# New species of Araceae from Ecuador

Authors: Croat, Thomas B., Joyce, Maggie, and Kostelac, Carla V.

Source: Willdenowia, 40(2) : 331-343

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

URL: https://doi.org/10.3372/wi.40.40212

THOMAS B. CROAT[1*], MAGGIE JOYCE[1] & CARLA V. KOSTELAC[1]

# New species of *Araceae* from Ecuador

**Abstract**

Croat T. B., Joyce M. & Kostelac C. V.: New species of *Araceae* from Ecuador. – Willdenowia 40: 331–343. – Online ISSN 1868-6397; © 2010 BGBM Berlin-Dahlem.
doi:10.3372/wi.40.40212 (available via http://dx.doi.org/)

Eight species from Ecuador are described as new to science, *Anthurium boekei, A. caldodsonii, A. kajekai, A. lynniae, A. mendietae, A. quinindense, A. werneri* and *Philodendron misahualiense*. Four of these, *A. boekei, A. caldodsonii, A. lynniae* and *A. quinindense,* are from the western slopes of the Andes, while the remainder are from the eastern slopes.

Additional key words: aroids, *Anthurium, Philodendron,* Andes, taxonomy

## Introduction

Field work by the first author and by other botanists during the past two decades in Ecuador has greatly increased the amount of material of *Araceae* available for studies. In preparation for the *Araceae* treatment for the Flora of Ecuador project, many new species have been discovered. Most of the exploration in the past 15 years has been carried out by botanists from the Missouri Botanical Garden, but several European institutions, notably Aarhus University in Denmark, have also collected throughout Ecuador. In addition, German botanists, working in several field stations in the country, have made important new discoveries. With the assistance of volunteer researchers at the Missouri Botanical Garden, some of these new species have been described and are published in the present contribution.

Classification of the forest vegetation in the habitat notes of the new species follows Holdridge & al. (1971).

***Anthurium boekei*** Croat, **sp. nov.**
Holotype: Ecuador, Loja, Alamor–Cazaderos, W of El Limo, 1400 m, 20.2.1985, *C. G. Harling & L. Andersson 22320* (GB 0000758). – Fig. 2A.

Planta scandens; internodia 4–15 cm longa, 6–7 mm diam.; cataphylla 3–4 cm longa, intacte vel semi-intacte persistentia; folia petiolo 2–9 cm longo, lamina anguste ovata, interdum ovato-elliptica, nervis primariis lateralibus 8–10 utroque; pedunculus 5–10 cm longus, 1–2 mm diam.; spatha viridis; spadix viridis sub anthesi, purpureus post anthesin, 2–7 cm longus.

Scandent epiphyte or hemi-epiphyte; *internodes* dark brown, 4–15 cm long, 6–7 mm diam.; *cataphylls* persisting intact or semi-intact at upper nodes, 3–4 cm long. *Leaves* with *petiole* sulcate adaxially, 2–9 cm long (averaging 3.2 cm), drying to 1.5–3.5 mm diam.; *blade* broadly ovate, sometimes ovate-elliptic, coriaceous, semiglossy, moderately bicolorous, drying to light brown and semiglossy above, paler and matte to weakly glossy below, 8–14 cm long (averaging 12 cm), 4.5–10 cm wide (averaging 7 cm), 1.5–2.6 × longer than wide, rounded to emarginate at apex, often with a short apiculum; petiole/blade ratio 1.9–6.5 (averaging 1.8); *midrib* convex on both sides, paler below; *primary lateral veins* 8–10 per side, *collective veins* more or less equally sunken above, raised weakly below; *basal veins* two per side,

1 Missouri Botanical Garden, P.O. Box 299, St Louis, MO 63166-0299, USA; *e-mail: thomas.croat@mobot.org (author for correspondence).

both forming collective veins, one at or near the blade margin, one 0.5–1 cm from margin, at times innermost collective vein arising from lowermost primary lateral vein; upper surface sparsely glandular-punctate, glands black, c. 0.02 mm diam.; lower surface densely glandular-punctate, glands reddish brown, c. 0.15 mm diam. *Inflorescence* with *peduncle* 5–10 cm long, 1–2 mm diam.; *spathe* green, reflexed; *spadix* 2–7 cm long, green at anthesis, becoming purplish after anthesis; old pollen yellowish.

*Anthurium boekei* is endemic to Ecuador, known from Loja and El Oro provinces in SW Ecuador in Premontane dry forest and Premontane moist forest life zones at elevations from 600 to 1600 m. It grows on road banks, cliffs or trees.

The species is a member of *Anthurium* sect. *Tetraspermium* and is distinguished by its epiphytic vining habit, elongated, dark brown-drying internodes with conspicuous, thick whitish roots, usually ovate to broadly ovate-elliptic, greyish green-drying blades with a single pair of collective veins rather remote from the margin and a weaker submarginal pair of veins extending to nearly the middle of the blade as well as by the green inflorescence. In addition, the species is glandular-punctate on both surfaces.

*Anthurium boekei* is very similar to *A. caldodsonii* (described below) in having broadly ovate blades, but the latter differs in having more conspicuous venation, more conspicuous glandular punctations on the lower leaf surface and in lacking glandular punctations on the upper leaf surface as well as by having a violet-purple spadix at anthesis, whereas *A. boekei* has conspicuous, broad-glandular punctuations on the upper leaf surface and a green spadix.

*Anthurium boekei* is also similar to *A. bogneri* (Croat & al. 2010) but the latter has a purplish rather than a green spadix and typically has smaller leaf blades, with the lower blade surface minutely roughened upon drying instead of moderately smooth (merely inconspicuously areolate on magnification) in *A. boekei*. In addition, the glands on the upper leaf surface of *A. boekei* are raised upon drying with a distinct whitish margin. In contrast, *A. bogneri* has the glands on the lower surface somewhat sunken upon drying and lacking any distinct pale margin.

The species is named in honour of Dr Jef D. Boeke, a molecular biologist, founder and Director of the HiT Center at Johns Hopkins University School of Medicine. Though Boeke's research focusses on the mechanism and regulation of the "jumping" of yeast and human mobile genetic elements, he played an important role in systematic botany earlier in his career while a student at Bowdoin College. A Thomas J. Watson Fellowship in 1976 and 1977 provided him with the opportunity to take an 11 month-long collecting expedition overland in a VW beetle from Maine through Central America and northern South America to Bolivia. This allowed him to make extensive collections in the Andes, including the first collection of this new species.

*Paratypes*. — Ecuador: Loja: Quebrada Suquinda, 5 km west Sozoranga, 4°18'S, 79°48'W, 1600 m, 31.1.1991, *M. Kessler 2328* (QCA); Celica–Zapotillo road, c. 3 km below Pózul, 1400 m, 9.4.1980, *Harling & Anderson 18060* (GB); Alamor–Pugango road, km 20, 500 m, 2.4.1980, *Harling & Anderson 17763* (GB); ibid., km 12–15, 600– 700 m, 7.4.1980, *Harling & Anderson 17968* (GB); Reserva Laipuna, off Catacohá–Macará road, NW of Portachuelo, 4°14'S, 79°55'W, 1100–1200 m, 3.3.2004, *Werner 915* (GOET). — El Oro: Pasaje–Cuenca road, San Sebastian, 30.6.1978, *Boeke 2296* (NY). — Tungurahua: Camino Baños–Illuchi–El Tablón, sector El Guarumal, 2000 m, 9.9.1986, *Freire & Freire 363* (GB).

***Anthurium caldodsonii*** Croat, **sp. nov.**
Holotype: Ecuador, Chimborazo, Alausí–El Triunfo, 26.4 km W of Huigra, 35.1 km E of border of Guayas Province, 2°20'S, 79°02'W, 1270 m, 19.7.1986, *T. B. Croat 61577* (MO 3422140; isotypes: F, K, QCNE, US, USM). – Fig. 1A–B.

Internodia (3–)6–11 cm longa, 4–7 mm diam.; cataphylla 7–9 cm longa; folia petiolo 1.2–5 cm longo, lamina ovata ad ovato-elliptica, 9–11 cm longa, (6–)9–11(–13) cm lata, nervis primariis lateralibus 6–9 utroque; pedunculus 4.5–10 cm longus; spatha 2–2.4 cm longa, 4–6 mm lata; spadix 3.2–5.5 cm longus, 4–7 mm diam.

Epiphytic; *stems* to 0.5 m long, rhizomatous; *internodes* (3–)6–11 cm long, 4–7 mm diam., drying matte, dark brown; *cataphylls* 7–9 cm long, 1–1.5 cm diam., persisting as fibres at least at uppermost nodes, drying pale to dark brown. *Leaves* with *petiole* 1.2–5 cm long (averaging 2.2 cm), 2–4 mm diam., subterete to terete, broader than thick, finely ribbed, narrowly sulcate adaxially; *blade* ovate to ovate-elliptic, 9–11 × (6–)9–11(–13) cm (averaging 11.3 × 8.9 cm), 1.3–1.4 × as long as wide, averaging 5.6 × longer than petiole, abruptly acuminate at apex, rounded at base, coriaceous, semiglossy to matte, moderately bicolorous, drying light yellow-brown and ± concolorous, the surfaces moderately smooth, eglandular above, dark glandular-punctate below; *midrib* narrowly rounded above, bluntly acute and paler below; *primary lateral veins* 6–9 per side, departing midrib at 40–45° angle, obtusely raised and concolorous above, narrowly rounded and concolorous below, about as prominent as the collective veins; *interprimary veins* almost as distinct as primary lateral veins; *tertiary veins* moderately weak on both surfaces; *collective veins* arising from one of the primary lateral veins very near the base, a secondary pair of collective veins merging promptly


Fig. 1. *Anthurium caldodsonii* – A: holotype at MO, *Croat 61577;* B: paratype at SEL, *Dodson 8581*.

with the margins; *upper surface* drying greyish brown and matte, eglandular; *lower surface* slightly paler and dark yellowish brown, densely glandular-punctate, the glands moderately small (0.15 mm diam.). *Inflorescence* erect; *peduncle* 4.5–10 cm long (averaging 6 cm), 2–3 cm diam., about 3 × as long as petiole, matte, medium brown; *spathe* reflexed, 2–2.4 × 0.4–0.6 cm (averaging 2.2 × 0.5 cm), elliptic, matte, green to greenish purple, drying deep brown; *spadix* 3.2–5.5 cm long, 4–7 mm diam., matte, violet-purple, drying deep brown; *flowers* 9–10 visible in the principle spiral, 5–7 visible in the alternate spiral, 2.2–2.4 × 2 mm; lateral tepals 1 mm wide, the outer margins 2-sided, the inner margin broadly rounded; *stamens* held at level of tepals, widely spaced on 4 sides of the pistil, 0.12 × 0.2 mm, the thecae ovoid, slightly divaricate.

*Anthurium caldodsonii* is found in Ecuador (Los Rios, Pichincha and Chimborazo provinces) at elevations of 650–1270 m in Premontane moist forest and Premontane wet forest life zones.

This species is a member of *Anthurium* sect. *Tetraspermium* and is characterised by its epiphytic habit, elongate, reddish, brown-drying internodes, persistent, pale, appressed cataphyll fibres, short, sulcate petioles, rather broadly ovate, moderately coriaceous leaf blades, which are rounded at the base with glandular punctations only on the lower surface, as well as by the moderately long-pedunculate inflorescence (about 3 × longer than petioles) with a green, reflexed spathe and cylindroid, violet-purple spadix.

*Anthurium caldodsonii* is similar to *A. boekii* (described above) but the latter species has conspicuous, dense, fleshy, white roots, mostly intact cataphylls and a green rather than violet-purple spadix.

The species is named in honour of Dr Caloway Dodson of the Missouri Botanical Garden and former Director of Selby Garden, who first collected fertile material of the species in 1979 (Mike Madison collected a sterile specimen in 1977 from the same area). Dodson, one of the world's foremost authorities on orchids, has spent much of his long career in the tropics, especially in Ecuador, where the type material was collected. He was the first to explore the type locality at Las Centinellas, where many interesting and new species have been discovered subsequently.

*Paratypes.* — Ecuador: Los Ríos: El Centinella, 12 km E of Patricia Pilar, 650 m, 9.4.1977, *M. T. Madison 3825* (SEL); El Centinella, Patricia Pilar to 24 de


Fig. 2. A: *Anthurium boekei* – holotype at GB, *Harling 22320;* B: *A. kajekai* – holotype at MO, *Kajekai 738;* C–D: *Philodendron misahualliense* – isotype at QCNE (C), holotype at MO (D), *Ceron 6047.*

Mayo at km 12, 600–650 m, 28.7.1979, *C. Dodson 8581* (MO, SEL).

***Anthurium kajekai*** Croat, **sp. nov.**
Holotype: Ecuador, Zamora–Chinchipe, Yacuambi, Centro Shuar Kurints, on slopes above Río Yacuambi, 3°46'S, 78°54'W, 920 m, 2006, *C. Kajekai & A. Wisum 738* assisted by Pedro and Julio Tentets of the Kurints community (MO 6192211; isotypes: GB, K, QCNE, US) – Fig. 2B.

Internodia 12–19 cm longa, 0.8–1.2 cm diam.; cataphylla 2–5 cm longa, 0.5–2 cm diam.; folia petiolo 45–66 cm longo, lamina anguste oblongo-oblanceolata, 71–78 cm longa, 26–34 cm lata, nervis primariis lateralibus 7–10 utroque; pedunculus 46–92 cm longus; spatha 8.4–14 cm longa, 1–1.4 cm lata; spadix 9–16.6 cm longus, 6–9 mm diam.

Epiphytic; *stems* to 20 cm, shortly erect; *internodes* 12–19 cm long, 0.8–1.2 cm diam., drying matte reddish brown; *cataphylls* 2–5 cm long, 0.5–2 cm diam., lanceolate, matte, drying medium brown, persisting as fibres. *Leaves* with *petiole* 45–66 cm long, subterete, prominently sulcate adaxially and sometimes with a medial rib adaxially, usually prominently ribbed on drying with up to 9 ribs circumferentially (sometimes stronger ribs alternating with weaker ribs), drying matte, grey-brown; *geniculum* 1 cm long, remote; *blade* narrowly oblong-oblanceolate, 71–78× 26–34 cm (averaging 74.5 × 30 cm), 2.2–2.7 × as long as wide, 2.3 × longer than petiole, gradually acuminate at the apex, moderately bicolorous, dark green and semi-glossy above, slightly paler and slightly more glossy below; *midrib* broadly convex, concolorous above, multi-ribbed, quadrangular and slightly darker brown below; *primary lateral veins* 7–10 pairs, arising at c. 45° angle, narrowly rounded on both surfaces, drying ± concolorous and sometime with acute ridges above, narrowly rounded, darker and often with fine ridges below; *tertiary veins* drying prominently raised on both surfaces; *collective veins* arising from one of the primary lateral veins from below the middle to the upper $^2/_3$ of the blade, drying raised on both surfaces. *Inflorescence* erect, shorter than leaf; *peduncle* 46–92 cm long, 5.5 × longer than spathe, drying reddish brown; *spathe* 8.4–14 × 1–1.4 cm, lanceolate, green, drying light brown, matte; *spadix* 9–16.6 cm long, 6–9 mm diam., violet-purple, drying purplish brown, sessile or weakly stipitate to 3 mm. *Flowers* 10 visible per spiral, 2.2–2.5 × 1.8–2 mm; tepals matte, moderately smooth on drying, lateral tepals 1–1.2 mm wide, the outer margins 2-sided, the inner margins nearly straight to concave on drying; *stamens* held in a tight contiguous cluster around pistil, 0.5–0.6 × 0.8–0.9 mm, thecae slightly divaricate.

*Anthurium kajekai* is known only from the type locality in Ecuador in the Zamora–Chinchipe Province near Yacuambi at 920 m in a Premontane wet forest life zone. The species is a member of *Anthurium* sect. *Pachyneurium* and is characterised by its lanceolate cataphylls persisting as reddish brown fibres, its quadrangular, multi-ribbed petioles, its lanceolate leaf blades with a prominently remote geniculum as well as by its sessile purplish brown spadix.

The species is most closely related to *Anthurium pranceanum* Croat from Acre State of Brazil. Both species share the same yellow-brown drying colour, have similarly dried cataphyll fibres and a violet-purple spadix. The latter differs in that it grows below 500 m elevation, in having leaf blades ovate-elliptic to ovate, rounded at the base, then prominently decurrent onto the petiole with the geniculum remote from 6–20 cm from the base of the chlorophyllus portion of the blade (the chlorophyllous portion is only 1.7–1.9 × longer than wide). In contrast, *A. kajekai* has blades narrowly oblong-oblanceolate, acute at the base and, though prominently decurrent at the base, the chlorophyllous portion extends all the way to the geniculum and is 2.2–2.7 × longer than wide. In addition, the petioles of *A. pranceanum* are 1.2–1.9 × longer than the blade but only 0.7–1.1 × so in *A. kajekai*. Other differences are that the blades of *A. pranceanum* have 6–10 primary lateral veins and dry much less veiny in *A. pranceanum,* whereas in *A. kajekai* there are 7–10 primary lateral veins and the tertiary and reticulate venation is prominent on both surfaces upon drying.

The species is named in honour of Camillo Kajekai, an Ecuadorian indigenous botanist, who collected the type material. He is a parataxonomist working with David Neill in the Shuar indigenous region in SW Ecuador.

*Paratype*. — Ecuador: Zamora–Chinchipe: Cantón Yacuambi, Centro Shuar Kurints, on slopes above Río Yacuambi, 3°46'S, 78°54'W, 920 m, 7.9.2006, *Camilo Kajekai & A. Wisum 736* assisted by Pedro and Julio Tentets of the Kurints community (LOJA, QCNE).

***Anthurium lynniae*** Croat, **sp. nov.**
Holotype: Ecuador, Imbabura, along road from Selva Alegre and Otovalo, 61.3 km S of jct. with main road at Otovalo, 0°17'06"N, 78°30'08"W, 1678 m, 1.5.2003, *T. B. Croat & L. P. Hannon 88419* (MO 5700396-9; isotypes: AAU, B, COL, F, K, NY, QCNE, S, US) – Fig. 3A–D.

Internodia brevia, usque ad 3.5 cm diam.; cataphylla 15 cm longa; folia petiolo 42.5 cm longo, lamina anguste ovato-triangularis, 55 cm longa, 35 cm lata, nervis primariis lateralibus 6–15 utroque, nervis basalibus 7–9(–10) utroque; spatha 16.5–18 cm longa, 2.7 cm lata; spadix 20.6 cm longus, basi 12 mm diam.

*Stems* less than 1 m long; *internodes* short, to 3.5 cm diam.; *cataphylls* 15 cm long, persisting semi-intact at apex, drying pale tan, soon deciduous. *Leaves* with *petiole* 42.5 cm long, 1.9 cm diam. at base, 7 mm diam.


Fig. 3. *Anthurium lynniae* – the four sheets of the holotype at MO, *Croat 88419*.

midway, densely and obscurely short-lineolate, medium green, weakly glossy; sheath 5–10 cm long, free-ending at apex; *geniculum* 3 cm long, 8 mm diam., slightly paler; *blade* narrowly ovate-triangular, 55 × 35 cm, 1.2–1.3 × longer than wide, (0.7–)0.97(–1.2) × as long as the petiole, dark green and matte-subvelvety above, slightly paler and semiglossy below; *anterior lobes* 41.5 cm long, the lateral margins almost straight; *posterior lobes* 17.3 × 13 cm wide; *sinus* obovate, 13.5 cm deep, 4.4 cm wide; *midrib* slightly paler, narrowly rounded at base, bluntly acute toward apex above, narrowly rounded below; *primary lateral veins* 6–15 pairs, arising at 50–60° angle, paler and bluntly acute above, narrowly raised and slightly paler below; interprimary veins usually present between each pair of primaries, scarcely less prominent; *basal veins* 7–9(–10) pairs, the first free to the base, the fifth and sixth coalesced to 8 cm; posterior rib curved, naked to 4.2 cm; *collective veins* arising from the uppermost primary lateral veins. *Inflorescence* erect-spreading; *peduncle* terete, matte, pale medium green, minutely paler green-speckled, up to 45 cm; *spathe* pale medium green, glossy outside, matte inside, reflexed-spreading, 16.5–18 × 2.7 cm, drying manilla-coloured, matte and twisted while still on live plant; *spadix* stipitate 4 mm, medium dark green, becoming brick-red and weakly glossy, drying dark purple, matte, 20.6 cm long, 12 mm diam. at base, 10 mm diam. midway, 7 mm diam. at 1 cm from the apex, narrowly rounded at the apex. *Flowers* 12–13 visible per spiral, 1.8–2 mm long and wide; tepals moderately smooth, lateral tepals 1.4–1.5 mm wide, the outer margins obtusely 2-sided, inner margins narrowly rounded; *stamens* 0.8–0.9 mm long and wide, held just above the level of the tepals and forming a tight cluster over the stigma, thecae oblong, scarcely divaricate.

*Anthurium lynniae* is known only from the type locality in the Lita–San Lorenzo region in Esmeraldas Province at 650 m between Lita and Alto Tambo in an area of Premontane wet forest life zone.

The species is a member of *Anthurium* sect. *Cardiolonchium* and is characterised by its short internodes, semiintact, pale cataphylls, subterete, obtusely sulcate petioles, narrowly ovate-triangular sagittate and matte subvelvety leaf blades.

The species most closely resembles *Anthurium dolichostachyum,* which has leaf blades of similar shape and texture as well as drying colour. That species differs in having a pale green to creamy white spadix as opposed to the brick red spadix of *A. lynniae*.

The species is named after the first author's former colleague and collecting partner Lynn Peters Hannon. Lynn Hannon, an artist by training, became interested in plants and had made two trips to Ecuador before the first author met her. Along with Dr Richard Mansell, Lynn Hannon and the first author began to work on a floristic project in Ecuador in the region of Lita in Esmeraldas Province. Lynn also played an important role by maintaining in cultivation many of the interesting new species that Mansell, Hannon and the first author collected. She also prepared hundreds of specimens from the living collections along with detailed descriptions of the flowers. Unfortunately, Lynn died on 10 July 2006 (Croat 2006). In the last month of her life, when she could no longer care for the collections, she asked the first author to transfer them to the Missouri Botanical Garden. With regard to her botanic work, Lynn will be principally known for her revision of *Chlorospatha,* to which she was encouraged by the first author and which she finished with his help (Croat & Hannon, in press).

***Anthurium mendietae*** Croat, **sp. nov.**
Holotype: Ecuador, Zamora–Chinchipe, Estación Cientifica San Francisco, El Milagro Creek, 2250 m, 30.4.2008, *G. Mendieta & L. Nauheimer 657* (MO 6103344; isotypes: AAU, B, COL, F, GB, K, M, NY, QCNE, S, SEL, US) – Fig. 4A–D.

Internodia 4–6 cm longa; cataphylla decidua; folia petiolo 8–11 cm longo, lamina ovato-sagittata, 10–12 cm longa, 5–6 cm lata, nervis primariis lateralibus 6–7 utroque; pedunculus 4.5–5 cm longus; spatha 2 cm longa, 0.6–1 cm lata; spadix 2 cm longus, 0.2–0.3 cm diam.

Erect, appressed climber, epiphyte; *internodes* 4–6 cm long, 0.5–0.7 cm diam., green, *cataphylls* persisting intact at the upper nodes only, deciduous at lower nodes. *Leaves* with *petiole* terete, green, semiglossy, 8–11 cm long (averaging 9.6 cm), 1–3 cm diam.; *geniculum* 1–2 cm long; *blade* ovate-sagittate, 10–12 × 5–6 cm (averaging 11 × 5.5 cm), 1.8–2 × longer than wide, averaging 1.1–1.25 × longer than petiole, coriaceous, medium dark green, bicolorous, much paler below; *anterior lobe* 8–10 × 2.5–3 cm; *posterior lobe* directed inward, 1.5–2.5 × 2–2.5 cm; *midrib* sharply raised to about $^{6}/_{10}$ of its length, drying brown; *primary lateral veins* 6–7 per side, departing midrib at 45° angle, interprimary veins present. *Inflorescence* nonerect; *peduncle* terete, 4.5–5 × 0.1–0.2 cm diam., light green; *spathe* lanceolate, rounded at base, yellowish light green, weakly glossy, 2 × 6–10 mm wide, inserted at 60° angle; *spadix* short, thin, matte, brownish purple, 2 cm long, 0.2–0.3 cm diam., stipitate to 4 mm.

*Anthurium mendietae* is only known from the type locality in Ecuador in Zamora-Chinchipe Province at 2250 m in a Lower montane forest life zone.

The species is a member of *Anthurium* sect. *Cardiolonchium* and is characterised by its small size, appressed-climber habit, ovate-cordate leaf blades that are twice as long as wide, petiole lengths close to that of the blades and a yellowish light green spathe. This species is related to *A. albidum* in that they both have ovate-cordate


Fig. 4. *Anthurium mendietae* – A: leaf blade, adaxial surface; B–C: inflorescence, side view with stem; D: inflorescence, close-up. – Photographs by G. Mendieta of living plants from the type collection.

leaf blades and a similar length peduncle. However, *A. albidum* has much larger, broader leaves and shorter internodes.

The species was named in honour of Glenda Mendieta Leiva, a Peruvian ecologist from Oldenburg University in Germany, where she is working on her Ph.D. on the community ecology of epiphytes in central Panama, west of the Panama Canal. Glenda discovered the plant at her study site at the Estación Científica San Francisco and Lars Nauheimer, a German student now working on his Ph.D. in Munich, described the fresh plant for the field notes.

***Anthurium quinindense*** Croat, **sp. nov.**
Holotype: Ecuador, Esmeraldas, along road between Santo Domingo de los Colorados and Esmeraldas, 134 km NW of Santo Domingo, 62 km N of Quinindé, 80 km SE of junction to Atacames S of Esmeraldas, disturbed forest along road, 0°35'N, 79°33'W, 270 m, 31.3.1983, *T. B. Croat 55581* (MO 3037650; isotypes: AAU, B, CAS, CM, COL, CUVC, F, G, HUA, K, M, NY, QCNE, PSO, S, SEL, UB, US, VEN) – Fig. 5A–D.

Internodia brevia, 1.5–4 cm diam.; cataphylla 9.5–21 cm longa; folia petiolo 39–74 cm longo, lamina ovato-sagittata, 46–99 cm longa, 48–66.5 cm lata, nervis primariis lateralibus 9–13 utroque; pedunculus 11–18.5 cm longus, 6–7 mm diam.; spatha 13.5–15 cm longa, 1.5 cm lata; spadix 23.3–42 cm longus, marroninus vel atropurpureus.

Terrestrial; *stems* to c. 1 m long; *internodes* short, 1.5–4 cm diam.; *cataphylls* 9.5–21 cm long, narrowly rounded with a short apiculum at apex, yellow-green, soft and pliable, papery thin and drying light brown, weakly 1-ribbed, persisting semi-intact at upper nodes, drying pale brown with close, pale fibres closely parallel. *Leaves* with *petiole* 39–74 cm long, 8 mm diam. midway, subterete, obtusely flattened and weakly and narrowly sulcate, dark green, matte-subvelvety to semiglossy; *geniculum* 3.4–4 cm long, 9 mm diam.; *blade* ovate-sagittate, 46–99×48–66.5 cm, broadest near petiole attachment, 1.3–2.3× longer than broad, as long as petioles, dark green, glossy to weakly glossy above, moderately paler and weakly glossy below; *anterior lobe* 33.5–84.5 cm long, broadly convex along margin; *posterior lobes* 24–28×15.3–19.5 cm; *basal veins* 9(–10), the first free to the base, the remainder branching off the posterior rib at regular intervals, the fifth and higher orders fused to 11 cm long, posterior rib 12.5 cm long, naked to 9–11.5 cm; *sinus* 14–22.5 cm deep, 11–22 cm wide; *midrib* bluntly acute and slightly paler above, narrowly round-raised and moderately paler below; *primary lateral veins* 9–13, narrowly and bluntly acute, concolorous above, narrowly raised and paler below; *tertiary veins* moderately obscure above, darker than surface, in part weakly raised below; *collective veins* arising from one of the lowermost primary lateral veins or the first pair of basal veins, 3–8 mm from margin, moderately loop-connecting with primary lateral veins. *Inflorescence* erect; *peduncle* 11–18.5 cm long, 6–7 mm diam., dark green, matte; *spathe* green, 13.5–15×1.5 cm, soon withering, turning light brown; *spadix* 23.3–42 cm long, 1.1 cm diam. at base, 8–9 mm diam. midway, 5–6 mm diam. at 1 cm from apex, maroon to dark purple [B & K blue-purple 2/10], semiglossy; *flowers* sub-4-lobed, 13–15 visible per spiral, 2.2–2.3×2–2.4 mm; lateral tepals 1.2–1.3 mm wide, obtusely shield-shaped, the outer margin weakly 3-sided; stamens emergent 1–1.5 mm at anthesis before retracting, anthers 0.8×0.25 mm, the thecae scarcely divaricate; pollen pale yellow. *Infructescence* erect-spreading; *berries* purplish violet, emerging before maturity.

*Anthurium quinindense* is believed to be endemic to western Ecuador in Esmeraldas Province between Santo Domingo de los Colorados and Esmeraldas at 270 m in a Tropical moist forest life zone.

*Anthurium quinindense* is a member of *A.* sect. *Cardiolonchium* and is characterised by its short internodes, narrowly and obtusely sulcate petioles, ovate-sagittate, greenish-drying leaf blades as well as by its green, lanceolate spathe and long-tapered, brick red spadix. The species is most easily confused with *A. dolichostachyum,* a species common at a wide range of elevation on the western slopes of the Andes in Ecuador, which has similar leaves and a similarly thin, early withering spathe. That species differs in having a spadix that is creamy white to greenish white, never purple.

The species is also similar to an undescribed species from Reserva Sachawiwa *(Croat & Lynn Hannon 93460)* but that species dries darker, somewhat blacker on the upper surface, has the collective veins 1–3 mm from the margin and an almost reddish violet spadix.

*Holm-Nielsen 25396,* an undetermined collection from near San Miguel in Esmeraldas Province at 200 m elevation (along Río San Miguel at 0°45'N, 78°54'W), might be *Anthurium quinindense* but it has the collective veins arising from the third pair of basal veins and dries darker brown. It is described as having a bordeaux-red spadix but the specimen with the inflorescence has not been seen.

The species is named after the type locality, 'Quininde', in Esmeraldas Province where it was collected.

*Paratypes*. — Ecuador: Esmeraldas: Along road between Santo Domingo de los Colorados to Esmeraldas, 90 km NW of Santo Domingo, 8.8 km NW of Quininde, 85 km SE of Esmerladas, disturbed forest along road, 270 m, 0°26'N, 79°03'W, 31.3.1983, *T. B. Croat 55569* (MO, QCA).


Fig. 5. *Anthurium quinindense* – A: leaf blade, adaxial surface; B: leaf blade, abaxial surface; C: inflorescence; D: infructescence, close-up. – Photographs by T. Croat of living plants from the type collection.

***Anthurium werneri*** Croat, **sp. nov.**
Holotype: Ecuador, Zamora–Chinchipe Province, area of Estación Científica San Francisco 3°58'S, 79°04'W, 1980 m, 15.10.2006, *F. Werner 2099* (MO 6122450; isotype: QCNE) – Fig. 6A–D.

Internodia 8 cm longa, 0.4–0.6 cm diam.; cataphylla 15.5 cm longa; folia petiolo 58 cm longo, lamina 33–38.5 cm longa, 7.9–9.4 cm lata, nervis primariis lateralibus 9–11 utroque; pedunculus 53 cm longus; spatha 12 cm longa, 2.2 cm lata; spadix 10 cm longus, 7 mm diam.

Epiphytic or terrestrial; *stems* to 60 cm long; *internodes* 8 cm long, 0.4–0.6 cm diam., drying medium brown, matte; *cataphylls* 15.5 cm long, 0.8 cm diam., matte, marcescent, ribbed. *Leaves* with *petiole* 58 cm long, subterete to terete, sulcate, faintly ribbed, drying brown, slightly purple tinged; *blade* trisect with median lobe slightly longer and wider than lateral lobes, 33–38.5 × 7.9–9.4 cm (averaging 36.8×8.7 cm), 0.63× as long as petiole, broadest at middle, acute apex, matte, drying green-grey, moderately bicolorous, paler below; *median lobes* 38.5 cm long, 9.4 cm wide, c. 4.1× as long as wide; *lateral lobes* 33–37 cm long, 7.9–9 cm wide (averaging 35×8.4 cm), c. 4.1× as long as wide; *midrib* weakly acute, concolorous above, convexly raised and slightly darker below; *primary lateral veins* 9–11 per side, departing midrib at c. 45° angle, slightly sunken and concolorous above, raised and darker below; *interprimary veins* concolorous above, weakly raised below; collective veins arising from one of the primary lateral veins in lower third of lobe. *Inflorescence* erect; *peduncle* 53 cm long, drying 3 mm diam., slightly shorter than petiole, drying matte, greenish brown; *spathe* 12 × 2.2 cm, oblong, drying matte, light brown; *spadix* 10 cm long, 7 mm diam., sessile, drying purplish brown.

*Anthurium werneri* is endemic to Ecuador, known only from the type locality in Zamora–Chinchipe Province at the Estación Científica San Francisco at 1980 m elevation in Lower montane wet forest.

This species is a member of *Anthurium* sect. *Dactylophyllium* and is characterised by its elongate internodes, marcescent cataphylls, elongate petioles slightly longer than the peduncle, by the trisect leaf blades with the collective veins arising from one of the primary lateral veins in the lower third of the segment and by a slightly longer and wider median lobe than the lateral lobes. In addition, it has a long-pedunculate inflorescence with a cylindric purplish brown spadix.

The species is most easily confused with *Anthurium triphyllum,* which is semiglossy to glossy (both in fresh condition and upon drying), has a spadix that dries reddish brown and a slightly shorter peduncle. The most easily discerned distinction that separates *A. triphyllum* from *A. werneri* is that the leaf segments of the former are significantly shorter, wider and more blunt at the apex. *A. triphyllum* has leaf segments that average 35.8 × 17 cm, while those of *A. werneri* average 36.8×8.7 cm. The blades of *A. triphyllum* are light green and semiglossy on the lower surface, while darker and matte in *A. werneri*. *A. triphyllum* is moderately small and more common, usually terrestrial and occurring mostly in the ravines at Estación Biólogo San Francisco, whereas *A. werneri* occurs higher up on the slopes in the study area, growing as a hemi-epiphyte.

*Anthurium werneri* is named in honour of the German botanist Florian Werner, whose Ph.D. thesis involved the study of epiphytes in Ecuador, especially at the Estación Científica San Francisco between Zamora and Loja. It was in this area where he collected the type material. Werner has been collecting in Ecuador for a number of years and has made many interesting and excellent collections of *Araceae*. Werner's thesis is titled "Effects of human disturbance on diversity and ecology of vascular epiphyte assemblages in the Andes of Ecuador" and he is affiliated with the Department of Systematic Botany of the University of Göttingen.

*Paratype*. — Ecuador: Zamora–Chinchipe: Area of Estación Científica San Francisco, 3°58'S, 79°04'W, 1990 m, 7.2.2005, *F. Werner 1476* (MO, QCNE).

***Philodendron misahualliense*** Croat & C. Cerón, **sp. nov.**
Holotype: Ecuador, Napo, Tena Cantón, 8 km east of Misahualli, 1°04'S, 77°36'W, 400 m, 23.–31.1.1989, *C. Cerón 6047* (MO 3656372; isotype: QCNE 17330) – Fig. 2C–D.

Internodia 4–7.4 cm longa, 1.3–1.6 cm diam.; cataphylla decidua, 18.5–40 cm longa; folia petiolo 27–28.5 cm longo, lamina anguste ovato-triangularis, 29–42 cm longa, nervis primariis lateralibus 5–7 utroque; pedunculus 10.5–25 cm longus; spatha 10.2–12.6 cm longa; spadix 12–13.8 cm longus.

Epiphytic; *stems* to 0.3 m; *internodes* 4–7.4 cm long, 1.3–1.6 cm diam., matte, drying light brown; *cataphylls* deciduous, 18.5–40 cm long. *Leaves* with *petiole* 27–28.5 cm long, matte, quadrangular, drying deep brown; *blade* narrowly ovate-triangular, 29–42×15.5–26.5 cm (averaging 31.4×19.4 cm), c. 1.8× as long as wide, averaging 1.3× longer than the petiole, gradually acuminate at apex, broadly cordate at base, drying grey-brown and glossy above, light brown and semiglossy below, moderately bicolorous; *midrib* concolorous, slightly sunken above, broadly convex below; *primary lateral veins* 5–7 per side, departing midrib at a 45° angle, flat and concolorous above, broadly convex and lighter below; *basal veins* concolorous, coalesced, weakly raised above and flat below. *Inflorescence* erect; *peduncle* 10.5–25 cm long, mat-


Fig. 6. *Anthurium werneri* – A: leaf blade, adaxial surface; B: flowering plant detached from tree; C: stem with base of petioles and cataphylls; D: inflorescence, close-up; photographs by F. Werner of living plants from the type collection.

te, drying deep brown; *spathe* 10.2–12.6×0.8–1.5 cm (averaging 11.6×1.3 cm), matte, drying deep reddish brown; *spadix* 12–13.8×0.6–1 cm drying reddish brown; pistillate portion 4.8 cm long, 8–9 mm in diam.; staminate portion 6 cm long, 9 mm diam.; pistils 1.4–1.5 mm long, 0.8–0.9 mm diam., style about as broad as the pistils, stigma 0.5 mm diam., button-shaped; locules 6–7, ovules basal, 1–3 per locule.

*Philodendron misahualliense* is known only from the type locality in Ecuador (Napo) at elevations of 400 m in a Tropical wet forest life zone.

This species is a member of *Philodendron* sect. *Macrobelium* subsect. *Macrobelium* and is characterised by its long internodes, deciduous cataphylls, narrowly ovate-triangular, subcordate, bicolorous leaf blades that are c. 1.8 × as long as wide and its long-pedunculate inflorescence with a spathe that dries deep reddish brown.

This species is most easily confused with *Philodendron huaynacapacense* Croat and *P. heleniae* subsp. *amazonense* Croat. In *P. huaynacapacense,* the petiole dries greenish yellow-brown, the midrib and primary lateral veins dry much darker than in *P. misahualliense* and irregular purplish dots are present on the lower blade surface. The main distinction appears to be the spathe, which is medium green outside and pale green inside in *P. huaynacapacense. P. heleniae* subsp. *amazonense* dries matte, has bullate leaf blade texture and somewhat cordate blades. The main distinction appears to be the inflorescence, which is much smaller and usually white in *P. heleniae* subsp. *amazonense*.

This species was named after the town of Misahuallí in Napo Province, Tena Cantón, where the type collection was made.

## References

Croat T. B. 2006: A tribute to Lynn Hannon, her contributions to aroid horticulture and systematics. – IAS Newsletter **28(3):** 9–10.

Croat T. B. & Hannon L. P. [in press]: A revision of *Chlorospatha (Araceae)*. – Ann. Missouri Bot. Gard.

Croat T. B., Jackson A. & Kostelac C. V. 2010: New species of *Anthurium (Araceae)* from the Cordillera del Cóndor, Ecuador. – Willdenowia **40:** 123–136. [CrossRef]

Holdridge L. R., Hatheway W. H., Liang T. & Tosi J. A. 1971: Forest environments in tropical life zones. – Oxford: Pergamon.