BioOne COMPLETE

New species of Gymnanthes (Euphorbiaceae) from Bolivia and Colombia, and taxonomic notes on the genus in Venezeula

Author: Esser, Hans-Joachim

Source: Willdenowia, 47(3) : 217-224

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: https://doi.org/10.3372/wi.47.47304

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

Willdenowia
Annals of the Botanic Garden and Botanical Museum Berlin-Dahlem

HANS-JOACHIM ESSER[1]

New species of *Gymnanthes* (*Euphorbiaceae*) from Bolivia and Colombia, and taxonomic notes on the genus in Venezeula

Version of record first published online on 9 November 2017 ahead of inclusion in December 2017 issue.

Abstract: New, locally endemic species of *Gymnanthes* are described from Bolivia (*G. microphylla*) and Colombia (*G. hirsuta*). Both species are characterized, among other features, by a specific indumentum different from each other and from other, related species. In addition, two species from Venezuela are discussed: *G. apiculata* is proposed as a synonym of *Actinostemon caribaeus*, and the name *G. hypoleuca* is lectotypified.

Key words: *Actinostemon*, Bolivia, Colombia, *Euphorbiaceae*, Guyana, *Gymnanthes*, lectotype, new species, *Sebastiania*, synonymy, taxonomy, typification, Venezeula

Article history: Received 30 June 2017; peer-review completed 14 August 2017; received in revised form 29 September 2017; accepted for publication 10 October 2017.

Citation: Esser H.-J. 2017: New species of *Gymnanthes* (*Euphorbiaceae*) from Bolivia and Colombia, and taxonomic notes on the genus in Venezuela. – Willdenowia 47: 217–224. doi: https://doi.org/10.3372/wi.47.47304

Introduction

Gymnanthes Sw. (*Euphorbiaceae*) is a pantropical genus that is most common in dry tropical regions of South America, but also has a few species in wet tropical areas in the Neotropics and Palaeotropics, with many of them local and rare. Originally restricted to a few Neotropical species (Pax & Hoffmann 1912), the genus has recently been expanded to include species formerly classified in *Sebastiania* Spreng. (Esser 2001; Esser & al. 2010), and currently includes c. 45 known species (Esser 2001; Webster 2014).

In the course of ongoing taxonomic studies, two new species were found and are described here. In addition, a lectotype and new synonyms are contributed for species from Venezuela.

New species

Gymnanthes hirsuta Esser, **sp. nov.** – Fig. 1, 2.
Holotype: Colombia, Valle, Mun. Roldanillo, Hacienda Churimal, km 68 carretera Panorama (desde glorieta de Riofrío), 04°22'09"N, 76°09'34"W, 975 m, fl., fr., 28 Mar 2009, *P. Silverstone-Sopkin, M. E. Cardona & H. Sanint 10941* (CUVC 045050 image!; isotypes: COL, CUVC!, M 0243798!).

Diagnosis — This new species is unique in the genus because of the densely hirsute indumentum (0.5–0.6 mm long) of the branches, abaxial surface of the leaves, female flowers and fruits.

Description — *Shrubs* spinescent, 2–4 m tall, without

1 Botanische Staatssammlung München, Menzinger Straße 67, 80638 München, Germany; e-mail: esser@bsm.mwn.de

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use



Fig. 1. Isotype of *Gymnanthes hirsuta – Silverstone-Sopkin & al. 10941* (M 0243798).

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use



Fig. 2. *Gymnanthes hirsuta* – A: branch showing leaves from above and inflorescence buds; B: branch showing leaves from below and fruits; C: habit, whole plant; D: detail of branch with open inflorescence. – Colombia, Valle, Mun. Roldanillo, Hacienda Churimal, 28 Mar 2009, photographs by Philip Silverstone-Sopkin.

visible latex, monoecious; lateral branches stiff, terminating in a spine-like, leafless tip, with erect, simple, pale hairs 0.5–0.6 mm long. *Leaves* alternate; *stipules* soon caducous and rarely seen, 2–3 × 1.2–1.5 mm, membranous, with scattered hairs, margin entire; *petiole* 3–7 mm long, hirsute, eglandular; *leaf blade* discolorous, distinctly glaucous-papillate abaxially, elliptic, 2–6.5 × 0.8–2.5 cm, 2.4–2.6 × as long as wide, subcoriaceous to coriaceous, base acute, margin subentire with indistinct teeth, apex rounded-subobtuse; densely to sparsely hirsute abaxially with hairs similar to branches, slightly longer on midrib, with scattered hairs adaxially, dense on midrib, a pair of marginal glands on margin near base, c. 0.35 mm in diam., 0–2 additional glands on each half, otherwise eglandular; lateral veins in 10–12 pairs, not triplinerved, veinlets reticulate, indistinct. *Inflorescences* axillary, unbranched, reddish in bud, later greenish. *Pistillate flowers* usually solitary; pedicel c. 4 mm long, hirsute; sepals 3, free, c. 0.25 × 0.25 mm; ovary with 3 carpels, smooth, hirsute; styles free, undivided, c. 2 × 0.25 mm. *Staminate inflorescences* yellowish, 4–7 × c. 1.5 cm; axis hirsute; floral bracts irregularly elliptic, c. 0.75 mm long, with scattered hairs, with a pair of flat, ellipsoid glands c. 0.25 mm long; cymules 3-flowered. *Staminate flowers* glabrous; pedicel 0.65–0.75 mm long; sepals 3, vestigial, free, 0.3–0.4 × c. 0.15 mm; stamens 3, free; filaments c. 0.2 mm long; anthers c. 0.3 mm long. *Fruits* usually solitary; pedicel 5–7 mm long, hirsute; capsule 6–7 × 8–9 mm, smooth, hirsute; remaining columella 3.5–4 mm long. *Seeds* not seen.

Distribution and ecology — So far known only from the type locality. In very dry tropical forest (bosque muy seco tropical, or bms-t), on rocky substrate on bare soil, at elevations of 930–975 m. The Hacienda Churimal is located in the northernmost of two very dry forest enclaves in the Cauca Valley, 6 km S of the town of Roldanillo. Flowers and fruits were found in March and October.

Remarks — There are a few Neotropical species of *Gymnanthes* with distinctly pubescent fruits and leaves, such as *G. vestita* Müll. Arg. from Brazil (Esser & al. 2010).

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

None of these, however, is as densely hirsute as this new species on most surfaces (except for the only sparsely pubescent upper leaf surface and staminate flowers), and few are as distinctly sclerophyllous and scleromorphic, with the short, leafy side branches terminating in spiny tips. This last character is shared with *G. microphylla*, described below from Bolivia, but the latter is otherwise sufficiently distinct.

Gymnanthes hirsuta is presumably the second species of *Gymnanthes* known from Colombia. Webster & al. (1999) cited Colombia in the distribution data of *G. hypoleuca* Benth., which was later included by Murillo (2004), but no specimen was cited and this record might therefore be doubtful. The World Checklist of *Euphorbiaceae* (Govaerts & al. 2000) did not mention Colombia.

Additional specimen studied (paratype) — Colombia: Valle: Mun. Roldanillo, Hacienda Churimal, km 68 via a Roldanillo (desde Glorieta de Riofrío en carretera Panorama), valle geográfico del río Cauca, 04°22'11"N, 76°09'33"W, 975 m, fl., fr., 11 Oct 2009, *S. Duque-López 25* (CUVC 042109).

Gymnanthes microphylla Esser, **sp. nov.** – Fig. 3, 4.
Holotype: Bolivia, Cochabamba, Mizque, c. 10 km from Mizque on ascent along road to Arani, 17°00'S, 65°22'W, 2700 m, fl., fr., 8 Dec 2004, *J. R. I. Wood 21102* (LPB 0004001!; isotypes: K!, M 0243797!).

Diagnosis — The new species is similar to *Gymnanthes schottiana* Müll. Arg., but differs in particular by branches and pedicels that are pubescent with very short hairs less than 0.1 mm long (but not glabrous), broadly elliptic leaf blades (1.45–2 × as long as wide, versus narrowly elliptic to obovate, 2.7–3.5 × as long as wide), and larger, 5–7 mm long, often muricate fruits (versus 2–3 mm long, never muricate).

Description — *Shrubs* spinescent, 1.5–4 m tall, with white latex, monoecious; lateral branches stiff, terminating in a spine-like, leafless tip; younger branches and pedicels with very short, erect, pale hairs 0.05–0.07 mm long. *Leaves* alternate; *stipules* soon caducous and rarely seen, c. 0.4 × 0.2 mm, membranous , glabrous, margin entire; *petiole* 2–2.5 mm long, pubescent similar to branches, eglandular; *leaf blade* discolorous, distinctly glaucous abaxially, broadly elliptic, 8–22 × 5–14 mm, 1.45–1.7(–2) × as long as wide, (membranous to) chartaceous, base rounded(-obtuse), margin subentire with indistinct teeth, apex rounded-subobtuse; surfaces glabrous, marginal glands 0 or 1(or 2) per side, c. 0.3 mm in diam., otherwise eglandular; lateral veins in 7 pairs, not triplinerved, veinlets reticulate, clearly visible to indistinct abaxially, indistinct adaxially, occasionally reddish. *Inflorescences* axillary, unbranched. *Pistillate flowers* usually solitary, axillary, not directly connected to staminate inflorescences; pedicel (3–)5–6 mm long, often pubescent similar to branches; sepals 3, vestigial, free, c. 0.75 × 0.25 mm, with irregular margins; ovary with 3 carpels, glabrous, usually with 3 pairs of distinct appendages c. 1 mm long; styles free, undivided, c. 2 × 0.25 mm. *Staminate inflorescences* rare, yellowish, 4–10 × 2–4 mm, glabrous; floral bracts 0.5–0.7 mm long, with a pair of cylindrical glands 0.2–0.4 × 0.1–0.2 mm; cymules 1-flowered. *Staminate flowers* glabrous; pedicel 0.5–1 mm long; sepals 3, vestigial, c. 0.5 × 0.3 mm; stamens 3, free; filaments 0.25–0.3 mm long; anthers 0.25–0.3 mm long. *Fruits* usually solitary; pedicel 3–15 mm long, often pubescent similar to branches; sepals quite persistent; schizocarps with 3 carpels, 5–7 × 6–8 mm, glabrous, only slightly sulcate, rarely smooth but more often muricate with 3 pairs of small appendages to c. 1.5 mm long; remaining columella c. 2.5 mm long, trialate. *Seeds* uniformly brown, c. 4.5 × 3.5 mm; caruncle distinct, c. 1.5 mm in diam.

Distribution and ecology — The species is known from three departments of Bolivia (Chuquisaca, Cochabamba and Potosí). It is locally frequent on rocky slopes with sparse vegetation, on nearly bare, flat rocks, dry bushland, and dry, xerophytic forest (where often in more humid microclimate), at elevations of 1850–2850 m (3750 m probably recorded in error). Flowering plants were collected in December and January; fruiting ones from November to April.

Vernacular name — tikira.

Remarks — Most specimens of this species were collected in fruit. Staminate flowers are rarely collected, but these are very small and easy to miss. The type collection is the only one with abundant flowers and fruits.

The genus *Gymnanthes* has hitherto been known from three species in Bolivia (Esser 2014), all more widespread in dry vegetation in South America and rare in Bolivia (see also Oliveira & al. 2013). This new species is the first Bolivian endemic, locally frequent in dry vegetation types.

This new species is similar to *Gymnanthes schottiana* from Brazil, formerly known as *Sebastiania schottiana* (Müll. Arg.) Müll. Arg., with which it has sometimes been confused. Both species share comparatively small leaves, small, axillary staminate inflorescences of similar size, and solitary, axillary fruits on long pedicels; however, the leaves of *G. microphylla* are even smaller and are presumably the smallest in the genus. The unusual indumentum of the new species is unique, being always present at least on some parts but consisting of very short (less than 0.1 mm long) hairs that are barely visible without magnification.

Several of the specimens had previously been determined as *Sebastiania haploclada* Briq. However, the latter is endemic to Peru and, although a shrub with a similar spinescent habit and smaller leaves, it belongs to *Sebastiania* and differs by large and fleshy floral bracts c. 1 mm long, sessile staminate flowers, leaves elliptic-

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use



Fig. 3. *Gymnanthes microphylla* – A: habit; B: staminate inflorescence; C: non-muricate fruit. – All from *Wood 21187* (LPB). – Drawn by Carlos Maldonado.

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

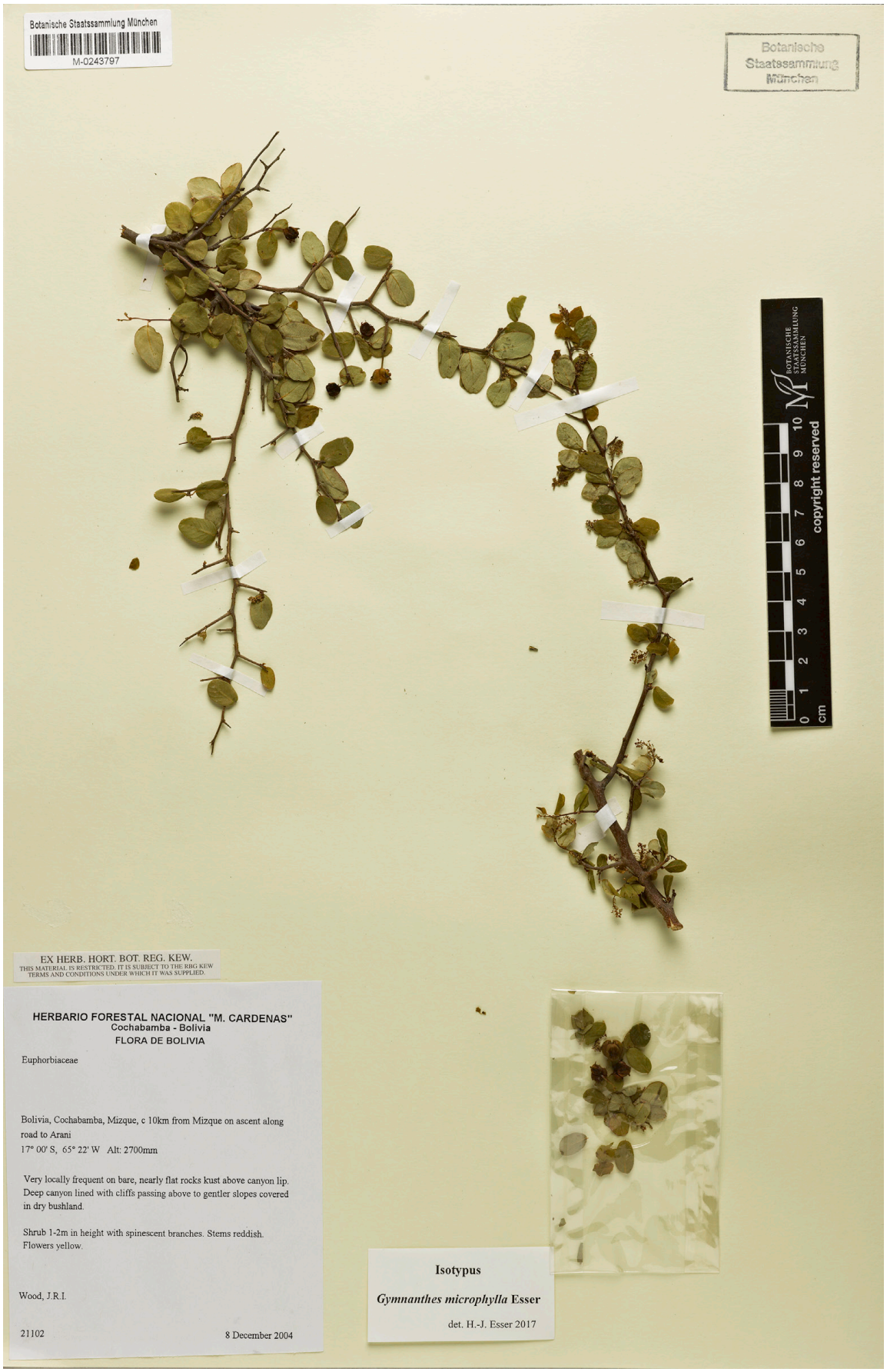


Fig. 4. Isotype of *Gymnanthes microphylla* – *Wood 21102* (M 0243797).

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

obovate, and in being completely glabrous on all parts. Fruits (usually very characteristic in *Sebastiania*, i.e. sessile and thin-walled) are not known.

Additional specimens studied (paratypes) — Bolivia: Cochabamba: prov. Mizque, Mizque, fl., 1980, *S. G. Beck s.n.* (LPB); prov. Mizque, Camino Chaguarani – Mina Asientos, 1850 m, fl., fr., 23 Jan 1994, *A. López & E. Saravia AL 134* (BOLV, USZ); prov. Mizque, ladera sobre río Yunquillas, exposición oeste, 2300 m, fr., 8 Dec 1992, *M. Atahuachi & al. MA 178* (LPB); Sierra de Aguas Blancas, fr., 5 Feb 1928, *C. Troll 1242* (B); prov. Campero, 8 km de Peña Colorada a Pasorapa, cerca quebrada Quina Quina, 1900 m, sterile, 17 Jun 1987, *S. Estenssoro 760* (LPB); prov. Campero, alrededores de Pasorapa, 2050 m, fr., 29 Jan 1993, *E. Saravia 648* (BOLV); prov. Campero, Cumbre de Pasorapa, sobre la ruta, Peña Colorada – Pasorapa, 2470 m, fr., 25 Jan 1993, *E. Saravia 588* (BOLV); prov. Campero, 2080 m, fr., 23 Nov 1999, *C. Antezana 1323* (MO); prov. Campero, Pasorapa, bajada a Pararopa viniendo de Pasorapilla, 18°18.29'S, 64°38.12'W, 2257 m, fl., fr., 28 Dec 2004, *J. R. I. Wood & al. 21287* (K, LPB, M); prov. Capinota, Irpa Irpa, 2510 m, fr., 4 Feb 1996, *M. Mercado U. MM 1030* (BOLV); prov. Capinota, Comunidad de Apillapampa, 17°48.894'S, 66°12.278'W, 2840 m, fr., 2 Mar 2003, *E. Thomas 288* (M); prov. Capinota, Atojhacchaña – Capinota, c. 2500 m, sterile, Jan 1985, *F. Pedrotti & al. 9* (LPB); prov. Quillacollo, Parotani, 1–2 km E of Parotani along railway to Cochabamba, c. 0.5 km before La Cabaña on S side of river, 17°30'S, 67°40'W, 2500 m, fr., 7 Feb 2004, *J. R. I. Wood 20176* (K, LPB, M). — Chuquisaca: prov. Oropeza, km 31 on road from Sucre to Potosi (Yotala – Puente Mendez), 2500 m, fr., 10 Mar 1996, *J. R. I. Wood 10821* (LPB); prov. Oropeza, pasando por puente Millares, subiendo hacia al E, 19°25.30'S, 65°10.27'W, 2437 m, fr., 21 Feb 2004, *J. R. I. Wood & J. Gutiérrez 20223* (K, LPB, M); prov. Yamparaez, en el camino Potosí–Sucre, 2620 m, fr., 28 Feb. 1991, *G. Navarro GN 247* (BOLV, LPB); prov. Zudañez, ladera oeste del río Pilcomayo, cerca Oronkhata, 2100 m, sterile, 27 May 2004, *R. Lopéz & al. 868* (LPB). — Potosí: prov. Chayanta, 1.5 km W de Maragua, 3750 m (?), sterile, 18 Nov – 3 Dec 1998, *N. Mazi & Carlos F. (proyecto ZONISIG) 281* (LPB); prov. Saavedra, pasando Retiro, 2600 m, fl., 30 Mar. 1993, *G. Torrico & al. 288* (BOLV, LPB, M); prov. Linares, valle de Oronkhota, subiendo de Oronkhota hacia Jatum Palmar, 2520 m, fr., 4 Apr. 1993, *G. Torrico & C. Peca 316* (LPB).

Taxonomic update for two taxa from Venezuela

Actinostemon caribaeus Griseb. in Abh. Königl. Ges. Wiss. Göttingen 7: 168. 1857 ≡ *Actinostemon concolor* var. *caribaeus* (Griseb.) Müll. Arg. in Candolle, Prodr. 15(2): 1193. 1866. – Holotype: Guadeloupe, fr., s. dat., *E. P. Duchaising s.n.* (GOET 006426 image!).

= *Gymnanthes apiculata* Badillo in Ernstia 26: 17. 1984. – Holotype: Venezuela, Aragua, Cata–Cuyagua, 300–400 m, fl., 25 Jan 1972, *V. M. Badillo 4817* (MY image!), syn. nov.

The name *Gymnanthes apiculata* was validly published by Badillo in a checklist (Badillo & al. 1984), but has been widely overlooked. It was not included in the World Checklist of *Euphorbiaceae* (Govaerts & al. 2000) and, at the time of writing this manuscript, it is still missing in IPNI (http://www.ipni.org). The genera *Actinostemon* Mart. ex Klotzsch and *Gymnanthes* are similar, differing, among other features, in the floral buds (individual cymules covered and protected by the bracts in *Gymnanthes*, versus the whole inflorescence covered and protected by large bud scales in *Actinostemon* with the bracts reduced) and some leaf characters (leaves mostly serrate with marginal glands in *Gymnanthes*, versus leaves entire with laminar glands in *Actinostemon*). Mature inflorescences and fruits are indeed very similar and can be confused easily. Badillo did not include *Actinostemon* in his checklist and probably did not study authentic material of the genus, so he might have confused the genera. *Actinostemon caribaeus* is known from N Venezuela (Jablonski 1969), and *G. apiculata* fits well into the known distribution area of the species.

Gymnanthes hypoleuca Benth. in Hooker's J. Bot. Kew Gard. Misc. 6: 325. 1854 ≡ *Sebastiania hypoleuca* (Benth.) Müll. Arg. in Candolle, Prodr. 15(2): 1184. 1866 ≡ *Ateramnus hypoleucus* (Benth.) Rothm. in Feddes Repert. Spec. Nov. Regni Veg. 53: 5. 1944. – **Lectotype (designated here):** Venezuela, Amazonas, Río Negro above Sao Joaquim, prope San Carlos, Mar 1853, *R. Spruce 2806* (K 000253578!; isolectotypes: BM!, BR!, E!, G-DC!, GH!, GOET!, K!, LD image!, NY!, OXF!, P!, RB image!, TCD!, W!). Remaining syntype: Brazil, Amazonas, ad ripas fl. Uaupés, Jan 1853, *R. Spruce 2806* (K!).
– "*Actinostemon ayangannae*" Jablonski, in sched., nom. nud. – Voucher: Guyana, Mt Ayanganna, NE side, 750–900 m, fl., 17 Aug 1960, *S. S. Tillett, C. L. Tillett & R. Boyan 45668* (COL!, F, GH!, K!, P!, S!, U!, W!).

There is a some confusion about the types of *Gymnanthes hypoleuca* in the literature. Bentham (1854) cited two collections from different localities, but he did not mention collecting numbers. Both syntype collections are in fact numbered *2806*. *Spruce 3780* (sometimes considered a syntype, as seen in several herbaria and by Gillespie 1993) was collected only after the description of the species (Brazil, Amazonas, insula secus ostia fl. Marauiá, Dec 1854) and cannot therefore be a type for the name, but is instead the type gathering of *G. hypoleuca* var. *angustifolia* Müll. Arg. The lectotype designated here was chosen because it has the larger number of duplicates,

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

and this particular sheet bears an original Spruce label more detailed than those of the duplicates.

Gymnanthes hypoleuca occurs from the West Indies through the Guianas to Brazil, but is obviously quite rare outside of the West Indies; only a single collection each is known from French Guiana (*Melinon 33*, P*)*, Guyana (*Tillett & al. 45668*, see above) and Venezuela (the type). Perhaps this rarity led Spruce to re-collect this species under the same number, which is very unusual for his collections.

The single Guyanan collection has been labelled with the unpublished name "*Actinostemon ayangannae*" by Jablonski. This specimen differs from typical *Gymnanthes hypoleuca* by slightly smaller and cuspidate (not acute-subacuminate) leaves, smaller floral bracts, and the sepals of the staminate flowers even more reduced and quite invisible; none of these features seems sufficient to separate the two. Pistillate flowers are quite rare in this species.

Acknowledgements

This study used collections of the herbaria B, BM, BOLV, BR, COL, CUVC, E, F, G-DC, GH, GOET, K, LPB, M, MO, NY, OXF, P, S, TCD, U, USZ and W; my thanks are due to the directors and curators of these herbaria who provided their collections for study. Carlos Maldonado (LPB) prepared the drawing of *Gymnanthes microphylla* (Fig. 3). John Wood and Stephan Beck provided data on the ecology of *G. microphylla*. Philip Silverstone-Sopkin provided specimens, photographs (Fig. 2). and additional information on *G. hirsuta*. Paul Berry (MICH) and Gordon McPherson (MO) are thanked for their comments on an earlier version of this paper.

References

Badillo V. M., Rojas C. E. B. & Huber O. 1984: Lista preliminar de especies antofitas del Parque Nacional "Henri Pittier", Estado Aragua. – Ernstia **26:** 3–58.

Bentham G. 1854: On the north Brazilian *Euphorbiaceae* in the collections of Mr. Spruce. – Hooker's J. Bot. Kew Gard. Misc. **6:** 321–333.

Esser H.-J. 2001: *Euphorbiaceae* tribe *Hippomaneae*. – Pp. 352–393 in: Radcliffe-Smith A., Genera Euphorbiacearum. Kew: Royal Botanic Gardens.

Esser H.-J. 2014: *Gymnanthes* (*Euphorbiaceae*). – P. 602 in: Jørgensen P. M., Nee M. & Beck S. G. (ed.), Catálogo de las plantas vasculares de Bolivia. – Monogr. Syst. Bot. Missouri Bot. Gard. **127(1)**.

Esser H.-J., Lucena M. F. A. & Alves M. 2010: A new species of *Gymnanthes* (*Euphorbiaceae*) from northeastern Brazil. – Willdenowia **40:** 345–349.

Gillespie L. J. 1993: *Euphorbiaceae* of the Guianas: annotated species checklist and key to the genera. – Brittonia **45:** 56–94.

Govaerts R., Frodin D. G. & Radcliffe-Smith A. 2000: World checklist and bibliography of *Euphorbiaceae* (and *Pandaceae*). – Kew: Royal Botanic Gardens.

Jablonski E. 1969: Notes on Neotropical *Euphorbiaceae* 4. Monograph of the genus *Actinostemon*. – Phytologia **18:** 213–240.

Murillo J. 2004: Las *Euphorbiaceae* de Colombia. – Biota Colomb. **5:** 183–200.

Oliveira L. S., Freire Moro M., Nic Lughadha E. M., Martins F. R., Melo A. L., Esser H.-J. & Sales M. F. 2013: Hidden in the dry woods: mapping the collection history and distribution of *Gymnanthes boticario*, a well-collected but very recently described species restricted to the dry vegetation of South America. – Phytotaxa **97:** 1–16.

Pax F. & Hoffmann K. 1912: *Euphorbiaceae – Hippomaneae*. – In: Engler A. (ed.), Das Pflanzenreich. Regni vegetabilis conspectus **IV.147.v (Heft 52).** – Leipzig: Wilhelm Engelmann.

Webster G. L. 2014: *Euphorbiaceae*. – Pp. 51–216 in: Kubitzki K. (ed.), The families and genera of vascular plants **11.** – Berlin & Heidelberg: Springer.

Webster G. L., Berry P. A., Armbruster W. S., Esser H.-J., Gillespie L. J., Hayden W. J., Levin G. A., Secco R. S. & Heald S. V. 1999: *Euphorbiaceae*. – Pp. 72–228 in: Berry P. A., Yatskievych K. & Holst B. (ed.), Flora of the Venezuelan Guayana **5.** – St. Louis: Missouri Botanical Garden Press.

Willdenowia
Open-access online edition www.bioone.org/loi/will BioOne
Online ISSN 1868-6397 · Print ISSN 0511-9618 · Impact factor 0.680
Published by the Botanic Garden and Botanical Museum Berlin, Freie Universität Berlin
© 2017 The Author · This open-access article is distributed under the CC BY 4.0 licence

Downloaded From: https://bioone.org/journals/Willdenowia on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use