of *Cantua dendritica* (A) and *Cantua flexuosa* (B); scale = 3 mm.

triangular-acute to acuminate, 2–5 mm long, 2–4 mm broad at base of lobe, valvate in bud, internal lobe apex with a very small tuft of glandular and eglandular hairs, external calyx glandular, the trichomes with a terminal gland, 0.08–0.28 mm long, the stalk 3–6-celled, the gland multicellular, composed of two layers of cells, the distal layer pigmented yellowish in color, the proximal layer unpigmented; corolla narrowly funnelform, 1.8–2.5 cm long, the tube 1.1–1.8 cm long, 4–6 mm in diameter, yellowish to cream, glabrous externally and internally, slightly incurved, corolla lobes irregularly retuse to deeply cleft, 4–5 mm long and 6–11 mm wide, cream white, sometimes tinged with pink, margin densely ciliate with long, irregularly branched, dendritic trichomes, imbricate in bud; stamens exserted, adnate to and inserted at the base of the corolla tube and also adnate to the gland region of the ovary, filaments 2.5–4.3 cm long, glabrous, white to cream in color, subequal to unequal in length; anthers versatile but inverted when emerging from the corolla, cordate to sagittate, 2–4.5 mm long, pale yellow, pollen pantoporate, exine reticulate, with insulae (verrucae); nectary disc collar-like and fused to the proximal region of the carpels and the receptacle; ovary glabrous, pyriform, 4–8 mm long, 2–5 mm wide at base, with about 10–12 ovules per locule; style simple, exserted, 2.5–3.8 cm long, stigma lobes 0.5–2 mm long. Fruit a lanceolate-oblong, loculicidally dehiscent capsule, 1.5–2.5 cm long, with 3 (rarely 4) valves, much longer than the calyx, valves remaining fused at the base after dehiscence; seeds small, flattened, oblong to ovate, 7–9 × 2–4 mm, brown, with a whitish, asymmetric wing, much broader on one end.

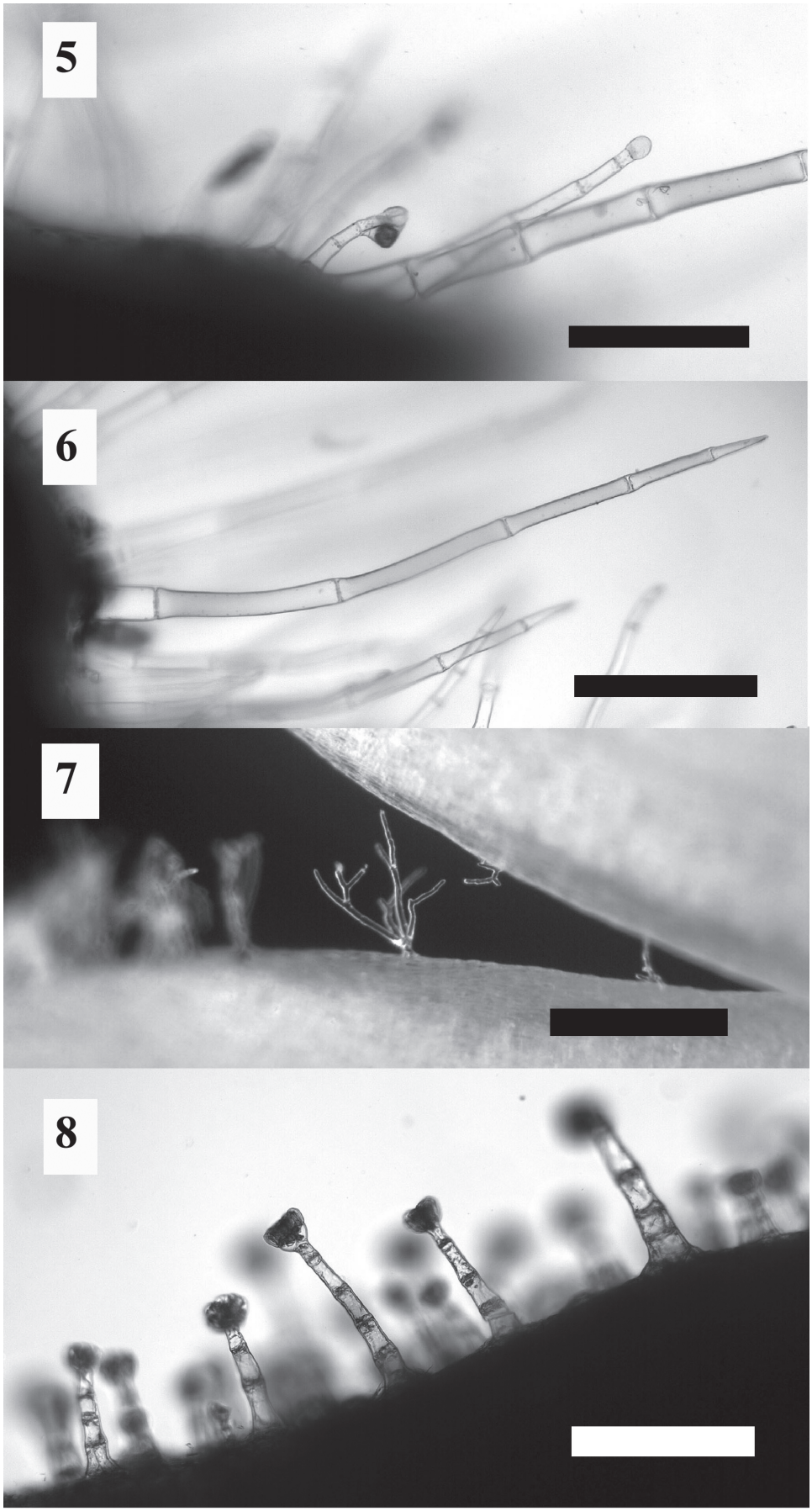

Fig. 5–8. Trichome variation in *Cantua dendritica*.—5. Glandular trichome of the leaves; scale = 0.05 mm.—6. Eglandular trichome of leaf; scale = 0.1 mm.—7. Branched trichomes of the margins of corolla lobes; scale = 0.02 mm.—8. Glandular trichomes of the calyx; scale = 0.1 mm.

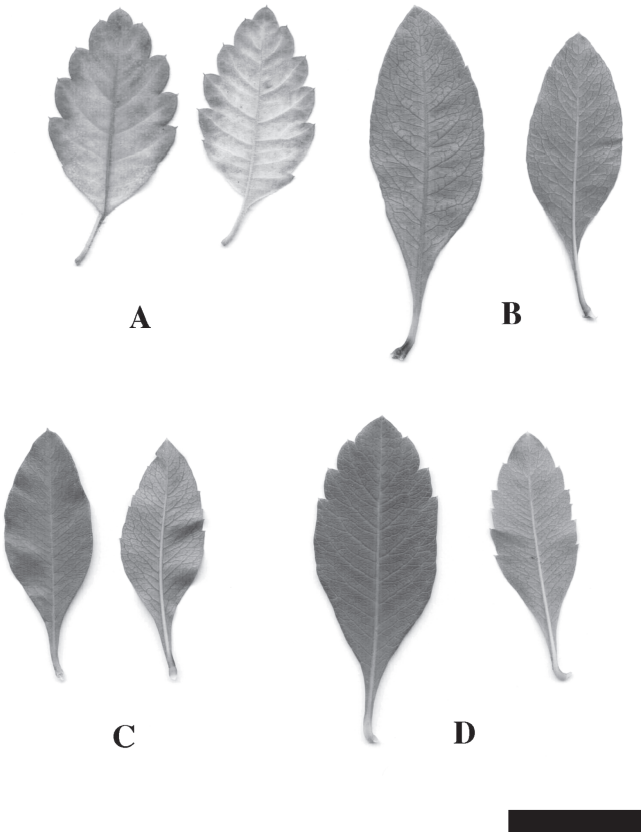

Fig. 9. Comparative leaf morphology of *Cantua dendritica* (A) and *C. flexuosa* from Huanuco (B), Piura (C), and Huancavelica (D); scale = 2 cm.

Cantua dendritica is restricted to shaley clay soils of canyon bottoms, roadsides and steep eroding slopes above washes and rivers. Locally this species is called Ccellmo or K'ellmo. The population 3 km north of Paucartambo (e.g., *Gentry et al. 23409*) is frequently visited by hummingbirds (*Colibri coruscans*) that feed on the abundant nectar (J. M. Porter pers. obs.), and hummingbirds may be the primary pollinators. Like many species of *Cantua*, *C. dendritica* is apparently self-compatible, based on a series of self-pollination trials in the field, using bagged inflorescences (J. M. Porter unpubl. data).

Etymology.—The specific epithet, *dendritica*, Latin, translates to "branched," referring to the unusual branched trichomes of the corolla margin.

Paratypes.—PERU. Cusco, Paucartambo, Valle del Paucartambo, 3000–3400 m, Jul 1930, *F. L. Herrera 2985* (US); Valle del Paucartambo, 3000 m, Jul 1931, *F. L. Herrera 3342* (F, G); Dist. Marcachea, in quebrada de Paucartambo, rocky places, 3000–3200 m, 31 Jul 1939, *C. Vargas 11184* (CUZ, F, UC); camino a Paucana, 2500 m, Jun 1950, *C. Vargas C. 9455* (CUZ, MO); 3 km N of Paucartambo, 2800 m, 28 Jun 1978, *A. Gentry*, *M. Dillon*, *P. Berry & J. Aronson 23409* (F, NY, MO).

Corolla vasculature of *Cantua dendritica* is similar to that of many species in Polemoniaceae. The central primary vascular strand forms a trifurcation at the proximal end of the corolla, resulting in the formation of two lateral primary vascular strands. The vascular strands of the filament are associated with the corolla tube only for 1–2.3 mm, and spaced midway between the central primary vascular strands. The central and lateral strands are evenly spaced and continue up the corolla tube. The lateral strands bifurcate 1–4 mm proximal to the sinuses of the corolla lobes. Both of the resulting strands bifurcate again one to several times before terminating at the lobe margin. The central strand branches asymmetrically slightly below to slightly above the sinuses of the corolla lobes, such that the central vein remains central. A lateral vascular strand diverges that is evidently smaller than the central, followed by a similar branching on the opposite side. These secondary strands anastomose with similar-sized vascular strands derived from the lateral primary vascular strands. The central strand may or may not branch again, distal to the anastomoses, before terminating at the lobe margin. This pattern of corolla vasculature is very similar to that of *Cantua flexuosa* (L. A. Prather unpubl. data; J. M. Porter unpubl. data).

NOMENCLATURAL CHANGES IN *CANTUA*

In their phylogenetic classification of Polemoniaceae, Porter and Johnson (2000) subsumed the genus *Huthia* into *Cantua*. Although this transfer was based upon morphological evidence, recent cladistic analyses of chloroplast *ndh*F DNA sequences (Prather et al. 2000) are consistent with this change. Regardless, the transfers of *Huthia caerulea* Brand and *H. longiflora* Brand by Porter and Johnson resulted in the incorrect production of two nomenclatural homonyms. The direct recombination of the epithet "*caerulea*" is illegitimate because the name *Cantua caerulea* has previously been used for the taxon currently referred to as *Loeselia caerulea* (Cavanilles) G.Don. Similarly, the epithet "*longiflora*" was illegitimate because the combination *C. longiflora* was once used for the species now known as *Ipomopsis longiflora* (Torrey) V.E.Grant. We propose two new names as replacements for these later homonyms. At the same time we provide lectotypification for *H. caerulea* and *H. longiflora*.

Cantua volcanica J.M.Porter & Prather, nom. nov.

Replaced name: *Huthia caerulea* Brand, *Bot. Jahrb. Syst*. **42**: 175 (1908). *Cantua caerulea* (Brand) J.M.Porter & L.A.Johnson, *Aliso* **19**: 62 (2000), nom. illeg., non *Cantua caerulea* [Cavanilles] Poir., *Encyc. Suppl.* **2**: 80 (1811) [= *Loeselia caerulea* (Cavanilles) G.Don].—TYPE: Peru. Dept. Arequipa: Misti volcano, 2800–2900 m, 14 May 1905, *Weberbauer 4837* (lectotype: here designated, G).

Etymology.—The specific epithet, *volcanica*, Latin, translates to "of the volcano," referring to the type locality, on the slopes of Volcán Misti.

Lectotypification of *Huthia caerulea* is complicated by the destruction of Brand's herbarium in Berlin during World War II. The material deposited in B and used by Brand in his original description was destroyed. A duplicate of *A. Weberbauer 4837*, the only collection cited in the protologue, is found only at G. This specimen bears no annotation by Brand nor does it possess precisely the same collection information (e.g., 14 May 1905) provided by Brand (1908), but the specimen appears to be a duplicate of the original material, cited in the protologue, and it does not conflict with Brand's description. The lectotype is therefore selected as *A. Weberbauer 4837* (G).

Cantua mediamnis J.M.Porter & Prather, nom. nov.

Replaced name: *Huthia longiflora* Brand, *Bot. Jahrb. Syst.* **50**, *Beibl.* **111**: 51 (1913). *Cantua longiflora* (Brand) J.M.Porter & L.A.Johnson, *Aliso* **19**: 62 (2000), nom. illeg., non *Cantua longiflora* Torrey, *Ann. Lyceum Nat. Hist. New York* **2**: 221 (1828) [= *Ipomopsis longiflora* (Torrey) V.E.Grant].—TYPE: Peru. "Dept. Ayacucho, Prov. Parinacochas: plateau between the rivers Rio de Lomas and Rio de Yauca. May 1911," *Weberbauer 5752* (lectotype: here designated, S; isotypes BM, CAS, G, NY, S, UC, US).

Etymology.—The specific epithet, *mediamnis*, Latin, translates to "between rivers," referring to the type locality, on the plateau between Rio de Lomas and Rio de Yauca.

Lectotypification of *Huthia longiflora* is also complicated by the destruction of Brand's herbarium in Berlin during World War II. The material used by Brand in his original description and deposited at B was, without question, destroyed. Duplicates of *A. Weberbauer 5752*, the only collection cited in the protologue, are found at several herbaria worldwide (CAS, F, G, S). Some of the collections (e.g., G and S) credit the Field Museum as the source of their collections. Unfortunately, none of the specimens bear an annotation by Brand nor possess the same collection date information (14 May 1911) cited in the protologue by Brand (1913). Indeed, all specimens differ slightly in the collection information provided. In Weberbauer's memoirs (1945), he provides a slightly different description of the collection locality, as well. As a result it is impossible to make a claim that Brand actually observed any particular specimen. All of the specimens do however represent duplicates of the original material. The lectotype is therefore selected as that specimen that most closely and completely matches the protologue of Brand.

There are two sheets of *A. Weberbauer 5752* at Stockholm (S). One sheet cites the collection locality as "Peru, Dept. Ayacucho, Prov. Parinacochas, plateau between the rivers Rio de Lomas & Rio de Yauca, May 1911." The plateau between the Rio de Lomas and Rio de Yauca was specified in the protologue. In addition, this is the only specimen that has retained some of the original color of the corolla, blue. This specimen is selected as the lectotype.

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