THE REINSTATEMENT OF *APHANANDRIUM* (ACANTHACEAE), A NEW SPECIES FROM ECUADOR AND FOUR NEW COMBINATIONS

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Abstract. *Aphanandrium*, a genus of herbs and shrubs in the Acanthaceae from the Neotropics, is reinstated based on a previous phylogenetic study, and the following new combinations are herein presented: *Aphanandrium grandifolius*, *A. harlingii* var. *harlingii*, *A. harlingii* var. *longifolius*, and *A. nitidus*. Also, *Aphanandrium narupayacuensis*, a distinctive new species from the lowlands of northeastern Ecuador, is formally described and illustrated, and its relationship to morphologically closely related species is discussed.

Keywords: Ecuador, Narupayacu, *Neriacanthus*, Neotropics

Resumen. *Aphanandrium* Lindau, un género de pequeños arbustos of Acanthaceae del Neotrópico es validado con base en un estudio filogenético previo y se presentan las siguientes nuevas combinaciones: *Aphanandrium grandifolius*, *A. harlingii* var. *harlingii*, *A. harlingii* var. *longifolius*, y *A. nitidus*. Además, se presenta formalmente a *Aphanandrium narupayacuensis*, una distintiva nueva especie de las tierras bajas del noreste de Ecuador, se discute sus relaciones con las especies morfológicamente cercanas.

Palabras claves: Ecuador, Narupayacu, *Neriacanthus*, neotrópicos

Aphanandrium Lindau (Lindau, 1895), is a small Neotropical genus in the Acanthaceae that was originally based on *A. lehmannianum* Lindau (Lindau, 1895), a species from western Colombia (Leonard, 1958). Previously, *A. lehmannianum* was transferred to *Neriacanthus* Benth. (Bentham and Hooker, 1876), a genus proposed to accommodate *N. purdieanus* Benth. (Bentham and Hooker, 1876), a species endemic to Jamaica. The latter species has been placed in synonymy with *Salpixantha* (1845), the older generic name, that comprises two species endemic to Jamaica (Franck and Daniel, 2015).

In the treatment of the Acanthaceae of Colombia (Leonard, 1958) and Ecuador (Wasshausen, 2013), the mainland species of *Aphanandrium* were treated as *Neriacanthus* s.l. However, a molecular analysis reveals that the mainland species of *Neriacanthus* s.l. are a monophyletic lineage, sister to the clade that contains *Salpixantha* (Manzitto-Tripp et al., 2022); therefore, the Central and South American species of *Neriacanthus* should be assigned to another genus (Franck and Daniel, 2015). Morphologically, *Neriacanthus* s.s. can be recognized by tricolpate pollen grains with each colpus flanked by a pair of pseudocolpi. ¨Pseudocolpi are not otherwise known in Acantheae and thus appear to be a synapomorphy for mainland *Neriacanthus*¨ (McDade et al., 2005).

In this paper, *Aphanandrium* is reinstated based on previous molecular work (McDade et al., 2005), and four new combinations from *Neriacanthus* s.l. to *Aphanandrium* are presented to accommodate the mainland members of this genus. Furthermore, a highly distinctive new species of *Aphanandrium* has been discovered from field work in northeastern Ecuador and is formally presented here.

Taxonomy

Aphanandrium Lindau, Nat. Pflanzenfam. 4 (3b): 323. 1895.

TYPE: *Aphanandrium lehmannianum* Lindau, Nat. Pflanzenfam. 4 (3b): 323. 1895.

Homotypic synonym: *Neriacanthus lehmannianus* (Lindau) Lindau, Symb. Antill. 2: 209. 1900. TYPE: COLOMBIA. Valle del Cauca: Cali, 2000–2200 m, June–July (without year, fl), *F. C. Lehmann 7852* (Neotype: [designated here] K [000534388]; Isoneotype: K [000534387]).

A Neotropical genus that comprises five species of herbs and subshrubs, ranging from Panama to Venezuela and Peru. In the original publication (Lindau, 1895: 323), the genus *Aphanandrium* was proposed based on *Aphanandrium lehmannianum* from Colombia, but without reference to a type or herbarium collection. Later, *Lehmann 7852*, referred to as gathered in Ecuador, is cited as the type collection of *A. lehmannianum* which was transferred to *Neriacanthus* (Lindau, 1900: 209, Leonard, 1958: 123). However, since the specimen originally at B has not been found, it is most likely that it was destroyed during the allied bombing of Berlin in World War II. Two duplicates of *Lehmann 7852* from Cali, Colombia, both studied by Leonard and handwritten as ¨type¨, were found at K. Since these were not

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included in the protologue in the original publication, they cannot be designated as lectotypes. Therefore, one of those (K [000534388]) is selected here as the neotype, following Arts. 7.9, 9.8, 8.13, 9.19c of ICBN (2022).

The following new combinations transferred from *Neriacanthus* to *Aphanandrium* are formally presented here.

1. Aphanandrium grandiflorum (Leonard) Wassh., *comb. nov.*

Basionym: *Neriacanthus grandiflorus* Leonard, Contr. US. Natl. Herb. 31(2): 121, f. 41. 1953. TYPE: COLOMBIA. El Valle: cordillera occidental, vertiente occidental, Hoya del río Sanguininí, lado izquierdo, La Laguna, bosques, 1250–1400, 10–20 December 1943 (fl), *J. Cuatrecasas 15625* (Holotype: US [1852711]; Isotype: F [1335149]).

Additional specimens examined: PANAMA. Veraguas: Cerro Tute, western slopes, 1100 m, 23 October 1980 (fl), *P. J. M. Maas & R. L. Dressler 5042* (US); ridge east of cerro Tute, NW of Santa Fe, 08°29'15"N, 081°07'30"W, 900–1250 m, 25 October 1975 (fl), *R. L. Dressler 5202* (US).

Habitat: From premontane to montane rain forests.

2. Aphanandrium harlingii var. **harlingii** (Wassh.) Wassh., *comb. nov.*

Basionym: *Neriacanthus harlingii* var. *harlingii* Wassh., Opera Bot. 92: 271. 1987. TYPE: ECUADOR. Morona-Santiago: Road Limón (General Plaza)-Gualaceo, km 20–30 from Limón, 2000–2300 m, 25 March 1974 (fl), *G. Harling & L. Andersson 12830* (Holotype: US [2791223]; Isotype: GB).

Additional specimens examined: ECUADOR. Morona Santiago: Between Campanas and Arenillas, along Río Tintas SE of El Pan, 2195 m, 13 July 1943 (fl), *J. A. Steyermark 53640* (F, US); road Cuenca-General Plaza (Limón), km 45, c. 2000 m, without date, *B. Sparre 18706* (S). Gualaceo-Limón road, 27.4 km SE and below highest pass, 2310 m, 15 June 1989 (fl), *L. J. Dorr & I. Valdespino 6296* (US); eastern slopes of the cordillera, valley of the Río Negro, down to the Río Pailas (on the trail to Mendez), 1800–2200 m, 20–24 August 1945 (fl), *W. H. Camp E-4923* (US).

Habitat: In montane wet forest.

3. Aphanandrium harlingii var. **longifolium** (Wassh.) Wassh., *comb. nov.*

Basionym: *Neriacanthus harlingii* var. *longifolius* Wassh., Opera Bot. 92: 271. 1987. TYPE: ECUADOR. Napo: Cerro Huacamayos, on road Baeza-Tena, ca. 34 km from Baeza, ca. 0°41'S, 77°50'W, ca. 2000 m, 9–10 August 1980 (fl), *B. Ollgaard, S. Roth & C. Sperling 35851* (Holotype: US [2993116]; Isotypes: AAU [×2], US [3280014]).

Additional specimens examined: ECUADOR. Napo: Km 33 Baeza-Tena road, cordillera de Huacamayos, 0°39'S, 77°51'W, 2000 m, 4 May 1986 (fl), *P. M. Jørgensen et al. 61274* (AAU); El Chaco, sitio Tres Cruces, hda. El Mirador, 0°11' S, 77°42'W, 2000 m, 23 January 1991 (fl), *W. Palacios 6895* (MO, QCNE, US); S slope, cordillera de Guacamayos, c. 5 km below pass, 0°40'S, 77°55'W, 1950 m, 27 April 1985 (fl), *B. A. Stein 2645* (MO, US).

Habitat: Occasional on steep slopes, ridges, ravines and road banks in montane rain forests, at elevations between 2000 and 3000 m (Wasshausen, 2013).

4. Aphanandrium nitidum (Leonard) Wassh., *comb. nov.*

Basionym: *Neriacanthus nitidus* Leonard, Fieldiana, Bot. 28:563. 1953. TYPE: VENEZUELA. Mérida: quebrada de Los Salchichales, tributary of Río Canaguá, 1950–2135 m, 9 May 1944 (fr), *J. A. Steyermark 56424* (Holotype: F [1205072]; Isotype: US [1997546]).

Habitat: In ravines, montane moist forests.

A distinctive new species of *Aphanandrium* has recently been found in northeastern Ecuador and is formally described here.

5. Aphanandrium narupayacuensis Cornejo, Wassh. & Exe, *sp. nov.*

TYPE: ECUADOR. Napo: Narupayacu Reserve, c. 21 km NE from Archidona, 0°43'S, 77°46'W, ca. 1170 m, 5 November 2022 (fl, fr), *N. Exe 001* (Holotype: GUAY; Isotype: QCA). Fig. 1.

The new species of *Aphanandrium* is similar to *A. harlingii (Wassh.) Wassh.*, but differs by having lorate leaves and narrower floral bracts.

Herbs to 60 cm tall; stems red on top, simple or few-branched, the branches loose, spreading to subtract, subquadrangular at apex, glabrous throughout. *Leaf blades* lorate, distally straight to laterally curved upward, thinly chartaceous, 5–12 × 0.25–0.4 cm, cuneate at base, entire to somewhat sinuate revolute (dry) at margin, acute to caudate at apex, mid vein prominent, the blades olive-green and nitid (living) adaxially, mid vein prominent to impressed, blade light green (living), glandular dark brown-punctate (dry) abaxially, secondary veins inconspicuous on both sides, glabrous; petioles 1–2 mm, glabrous. *Inflorescence* spicate, terminal 6–21 × 1.0–1.5 cm, the peduncles 2.5–6 cm, the rachis subquadangular, glabrous; *floral bracts* lanceolate 3–7 × 1.0–1.5 mm obtuse at base minutely obscurely dentate to sinuate at margins, acute to acuminate at apex, green, glabrous; *bractlets* narrowly lanceolate or linear lanceolate, 2–3 × 0.3–0.5 mm, gradually narrowed to the tip, maroon to dark purple; *calyx* 4–5 mm long, lobes linear-lanceolate, gradually narrowed to a subulate tip, the posterior lobe 1 mm wide, the lateral ones 0.5 mm wide, the anterior ones 0.75 mm wide, all inconspicuously striate, red, glabrous; *corolla* white, ca. 15–16 mm long, glabrous, the tube cylindric, straight or curved ca. 15 × 1.2 mm, swollen, ca. 2 mm wide at base and ca. 2.5 mm at apex, the swollen apex with short trichomes within, abaxially yellow, the limb ca. 8–9 mm wide, the lobes ovate to oblong, obtuse to notched, the posterior lobe 3 × 2.5 mm, the lateral lobes ca. 5 × 2.5 mm, the anterior lobe transversely reniform, 5–6 × 8–9 mm, inconspicuously bilobed, the terminal somewhat vestigial, otherwise without lobes; *stamens* inserted at base of swollen upper third of corolla tube, filaments 1.5–2.5 mm, glabrous, the anthers oblong, 1.5–2 mm, 1-thecous, dorsifixed midway

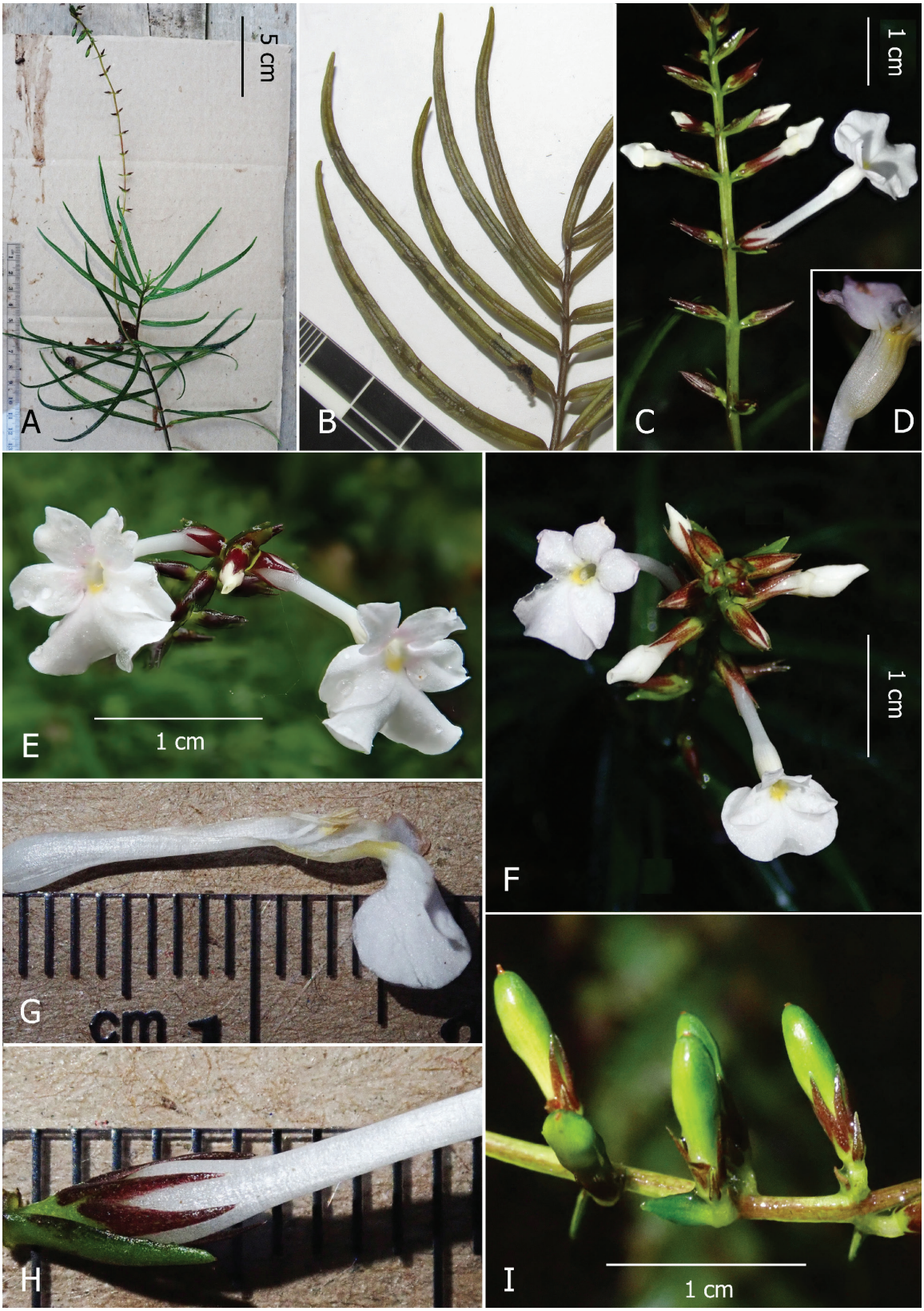

FIGURE 1. *Aphanandrium narupayacuensis* Cornejo, Wassh. & Exe. **A**, habit; **B**, terminal leafy branch, abaxial view; **C**, inflorescence; **D**, close-up of swollen distal part of corolla tube; **E**, **F**, flowers at anthesis; **G**, longitudinal section of corolla, lateral view; **H**, floral bract, calyx, and base of corolla tube; **I**, fruits nearly to maturity attached to the rachis of infructescence, lateral view. A–I are based on the type. Photographs A, B, G, and H by X. Cornejo; C, D, E, F, and I, by N. Exe.

Table 1. Morphological comparison of species of *Aphanandrium*.

	A. lehmannianum	*A. grandiflorum*	*A. harlingii var. harlingii*	*A. harlingii var. longifolium*	*A. nitidum*	*A. narupayacuensis*
Habit	herb	suffrutescent herb	suffrutescent herb	shrub or subshrub	woody vining epiphyte	herb
Color of corolla	white or yellow proximally	Lilac	white	white	unknown	white
Length of corolla	2 cm	4 cm	1.7 cm	2.5 cm	unknown	1.5–1.6 cm
Length and width of floral bracts	8–15 × 3–7 mm	23 × 9 mm	ca. 8.5 × 3–9 mm	ca. 10.5 × 2 mm	ca. 15 × 8 mm	3–7 × 1–1.5 mm
Shape of leaves	oblong elliptic to oblanceolate	oblong elliptic	elliptic	elliptic to obovate	elliptic	lorate
Length and width of leaves	8–13 × 2–4 cm	3–10 × 1.5–4.5 cm	3–6 × 0.6–2.0 cm	9–13.5 × 3.3–4.0 cm	6–8 × 1.8–3.0 cm	5–12 × 0.25–0.4 cm
Secondary veins	8–12 pairs	8–9 pairs	5–10 pairs	9–14 pairs	5–7 pairs	inconspicuous
Length of petioles	10–15 mm	10–15 mm	4–13 mm	8–10 mm	3–7 mm	1–2 mm
Size of capsules	ca. 12 × 4 mm	ca. 15 × 5 mm	ca. 10 mm	ca. 14 mm	ca. 18 × 5 mm	7–8 × 1.5–2.0 mm
Distribution	Colombia, Western cordillera	Panama and Colombia, Western cordillera	SE Ecuador, eastern Andean slopes	NE Ecuador, eastern Andean slopes	Venezuela, Eastern Andean cordillera	NE Ecuador, eastern Andean slopes
Altitudinal range	1700–2900 m	900–1400 m	1800–2300 m	2000–2300 m	1950–2150 m	ca. 1170 m

between middle and base, dorsally pilose, the trichomes pluricellular, univariate, hyaline; *ovary* oblong, 1.5 × 1 mm long; *style* ca. 8 mm, glabrous; *stigma* papillose, flattened. *Capsule* oblong-clavate to clavate 7–8 × 1.5–2 mm, obtuse and apiculate at apex, green (living), brown and glossy (dry), short-glandular-depressed, 4-seeded; *seeds* broadly ovate to suborbicular, brown, ca. 1.5 × 1.5 mm, glabrous, retinacula ca. 1.5 mm.

Aphanandrium narupayacuensis is easy to recognize by the elongate narrowly-oblong to lorate leaves with very short petioles, 1–2 mm long, and inconspicuous secondary veins, which is a unique feature among species in this genus. Further distinguishing characteristics in *A. narupayacuensis* are: longer spikes, 6–21 cm; the peduncles and spike axis are not purplish; the bracts are lanceolate, 3–7 × 1.0–1.5 mm; the bractlets are narrowly lanceolate to linear lanceolate, 2–3 × 0.3–0.5 mm, maroon to dark purple; the calyx is red, and the corolla is 15–16 mm long. In contrast, in *A. harlingii* the spikes are 1.7–7 cm long, the peduncles and spike axis are dark purplish, the bracts subulate, 8.5–10.5 × 2–3 mm, the bractlets are lanceolate-subulate, 4 × 0.75–0.85 mm, mucronulate and glabrous, the calyx is purplish and the corolla is 17–25 mm long.

Etymology: The epithet refers to the Narupayacu river, for which the Narupayacu Reserve, the type locality, is named. Narupayacu is a Quichua word that is composed of *Narupa*, meaning palm, and *yacu*, meaning river (José A. Simbaña, pers. comm.).

Common names: Unknown.

Habitat and distribution: Known only from the type locality.

Aphanandrium narupayacuensis is restricted to vertical cliff bands located to the south of the Narupayacu waterfall (left side when viewing the waterfall from below), at the Narupayacu Hummingbird Gardens. The exposed cliff outcrops range from a few meters to approximately 15 meters high. The cliff substrate consists of various sedimentary rock types, crumbling in layers and allowing water from

the river to seep through the cliffs. The rocks of the cliffs naturally exude bitumen, and the oily black substance oozes from the cliffs on a hot day. A distinctive lithophytic plant community is found in areas with wet seeps, including *A. narupayacuensis* as a dominant species. *A. narupayacuensis* plants are multi-stemmed with long rhizomes, running beneath a thick layer of bryophytes, anchored directly to rock. The plant community in wet areas of the cliff includes bryophytes, vascular epiphytes such as ferns, *Selaginella*, and multiple species of Gesneriaceae. The surrounding area is a patchwork of primary- and secondary- growth forest with a rich shrub layer. The plant community on sections of the cliff lacking wet seeps is notably different from the wet areas, indicating that the steady, year-round moisture provided by the seeps is an important factor in the growth of *A. narupayacuensis*.

Phenology: Flowers have been observed from October to February, and fruits from November to March.

Conservation status: At least 100 individuals estimated (Nolan Exe obs. pers. in the field). At present, due to the scarce information, the new species is designated as DD (data deficient; IUCN 2022).

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