

Dieffenbachia batistae and *D. mortoniana* (Araceae, Aroideae, Spathicarpeae), new species from Panama

Orlando O. Ortiz^{1,2,*} & Thomas B. Croat³

¹⁾ Herbario PMA & Departamento de Botánica, Universidad de Panamá, Estafeta Universitaria 0824, Panama City, Panama (*corresponding author's e-mail: ortizopma@gmail.com)

²⁾ Coiba Scientific Station (COIBA AIP), Clayton, Panama City, Panama

³⁾ Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166-0299, USA

Received 12 Oct. 2020, final version received 12 Jan. 2021, accepted 12 Jan. 2021

Ortiz O.O. & Croat T.B. 2021: *Dieffenbachia batistae* and *D. mortoniana* (Araceae, Aroideae, Spathicarpeae), new species from Panama. — *Ann. Bot. Fennici* 58: 95–99.

Dieffenbachia (Araceae) currently comprises 57 species described from Mexico, through Central America, the West Indies, Trinidad to South America. Our comprehensive revision of herbarium specimens and recent explorations in remote areas of Panama, identified two new endemic species of *Dieffenbachia*: *D. batistae* O. Ortiz & Croat and *D. mortoniana* O. Ortiz & Croat. Descriptions, taxonomic comments, conservation notes and photographs of the new species are provided.

The neotropical aroid tribe Spathicarpeae (Araceae, Aroideae), includes the genera *Dieffenbachia*, *Bognera*, *Mangonia*, *Taccarum*, *Asterostigma*, *Gorgonidium*, *Synandropadix*, *Gearum*, *Spathantheum*, *Spathicarpa*, *Croatiella*, *Incarum* and *Lorenzia* (Bogner & Gonçalves 1999, Gonçalves *et al.* 2007, Gonçalves 2012). With the exception of *Dieffenbachia*, all the genera of Spathicarpeae are endemic to South America.

Dieffenbachia and *Bognera*, formerly placed in a separate tribe Dieffenbachieae (Mayo *et al.* 1997), are essentially understory herbs. *Dieffenbachia* comprises caulescent herbs that usually occur in the understory, along clearing edges, stream banks in humid to wet forest, and flooded forests or wetlands, where often they are capable of surviving for long periods of time under water (Croat 1988). This genus represents one of the dominant plant groups within the low- to mid-altitude forests of the Neotropics (Croat 2004). The individuals can grow as large colonies form-

ing dense local stands (mainly in wetlands) or scattered throughout the understory (Croat 1988; first author's pers. obs.).

The number of *Dieffenbachia* species is estimated to be 145, with 57 species currently published (second author's own data). Their natural distribution extends from Mexico, through Central America, the West Indies, Trinidad to South America. In the latest revision from Central America, Croat (2004) treated 26 *Dieffenbachia* species, 20 of them new to science. In a provisional treatment of 119 South American species by the second author (thus far unpublished), 99 of them are considered new to science.

As a result of comprehensive revision of herbarium specimens and recent explorations in poorly explored areas of Panama identified by Ortiz *et al.* (2019), we recognized two new endemic species of *Dieffenbachia*, which we describe in this paper. These taxonomic novelties increase the number of Panamanian species

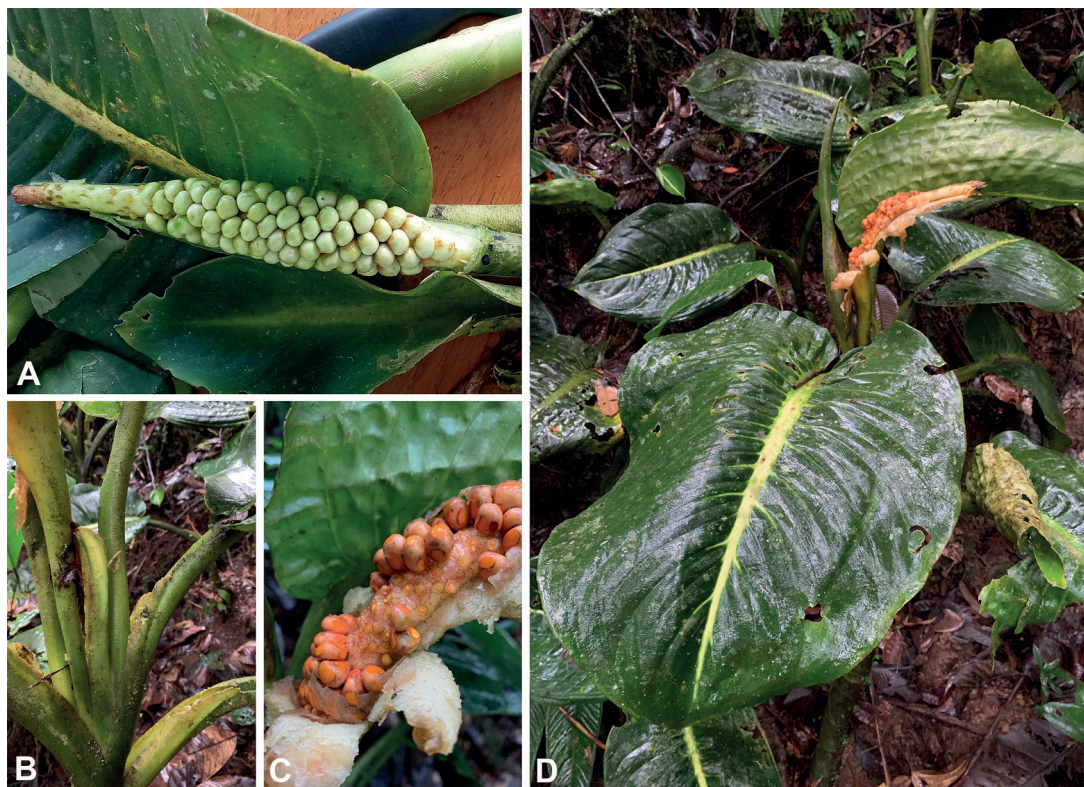


Fig. 1. *Dieffenbachia batistae* (from the holotype). — **A:** Infructescence (immature). — **B:** Petioles. — **C:** Ripe berries. — **D:** Habit. Photographs by Juvenal Batista.

to 23, nine being endemic to the country. The descriptive terminology follows Croat (2004). An estimation of the conservation status was made according to the criteria of the International Union for Conservation of Nature (IUCN 2012). Herbarium specimens, including types, were studied from MO, PMA, SCZ and UCH.

***Dieffenbachia batistae* O. Ortiz & Croat, *sp. nova* (Fig. 1)**

TYPE: Panama. Veraguas: Santa Fe National Park, trail going up La Tortuga hill before reaching Camp 5 on the way to La Sabaneta, a mature humid forest, 08°36'49" N, 81°02'55" W, 610 m a.s.l., 7 July 2020 *J.E. Batista et al.* 2008 (holotype PMA; isotypes FT, MO). — **PARATYPES:** Panama. Veraguas: Santa Fe National Park, Concepción river, disturbed forest, 08°45'8.87" N, 80°56'6.85" W, 204 m a.s.l., 13 April 2019 *J.E. Batista & Z. Serracín* 1905 (PMA).

ETYMOLOGY: Named in honor of Juvenal Batista, a young Panamanian botanist who collected the type specimen. Together with Scott Mori from the NY herbarium, Batista has published extensively on Lecythidaceae of Panama.

Medium-sized terrestrial herb, 50–70 cm tall; stem erect, up to 40 cm long; internodes moderately short, to 2 cm long, 1 cm. in diam., drying yellowish; sap unknown. Leaves scattered along stem, denser near apex; cataphyll 2-ribbed, 17 cm long; petioles 21 cm long, obtusely somewhat flattened adaxially, densely cross-checked with minute fissures, sheathing near midway or slightly above, for ca. 60% their length, drying yellowish and greenish at apex; sheath 14 cm long, finely striate, acute at apex, drying greenish; margin more or less intact; unsheathed portion broadly and sharply sulcate, 6.7 cm long, 0.8 cm in diam.; blades broadly ovate, 39.5 cm long, 28–30 cm wide, 1.37 times longer than broad, gradually acuminate at apex, cordate at base, dark green and weakly glossy above, moderately paler and matte below; anterior lobe 35 cm long, broadly ovate; posterior lobes rounded, subcordate at the base, 6.0 cm long, 7.0 cm wide; sinus V-shaped, ca. 3.0 cm wide, 2.0 cm deep; basal veins 1–2 pairs, free

to the base; posterior ribs absent; midrib broadly flattened, discolourous, whitish except (greenish streaked near base) on the upper surface, greenish-yellow on the lower surface, drying yellowish on both surfaces; primary lateral veins 16–18 pairs, weakly quilted-sunken, arising at 65° angle in middle, to 45° angle toward apex, to 110° angle near base, weakly quilted-sunken, concolorous above, narrowly rounded slightly paler below. Inflorescence solitary, erect; peduncle subterete, densely transverse-fissured, 18 cm long, 0.3 cm in diam., drying yellowish; spathe total length unknown, 12 cm long up to naked portion of the spadix, 3–4 cm in diam., medium green; spadix with an obvious naked portion (not contiguous); pistillate portion 9.0 cm long, ca. 0.5 cm in diam.; pistils 48–50, densely aggregated, subglobose, tan-brown in pickled condition, ca. 4 positioned across the width of the spadix; staminodia few persisting, thickly obovoid, medium brown; staminate spadix not seen; sterile intermediate portion naked, 3.0 cm long, ca. 0.5 cm in diam. Berries orange. Flowering and fruiting in April.

DISTRIBUTION AND HABITAT: *Dieffenbachia batistae* is endemic to Panama, known only from the type locality in Veraguas Province where it grows at 204–610 m a.s.l. in the *Tropical wet forest zone* (Holdridge *et al.* 1971).

CONSERVATION STATUS: Currently, information to make direct or indirect assessment of the risk based on distribution or the population status is insufficient. Thus, *D. batistae* is classified as Data Deficient (DD).

In the treatment of *Dieffenbachia* from Central America (Croat 2004), *D. batistae* keys out to *D. grayumiana* but the latter differs from the former by having narrower leaf blades, 1.5–2.6 times longer than wide, the midrib and primary lateral veins occasionally diminutively granularly-puberulent on lower surfaces, a lightly paler to concolorous midrib above and spadices with 115–160 pistils.

Dieffenbachia batistae is also similar to *D. rodriguezii* and *D. isthmia*, which may also have subcordate leaf blades and a long sterile segment between the staminate and pistillate portions of the spadix. *Dieffenbachia rodriguezii*, an endemic montane species from Costa Rica, differs from *D. batistae* by having blackish-drying

stems, narrowly ovate dark olive-green drying blades, four or five pairs of basal veins and fewer primary lateral veins (up to nine pairs). *Dieffenbachia isthmia*, which occurs in low to mid-elevation areas of Panama and Colombia, differs from *D. batistae* by having leaves with petiole sheaths markedly rounded to auriculate at apex, oblong-ovate to narrowly ovate blackened drying blades, a concolorous to slightly paler midrib above (when fresh) and fewer primary lateral veins (up to 15 pairs).

***Dieffenbachia mortoniana* O. Ortiz & Croat, *sp. nova* (Fig. 2)**

TYPE: Panama. Darién: Serranía de Majé, Chucantí Private Reserve, Los Helicópteros trail, 08°47'45''N, 78°27'47''W, 1325 m a.s.l., 4 April 2018 O.O. Ortiz, M. de Stapp, J. Valdés, V. Jiménez, K. Rodríguez, N. Gálvez, M. Martínez & R. Zambrano 3153 (holotype PMA).

ETYMOLOGY: Named in honor of Jess Morton from San Pedro, California. A poet and dedicated patron of arts and conservation, he has shown unwavering support for Adopta Bosque Panamá in its efforts to preserve the unique forests of Cerro Chucantí, the only known locality for this species. He is a founding member of the Palos Verdes/South Bay Audubon Society, which champions the work of ADOPTA, and of the Endangered Habitats League and Endangered Habitats Conservancy, all three important vehicles for promoting the environmental health of southern California.

Small terrestrial herb to ca. 0.5–1.0 m tall; stem usually 30 cm long, older portions of stem trailing across forest floor to ca. 1.0 m; sap clear, inconspicuous; cataphyll not seen; internodes 1.0–2.5 cm long, 1.0–1.5 cm in diam., 0.5 cm in diam. (when dry), dark green, semiglossy, drying grayish-green. Leaves erect-spreading; petioles 4.0–5.0 cm long, sheathed nearly throughout or near the apex, for 90%–100% their length; sheath 4.0–4.5 cm long, tightly incurled, unequal and weakly free-ending at apex; unsheathed portion up to 0.5 cm long, weakly sulcate adaxially; blades narrowly lanceolate, 10.0–15.5 cm long, 3.0–5.0 wide, 3.1–3.3 times longer than wide, 2.5–3.4 times longer than petioles, narrowly acuminate at apex, acute at the base, minutely undulate on margins, dark green and weakly glossy above, moderately paler and semiglossy below; midrib flat-sunken and concolorous near base, narrowly rounded, concolorous toward apex above, narrowly rounded and slightly paler

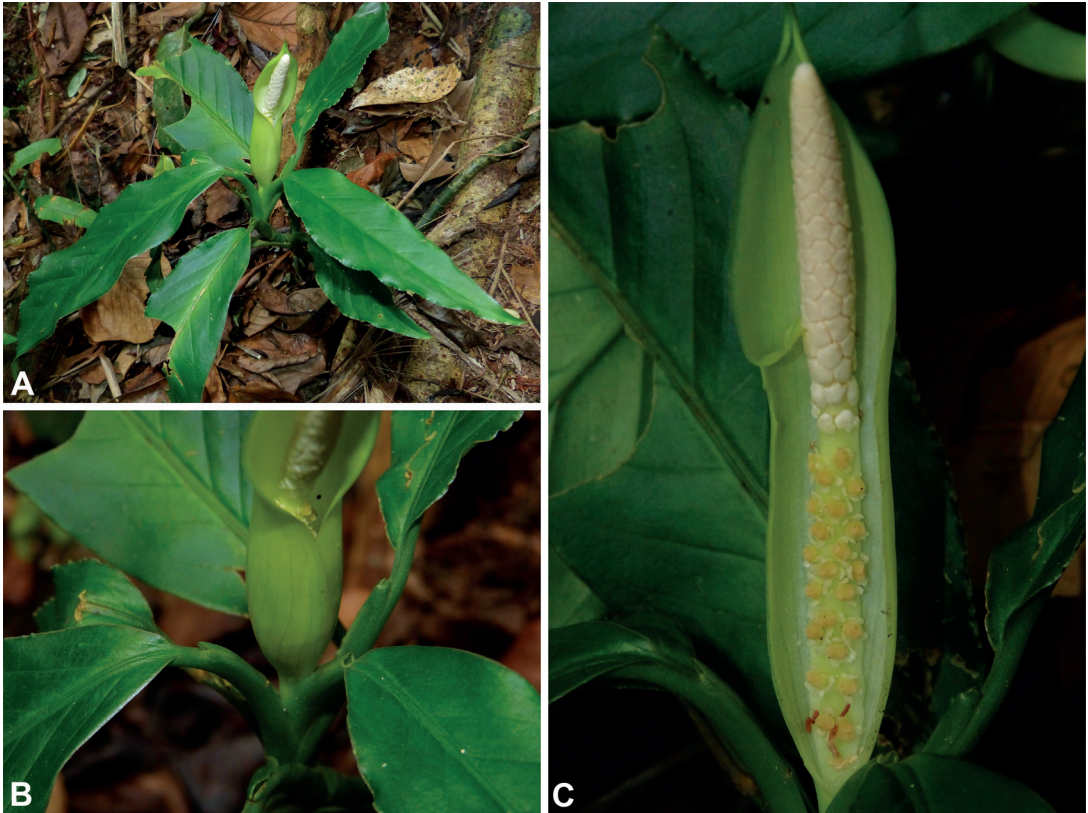


Fig. 2. *Dieffenbachia mortoniana* (from the holotype). — **A:** Habit. — **B:** Petioles and spathe-tube. — **C:** Spadix and spathe cut longitudinally.

below; primary lateral veins 7–8 pairs, arising at 45° angle, weakly sunken and concolorous above, narrowly rounded and slightly darker below. Inflorescence solitary; peduncle 3.0 cm long, medium green, almost obscured by petiole sheath; spathe 7.0–7.2 cm long, 0.5–0.9 cm in diam. on tube at anthesis, medium green, weakly glossy outside, semiglossy, slightly paler within, convolute in lower half exposing down to the upper portion of the sterile staminate segment at anthesis, ca. 1 cm longer than spadix at anthesis; spadix contiguous (lacking a sterile naked part), 5.0–7.0 cm long; staminate portion 3.0–3.2 cm long, 0.5 cm in diam. midway, creamy white, bluntly pointed at apex, all but the lower 2 spirals fertile; sterile segment with flowers moderately contiguous; pistillate portion 3.5 cm long, 0.5 cm in diam.; pistils 20, pale yellow, moderately spaced, no more than 3 across the spadix; staminodia somewhat flattened, tongue-shaped, broader than long, whitish. Berries not seen. Flowering in April.

DISTRIBUTION AND HABITAT. This species is endemic to Panama, known only from the type locality in Serranía de Majé in eastern Panamá Province where it grows at 1325 m a.s.l. in the *Premontane rain forest* and *Tropical wet forest* zones (Holdridge *et al.* 1971). According to our field observations, *D. mortoniana* does not grow in colonies. It is rare and restricted to cloud elfin forests that are generally above 1200 m a.s.l.

CONSERVATION STATUS. This species has an area of occupancy of 4 km² and is currently known from only one locality within Chucanti Nature Reserve. However, the sites nearby this reserve are highly exposed to anthropogenic disturbances caused by livestock farming. Taking into account the restricted natural distribution of this species, as well as the potential threats to its habitats, *D. mortoniana* should be seen as critically endangered, CR B2ab(ii,iii,iv).

In the taxonomic treatment of *Dieffenbachia* by Croat (2004), *D. mortoniana* keys out to *D.*

killipii, but they represent distinctive taxa, both morphologically and ecologically. The elevational distribution of *D. killipii* includes areas that generally located between 0 to 900 m a.s.l. (Croat 2004). In fact, that species can occur in the type locality of *D. mortoniana* (Cerro Chucantí), however, mainly below 900 m a.s.l. (Vargas & de Stapf 2019). In contrast, *D. mortoniana* generally occurs in montane elfin forests of Cerro Chucantí, above 1200 m a.s.l. *Dieffenbachia killipii* can be distinguished from *D. mortoniana* by the combination of the following characters: dark yellow-brown to orange-brown drying internodes, usually oblong-elliptic to oblong-ovate, subcordate and wider leaf blades (7–16 cm wide), inflorescences with wider spathe-tubes (2–3 cm in diam.), longer spadices (generally more than 10 cm long), 20–37 pistils in the pistillate portion and very thickened claviform staminodia.

Acknowledgements

We are very grateful to the curators of the following herbaria: PMA, MO, SCZ, and UCH for allowing access to their collections; Juvenal Batista for allowing access to their photographs and collections. We are also thank the University of Panama (UP), Missouri Botanical Garden, Adopt a Panama Rainforest Association (ADOPTA) and Ministerio de Ambiente (MiAmbiente) for their assistance.

References

- Bogner J. & Gonçalves E.G. 1999. The genus *Gearum* N.E. Br. (Araceae: Tribe Spathicarpeae). — *Aroideana* 22: 20–29.
- Croat T.B. 1988. The ecology and life forms of Araceae. — *Aroideana* 11: 4–56.
- Croat T.B. 2004. A revision of the genus *Dieffenbachia* (Araceae) of Mexico and Central America. — *Annals of the Missouri Botanical Garden* 91: 668–772.
- Gonçalves E.G. 2012. *Lorenzia* (Araceae – Spathicarpeae): a new genus supported by matk sequence data. — *Systematic Botany* 37: 48–52.
- Gonçalves E.G., Mayo S.J., Van-Sluy M.A. & Salatino A. 2007. Combined genotypic-phenotypic phylogeny of the tribe *Spathicarpeae* (Araceae) with reference to independent events of invasion to Andean regions. — *Molecular Phylogenetics and Evolution* 43: 1023–1039.
- Holdridge, L.R., Grenke, W.C., Hatheway, W.H., Liang, T. & Tosi, J.A. 1971. *Forest environments in tropical life zones: a pilot study*. — Pergamon Press, New York.
- IUCN 2012. *IUCN Red List categories and criteria*, version 3.1, 2nd ed. — IUCN, Gland & Cambridge.
- Mayo S.J., Bogner J. & Boyce P.C. 1997. *The genera of Araceae*. — Royal Botanic Gardens, Kew.
- Ortiz O.O., Flores R., McPherson G. Carrión J.F., Campos-Pineda E. & Baldini R.M. 2019. Additions to the flora of Panama, with comments on plant collections and information gaps. — *Check List* 15: 601–627.
- Vargas M.G.P. & de Stapf M.N.S. 2019. Diversidad de plantas herbáceas y subarborescentes en Cerro Chucantí, Provincia de Darién [Diversity of herbaceous and sub-shrub plants on Cerro Chucantí, Darién Province]. — *Tecnología* 21: 69–91. [In Spanish with English summary].