TOWARDS A TAXONOMIC TREATMENT OF THE ERICACEAE FOR BOLIVIA AND PERU: NEW SPECIES OF *THIBAUDIA*, SYNONYMS, LECTOTYPES, AND OBSERVATIONS

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ABSTRACT

Thibaudia cardenasii Luteyn, **T. nervosa** Luteyn, **T. beckii** Luteyn, **T. cuscoensis** Luteyn, and **T. lanata** Luteyn are described and illustrated. New synonyms and lectotypes are proposed for numerous taxa of Ericaceae, all towards a taxonomic treatment of Ericaceae for Bolivia and adjacent southern Peru.

RESUMEN

Se describen e ilustran **Thibaudia cardenasii** Luteyn, **T. nervosa** Luteyn, **T. beckii** Luteyn, **T. cuscoensis** Luteyn y **T. lanata** Luteyn. Además, se proponen nuevos sinónimos y lectotipos para numerosos taxones de Ericaceae, todos con miras a un tratamiento taxonómico de Ericaceae para Bolivia y el sur del Perú adyacente.

INTRODUCTION

A formal taxonomic (i.e , floristic) treatment of the Ericaceae has never been published for Bolivia. There are only listings of the species by Foster (1958), Luteyn and Maldonado (2014), and the family account for the Parque Nacional Amboró (Nee 2008). Macbride (1959) published a taxonomic treatment of the Ericaceae occurring in Peru, and Soukup (1972) and Brako and Zarucchi (1993) a listing of the then recognized species for Peru. León (2006) published a list of the endemic species of Ericaceae for Peru. Nearly all are now outdated. Several papers have added to the overall numbers of species of Ericaceae in this region, and many nomenclatural changes have been published (see Luteyn 1978, 2002; Luteyn & Ortiz 2008; Luteyn et al. 2008; Pedraza 2010; Pedraza & Luteyn 2010, 2011; Salinas & Pedraza-Peñalosa 2014). Additionally, Luteyn (2002) published a key to the species of Ericaceae in Bolivia. Photographs and illustrations of many of the species of Ericaceae from Bolivia and adjacent southern Peru have been published by Luteyn (1978, 2002), Luteyn and Pedraza (2007a, b, c), Nee (2008), Pedraza (2010), Pedraza and Luteyn (2010, 2011), and Salinas and Pedraza-Peñalosa (2014).

Historically, the most important monographers of South American Vaccinieae (Ericaceae) have been the German botanist J.F. Klotzsch (1851), who working out of the Berlin herbarium reviewed all previous historical studies of the world's species of "Bicornes" (i.e., Ericaceae s.l.) to that time. He provided a coherent classification and discussed general relationships, provided keys to all the genera, and for Neotropical members of Vaccinieae described 12 new genera (of which 7 are currently recognized) and many new species. The chief value of Klotzsch's study was to provide a strict delimitation of genera and species in a rather modern concept. A second German botanist R. Hoerold, studied intensively the tropical American vaccinioids using the same plants as Klotzsch did at Berlin, but based his doctoral studies "Systematische Gliederung und geographische Verbreitung der amerikanischen Thibaudieen" (Hoerold 1909) **only** on the herbarium specimens in Berlin (B). The American A.C. Smith, provided the most comprehensive treatment of tropical Ericaceae to that date; he entitled his doctoral subject "The American Species of Thibaudieae" (Smith 1932) and based it upon the study of nearly all type material of all species of Vaccinieae (called tribe Thibaudieae in 1932) from all the world's

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major herbaria described to that time. I began my studies of Neotropical Ericaceae in 1975, and in 2005 I began a formal taxonomic study of the family in Bolivia and adjacent southern Peru, having been awarded a National Science Foundation grant. That grant enabled me to make numerous trips to that area for field work, visit local and international herbaria to study herbarium specimens, and support local infrastructure, especially at LPB. My retirement in 2007 has subsequently slowed that work, although I am currently publishing additional pertinent observations and nomenclatural matters as to Peruvian and Bolivian species in advance of the formal taxonomic treatment (see for example Luteyn In prep. a, b, c; Ortiz et al. In prep.; Pedraza-Peñalosa & Luteyn In prep.).

Here I present descriptions for five new species of *Thibaudia* from Bolivia and Peru, numerous new synonymies for previously acknowledged species based on my recent studies, and new lectotypifications for species where the original type was never cited, the holotype has been destroyed, or in accordance with my understanding of the citation of types as per McNeill (2014). With emphasis on the species from Bolivia and southern Peru, several critical species are also discussed below, with new synonyms proposed and lectotypes designated, along with new and noteworthy thoughts about probable infra- and intergeneric relationships as I currently interpret them. The many synonyms are needed predominantly because most previous authors examined so few other specimens with which to compare and most had virtually no or only limited field experience. I hope that this paper adds valuable insight from my extensive and intensive field and herbarium observations of Neotropical Ericaceae throughout their range over a period of time that spans approximately 48 years. Here I make known my ideas in advance of a formal floristic treatment so that future researchers of tropical Ericaceae may benefit from them.

The forested regions in which these new species are found are threatened by increasing human activities, mainly through excessive logging, followed by burning, and then conversion to agriculture, or by livestock overgrazing, or mining. However, any changes to that flora and fauna are harmful. Therefore, to maintain the high biodiversity and integrity of these ecosystems it is necessary to increase their protection and management before their unique qualities disappear. Most of these new species must be considered vulnerable and in extreme danger of extinction already because ongoing habitat degradation and fragmentation reduce population sizes of native species. Contrary to some views that fieldwork is no longer necessary, this study points out once again not only the richness of the flora in the Neotropics but also, more importantly, the still desperate need for collecting and basic herbarium research.

[**Notes.—**Wherever possible historical photographs, herbarium barcodes, and online illustrations of types and critical specimens have been cited to verify and designate my species concepts. Historical photographs are cited by negative number preceded by the herbarium acronym or photographer's initials as follows: "F neg. 1040" =negative from the J.F. Macbride 1929–1933 Berlin Negatives Type Photo Collection (consisting of 40,425 numbers *fide* Grimé & Plowman 1986) at The Field Museum of Natural History (Chicago) (that collection now continues with over 71,000 negatives beyond those of Macbride); "ACS neg. 17" =negative from A.C. Smith's (1931–1932?) type photos deposited at The New York Botanical Garden; and "EPK neg. 474" =negative from the E.P. Killip 1932 "Plants in European Herbaria" photo collection at the U.S. National Herbarium (Smithsonian Institution, Washington, D.C.). Other more recent NY photos either lack numbers altogether (and are given as "NY s.n.") **or** are listed as (for example) "NY neg. 9743." It is also important to keep in mind that when A.C. Smith annotated or cited a specimen of Ericaceae/Vacciniaceae (at least between 1930 and 1953) as "TYPE" or "type" he meant the same as holotype in our current concept, and when he cited "TYPE COLL." or types "are duplicated in …" or "(dupl. at …)" he meant isotype(s) (again, in our current concept). He wrote the words "type" or "type coll." immediately afer the acronym of the institution where he was citing the type (for example, "C, GH, K, type, P, Y" meaning that the holotype was at K and isotypes were at C, GH, P, and Y), or for example, "C, GH, K, P, Y, type coll." meaning that all the specimens cited were isotypes, or for example, "GH, type, Acad. Nat. Sci. Phila., US") to mean the holotype was at GH and isotypes were at the Acad. Nat. Sci. Phil. and US. At that time Smith also used the acronym "Y" for NY, "M" for MA, "Acad. Nat. Sci. Phil." for PH. Herbarium specimen barcodes are cited with the herbarium acronym first followed by a space and then the

number without the leading zeros—thus "K 442212" not K000442212. Unless otherwise stated, digitized photographs of all types have been seen online on JSTOR's Global Plants and have been cited as "image!" following the barcode number. All herbarium specimens, photographs, and digital images herein cited have been seen unless followed by "n.v." Digital photos of the five new species herein described will be placed on the New York Botanical Garden online website once the names are published. Herbarium acronyms follow Index Herbariorum (2016).

NEW SPECIES

Thibaudia cardenasii Luteyn, sp. nov. (**Fig. 1**). TYPE: BOLIVIA. COCHABAMBA. PROV. AYOPAYA: San Cristóbal, 16°41'40"S, 66°42'32"W, 2890 m, 27 Oct 2005 (fl), *E. Fernández, D. Lizarro, D. Barja, C. Patzi, M. Canaza & M. Decker 4229* [(HOLOTYPE: LPB; ISOTYPES: BOLV n.v., NY (barcode NY 1043505)].

Diagnosis.—*Thibaudia cardenasii* (Bolivia. Dept. Cochabamba: Prov. Ayopaya) differs from *T. macrocalyx* J. Rémy (Bolivia. Depts. La Paz and Cochabamba: Prov. Chapare) by having its leaf lamina basally rounded to subcordate (not truncate or subcuneate, rarely rounded) and apically short-acuminate to rounded-mucronate (not apically obtuse or subacute), and its calyx tube shorter than the limb, drying terete to bluntly 10-ribbed (not tube about equaling limb, drying bluntly 5-angled, the angles alternate with the lobes).

Description.—**Tree** to 4 m (fide label); mature stems terete, minutely striate, nitid, glabrous; twigs complanate, broadly and bluntly angled, striate, glabrous; axillary buds ovate, outer prophylls 2, ovate, acute, ca. 3 mm long, inconspicuous. **Leaves** with blades coriaceous, ovate to elliptic-ovate, 4.5–7.5 × 2.5–5 cm, basally rounded to subcordate, apically short-acuminate to rounded-mucronate, marginally subentire to remotely inconspicuously and shallowly crenate distally, glabrous on both surfaces but minutely glandular-fimbriate, fimbriae deciduous above; 3–5-plinerved, midrib thickened and raised in proximal ca. 5 mm then impressed distally above, conspicuously raised throughout beneath, lateral nerves plane to slightly impressed above, raised beneath, reticulate veinlets plane to slightly impressed above but inconspicuous, slightly raised but inconspicuous beneath; petioles canaliculate above, rugose, 3–5 mm long, glabrous. **Inflorescences** axillary, solitary, racemose, 2–7-flowered, rachis subterete, bluntly angled, minutely striate, 0.4–3 cm long, glabrous; floral bract caducous, ovate, obtuse, somewhat convolute-clasping, ca. 4 mm long, marginally minutely glandular-fimbriate; pedicels terete, striate, 11–13 mm long, glabrous; bracteoles nearly basal, caducous, not seen. **Flowers** 5-merous; calyx 7–8 mm long, glabrous, tube cylindric, bluntly 10-ribbed, truncate and slightly apophysate at base, 1.5–2.5 mm long, limb cylindric to spreading, 4.5–6.5 mm long, sometimes splitting irregularly, lobes triangular to ovate, acute, 2.3–5 mm long, marginally thinly glandular, sinuses acute; corolla membranaceous, unistratose, cylindric, 22.5 mm long (only one flower), "fucsia" (fide label), glabrous, lobes ovate, acute, ca. 2.5 mm long; **stamens** equal, as long as corolla, ca. 19 mm long, filaments distinct, ca. 4.5 mm long, short-pilose along margins distally, anthers ca. 16.5 mm long, thecae smooth, ca. 6.5 mm long, strongly incurved at base (i.e., somewhat inwardly hooked), tubules ca. 10 mm long, dehiscing introrsely by clefts ca. 4.5 mm long; style exserted, ca. 25 mm long, glabrous. **Berry** not seen.

Distribution.—Endemic to Bolivia (Dept. Cochabamba: Prov. Ayopaya) and known only from the type collection; in "mesobosque montano húmedo de yunga" with *Hedyosmum*, *Protium*, *Clusia*, and *Didymopanax* as the dominant trees, and an understory of pteridophytes and Melastomataceae (fide label data); at 2890 m. Flowering in Oct.

Etymology.—The new species is named to honor Martín Cárdenas Hermosa (1899–1973), one of Bolivia's most important botanists.

Thibaudia nervosa Luteyn, sp. nov. (**Fig. 2**). TYPE: PERU. CUZCO. PROV. LA CONVENCIÓN. DTTO. ECHARATI: Llactahuaman, N del Río Apurímac, NE de Pueblo Libre, S de la Cordillera de Vilcabamba, 12°51'55.5"S, 73°30'40"O, 1650 m, 14 Jul 1998 (fl), *S. Baldeón, W. Nauray, R. de La Colina & S. Udvardy 2945* (HOLOTYPE: USM).

Diagnosis.—*Thibaudia nervosa* is distinguished from *T. dudleyi* Luteyn by having inflorescences fasciculate and 1–5-flowered (not racemose, 10–20-flowered), pedicels 26–30 mm long (not 5–9 mm long), corolla glabrous without (not densely pilose distally without), calyx glabrous (not densely to sparsely short-white pilose on limb), staminal filaments glabrous (not marginally long-pilose distally), and anther tubules conspicuous and ca. 2.5–3 mm long (not vestigial, ca. 0.2–0.4 mm long).

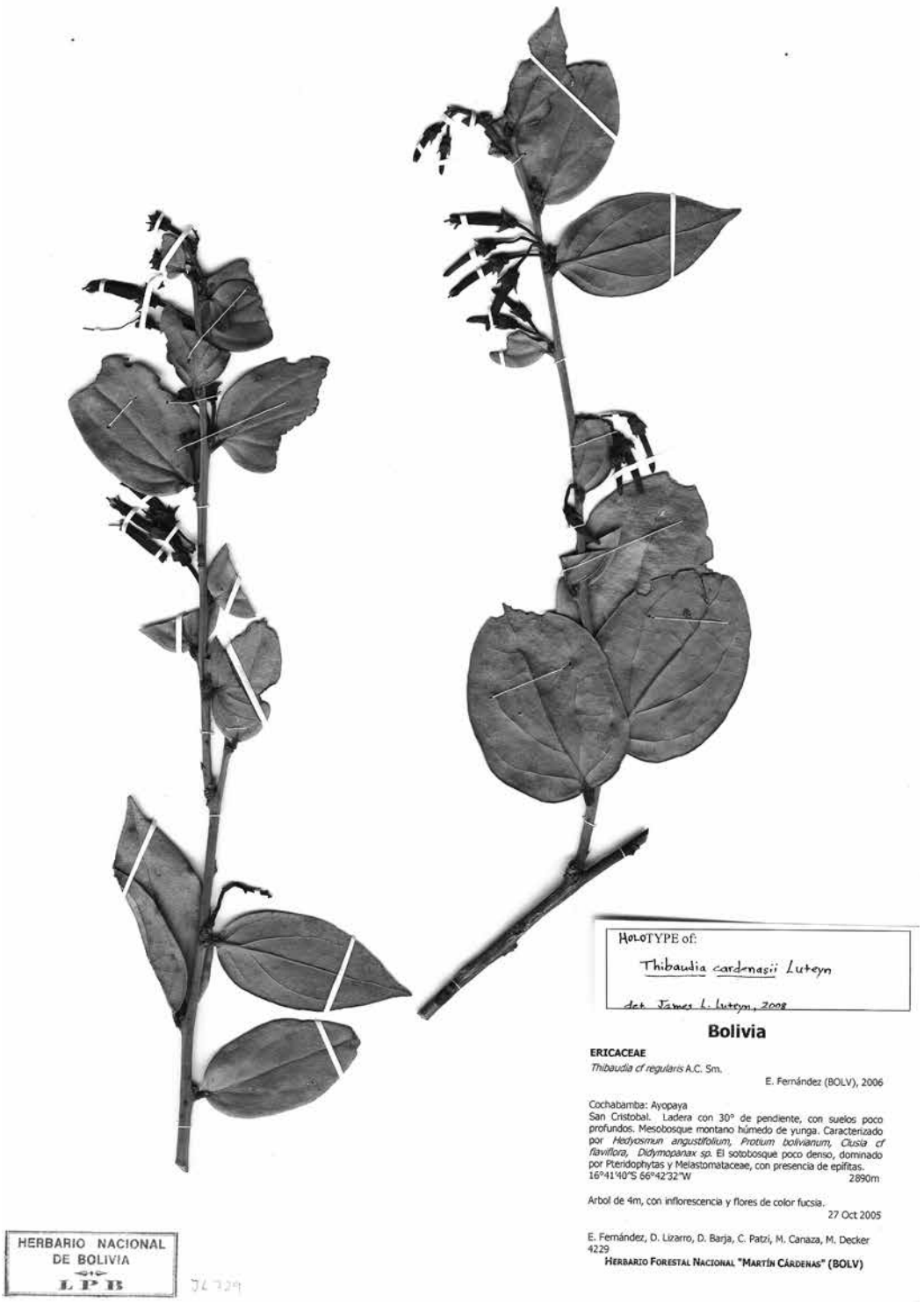

Fig. 1. *Thibaudia cardenasii* Luteyn. Photo of holotype sheet from LPB (*Fernández et al. 4229*).

Fig. 2. ***Thibaudia nervosa*** **Luteyn. Photo of holotype sheet from USM (*Baldeón et al. 2945*).**

Description.—Climbing **shrubs**; mature stems and twigs complanate, sharply to bluntly angled, striate, nitid, glabrous; axillary buds ovate, outer prophylls 2, lanceolate, keeled, with prominent midrib, acuminate, ca. 3 mm long, marginally fimbriate. **Leaves** with blades coriaceous, elliptic to ovate-elliptic, 6.5–16 × 3–9 cm, basally rounded, subcordate, subamplexicaul, apically broadly acute, marginally entire, glabrous on both surfaces but with scattered, minute, reddish brown glandular fimbriae beneath; pinnately nerved with 3–5 prominent, arcuate, lateral veins per side anastomosing to form a marginal nerve, midrib thickened, prominently raised and rugose in proximal third above and beneath, lateral nerves impressed above and raised beneath, reticulate veinlets prominent on both surfaces, weakly raised to plane above and raised beneath; petioles subterete, rugose, 3–5 mm long, glabrous. **Inflorescences** axillary, solitary, fasciculate, 1–5-flowered; floral bract deltate, keeled, with prominent midrib, acute, ca. 2 mm long, glabrous; pedicels striate, rugose, 26–30 mm long, glabrous; bracteoles 2, located near base, lanceolate, acuminate, 2–3.5 mm long, glabrous but marginally densely glandular-fimbriate. **Flowers** with calyx ca. 9 mm long, glabrous, tube obconic, striate, ca. 5 mm long, limb spreading-campanulate, rugose, ca. 4 mm long, lobes ovate, apiculate, ca. 1.5 mm long, sinuses acute; corolla bistratose, thick-carnose, cylindric, 12.5–15 mm long, red with white apex, glabrous without, lobes deltate, obtuse to acute, ca. 1.5–2 mm long, white, densely orangish arachnoid-tomentose within; **stamens** 10, equal, filaments connate into a tube 3 mm long, glabrous, anthers 8 mm long, thecae smooth, 5–5.5 mm long, incurved at base and there short-setose, tubules 2.5–3 mm long, dehiscing latrorsely along their entire length and apparently onto half of thecae length; style 11 mm long, glabrous. **Berry** not seen.

Distribution.—Endemic to southern Peru (Dept. Cusco) and known only from the collections cited herein; in "ceja de selva"; at 1650 m. Flowering in Jul. [The labels on the two USM collections state that they are from the "Smithsonian Institution, Lower Urubamba Biodiversity Program"; however, I have not yet seen duplicates at the US].

Paratypes.—**PERU. Cusco. Prov. La Convención. Dtto. Echarati:** same location as holotype, *Baldeón et al. 3022* (USM). **Dtto. Santa Ana:** Poromate, 12°55'S, 72°47'W, 2100 m, 18 Jun 2003 (bud), *Huamantupa et al. 3434* (MO n.v., NY); bosque del Chuyapi, 12°56'46"S, 72°46'40"W, 3200 m, 25 Jul 2006 (im fl), *Valenzuela et al. 7377* (MO n.v., NY). Dist. Echarati: Cerro Urusayhua, 12°27'S, 72°21'W, 1656 m, 25 Apr 2005 (fl), *Huamantupa 6422* (MO n.v., NY); Alturas de San Antonio, 12°25'S, 72°31'W, 1936 m, 21 Aug 2005 (fl), *Calatayud et al. 3350* (MO n.v., NY); Pie del Urusayhua, 12°27'S, 72°21'W, 1656 m, 14 May 2005 (fl), *Calatayud et al. 3035* (MO n.v., NY).

Discussion.—*Thibaudia nervosa* is characterized by having inflorescences fasciculate, pedicels 26–30 mm long, corolla glabrous without, calyx glabrous, and anther tubules conspicuous ca. 2.5–3 mm long. *Thibaudia nervosa* is similar to *T. dudleyi*, the species to which it is most similar in morphological characters, by having leaves with blades basally rounded or subcordate and subamplexicaul, corolla lobes densely pubescent within, and a unique type of anther dehiscence (see Luteyn 1978, fig. 8E). It is unfortunate that none of the paratypes have mature flowers.

Etymology.—The specific epithet draws attention to the prominent leaf nervation.

Thibaudia beckii Luteyn, sp. nov. (**Fig. 3**). TYPE: BOLIVIA. LA PAZ. PROV. NOR YUNGAS: Parq. Nac. Cotapata, "puente Mururata, hacia Charobamba," 16°11'25"S, 67°45'45"W, 1390 m, 30 Sep 2007 (fl), *St. G. Beck 29911* [HOLOTYPE: LPB n.v.; ISOTYPE: NY (barcode NY 3231115)].

Diagnosis.—*Thibaudia beckii* differs from *T. lanata* Luteyn by having stems, petioles, and pedicels glabrous (vs. densely pilose), pedicels ca. 17 mm long (vs. 6–7 mm long), corolla thin-membranaceous and ca. 11 mm long (vs. carnose, 14–15 mm long), corolla lobes and throat moderately short-pilose within (vs. densely long-lanate-woolly pilose).

Description.—Epiphytic **shrubs** to 1.5 m tall, arising from small lignotubers; mature stems terete, strongly and sharply ridged, puberulent, glabrate, bark reddish brown, exfoliating in thin sheets; twigs subterete, bluntly angled, puberulent; axillary buds ovate, prophylls ovate, inconspicuous, <1 mm long, apically acuminate, puberulent. **Leaves** with blades elliptic, 2.7–5.5 × 1.3–2.8 cm, basally obtuse to rounded, apically bluntly acute to rounded, marginally entire, glabrous; 3–5-plinerved, midrib, secondary, and tertiary nerves all raised above, midrib raised and conspicuous beneath, secondary nerves raised but inconspicuous beneath, tertiary nerves obscure beneath; petioles subterete, rugose, 3–4 mm long, puberulent, glabrate. **Inflorescences** of axillary fascicles, solitary, 1–2-flowered; floral bract ovate, ca. 1 mm long, apically acuminate, ciliolate; pedicels

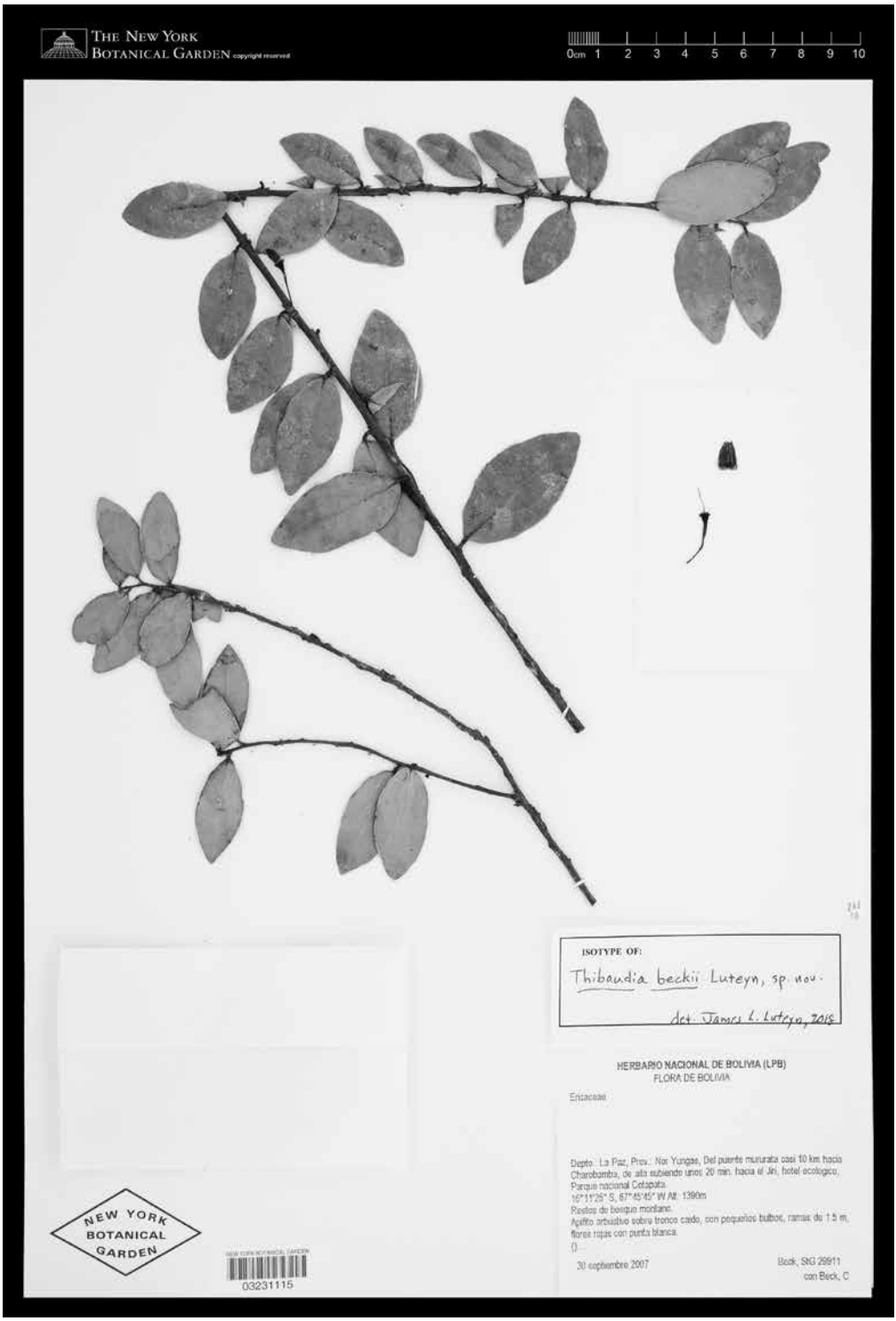

Fig. 3. *Thibaudia beckii* Luteyn. Photo of isotype sheet from NY (*Beck 29911*).

coarsely angled, ca. 17 mm long, glabrous; bracteoles basal, similar to floral bract. **Flowers** 5-merous; calyx articulate, campanulate, ca. 4 mm long, essentially glabrous, tube subterete, obconic, minutely rugose, ca. 2.5 mm long, limb ca. 1.5 mm long, lobes apiculate, ca. 0.5 mm long, sinuses broadly rounded, very weakly ciliolate; corolla thin-membranaceous, bistratose, ca. 11 mm long, red with white lobes, glabrous without, lobes oblong, ca. 2 mm long, apically obtuse, moderately short-pilose within (lobes and throat), also with 2 short (ca. 0.2 mm long), stout, cartilaginous teeth (thickened glandular hairs ?) on either side of base; **stamens** 10, equal, ca. 7 mm long, filaments connate, 3–3.3 mm long, glabrous, anthers ca. 4.5 mm long, thecae ca. 2.5 mm long, smooth, slightly incurved at base, with short basal appendage, tubules ca. 2 mm long, dehiscing alternately introrsely and latrorsely; style included, ca. 10 mm long, about as long as corolla, glabrous. **Berry** not seen.

Distribution.—Known only from the type collection; in "restos de bosque montano;" at 1390 m. Flowering in Sep.

Discussion.—*Thibaudia beckii* is characterized by having stems, petioles and pedicels glabrous, small, elliptic leaves, 1–2-flowered inflorescences, pedicels ca. 17 mm long, glabrous flowers, corollas that are thin-membranaceous and ca. 11 mm long with the lobes and throat moderately short-pilose, and the lobes also bearing basal cartilaginous teeth. *Thibaudia beckii* is morphologically similar to *T. lanata* Luteyn in bearing cartilaginous teeth at the bases of the corolla lobes, but otherwise it does not seem to be closely related to any other species.

Etymology.—This species is named for Stephan Beck in appreciation for his superb efforts to improve botanical knowledge in Bolivia by collecting plants, teaching and mentoring students, kindness in his assistance to botanical visitors, and in building infrastructure at the National Herbarium in La Paz (LPB).

Thibaudia cuscoensis Luteyn, sp. nov. (**Fig. 4**). TYPE: PERU. CUSCO. PROV. PAUCARTAMBO: Cordillera Tres Cruces, region of Acanacu, 3290–3500 m, 7 Dec 1978 (fl), *J.L. Luteyn & M. Lebrón-Luteyn 6379* [HOLOTYPE: NY (barcode NY 3201109); ISOTYPES: AAU, F, LPB, MO, USM].

Diagnosis.—*Thibaudia cuscoensis* is characterized by having its leaves obovate-elliptic, 5.3–8 × 2–5 cm, pinnately nerved with 3–4 lateral nerves per side, inflorescences short-racemose, 1–4(–9)-flowered, rachis 3–4(–20) mm long, and calyx sinuses acute.

Description.—Terrestrial **shrubs,** 2–3 m tall, or hemiepiphyte to 4 m tall, sometimes scandent or decumbent; mature stems subterete, broadly and bluntly angled, glabrous, bark cracking longitudinally into thin strips; twigs distinctly complanate, bluntly angled, striate, glabrous; axillary buds ovoid, prophylls relatively inconspicuous, ovate, 3–3.5 mm long, apically long-acuminate, glabrous except for a tuft of eglandular hairs at tip. **Leaves** with blades broadly obovate-elliptic, 5.3–8 × 2–5 cm, basally short-attenuate, apically rounded and shallowly retuse, marginally remotely broadly crenate, glabrous above but with few, scattered, reddish black, clavate glandular hairs beneath; pinnately nerved, midrib thickened in proximal 1–2 cm, impressed above and conspicuously raised beneath, secondary nerves 3–4 per side, anastomosing, impressed above and raised beneath, tertiary nerves impressed above and raised beneath; petioles subterete, canaliculate and shortly winged above, 5–7 mm long, rugose, glabrous. **Inflorescences** of axillary racemes, 1–4(–9)-flowered, rachis angled, striate, 3–4(–20) mm long, glabrous; floral bract and bracteoles ovate, 2–3 mm long, apically acuminate, marginally with few, stout, glandular hairs; pedicels subterete, striate, 13–20 mm long, glabrous. **Flowers** 5-merous; calyx cylindric-campanulate, 6–8 mm long, glabrous but bearing few, caducous, reddish glandular hairs in bud, tube cylindric, terete, or obscurely 10-ribbed when dry, 3.5–4.5 mm long, basally truncate, limb ca. 3.5 mm long, lobes triangular, 2–3 mm long, apically sharply acute, sinuses acute; corolla succulent, bistratose, cylindric-urceolate, 11–16 mm long, ca. 10 mm diam. (measured from pickled material), red to dark pinkish red with white limb and lobes, glabrous, lobes spreading, oblong, 2–2.5 mm long, apically bluntly acute; **stamens** equal, shorter than corolla, ca. 9 mm long, filaments connate, ca. 4 mm long, glabrous, anthers 6.5–7 mm long, thecae 3–4 mm long, smooth, incurved at base, tubules 3–3.5 mm long, dehiscing introrsely by elongate clefts; nectariferous disc succulent, glabrous; style shorter than corolla, ca. 11 mm long, glabrous. **Berry** not seen.

Distribution.—Endemic to southern Peru (Dept. Cusco); in ceja de la montaña thickets, bosque húmedo, and bosque secundario; at 2206–3500 m. Flowering in Feb , Mar., May, Jul., and Dec.

Fig. 4. ***Thibaudia cuscoensis*** **Luteyn. Photo of holotype sheet from NY (*Luteyn & Lebrón-Luteyn 6379*).**

Paratypes.—**PERU. Cusco. La Convención. Dtto. Vilcabamba:** Yupancca, 13º02'56"S, 72º57'27"W, 2800 m, 24 Feb 2007 (fl), *Valenzuela et al. 8973* (MO n.v., NY); 13º03'09"S, 72º55'33"W, 2206–2800 m, 18 Mar 2006 (fl), *Valenzuela et al. 6464* (MO n.v., NY). **Prov. Paucartambo:** Acjanaco, Cerro Macho Cruz, 3350–3450 m, 23 Jul 1990 (bud), *Cano E. 3936* (F n.v., NY, USM n.v.); Region of Acanacu, Cordillera Tres Cruces, 3290–3500 m, May 2005 (fl), *Norma Salinas et al. 7612* (COL, CUZ, NY), *Norma Salinas et al. 7623* (CUZ, MO, NY).

Discussion.—*Thibaudia cuscoensis* is characterized by its broadly obovate-elliptic leaves, which are prominently pinnately nerved, and its short-racemose inflorescences of 1–4 flowers. Two collections from the Cordillera Vilcabamba (*Valenzuela et al. 6464* and *8973,* both NY) are probably referable to *T. cuscoensis* (and their characteristics have been included in the description above), but differ from those of the Cordillera Tres Cruces by having longer rachises (sometimes up to 20 mm long vs. 3–4 mm long) that bear more numerous flowers (up to 9 vs. 1–4). *Thibaudia cuscoensis* keys closest to *T.* aff. *biflora* (Poeppig & Endl.) Hoerold—a species of uncertain status known from central Peru, but that apparent relationship may not be real and many more collections are needed from both species. *Thibaudia cuscoensis* differs from *T.* aff. *biflora* by having its leaves obovate-elliptic (vs. obovate-oblanceolate), 5.3–8 × 2–5 cm (vs. 1.3–4 × 0.8–1.6 cm), pinnately nerved with 3–4 lateral nerves per side (vs. obscurely 5-plinerved or pinnately nerved with 2 lateral nerves per side), inflorescences short-racemose, 1–4(–9)-flowered (vs. short-racemose to subfasciculate, 1–2(–3)-flowered), rachis 3–4(–20) mm long (vs. up to 5 mm long), and calyx sinuses acute (vs. broadly rounded).

Etymology.—Named after the Peruvian Department of Cusco, where this and so many other interesting and unique plants grow.

Thibaudia lanata Luteyn, sp. nov. (**Fig. 5**). Type: PERU. Cusco. Prov. La Convención: Dtto. Maranura, Mesapelada, bosque primario, 12º54'33"S, 72º37'06"W, 2450 m, 19 Apr 2004 (fl), *W. Galiano, E. Suclli, P. Núñez, A. Rodríguez & V. Chama 6135* [holotype: NY (barcode NY 3231114); isotypes: CUZ n.v., MO n.v., USM n.v.].

Diagnosis.—*Thibaudia lanata* differs from *T. nervosa* Luteyn by having stems, petioles, and pedicels densely white-pilose (vs. glabrous), leaf blades 2.7–4.5 × 1.5–3 cm (vs. 6.5–16 × 3–9 cm), leaf bases rounded to obtuse, not subamplexicaul (vs. subcordate, subamplexicaul), and pedicels 6–7 mm long (vs. 26–30 mm long); and from *T. dudleyi* Luteyn by smaller leaves (2.7–4.5 × 1.5–3 cm, not 4–12.5 × 2–7.5 cm), leaf bases rounded to broadly obtuse (not rounded or subcordate), and inflorescences subfasciculate (not long-racemose).

Description.—Epiphytic **shrubs;** mature stems subterete, striate, densely and shortly white-pilose with eglandular hairs, glabrate, bark exfoliating in thin sheets; twigs bluntly angled, densely and shortly white-pilose with eglandular hairs; axillary buds ovoid, prophylls inconspicuous, ovate, ca. 2 mm long, apically acute, densely pilose as twigs. **Leaves** with blades elliptic to broadly elliptic, 2.7–4.5 × 1.5–3 cm, basally obtuse to rounded, not amplexicaul, apically obtuse, marginally entire, moderately and shortly white-pilose on both surfaces with eglandular hairs, glabrate; 3(–5)-plinerved from near base, midrib weakly impressed above and raised beneath, secondary nerves plane to slightly impressed above and raised beneath, tertiary nerves slightly raised on both surfaces but inconspicuous; petioles subterete, canaliculate above, rugose, 5–7 mm long, densely and shortly white-pilose with eglandular hairs. **Inflorescences** of axillary fascicles, 2–4-flowered; floral bract ovate, 2.5–3 mm long, apically acute, marginally densely and shortly white-pilose with eglandular hairs distally, also with stout, ferrugineous glandular hairs proximally fusing to form a supramarginal gland; pedicels subterete, striate, rugose, 6–7 mm long, densely and shortly white-pilose with eglandular hairs; bracteoles basal, similar to floral bract. **Flowers** 5-merous; calyx articulate, 7–8 mm long, campanulate, glabrous to sparsely and shortly white-pilose with eglandular hairs, tube obconic, rugose, ca. 5 mm long, sometimes appearing bluntly angled opposite lobes, limb rugose, 2.5–3 mm long, lobes broadly deltate, 1–1.5 mm long, apically acute to apiculate, sinuses broadly rounded; corolla carnose, bistratose, 14–15 mm long, 4–6 mm diam , red with white lobes, glabrous without, lobes spreading, reflexed, ovate, 2–2.5 mm long, apically obtuse, densely long-lanate at throat within, so much so as to close mouth, also with 2 short (ca. 0.2 mm long), stout, cartilaginous teeth (thickened glandular hairs?) on either side of base; **stamens** 10, equal, ca. 9 mm long, filaments equal, connate, 3.5–4 mm long, glabrous, anthers equal, ca. 7 mm long, thecae ca. 4 mm long, smooth, tubules ca. 3 mm long, dehiscing latrorsely by clefts over entire length of tubules (and seemingly onto thecae); style included, about equaling corolla, glabrous. **Berry** not seen.

Distribution.—Endemic to Peru and known only from the type specimen; in "bosque primario;" at 2450 m. Flowering in Apr.

Fig. 5. *Thibaudia lanata* Luteyn. Photo of holotype sheet from NY (*Galiano et al. 6135*).

Discussion.—*Thibaudia lanata* is characterized by stems, petioles, and pedicels densely white-pilose with unicellular, eglandular hairs, small leaves (leaf blades 2.7–4.5 × 1.5–3 cm) with bases rounded to broadly obtuse (not subamplexicaul), subfasciculate inflorescence, short pedicels (6–7 mm long), succulent corollas, corolla lobes that are densely lanate within and bear two short (ca. 0.2 mm long), stout, "teeth" (thickened glandular hairs?) on either side at base, and latrorse dehiscence. *Thibaudia lanata* is morphologically similar to *T. beckii* (Bolivia), having in common the unique "teeth" on either side of the base of each corolla lobe (see above). It also has in common with *T. nervosa* and *T. dudleyi* the rare feature of latrorse anther dehiscence. Furthermore, it also has in common with *T. dudleyi* (probably the most closely related species) stems, petioles, and pedicels densely white-pilose with unicellular, eglandular hairs, exactly the same unique 2-layered corolla, and extremely lanate corolla mouth within (see Luteyn 1978, fig. 8E).

Etymology.—The epithet is meant to draw attention to the corolla lobes which are extremely lanate-woolly at the mouth within.

NOMENCLATURAL NOTES

AGARISTA D. Don ex G. Don, Gen. Hist. 3:788. 1834. LECTOTYPE SPECIES: *Agarista nummularia* (Cham. & Schltdl.) G. Don. One species is found in Bolivia (Judd & Herman 1990).

Agarista boliviensis (Sleumer) Judd, J. Arnold Arbor. 65:333. 1984. *Leucothoe boliviensis* Sleumer, Notizbl. Bot. Gart. Berlin-Dahlem 12:131. 1934. TYPE: BOLIVIA. SANTA CRUZ. PROV. CABALLERO: Valley of Comarapa, 2000 m, 26 Oct 1928, *J. Steinbach 8568* [**LECTOTYPE, here designated:** NY (barcode NY 10139, image!; photo, NY neg. 9978); ISOLECTOTYPES: B, destroyed; BM (barcode BM 906616, image!), E (barcode E 326869, image!), F (barcode F 55439, image!; photo, F neg. 59502), G (2x; photo, F neg. 28929), GH (barcode GH 15109, image!), K (barcode K 494460, image!; photo, NY neg. 18175), L (barcode L 6614, image!), LIL n.v., MO (barcode MO 345489, image! but mistakenly cited as "Holotype"), S (barcode S 54188, image!), U (barcode U 1716, image!), UC (barcode UC 394830, image!), US frag. ex B-destroyed (barcode US 116789, image on US institutional site)].

Illustration.—Luteyn and Pedraza-Peñalosa 2007c.

Sleumer (1934:131) cited the "Type" of *Leucothoe boliviensis* at B (no other duplicates were given by him). In 1984 (p. 333), Judd transferred Sleumer's species to *Agarista*, mentioning that the "holotype, B (destroyed)," that there was a "fragment of holotype, US!," and that there were numerous "isotypes" (he mentioned 11); he (Judd) did not specifically designate a lectotype in his treatment. I consider the sheet at NY to be the best specimen from the syntypes and, therefore, am designating it as lectotype.

DIOGENESIA Sleumer, Notizbl. Bot. Gart. Berlin-Dahlem 12(112):121. 1934. TYPE SPECIES: *Diogenesia octandra* Sleumer. Two species occur in Bolivia and adjacent southern Peru.

Diogenesia boliviana (Britton) Sleumer, Bot. Jahrb. Syst. 71:396. 1941. *Rusbya boliviana* Britton, Mem. Torrey Bot. Club 4:215. 1895. *Eleutherostemon bolivianum* (Britton) Herzog, Meded. Rijksherb. Leiden 27:23. 1915, in text. *Vaccinium bolivianum* (Britton) Sleumer, Notizbl. Bot. Gart. Berlin-Dahlem 13:137. 1936. TYPE: BOLIVIA. LA PAZ. PROV. MURILLO: Zongo, Nov 1890 (fl, im fr), *Bang 852* [LECTOTYPE, designated by Sleumer (1936): NY (barcode NY 10428, image!; photo, NY neg. 10105); ISOLECTOTYPES: B *fide* Sleumer (1936) n.v., destroyed; BM (barcode BM 993627, image!), E (barcode E 327865, image!), F (barcode F 55493, image!; photo, F neg. 59551), G (barcode G 342336, image!), GH (barcode GH 14897, image!), K (barcode K 442214, image!), M (barcode M 164560, image!), MO (barcode MO 35207, image!), US(2x, barcodes US 118401 and US 921460, image!)].

Illustration.—Luteyn and Pedraza-Peñalosa 2007c.

In Britton's protologue (1895) of *Rusbya boliviana*, he mentioned only one collection "(*852*)" (i.e., *Bang 852*) without mentioning any duplicates or a herbarium where he saw the collection (although it is presumed that he saw it at NY where he worked). In 1915 Herzog (p. 22) described a new genus *Eleutherostemon* (Vaccinieae) and on p. 23 in the text of his new *E. racemosum* he made the new combination *E. bolivianum* (Britton) Herzog by directly referring to *Rusbya boliviana* Britton and stated that their generic coherence could not be doubted (no mention of a collection nor collection number for the Britton species was made). Smith (1932:446) cited *Rusbya boliviana* in his "EXCLUDED SPECIES" and stated that he saw "the type collection borrowed from the Gray Herbarium." Smith did not mention the actual "Type" [(or holotype using our modern terminology, but here his mention of a "type collection" from GH signifies an isotype following Smith's method of citation of types—see **Notes** above)], nor any other herbarium specimens, not even *Bang 852* at NY where he

did his study. Sleumer (1936:137), in his new combination *Vaccinium bolivianum*, cited "(*Bang n. 852*, Typus in Herb. New N[Y]ork Bot. Gard., ferner in Herb. Berlin)," effectively lectotypifying the species based on the NY sheet of *Bang 852*. In 1941 Sleumer (p. 396) made the new combination *Diogenesia boliviana*, but did not mention any specimens. Then in 1950 writing about *E. bolivianum*, Smith (1950:352) mentioned "Type: Songo, Bolivia, *Bang 852* (NY; duplicates US and other herbaria). Range: Known only from the type collection" reiterating his belief that the holotype (our concept) was also located at NY. I consider the sheet of *Bang 852* at NY to be the best specimen from the syntypes, the most probable one that Britton worked with, and following Sleumer am designating it as lectotype.

Vaccinium thibaudioides Sleumer, Notizbl. Bot. Gart. Berlin-Dahlem 12:140. 1934. *Diogenesia thibaudioides* (Sleumer) Sleumer, Bot. Jahrb. Syst. 71:396. 1941. TYPE: BOLIVIA. COCHABAMBA. PROV. CHAPARE: Incacorral, 2350 m, 17 Mar 1929 (fl, fr), *J. Steinbach 9628* [HOLOTYPE: B, destroyed; **LECTOTYPE, here designated:** NY (barcode NY 10688, image!); ISOLECTOTYPES: A, BM (barcode BM 582317, image!), E (barcode E 373017, image!), F (barcode F 55562, image!; photos, F neg. 59601 and NY neg. 9650), F frag. ex G (barcode F 55563, image!), G (barcode G 342340, image!; photo, F neg. 28942), GH (barcode GH 14901, image!), K (barcode K 442212, image n.v.), LIL (barcode LIL 1084, image!), MO (barcode MO 345700, image!), S (barcode S 54354, image!), U (barcode U 1721, image!), US (barcode US 116948, image!)].

I consider the sheet of *J. Steinbach 9628* at NY to be the most complete specimen from the syntypes (flowers, fruits, wood, annotated by Sleumer) and am therefore designating it as lectotype.

POLYCLITA A.C. Smith, Bull. Torrey Bot. Club 63:314. 1936. TYPE SPECIES: *Polyclita turbinata* (O. Kuntze) A.C. Smith. Monotypic genus endemic to Bolivia.

Polyclita turbinata (O. Kuntze) A.C. Smith, Bull. Torrey Bot. Club 63:314. 1936. *Chupalon turbinatum* O. Kuntze, Rev. Gen. Pl. 3(2):190. 1898. *Thibaudia turbinata* (O. Kuntze) Hoerold, Bot. Jahrb. Syst. 42:272. 1909. TYPE: BOLIVIA: "Santa Rosa," 2000–3000 m, 3 Apr 1892 (fl), *Kuntze s.n.* [**LECTOTYPE,** first-step designated by Smith (1932:415) and second-step **here designated:** NY (barcode NY 9941, image!; photo, NY neg. 9743); ISOLECTOTYPES: B (destroyed, photo F neg. 4636), NY (barcode NY 9940, image!; photo, NY neg. 9742)].

Illustration.—Smith (1936, stamens); Luteyn 1998; Luteyn and Pedraza-Peñalosa 2007a, c.

In the protologue of *Chupalon turbinatum* Kuntze (1898) did not mention a collection number, a date of his collection, nor specifically that the type was at B (nor anywhere else), although he worked at B. In 1907 the New York Botanical Garden purchased the herbarium of Otto Kuntze with funds from Mrs. Andrew Carnegie. Hoerold (1909) merely referred to Kuntze (1898) in his new combination—no type nor duplicates were mentioned. In 1930, A.C. Smith (when working at NY) annotated a *Kuntze s.n.* collection at NY (barcode NY 9941) as "TYPE" and a second (duplicate) *Kuntze s.n.* collection at NY (barcode NY 9940) as "TYPE COLL" (i.e., holotype and isotype, respectively, using our modern terminology, but here following Smith's method—see **Notes** above). Then in his "The American Species of Thibaudieae" (Smith 1932:415) he cited the type locality for *Thibaudia turbinata* (Kuntze) Hoerold (basionym: *Chupalon turbinatum* O. Kuntze) as "Santa Rosa, Bolivia, altitude 2,000 to 2,600 meters. Type collected by Kuntze, April 3, 1892"—the first mention of the exact elevation written on the type sheets and for an exact date for the type collection—and "Known only from the type collection. Bolivia: Santa Rosa, *Kuntze* (B, Y, type)," thus effectively lectotypifying the species. When Smith (1936:314) described the new monotypic genus *Polyclita*, he cited as the type species *P. turbinatum* (O. Kuntze) A.C. Smith and merely referred back to Kuntze (1898), Hoerold (1909), and Smith (1932) in making his new combination—the species was still known only from Kuntze's (1898) original material, viz., *Kuntze s.n.,* 3 Apr 1892. [Global Plants incorrectly shows a Field Museum photograph (F neg. 4631) as an isotype of *Chupalon turbinatum*; that photo shown on Global Plants is actually *Lehman 8232*, the type number for *Thibaudia lehmannii* Hoerold (1909). The correct F negative number for *Chupalon turbinatum* should be F neg. 4636!].

Polyclita turbinata is often superficially mistaken for *Thibaudia macrocalyx* (compare illustrations: Luteyn & Pedraza-Peñalosa 2007c.) because of the winged calyx tube. *Thibaudia macrocalyx* has its calyx articulate with the pedicel and its wings alternate with the calyx lobes, whereas *P. turbinata* has its calyx continuous with the pedicel and wings opposite the calyx lobes. Its relationships probably lie with the polyphyletic genus *Thibaudia* (but see below).

SIPHONANDRA Klotzsch, Linnaea 24:24. 1851. **nom. cons.** Type species: *Siphonandra elliptica* (Ruiz & Pavón ex G. Don) Klotzsch (for lectotypification see Luteyn & Ortiz 2008). The generic name *Siphonandra* Klotzsch (Ericaceae) has recently also been conserved against *Siphonandra* Turczaninow (Rubiaceae); see Pedraza and Luteyn (2013) with initial response in Taxon 63(6):1363. 2014, and final approval in Wilson (2016).

Illustration.—Luteyn and Pedraza-Peñalosa 2007c.

Siphonandra is a distinctive, high-elevation genus of five species endemic to southern Peru and northern Bolivia (Luteyn & Ortiz 2008). With only one extant collection each of three of the five species, it is difficult to assess the relationships among any of the species in this genus. Named for its long, slender, staminal tubules, it is characterized by its articulate calyx and perfectly terminal pores at the tips of slender tubules. The current generic concept follows that of Klotzsch (1851) and Smith (1932), but differs by the acceptance of species with distinct staminal filaments (vs. connate in original concept), as first noted by Sleumer (1941).

SPHYROSPERMUM Poeppig & Endlicher, Nov. Gen. Sp. Pl. 1:4. 1835. Lectotype species: *Sphyrospermum buxifolium* Poeppig & Endlicher (Smith 1933:206).

Sphyrospermum is a genus of 22 species that range from southern Mexico through the highlands of Central America, the Andes of South America into Bolivia, east into French Guiana, and the Caribbean from Haiti to Trinidad. Four species occur in Bolivia and adjacent southern Peru.

Sphyrospermum buxifolium Poeppig & Endlicher, Nov. Gen. Sp. Pl. 1:4, pl. 8. 1835. Type: PERU: between Pampayacu and Cuchero, fl Nov, anno 1829, *Poeppig 1291* [**lectotype, here designated:** W (barcode W 28580; photo, NY s.n.); isolectotypes: F (barcode F 40440F, image!; photo, F neg. 59562), GH (barcode GH 55286, image!), NY (barcode NY 10458, image!)].

Other illustrations.—Luteyn (1996); Luteyn and Pedraza-Peñalosa (2007a,b,c, 2013).

No collection or collection number was cited in the protologue of *Sphyrospermum buxifolium*, although the title page of Poeppig and Endlicher's *Nova Genera ac Species Plantarum* (1835) stated that the collections were made by Poeppig himself (accompanied by Stephano Endlicher). Klotzsch (1851:49) cited (alphabetically) the four species of *Sphyrospermum* know to him at that time, and gave "Poeppig" as the collector for both *S. buxifolium* and *S. longifolium* Poeppig & Endlicher (1835), but he did not give a collection number for either species (neither did Macbride 1959). Smith 1933:208 stated the type as "PERU: Between Pampayacu and Cuchero, *Poeppig* (B, P, type coll.)" thereby indicating that he felt those two sheets were duplicates of the type collection, although he did not cite a collection number for the type nor did he designate either one of those specimens as the "TYPE" (i.e., holotype, using our modern terminology, but here following Smith's method—see **Notes** above). When I visited the herbarium W in Dec. 1986, where Poeppig's original collections are located, I annotated their sheet with the label that reads "*Poeppig 1291*" (currently with barcode W 28580) as the "Holotype"—I am now designating that same W sheet as the lectotype (since Smith in 1933 never cited a "type" only "type coll.," nor was a collection number previously indicated). The duplicate (i.e., syntype) sheets at F, GH, and NY all having labels that read "*Poeppig 1291*" (similar to the lectotype sheet at W). The two specimens (at B and P) cited by Smith (1933:208) as part of the "type coll." that do not bear a collection number are now considered to be possible syntypes. With regards to the two herbarium specimens of *Sphyrospermum buxifolium* at B and P cited by Smith (1933:208) as part of the "type coll.," the sheet at B [since destroyed, but represented in photo by F neg. 4723 (=barcode F0BN004723, image!)] and the other at P (barcode P 649610, annotated by Sleumer in 1958 as an "Isotype" (image!) are *Poeppig s.n.* collections, and each has a label that reads "Sphyrospermum buxifolium Poepp. Endl. n. g." thus perhaps indicating type material (i.e., syntypes), but neither sheet has a collection number on its label, so they are at best "possible syntypes." The isolectotype sheet of *S. buxifolium* at GH mentioned above (barcode GH 55286) is **incorrectly** cited as *Poeppig 1271* on the Global Plants website. The sheet of *S. buxifolium* at MA (barcode MA 747446) identified as "Original material" on the Global Plants website is **not** type material but merely an early collection of the species by Ruiz and Pavón.

Sphyrospermum buxifolium is morphologically plastic and should be recognized as a variable complex. It occupies a great diversity of humid habitats and thus the size and texture of the leaves, flowers and pedicels,

and sometimes even the color of the corolla, vary among populations (and rarely within populations). The Bolivian and Peruvian variants within this complex have all been previously recognized as species and include the names *S. buxifolium*, *S. cordifolium* Benth., *S. longifolium* Poeppig & Endlicher, *S. weberbaueri* Hoerold, and *Sophoclesia robusta* Rusby—all are now synonymyzed under *S. buxifolium*, the oldest name with priority (see Luteyn & Pedraza 2013).

THIBAUDIA Ruiz & Pavón ex Jaume Saint-Hilaire, Expos. Fam. 1:362. 1805. TYPE SPECIES: *Thibaudia mellifera* Ruiz & Pavón ex Jaume Saint-Hilaire (Saint-Hilaire 1805:363).

Thibaudia consists of about 70 species. It occurs from Costa Rica, south into Bolivia, and eastward into Suriname and Guayanan Brazil. Approximately 15 species occur in the northern Bolivia and adjacent southern Peru portion of the Andes.

Thibaudia is difficult to circumscribe. For the most part, the species are distinct, but the characters that have been used traditionally to define the genus are also found in several other "closely related" genera, such as *Anthopterus*, *Themistoclesia*, *Cavendishia*, etc. (see for example, Smith 1936; Macbride 1959). Based on molecular data, the genus is polyphyletic as currently circumscribed (see cladograms in Kron et al. 2002, and also Powell & Kron 2003). Current molecular phylogenetic work indicates real problems of generic circumscription in Neotropical Vaccinieae in general, and it is possible that further generic realignments will be necessary.

Thibaudia diphylla Dunal, DC. Prodr. 7:562. 1839. TYPE: PERU: "circa Huasa Huasi et Paleo in regno Peruviano (Dombey!) … (v. s. in h. mus. Par.)" [HOLOTYPE: P (barcode P 647768, image!; photo, F neg. 38273); ISOTYPES: L frags. ex P holotype (barcode L 7868, image!), MPU frags. ex P holotype (Herb. Dunal barcode MPU 12311, image!).

Illustration.—Luteyn and Pedraza-Peñalosa 2007c (as *T. crenulata*).

The holotype of *Thibaudia diphylla* is a single sheet collected by Dombey in the general herbarium at P, verified by A.C. Smith (1950:377) after he examined the actual type specimen in P in 1932 and later also the photo provided to him by the "Chicago Natural History Museum" (=F neg. 38273). The two isotypes at L and MPU consist of small fragments taken from the P holotype.

Thibaudia crenulata J. Rémy, Ann. Sci. Nat., Bot. sér. III, 8:234. 1847. **syn. nov.** TYPE: BOLIVIA. LA PAZ: Yungas, vic. Chupi, *D'Orbigny 417* [HOLOTYPE: P (barcode P 647767, image!; photos, F neg. 38272 and NY neg. s.n.); ISOTYPES: L frag. ex P holotype (barcode L 7866, image!), NY frag. ex P holotype (barcode NY 10513, image!)].

The holotype of *Thibaudia crenulata* is a single sheet of *D'Orbigny 417* at P "D'Orbigny! in Herb. Mus. Paris" as stated by Rémy (1847:234). Evidently A.C. Smith did not see the *D'Orbigny* type (in P) when he visited the city in 1932, because he stated that "In 1932 I was unable to place *T. crenulata* Remy, but a photograph of the type (*d'Orbigny*, from Chupi, Yungas, Bolivia, in the Paris Herbarium) indicates beyond question that Remy's binomial must replace *T. boliviensis* (Kuntze) Hoer." (Smith 1950:378). The two isotype sheets at L and NY consist of small fragments taken from the P holotype.

Vaccinium leucostomum Lindley, Gardn. Chron. 1848:7, fig. [1 Jan 1848]. *Thibaudia leucostoma* (Lindley) Sleumer, Notizbl. Bot. Gart. Berlin-Dahlem 12:291. 1935. TYPE: PERU. "Veto," 8000 ft. [LECTOTYPE, designated by Sleumer (1935), *Lobb 276*, CGE n.v. (barcode CGE 16697, digital image sent to me!)].

No specimen or collection number for *Vaccinium leucostomum* was cited in the protologue, which also included a black/white, unnumbered fig. on p. 7. The name was based on a plant grown by Messrs. Veitch, of Exeter, England, from seeds collected by W. Lobb in Peru. Lobb stated that the flowers were "scarlet tipped with white" (Lindley 1848). Sleumer (1935:291) effectively lectotypified the name when he stated that the "type" was a single specimen of *Lobb 276* in the "Herb. Lindley" at Cambridge University (CGE). That herbarium specimen (Herb. J. Lindley, Ph.D., CGE 16697) bears in the lower right-hand corner in Lindley's hand the annotation "Vacc. leucostomum Gard. Chron." (hand-writing verified by Dr. Lauren M. Gardiner, CGE). The sheet does not have further label information, nor is there given a collection number *276* anywhere on the sheet. The specimen does, however, bear H.O. Sleumer's 1934 annotation "*Thibaudia leucostoma* (Lindl.) Sleumer, nov. comb." and "Original! (Lobb—Peru)," and I agree with Sleumer that it is the type. An exact copy of Lindley's

illustration (the figure on p. 7 of the protologue) is also found in van Houtte (1848, Fl. des Serres 4:329b, no. 105, plate *332*) published in "Mar 1848" roughly two months after Lindley's figure.

Eurygania ovata Hook. f., Bot. Mag. Curtis 104: pl. 6393. [1 Nov] 1878. *Thibaudia ovata* (Hook. f.) Hoerold, Bot. Jahrb. Syst. 42:275. 1909. TYPE: PERU: "Andes of Peru," s.d., *W. Lobb s.n.*[HOLOTYPE: K (barcode K 442220, image!; photo, NY s.n.)].

In the protologue of *Eurygania ovata* Hooker stated that the specimen at K was based on flowering material cultivated by Messrs. Veitch, of Exeter, England, and was sent to him (J.D. Hooker) in July 1878. He further stated that he was having trouble identifying that specimen "in hand" that had been flowering in July [1878] and that was the basis for the plate 6393. There is only a single specimen of *E. ovata* in the herbarium at K (barcode K 442220), which A.C. Smith annotated in 1931 as "*Thibaudia ovata* (Hook.f.) Hoer. TYPE" (i.e., holotype, using our modern terminology, but here following Smith's method—see **Notes** above). That specimen has a hand-written label that reads "*Eurygania ovata* Hf." and beneath it "Hort. Veitch June /78" as well as a hand-written note on the sheet itself (apparently in the same hand and same pen as that of the label) stating that it was collected by "Lobb in Peru" (**not** "Robb" as stated on both the K and Global Plants websites). Therefore, I have no doubts that the K sheet is the holotype.

Hornemannia boliviensis O. Kuntze, Rev. Gen. Pl. 3(2):191. 1898. **syn. nov.** *Thibaudia boliviensis* (O. Kuntze) Hoerold, Bot. Jahrb. Syst. 42:275. 1909. TYPE: BOLIVIA. DEPTO. COCHABAMBA: Santa Rosa, 3000 m, 3 Apr 1892 (fl), *Kuntze s.n.* [LECTOTYPE, designated by Smith (1932:437): NY (barcode NY 10095, image!; photo, NY neg. 9718); ISOLECTOTYPE: B (destroyed, but see below)].

In 1898 Kuntze described *Hornemannia boliviensis* based on one of his collections from "Bolivia: Santa Rosa 3000 m." In 1907 the New York Botanical Garden purchased the private herbarium of Otto Kuntze through the financial assistance of Andrew Carnegie (Zanoni 1980). Hoerold (1909) only mentioned the literature citation of Kuntze's protologue when he made his new combination *Thibaudia boliviensis*—he did not mention either a specimen or a collection number for the type. In 1930, after revising the American species of Thibaudieae, A.C. Smith annotated one NY sheet (barcode NY 10095) of *Kuntze s.n.,* April 3, 1892 from Bolivia: Santa Rosa 3000 m (*fide* an attached "OTTO KUNTZE" annotation label) as "Thibaudia boliviensis (Ktze.) Hoer. TYPE" (following Smith's way of citing a "Holotype" as explained above). At the same time, he (mistakenly) annotated a second NY sheet (barcode NY 10094, image!; photo, NY neg. 9717), *Kuntze s.n.* with location "BOLIVIEN 2000M" and date "1/4 April 1892" given on an attached "OTTO KUNTZE" annotation label, as "Thibaudia boliviensis (Ktze.) Hoer. TYPE COLL." (Smith's way of citing an isotype)—the information on the second sheet being totally different from the "TYPE" sheet! Two years later, in Smith's 1932 (p. 437) publication, he (correctly) stated "Type collected by Kuntze (April 3, 1892)" and a few lines further gave the complete type citation "Bolivia: Santa Rosa, *Kuntze*, April 3, 1892 (B, Y, type)"—thus Smith was the first monographer to effectively lectotypify (first-step) the species by giving the collector's name "*Kuntze*," the full date of the type collection "April 3, 1892" (Kuntze himself wrote it as "3 April 92" on his personal label attached to the lectotype sheet), **and** the herbarium location of the type and an isotype "(B, Y, type)" (following his method explained in **Notes** above). In truth, the second NY herbarium sheet [*Kuntze s.n. 1/4 Apr 1892* (barcode NY 10094)] that was annotated as "TYPE COLL." by Smith in 1930 is **not** a type at all, but merely a non-type collection of *H. boliviensis*. It is interesting that Smith (1932:437) did not mention the *Kuntze s.n. 1/4 Apr 1892* collection in his 1932 publication, but perhaps he realized his (1930 annotation) mistake. The B specimen cited by Smith (1932:437) as a type duplicate (and cited above as a possible lectotype) was destroyed in WWII and there is no photo of that specimen, thus it cannot be verified as part of the type collection. The photo of a B specimen (F neg. 4624, =barcode F0BN004624, image!) with the identification "*Kuntze Thibaudia boliviensis*" (basionym: *Hornemannia boliviense*) on the photo negative label, and possibly that of the isolectotype at B (since destroyed) cited by Smith (as noted above), does **not** show any collection or locality data at all, nor does it have any indication of the herbarium from which the photo was taken, and there is no label or herbarium information associated with the database of the Macbride "Berlin Negatives" collection at The Field Museum (Chicago), where it is recorded as "Type [status unknown]"; therefore, it cannot be verified as a type [the photo of the entire herbarium sheet itself seems to have been cropped so that it just shows the plant itself without any label data, if there was any]—in any case F neg. 4624 does **not** represent a specimen of *T. boliviensis*, but appears to be

another unidentified species of *Thibaudia*. With all of this information in mind, I am making a second-step lectotypification (as per ICN, Art. 9.17 Ex. 12) following Smith's (1932:437) lead by herein designating the NY sheet (with barcode NY 10095) as lectotype and the destroyed B sheet (cited by Smith 1932:437) as a possible isolectotype.

Thibaudia graebneriana Hoerold, Bot. Jahrb. Syst. 42:313. 1909. TYPE: PERU. JUNÍN. PROV. TARMA: W of Palca, 2800–3100 m, Feb 1903 (fl), *Weberbauer 2436* (HOLOTYPE: B, destroyed; **LECTOTYPE, here designated:** the B holotype photo represented by F neg. 4629, image!). Other illustrations: photo, ACS neg. 135 (NY).

To my knowledge, no other duplicates of *Thibaudia graebneriana* (*Weberbauer 2436*) exist in any Peruvian or other world herbarium (see Luteyn et al. 2008).

Thibaudia harmsiana Hoerold, Bot. Jahrb. Syst. 42:314. 1909. **syn. nov.** TYPE: PERU. HUÁNUCO. PROV. HUAMALIES: Monzón, 2000–2500 m, Aug 1903 (fl), *Weberbauer 3542* [HOLOTYPE: B, destroyed (photos, F neg. 4630, image!, and ACS 136); LECTOTYPE, designated by Luteyn et al. (2008): NY frag. ex B holotype (barcode NY 10523, image!); ISOLECTOTYPE: F frags. ex B holotype (barcode F 92209F, image!)].

To my knowledge, no duplicates of *Thibaudia harmsiana* (*Weberbauer 3542*) are present in any other world herbarium (see Luteyn et al. 2008).

Thibaudia herrerae A.C. Smith, Contr. U.S. Natl. Herb. 28:435. 1932. **syn. nov.** TYPE: PERU. CUZCO. PROV. URUBAMBA: T[F]orontoy, Santa Ana Valley, 2000–2800 m (fl), *F.L. Herrera 1384* [HOLOTYPE: US (barcode US 113539, image!; photo, ACS neg. 80); ISOTYPE: NY frags. ex US holotype (barcode NY 10524, image!)].

To my knowledge, no other duplicates of *Thibaudia herrerae* (*F.L. Herrera 1384*) are present in any other world herbarium.

Thibaudia regularis A.C. Smith, Contr. U.S. Natl. Herb. 28:436. 1932, plate 13. **syn. nov.** TYPE: PERU. CUZCO: Valle de San Miguel, at Machu Picchu, 2200–2400 m, 20 Jul 1928 (fl), *F.L. Herrera 2004* [HOLOTYPE: F (barcode F 40448F, image!; photos, F neg. 52548 and ACS neg. 87); ISOTYPES: G frags. ex F holotype (barcode G 352205, image!), NY (barcode NY 10541, image!; photo, NY neg. 9738), S (barcode S 54520, image!)].

For *Thibaudia regularis,* Smith (1932:436) cited the "Type in the herbarium of the Field Museum of Natural History, no. 580,234" (i.e., holotype in our modern terminology, but following his method of citation—see **Notes** above) and that the species was "Known only from the type collection."

Thibaudia neoherrerae Sleumer, Notizbl. Bot. Gart. Berlin-Dahlem 12:136. 1934. **syn. nov.** TYPE: PERU. CUSCO: "ohne nahere Angabe des Fundortes," s.d., *F.L. Herrera s.n.* (**LECTOTYPE, here designated:** US frags. ex B-destroyed (barcode US 113547, image on US institutional site).

Sleumer's type of *Thibaudia neoherrerae* ("*F.L. Herrera s.n.*, Typus in Herb. Berol.") was apparently a unicate and had neither collection number nor additional locality information other than "Cuzco." Smith (1950:378) mentioned two specimens at US, *Herrera 3279* and *Herrera 3317,* both "from Machupicchu, Cuzco, Peru." He suggested that "It is probable …" that one of them was a type duplicate of *T. neoherrerae* Sleumer. But without further data we cannot say. The US fragments, however, are said to have come from the B holotype, so I am herein designating that US sheet as the lectotype.

The most frequently encountered species of *Thibaudia* from Bolivia (Cochabamba dept.) north into southern Peru (Puno and Cusco depts.) is commonly known as *T. crenulata*. In fact, all of the herbarium material from central Bolivia into southern Peru previously determined as *T. crenulata* (including *T. boliviensis*) is morphologically quite stable with only slight variation in leaf shape and some pubescence variation of leaves, rachises, pedicels, and calyces. These populations are generally characterized by plants with relatively small, elliptic leaves that are tapered at both ends and have pinnate to weakly plinerved venation (although often of a slightly larger size in Paucartambo and La Convención provs., Peru), rachises usually short and thin with few to many flowers, sometimes appearing fasciculate, flowers that are small and less than 1 cm long, corollas that are succulent, cylindric-urceolate, red with white tips, and lobes pilose within (otherwise corolla glabrous), stamens sometimes alternately slightly unequal with filaments connate and glabrous, "satyrioid" anther tubules (flaring slightly distally, otherwise not very differentiated from the thecae), thecae that are setose and have a short appendix at the base, and a succulent, pulvinate nectariferous disc. North of this range, however, and especially into the Peruvian departments of Huánuco, Junín, and Amazonas, the aforementioned

combination of characters (as a suite) becomes relatively infrequent and is there replaced by several other variable morphological combinations of characters, which have given rise to numerous other specific names commonly known as: *T. regularis*, *T. herrerae*, *T. ovata*, *T. graebneriana*, *T. harmsiana*, *T. diphylla*, and *T. neoherrerae*.

In his monograph of the "American Species of Thibaudieae" A.C. Smith (1932:436) characterized *Thibaudia regularis* by the "unusually soft and fine pubescence of the leaves and young flowers," whereas J.F. Macbride (1959:110) thought it might be related or equal to *T. mellifera* Ruiz & Pavón ex Jaume Saint-Hilaire and *T. crenulata*. Smith (p. 436) characterized *T. herrerae* by its "very narrow leaves and a delicate inflorescence." *Thibaudia ovata*, *T. graebneriana*, and *T. harmsiana* were not specifically discussed (by Smith) other than to say that *T. graebneriana* had leaves "somewhat smaller" (than *T. ovata* "which may be owing to the higher locality altitude," Smith 1932:433). The relationships of *T. boliviensis* (then thought to be endemic to Bolivia) were not commented upon in 1932, although Smith did key it along with *T. herrerae*, *T. regularis*, and *T. mellifera*. Smith did not see any specimens (at that time) that matched *T. diphylla* and *T. crenulata* and only had their incomplete descriptions from the protologues! He therefore relegated them to the status of "Doubtful Species" only commenting that *T. diphylla* was "Probably … related to *T. angustifolia* and its allies" (Smith 1932:438) and that *T. crenulata* "may be allied to *T. boliviensis* or possibly equal to it" (Smith 1932:438). At the time of Smith's monograph (1932), he saw (or at least cited) only 16 herbarium collections (of which six were types!) within the group of nine species mentioned above including *T. mellifera*, but excluding *T. neoherrerae* which was not described by Sleumer until 1934.

Sleumer (1935:291) was the first person to synonymize Lindley's *Vaccinium leucostomum* with *Eurygania ovata* Hooker f. He also stated that the names (types?) of *V. leucostomum* and *E. ovata* probably came from the same plant or same location since both Lindley's and Hooker's material were documented as having come from the exact same source (viz., plants cultivated by Messrs. Veitch, of Exeter, England, from material sent by W. Lobb from Peru). Fifteen years later Smith (1950:376), after studying the type specimen of *T. diphylla* in the Paris herbarium, followed Sleumer's (1935:291) lead and synonymized both *V. leucostomum* and *E. ovata* along with *T. graebneriana* under *T. diphylla*, thus expanding upon Sleumer's (1935) synonymizing under his new combination *T. leucostoma* (Lindley) Sleumer. At the same time, after seeing a photograph of the type of *T. crenulata* also in Paris, Smith (1950:378) synonymized *T. boliviensis* and *T. neoherrerae* under *T. crenulata*. At that time he did not yet equate *T. crenulata* and *T. diphylla*. Macbride (1959:104–106) stated that he was following Smith's (1950:376, 378) species concepts. Macbride therein also followed Sleumer (1935:291) in citing *Lobb 276* as the type of *E. ovata*, implying that he also felt the two names were based on the same collection (of cultivated material), although he (Macbride) did not actually cite the herbarium at which the *Lobb 276* specimen was deposited.

After studying in detail all herbarium material of *Thibaudia* currently available from Bolivia and adjacent southern Peru, and after conducting intensive and extensive field work in Bolivia and adjacent southern Peru, I agree with Smith's morphological characterizations (summarized above) of the various species he studied and recognized. I have observed that *T. ovata* and *T. graebneriana* have slightly larger flowers, *T. harmsiana* differs in no noticeable way from the others, neither *T. regularis* nor *T. neoherrerae* differ from *T. herrerae*, and *T. regularis* is densely canescent short-pilose all over (except for the corolla without and although the NY type is glabrous!). But, having said this, and after studying all the herbarium material and having observed firsthand the widespread variation in the natural populations over a broad geographical range, I feel that there are too many intermediate forms with various degrees of pubescence, leaf size and shape, etc. to recognize any of these species as distinct. Therefore, I have here reduced to synonymy the species mentioned above and concomitantly restore the oldest name with priority for this "complex" *T. diphylla* (1839) with its many related forms occurring from central Bolivia northwards into central Peru.

Thibaudia floribunda Kunth in H.B.K., Nov. Gen. Sp. 3:269, pl. 254. 1819. TYPE: COLOMBIA. Cundinamarca: nr. Santa Fé de Bogotá, 3000 m, *Humboldt & Bonpland s.n.* [**LECTOTYPE,** first-step designated by A.C. Smith (1932:413), P; second-step lectotype **here designated:** P (barcode P 135142, image!); ISOLECTOTYPES: B (B-W no. 8232010, =barcode BW 8232010, seen online at http://

herbarium.bgbm.org/object/BW08232010), B (destroyed, but represented in photos by F neg. 4627 (=barcode F BN004627, image!) and ACS neg. 132), P (barcode P 135143, image!)].

Illustrations.—Luteyn 1996; Luteyn and Pedraza 2007c; Luteyn and Vidal 2015 (LÁMINAS XL, XLI). See also Sarton (1943), Stearn (1968), Rankin Rodríguez and Greuter (2001), Lack (2004), Hiepko (2006), Stauffer et al. (2011), and references therein for summaries of the distribution of the Humboldt and Bonpland collections which may have been used by Karl Sigismund Kunth for his descriptions.

I have not seen any herbarium specimen of *Thibaudia floribunda* in the historic "Herbier Humboldt & Bonpland." (=P-Bonpl) in the Muséum National d´Histoire Naturelle in Paris. But in my opinion, there were (historically) four syntypes for *T. floribunda*:

1) a syntype sheet in the general herbarium in the Muséum National d´Histoire Naturelle in Paris (barcode P 135142, image!) collected by "Bonpland" which according to Global Plants is the "Holotype of *Thibaudia floribunda* Kunth" and was "Verified by Kunth, K.S." It bears the original label of the "Herb. MUS. PARIS." with "Herbier de l'Amérique équatoriale donné par M. A. BONPLAND." at the bottom of the label and also the standard red "ISOTYPE" label. It was annotated by A.C. Smith in 1931 and H. Sleumer in 1959 but without any indication (in their own words) of type status. Karl Sigsmund Kunth was invited to Paris by Humboldt to study and organize the botanical collection amassed by Bonpland and Humboldt (Stearn 1968), and I assume (?) that he saw this sheet when he wrote the description of *T. floribunda*, since he arrived in Paris (from Berlin) in 1813 and overlapped with Bonpland until 1816 when Bonpland moved to Argentina taking with him his own (private) set of plants (cf. Sarton 1943; Heipko 2006). [Contrary views include those of Rankin Rodríguez and Greuter (2001:1246) who stated that Humboldt's largest part of the herbarium (i.e., P-Bonpl.) "is the one on which Kunth worked almost exclusively, which must be used for typifying the names of new taxa first published in the *Nova genera*"; and, in a later study of Humboldt and Bonpland's collections and entries in Bonpland's "Journal Botanique" conserved in the Bibliothèque Centrale of the Museum National d'Histoire Naturelle in Paris, Stauffer et al. (2011) were of the opinion that Kunth did not see Bonpland's private herbarium before it went to Argentina with him.] Kunth left Paris in 1829 and Bonpland donated (sent back) his personal herabarium to the "Paris Muséum" in 1832 (Sarton 1943:390; Lack 2004)—i.e., **after** the Ericaceae had been published in the *Nova genera et species plantarum* (published 9 July1819 *fide* Stafleu & Cowan 1979:370);

2) a second syntype sheet in the general herbarium at P (barcode P 135143, image!) was also collected by "Bonpland," which according to Global Plants is an "Isotype of Thibaudia floribunda Kunth" and was "Verified by Kunth, K.S." It bears the original label of the Herb. Drake and also the standard red "ISOTYPE" label and was annotated as "part of the type collection" by H.O. Sleumer in 1959;

3) a third syntype sheet at the Botanischer Garten und Botanisches Museum Berlin-Dahlem (B-W) is kept separately in the Willdenow Herbarium (B-W no. 8232010, =barcode BW 8232010 and seen online at http://herbarium.bgbm.org/object/BW08232010). It was most likely given to the German botanist Carl Ludwig Willdenow by Humboldt after his return from the New World in 1804 or 1805 (see Heipko 2006). It is filed in an old blue species-folder which has a label that reads "Decandria Monogynia Thibaudia venosa" and "America meridionalis." Inside the folder and attached to the actual herbarium sheet there is a hand-written label that reads "Thibaudia floribunda Humb et Kth." Also in the lower right-hand corner of the herbarium sheet and written directly on the sheet is "Humboldt. W." in D.F.L. von Schlechtendal's hand, typical for specimens in the set of plants (in B-W) given to Willdenow by Humboldt (see Fig. 3 *in* Rankin Rodríguez & Greuter 2001:1240), and finally;

4) the fourth syntype at the Botanischer Garten und Botanisches Museum Berlin-Dahlem (B) that was destroyed during WWII but is represented in photos by F neg. 4627 (=barcode F BN004627, image!) and ACS neg. 132, was part of the set given by Humboldt to Karl Sigismund Kunth in 1829 when he (Kunth) returned to Berlin to become the vice-director of the Botanical Garden (Heipko 2006) and subsequently purchased by the Berlin herbarium. The F neg. 4627 of that sheet (destroyed in WWII) shows a label that reads (amongst other) "Ex herb. Humb." When J.F. Macbride photographed the specimen in B and assumed that this sheet was the

type of *T. floribunda*, A.C. Smith had not yet seen or annotated it (as evidenced by a lack of Smith's annotation label), but it must certainly have been the sheet Smith cited as "B type" in his publication (Smith 1932:413). Smith thus became the first person to unknowingly lectotypify *T. floribunda* with the B sheet when he annotated and cited in his publication an actual collection and herbarium locality in the "DISTRIBUTION" paragraph for *T. floribunda* "Bogota and vicinity, *Humboldt & Bonpland* (B, type)"(i.e., holotype at B in our modern sense, but following his method of citation—see **Notes** above). Since Smith's typification citation in 1932 the B sheet has been destroyed, so a new lectotypification needs to be made.

One more piece needs to be thrown into this puzzle: curiously, two lines above the "DISTRIBTION" paragraph, Smith (1932:413) also mentioned in his "TYPE LOCALITY" paragraph "Bogotá, Department of Cundinamarca, Colombia, altitude about 3,000 meters. Type collected by Humboldt and Bonpland (or by Mutis?)" without any further mention of Mutis. The mention of Mutis in connection with the type of *Thibaudia floribunda* stems from the last line of Kunth's protologue (1819:269), where he stated "A Mutisio cum Bonplandio communicata." Could Kunth have meant that Mutis communicated to Bonpland a description of *T. floribunda* since Bonpland was originally supposed to write the descriptions (but after many years gave up and finally moved to Argentina), and in that case Kunth obtained it from Bonpland (or found the description in manuscript form) and then published it? And if so, perhaps the complete citation of the authority for *T. floribunda* should be Mutis ex Kunth *in* HBK! **Or,** perhaps "A Mutisio cum Bonplandio communicata" might refer to specimens originally collected by Mutis in Colombia and then sent to Bonpland in Paris (I thank Piero Delprete for suggesting this second alternative). Interestingly, four such sheets exist: one of *Mutis 2036* (collection number assigned by whom?) at US (annotated as "Type coll." by A.C. Smith in 1932) and three of *Mutis 2036* at MA (although none of these have been annotated by ACS nor anyone else as type material). *Mutis 2013* at MA only was annotated by A.C. Smith in 1932 simply as "Thibaudia floribunda HBK" without mention of type status. [All collections of *Mutis 2036* and *2013* have been listed on Global Plants as "Original material of Thibaudia floribunda HBK"]. Perhaps this was original material collected by Mutis, and perhaps it is what Kunth was referring to in the protologue when he wrote "A Mutisio cum Bonplandio communicata," but we can never be certain! Otherwise, I do not know of any particular reason why any of the Mutis collections at MA or US should be considered "types" (i.e., syntypes) of *Thibaudia floribunda*!

Finally, it might be argued that to be totally certain the plate *254* from the protologue upon which the new species was based would be the safest answer to the problem of lectotypification of *Thibaudia floribunda*. Indeed plate *254* is an excellent illustration of *T. floribunda*, but also are those prepared for Mutis in the Ericaceae volume of the *Flora de Mutis* (Luteyn & Vidal 2015, Lam. XL and XLI). The *Code*, however, in Art. 9.12 and following is quite specific in choosing a lectotype, saying that if no holotype or isotype exists, a syntype if such exists is the next element from which the new lectotype must be chosen and that these elements (i.e., specimens) take priority over an illustration (see McNeill et al. 2012).

I am quite certain that all four sheets of *Thibaudia floribunda* mentioned above should be considered "syntypes," but I have not had the opportunity to annotate them as such. In any event, I am herein designating as a second-step lectotypification (as per ICN, Art. 9.17 Ex. 12) the sheet at P (with barcode P 135142, image!), which is a specimen from the original material, is the best sheet of the remaining syntypes, and was perhaps used by Kunth (although debatable).[1]

Thibaudia pichinchensis Benth., Pl. Hartweg. 223. 1846. *Thibaudia floribunda* var. *pichinchensis* (Benth.) Macbride, Fl. Peru. Field Mus. Nat. Hist., Bot. Ser. 13 (Part 5, No. 1):107. 1959. **syn. nov.** Type: ECUADOR. Pichincha: W slopes of Volcán Pichincha, woods of

[1] **While A.C. Smith was waiting for the publication of his "The American Species of Thibaudieae" (Smith 1932, publ. 27 June 1932) he visited London, Paris, Geneva, and Berlin for six months ("From the fall of 1931 to the spring of 1932 …"; Smith 1996). Prior to that time he must not have seen specimens collected by Bonpland from P (perhaps he was not allowed to see the Bonpland collections in the Humboldt & Bonpland Herbarium at P, or they were not available to him for some reason, but there is no way to know!). In fact he did not cite any sheets of Ericaceae seen in or from P until a 1936 paper (perhaps he thought Kunth wrote the descriptions in Berlin?). Therefore, when he cites Bonpland collections from B as types (as in his 1932 paper), he was (inadvertently) making first-step lectotypifications, which should now be corrected. Smith annotated BM material during a visit there in 1932, but for typification purposes he did not cite in print BM specimens until 1933 (Smith 1933). Nor did he cite MA sheets until 1935 (Smith 1935, where he cited them with the acronym "M"). I do not believe Smith ever saw any Ruiz and Pavón collections at MA and to my knowledge only cited a few at B and P—to my knowledge he never actually visited the herbarium in MA!**

Guayan, *Hartweg 1217* [**LECTOTYPE,** first-step designated by Smith (1932:414): K; second-step **here designated:** K (Herbarium Benthamianum, barcode K 537123, image!); ISOLECTOTYPES: B, destroyed (photo, F neg. 4632 =barcode F BN004632, image!); BM (barcode BM 582256, bottom branch, image!), E (barcode E 373012, image!), G (2x, Herb. Bossier, barcode G 342346 and barcode G 352211, both image!), K (Herbarium Hookerianum, barcode K 537122, image!), LD (barcode LD 1245732, image!), NY ex G (barcode NY 10539, image!), P (2x, barcodes P 647771 and P 647770, both image!)].

Theodor Hartweg was "engaged" by the Horticultural Society of London as their collector and sent to Mexico in 1836. On page iii of the Preface of *Pl. hartw.* Bentham (1839) wrote: "The first remittance of these specimens [i.e., Hartweg's Mexican collections] has *now been received and distributed* [italics mine], with numbers attached to each specimen; and it is the object of the following pages to make known the corresponding names to the subscribers, and to be the means of publishing such genera or species as appear to be new … London, May 1839."

George Bentham actually published his *Thibaudia pichinchensis* in 1846 (p. 223) and, naturally, the type was always considered that specimen in the Herbarium Benthamianum 1854 in K (=barcode K 537123). However, in 1931 while personally visiting Kew, A.C. Smith annotated the sheet in the "Herbarium Hookerianum 1867" (=barcode K 537122, image!) as "Thibaudia floribunda HBK. (type of T. pichinchensis Benth.)" meaning holotype in our current concept, but following his method of citation—see **Notes** above)! At the same time he annotated the sheet in the "Herbarium Benthamianum 1854" (with barcode K 537123) as "Thibaudia floribunda HBK. (type coll. of Th. pichinchensis Benth.)." signifying isotype (or duplicate of the type) following his method. In 1932, Smith actually published (p. 414) "Mount Pichincha, *Hartweg 1217* (B, K, type of *T. pichinchensis*)" signifying that he considered the holotype as a specimen in K and the B specimen as an isotype following his method of citation—see **Notes** above. Smith did **not,** however, specify *in his publication* which sheet at K he considered the holotype—the one in Herb. Benth. or the one in Herb. Hook.—nor did he mention that he saw and annotated two sheets at K. As can be seen on Global Plants, the Herbarium Hookerianum sheet has attached to it an original (?) label with an inked hand-written "1217" on it (i.e., the Hartweg collection number); whereas the Herbarium Benthamianum sheet has attached to it an original (?) label with an inked hand-written "Thibaudia sp. a shrub 6–12 ft. high. In the woods of Guayan on the western declivity of Pichincha." and a penciled-on number 1217 (certainly added at a later date). The other syntype sheets of *Hartweg 1217* mentioned above include those at P (with barcode P 647770) which has an A.C. Smith 1931 annotation label "Thibaudia floribunda HBK. (type coll. of Th. pichinchensis Benth.)"; a BM sheet (BM 582256, bottom branch), a G sheet (G 352211), and a NY sheet (NY 10539) each of which has an A.C. Smith 1932 annotation label "Thibaudia floribunda HBK. (type coll. of Th. pichinchensis Benth.)"; a second P sheet (P 647771) having only an H.O. Sleumer 1959 annotation label "Thibaudia floribunda H.B.K. Isotype Th. pichinchensis Benth." (nothing by A.C. Smith); a second G sheet (G 342346) which has an A.C. Smith 1932 annotation label that reads "Thibaudia floribunda HBK." only (without any mention of type status); an E sheet (E 373012) with just a J.L. Luteyn 1978 isotype annotation label; and a LD sheet (LD 1245732) with only a red "TYPE MATERIAL" label. Therefore, from all syntypes known and available to me and as a second-step lectotypification (as per ICN, Art. 9.17 Ex. 12), I have designated as lectotype the best sheet which is also that sheet in the Herbarium Benthamianum at K.

Thibaudia floribunda var. *pichinchesis* is merely a pubescent form, acknowledged as such by Macbride in his protologue, but he nevertheless recognized it formally (Macbride 1959:107). Until now, that formal recognition at the varietal level has gone unnoticed. Various degrees of pubescence may be found in the species across the entire geographical range of the species from Venezuela to Ecuador, less frequent in Peru (depts. Amazonas, Cajamarca, Huánuco, Cusco) and Bolivia (Dept. La Paz), and is of no taxonomic consequence.

Thibaudia mellifera Ruiz & Pavón ex Jaume Saint-Hilaire, Expos. Fam. I:362. 1805. *Thibaudia melliflora* Ruiz & Pavón, Fl. Peruv. Chil. 4, t. 387, fig. b. 1802[1955], nom. nud. *Thibaudia mellifera* Ruiz & Pavón ex G. Don, Gen. Syst. 3:860. 1834. *Thibaudia melliflora* Ruiz & Pavón ex Dunal in DC. Prodr. 7:561. 1839. *Eurygania multiflora* Klotzsch, Linnaea 84:27. 1851. *Thibaudia multiflora* Ruiz & Pavón ex Klotzsch, Linnaea 24:27. 1851, as synonym [*fide* Smith 1932]. *Vaccinium melliflorum* F. Mueller, Sel. Pl. Indust. Cult. 249. 1876. TYPE: PERU. HUÁNUCO: "Thibaudia melliflora. vernacule -sumacmisqui.- Pillao in altis locii, et Churupallana" [*fide* attached hand-written label], *Ruiz & Pavón s.n.* [**LECTOTYPE, here designated:** MA (Herbarium Peruvianum

no. 15/52, barcode MA 747449, image!); probable isolectotypes: MA (Herbarium Peruvianum no. 15/53, barcode MA 747451, image!), MA (barcode MA 747454, image!), MPU (barcode MPU 12316, image!); possible isolectotypes: MA (Herbarium Peruvianum no. 15/52, barcode MA 747450, image!, MA (Herbarium Peruvianum no. 15/53, barcode MA 747452, image!), MA (Herbarium Peruvianum no. 15/53, barcode MA 747453, image!), L ex BM (barcode L 7871, image!), MO ex BM (barcode MO 345715, image!), NY ex BM (barcode NY 76852, image!; photo NY neg. 9728)].

The manuscript for vol. 4 of the *Flora Peruviana et Chilensis* consisted of plates only and it was there that Ruiz and Pavón illustrated "*Thibaudia melliflora*" as a new species (plate 387, fig. b). This manuscript, however, was not published in 1802 as anticipated, although the plates were distributed about this time (the exact date unknown) to several botanists by O. Rich, thus providing effective publication. Volume 4 was actually published in 1957 (see Stafleu 1967) in the Anales del Instituto Botánico A.J. Cavanilles [Madrid] as vol. 14(part 3), the species description as text on pp. 765–766, and the plate *387*, fig. b on p. 783. The epithet "*mellifera*" was first validly published by Jaume Saint-Hilaire in 1805 (I:362) and therefore has priority. Klotzsch (1851:27) used the epithet "*multiflora*" for his species and credited Ruiz and Pavón with that name in *Thibaudia*; however, both Ruiz and Pavón (*in mss*.) and Dunal (1839:561 *in* DC. Prodr.) used the epithet "*melliflora*"; therefore, Klotzsch's "*multiflora*" is a mistake (as was first pointed out by Bentham (1876:568). G. Don (1834, III:860) based his short diagnoses for some of Ruiz's plants that he found in Lambert's herbarium and followed the name of Saint-Hilaire in the case of *T. mellifera* (although he did not adapt all of Ruiz's manuscript names). Dunal (1839, 7:561) did not follow Saint-Hilaire's name in his treatment of *Thibaudia* in DC. Prodromus, but instead maintained Ruiz's manuscript name and cited "2. *T. melliflora* (R. et Pav. fl. per. mss. ex herb. Thib.)" and "(v. s. in h. DC. ex h. Thibaud et in h. Lamb.)," indicating that he saw plants in DeCandolle's herbarium that included specimens from Thibaud's as well as Lambert's herbaria (Lambert's, theoretically, being the same herbarium in which G. Don studied). Hoerold (1909:273) recognized *T. melliflora* Ruiz & Pavón citing their plate *387*, fig. b and including *T. mellifera* G. Don. Hoerold (1909:273) also cited *T. multiflora* Klotzsch as equaling *T. ovata* (Hooker f.) Hoerold. A.C. Smith (1932:313) stated that he felt the names on the plates in the unpublished Ruiz and Pavón vol. 4 were "authentic," so he followed those names (in this case using *Thibaudia melliflora* plate *387*, fig. b) and cited *T. multiflora* Ruiz & Pavon ex Klotzsch (1851:27) "as synonym" under his *T. melliflora* (p. 437). Sleumer (1935:294) showed definitively that Saint-Hilaire's (1805) names have priority and thus maintained and solidified the epithet *T. mellifera*.

The following paragraphs discuss my reasons for considering certain herbarium material as probable or possible isolectotypes. The three sheets I consider as "probable isolectotypes" bear old and seeming original labels, whereas the sheets considered "possible isolectotypes" have modern labels and information, although the L and NY sheet labels appear to read "Herb. Pavon." All of this plant material however (both probable and possible isolectotypes), looks like it could have come from the same exact field collection and then all should probably be considered syntypes (or isolectosyntypes)!

The three "probable isolectotypes" include a sheet at MA (Herbarium Peruvianum no. 15/53, with barcode MA 747451, image!) that bears an old hand-written label reading "Thibaudia melliflora Flor. Per. et Chil. t. 4to"; a second sheet at MA (barcode MA 747454, image!) bears an old hand-written label that reads "Thibaudia melliflora Fl. Peruv." at the top and "Ex Herbario Fl. Peruv. anno 1828" at the bottom (of the label), which H.O. Sleumer annotated in 1935 as "Original" and which also has attached to the sheet the standard red "Typus!" label as used at MA; and a third sheet at MPU (barcode MPU 12316, image!) that looks similar to other "original" material seen in Dunal's Prodr. herbarium and also bears a very old label that reads "Thibaudia mellifera Dunal vernacule-sumacmisqui" at the top (of the label) and "Habit montis altis Pillao et Churupallana Herb. Pavon" at the bottom—this label information being nearly identical to that borne on the above designated lectotype sheet at MA.

Five "possible isolectotypes" include a sheet at MA (Herbarium Peruvianum no. 15/52, with barcode MA 747450, image!) that bears a Herbarium Peruvianum label, but all names and locality information is written in the hand of Sleumer who annotated it in 1934 simply as "Typus"; a second sheet at MA (Herbarium Peruvianum no. 15/53, barcode MA 747452, image!) with a label that bears only Sleumer's 1934 hand-written annotation *Thibaudia mellifera* but without any indication of type status; a third sheet at MA (Herbarium Peruvianum

no. 15/53, barcode MA 747453, image!) with a label bearing only Sleumer's 1935 hand-written *T. mellifera* "Original!"; and finally three sheets at L (barcode L 7871, image!), MO (barcode MO 345715, image!), and NY (barcode NY 76852, image!; photo NY neg. 9728)—all ex BM and labeled as isotypes or type material. [No original material has been seen at BM despite the fact that fragments from BM were distributed to L, MO, and NY.]

Thibaudia mellifera ranges from the central Peruvian department of Huánuco north to Amazonas dept. and appears to differ from the *T. diphylla*-complex by having an apophysate calyx tube base and larger flowers with more pubescence inside (similar to *T. urbaniana*?). I am maintaining this and the following species as distinct, each being in great need of more field studies to determine their exact relationships with each other and to the *T. diphylla*-complex.

Thibaudia urbaniana Hoerold, Bot. Jahrb. Syst. 42:315. 1909. TYPE: PERU. Amazonas: E of Chachapoyas, between Tambo Bagazan [sic] and Tambo Almirante, 2200–2300 m, Jul 1904 (fl), *Weberbauer 4449* [**LECTOTYPE, here designated:** NY frag. ex B-destroyed (barcode NY 10556, image!; photos, F neg. 4637 and ACS neg. 141)].

There are no known duplicates of the original type material. According to Smith (1932:432), *Thibaudia urbaniana* Hoerold has a "close superficial resemblance" to *T. harmsiana*; therefore, ultimately, it may also be part of the *T. diphylla*-complex, although it has much larger leaves and longer corollas with more pubescence within the corolla limb.

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