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Voucher Materials

Descriptions of new species require deposit of type materials in a recognized herbarium.

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Back Cover: *Anthurium walterlewisianum*. Painting commissioned by his wife Memory Elvin-Lewis.

Florula of Araceae from the Cordillera del Cóndor (Ecuador and Peru).

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ABSTRACT

A florula of the Araceae of the Cordillera del Cóndor (Ecuador and Peru) is presented, built from a large set of herbarium collections made in that region over the last four decades. A total of 137 species of Araceae were identified, including 24 species that are published here as new and one new combination. The new species are *Anthurium bomboizense* Croat, *Anthurium chlaron* Croat, *Anthurium corrientense* Croat, *Anthurium ferryae* Croat, *Anthurium ivanportillae* Croat, *Anthurium jamboense* Croat, *Anthurium lapoanum* Croat, D.P. Hannon & Hormell, *Anthurium longistrorsum* Croat, *Anthurium losencuentrosense* Croat, *Anthurium muyunense* Croat, *Anthurium nigrolaminum* Croat & D.E. Weber, *Anthurium pseudoclavigerum* Croat, *Anthurium toasae* Croat, *Anthurium waiwaimense* Croat, *Anthurium walbertii* Croat, *Anthurium walterlevisianum* Croat, *Anthurium yankuamense*

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KEY WORDS

Araceae, Cordillera del Cóndor, Ecuador, Peru.

INTRODUCTION

The Cordillera del Cóndor region is an eastern outlier of the main Andean chain that extends about 150 km from north to

south, rises to a maximum elevation of about 2900 m, and forms part of the international border between Ecuador and Peru. The Cóndor forms part of the discontinuous chain of sub-Andean cordilleras that are situated between the Eastern Cordillera of the Andes and the Amazon lowlands, parallel to the main Andean chain but attaining more modest elevations and separated from the main Eastern Cordillera by lower elevation valleys. Besides the Cóndor, some of the other sub-Andean cordilleras include the Galeras and Cutucú ranges in Ecuador and the Cordillera Azul and Yanachaga ranges in Peru. The sub-Andean cordilleras, situated at the interface between the Andes and the Amazon, are among the most biologically diverse and least known areas on Earth. It is estimated that the flora of the Cordillera del Cóndor exceeds 4,000 species of vascular plants.

For over 160 years, the Ecuador-Peru border in the Cóndor region was in dispute, leading to armed conflict between the two countries in 1941, 1981, and 1995. Following the 1995 border conflict, the two countries began diplomatic negotiations, resulting in a peace treaty in 1998 that established the precise location of the international border. This peace treaty opened the door for extensive botanical explorations by various groups, including extensive field work by scientists affiliated with the Missouri Botanical Garden.

This article focuses on the species of Araceae that were collected over time in the

Cordillera del Cóndor region, based primarily on specimens available at the Missouri Botanical Garden. The region included in this study lies within the boundaries defined in the Missouri Botanical Garden Cordillera del Cóndor project. This comprises an area of about 1.1 million hectares (11,000 km²), including about 700,000 ha in southeastern Ecuador and 400,00 ha in adjacent northern Peru, from ca. 03°00'S to 04°30'S and 78°00'W to 79°00'W. In Ecuador, the study area includes all territory east of the Río Zamora and south of the Río Santiago in Morona-Santiago and Zamora-Chinchipe provinces, the entire watersheds of the Río Coangos in the northern portion, and the Río Nangaritza in the southern portion. In Peru, the study area includes the upper watersheds of the Río Cenepa and Río Comainas and the upper elevation areas adjacent to the Peru-Ecuador border; this area forms part of Condorcanqui province of Amazonas department. The lower portion of the Río Cenepa south of 04°00'S is not included in this study.

This article describes a total of 137 species of Araceae present in the Cordillera del Cóndor region, including 24 species that are published here as new and one new combination. The genera involved are *Adelonema* (2 species), *Anthurium* (71 species), *Caladium* (2 species), *Chlorospatha* (3 species), *Dieffenbachia* (1 species), *Dracontium* (1 species), *Monstera* (4 species), *Philodendron* (28 species), *Rhodospatha* (3 species), *Spathiphyllum* (5 species), *Stenospermation* (7 species), *Syngonium* (1 species) and *Xanthosoma* (9 species).

A determination key is provided to help in the identification of the species located in the Cordillera del Cóndor region, and a list of the specimens seen in the Cordillera del Cóndor region is included for each species.

MATERIALS AND METHODS

To determine which species originated from the study area, a search was first done of the Missouri Botanical Garden Tropicos database to identify the species of Araceae that had been collected in either of the three main geographical regions involved: Morona-Santiago and Zamora-Chinchipe in Ecuador, and Amazonas in Peru. Following this preliminary survey, the Cordillera del Cóndor region, as defined above in the introduction, was mapped on Google Earth, with the major rivers forming its boundaries precisely located. The specimens from each of the species selected in the first survey were then mapped on Google Earth using the tool built in the Tropicos database, and the species with specimens falling within the Cordillera del Cóndor region were then selected for this florula.

RESULTS

A total of 807 specimens of Araceae from the Cordillera del Cóndor were determined to belong to 137 species present in that area. Table 1 lists those species along with the number of specimens identified for each. The new species are indicated in bold.

As can be seen from the Table, the most prevalent species was *Anthurium breviscopum* Kunth with 46 specimens, followed by *Anthurium triphyllum* Brongn. ex Schott (30 specimens), *Anthurium lingua* Sodiro (23 specimens), *Rhodospatha latifolia* Poepp. (22 specimens) and *Monstera lechleriana* Schott (20 specimens). Fifty-five species had only one or two specimens collected from that area.

HISTORY OF ARACEAE COLLECTIONS IN CORDILLERA DEL CONDOR

Table 2 lists the main collectors of Araceae specimens for the Ecuadorian portion of the Cordillera del Cóndor, along with their years of involvement (usually with other collaborators not listed here).

For the Peruvian portion, known collections of Araceae specimens were made by Severo Baldeón in 1987 (Baldeón and Epiquién, 2004), by Hamilton Beltrán and Robin Foster in 1994, and by Severo Baldeón and Mirbel Epiquién in 2003, so that region has been less extensively explored than the Ecuadorian portion.

As can be seen from the Table, the first collections of Araceae in the Cordillera del Cóndor region were made in 1972, by Bruce MacBryde of Pont. Universidad Católica del Ecuador and Missouri Botanical Garden (for details on this first expedition to the Cordillera del Cóndor, see MacBryde 2019). Further collections were made by



Map 1. Map of Ecuador showing the studied area overlapping with adjacent Peru.

George Argent and Brinsley Burbidge in 1976, Thomas Croat in 1980, Gunnar Harling and Lennart Andersson in 1985, and Bradley Bennett in 1988 and 1989. A

more sustained wave of explorations started in 1990 with Jaime Jaramillo, David Neill and Walter Palacios, growing substantially following the peace treaty of 1998. David



Map 2. Close-up of the Cordillera del Cóndor area as defined for this study. The boundaries in Ecuador are formed by the Río Nangaritza to the south, the Río Zamora to the west and the Río Morona to the north. For Peru, the only Araceae collections seen by the authors were those of Beltrán & Foster in 1994 and that location is indicated on the map.

Neill and Thomas Croat were by far the leading collectors, having each made ten visits to the region. Since Thomas Croat focused primarily on the collection of

Araceae specimens, they represent the bulk of the specimens studied as part of this project.

TAXONOMY

Key to the genera of Araceae found at the Cordillera del Cóndor

1. Spadix uniform; flowers hermaphroditic or bisexual.
 2. Plants usually with a single leaf, this arising from a subterranean tuber; blades heavily dissected into 3-sections, each section further divided
Dracontium (*Dracontium spruceanum* (Schott) G.H.Zhu)
 2. Plants usually with 3 or more leaves at a time, arising from creeping terrestrial rhizome (except for *Caladium* and for some *Xanthosoma* species which can be tuberous) or appressed-climbing hemiepiphytes.
 3. Plants terrestrial.
 4. Plants with conspicuous reticulate veins and often with a collective vein; spathe usually lanceolate and persistent
Anthurium
 4. Blades usually with strictly parallel venation; spathe typically broad and deciduous or sometimes narrow and always persistent in *Spathiphyllum*.
 5. Primary lateral veins lacking
Stenospermation
 5. Primary lateral veins prominent.
 6. Spathe promptly deciduous; flowers atepalate
Rhodospatha
 6. Spathe persisting intact; flowers tepalate
Spathiphyllum
 3. Plants epiphytic or hemiepiphytic.
 7. Blades lacking prominent primary lateral veins
Stenospermation
 7. Blades with prominent primary lateral veins
 8. Spathe persistent; berries prominently emerging from the fruiting spadix
Anthurium
 8. Spathe deciduous; berries not conspicuously emergent, merely loosening and falling free.
 9. Blades entire and not perforated, with strictly striate venation, usually oblong-elliptic; seeds cochleate
Rhodospatha
 9. Blades typically perforate or pinnately lobed, rarely oblong-elliptic with striate to more or less reticulate venation; seeds large, subglobose
Monstera

1. Spadix divided into male and female portions.

10. Plants terrestrial.

11. Plants caulescent with a conspicuous, erect stem.; sap not smelling of anise or turpentine.

12. Blades thin with reticulate venation, milky sap and several collective veins.

13. Peduncle slender, often very elongated, contained usually within petiolar sheath *...Chlorospatha*

13. Peduncle thick, short, not ensheathed for most of its length in petiolar sheath *...Xanthosoma*

12. Blades subcoriaceous with parallel venation; sap caustic, smelling foul, usually not white *...Dieffenbachia (Dieffenbachia cannifolia Engl.)*

11. Plants creeping rhizomatous; sap smelling of anise or like turpentine; pistils many and closely compacted.

14. Sap smelling of anise; petioles often armed with spines; blades often pubescent; pistils intermixed with staminodia *...Adelonema*

14. Sap smelling somewhat like turpentine; petioles not armed with spines; blades usually not pubescent; pistils not intermixed with staminodia . . . *...Philodendron*

10. Plants epiphytic or hemiepiphytic.

15. Plants with milky sap; blades pedate, thin with reticulate venation and several collective veins; spathe blade falling off after anthesis; infructescence a globose syncarp with large rounded black seeds . . . *Syngonium (Syngonium podophyllum Schott)*

15. Plants usually lacking milky sap; blades variously shaped but not pedate (in study area), usually subcoriaceous with parallel venation; spathe persistent intact after anthesis; infructescence with berries, usually with many small, more or less elongated whitish or tan seeds *...Philodendron*

SPECIES DESCRIPTIONS

Adelonema Schott, *Prodr. Syst. Aroid.*, 316.
1860. Type: *Adelonema erythropus* Schott.

Curmeria André, *Ill. Hort.*, 20: 45.
1873. Type: *Curmeria picturata* Linden
& André, *Ill. Hort.*, 20: 45. 1873.

Adelonema sect. *Curmeria* (André) S. Y.
Wong & Croat, *Syst. Bot.* 41(1): 34.
2016.

Homalomena sect. *Curmeria* (André)
Engl., *Pflanzenr.*, 55(IV.23Da): 30.

1912. Type: *Curmeria picturata* Linden & André, *Ill. Hort.* 20: 45, t.121, 1873.

Polyphyllous sympodial, terrestrial to paludose, perennial herbs, stems typically short, decumbent with very short internodes, mostly hypogaeus with epigeous portion usually obscured with leaves. Cataphylls lacking or very inconspicuous. Leaves with blades elliptic, lanceolate, ovate, cordate, hastate, peltate, membranaceous or coriaceous, upper surface glabrous, lower surface (sect. *Adelonema*) or pubescent (sect. *Curmeria*), occasionally maculate, venation penni-parallel, petioles glabrous or with trichomes or spines (sect. *Curmeria*). Inflorescences pedunculate; prophylls often present and persistent, intact or fibrous; spathe a closed tube below, open above, constricted in middle, persistent until fruit maturity; spadix stipitate or sessile (sect. *Adelonema*), flowers unisexual, lower portion carpellate, upper portion staminate, a zone of staminodes usually present between carpellate and staminate sections. Carpellate

flowers with ovaries 2–4(5–6)-loculate, ovaries ovoid to oblong or subglobose, placentation parietal or axile, ovules 3-many per carpel, stigmas usually sessile, discoid, orbicular or shallowly 2–6-lobate; staminodes, when present in carpellate flowers, clavate. Staminodes often present (sect. *Curmeria*) between carpellate and staminate flowers consisting of clavate connective. Staminate flowers with 2–4(6) stamens, stamens short, connective truncate, anthers ovoid or oblong, equalling or longer than filament, dehiscent by an oval apical pore or longitudinal slit, pollen elliptical, inaperturate, 15–31 long, 14–20 wide, exine psilate to scabous. Infructescences consisting of obovoid to oblong or subglobose berries; seeds numerous, ellipsoidal or elongate-ellipsoidal, longitudinally striate.

Tropical America, Costa Rica to Colombia, the Guianas, Brazil and Bolivia in the Amazon basin and to Ecuador on the Pacific slope; Thirteen species; 20 expected.

Key to *Adelonema* species

1. Blades triangular-subhastate with posterior lobes projecting at a 45° angle, widest at the tip of the posterior lobes *Adelonema crinipes* (Engl.) S.Y.Wong & Croat
1. Blades ovate-cordate to oblong-lanceolate with posterior lobes subrotund to auriculate *Adelonema picturatum* (Linden & André), SY.Wong & Croat

Adelonema crinipes (Engl.) S.Y. Wong & Croat, *Syst. Bot.* 41: 37. 2016. — *Homalomena crinipes* Engl., *Bot. Jahrb. Syst.* 37: 124. 1905. Type: ex. hort. Herrenhausen, *Wendland s.n.* (holotype, B[†]). — Neotype, designated here: Peru. Loreto: Province Maynas, Iquitos, Munich (Rio Itaya), 03°50'S, 73°20'W, 130 m, R. Vasquez & N. Jaramillo 13038 (K, neotype; isoneotypes. MO, US, USM). **Figures 1–2.** *Wong et al, 2016 failed to designate isoneotypes.

The species is characterized by its terrestrial habit with a subterranean stem, leaves with deeply lobed triangular subhastate blades, and solitary inflorescences with the peduncle reddish and the spathe dark violet-purple to greenish yellow.

Terrestrial to 1.3 m tall; **stem** short, subterranean; **internodes** short, 1.5–4 cm diam.; **cataphylls** reddish purple, acutely 2-ribbed, only the bases persisting. LEAVES with **petioles** 46–100 cm long, obtusely flattened adaxially, medially sulcate, dark olive-green, moderately glossy, sometimes mottled with elongated whitish streaks throughout; **blades** triangular-subhastate, 29–62 cm long, 27–52 cm wide, 1–1.3 times longer than wide, 0.55–0.65 times as long as petiole, deeply lobed at the base with posterior lobes projecting at a 45° angle, acute and acuminate at apex, widest at the tip of the posterior lobes, subcoriaceous, medium to dark green and semiglossy above, moderately paler and matte below,

drying dark brown; **midrib** sunken and moderately paler above, narrowly round-raised and slightly paler below; **primary lateral veins** sunken and paler or concolorous above, convex and moderately paler below; **minor veins** fine, moderately distinct. INFLORESCENCE solitary; **peduncle** 7 cm long, 5 mm diam., reddish or heavily tinged purplish violet, puberulent; **spathe** dark violet-purple to greenish yellow, lightly tinged with faint purple-violet, obscurely pale-spotted, finely ribbed and matte outside with a low medial rib outside, 10–23 cm long, 2 cm diam. furled, 8.6 cm wide flattened, acumen to 1 cm long, tube 2–2.5 cm diam., constriction 1.3–2 cm diam.; **spadix** 9–17 cm long, 1.3 cm diam.; staminate portion with fertile portion creamy white, 10.1 cm long, 9 mm diam. at base, 8 mm diam. midway, 3 mm diam. 1 cm from apex; sterile staminate portion with irregular flowers, 0.7–1.4 cm long, 11 mm diam. at base, 9 mm diam. at apex, ivory-white; pistillate portion medium yellow-green, 5.3 cm long, 3.3 cm long in rear, 11 mm diam. at base, 1.4 cm diam. in middle, 1.2 cm diam. at apex.

Adelonema crinipes ranges from Colombia (Amazonas, Putumayo) to Brazil (Acre), Ecuador (Morona-Santiago, Napo, Pastaza, Zamora-Chinchipe), Peru (Amazonas, Loreto, Madre de Dios, Pasco) and Bolivia (Beni, La Paz, Cochabamba) at 500–1450 (1800) m in a *Tropical wet forest*, *Tropical wet forest*, sometimes and *Premontane wet forest* life zone. Frequently collected in areas of sandy soil often along streams in terra firme or seasonally inundated forests.



Figure 1. *Adelonema crinipes* (Linden & André) S.Y. Wong & Croat. Live plant growing at Missouri Botanical Garden showing leaf blade, adaxial surface.



Figure 2. *Adelonema crinipes* (Engl.) S.Y. Wong & Croat. Live plant growing at Missouri Botanical Garden showing inflorescence with white-spotted purplish spathe and white staminate portion of spadix.



Figure 3. *Adelonema picturatum* (Engl.) S.Y. Wong & Croat (not collected). Live plant showing pubescent, red-violet petioles and leaf blades, adaxial and abaxial surfaces.



Figure 4. *Adelonema picturatum* (Engl.) S.Y. Wong & Croat (not collected). Close-up view of dissected inflorescence showing spathe purple outside and green inside, and spadix with pistillate and staminate portions white.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Nangaritza Canton, Shaimi, Río Nangaritza, 930 m, 04°18'N, 78°43'W, 27 Oct. 1991, *Palacios et al.* 8699 (MO, QCNE); Cordillera del Condor, 822 m, along road between Los Encuentros and El Sarsa, 4.7 km E of Los Encuentros, 03°146'42"S, 78°38'32"W, 26 May 2003, *Thomas B. Croat & Mark Menke* 89443 (MO, QCNE).

Adelonema picturatum (Linden & André), S.Y.Wong & Croat, *Syst. Bot.* 41: 42. 2016. — *Curmeria picturata* Linden & André, *Ill. Hort.* 20: 45, t.121, 1873. — *Homalomema picturata* (Linden & André) Regel, *Gartenflora* 26: 33, t.891, 1877. –Type: *Curmeria picturata*, Pl. CXXI in *Illustration Horticole* 20, 1873 (holotype). [Rendered from a plant cultivated by L. Linden probably in Ghent, Belgium, collected by M. Roezl in ‘Nouvelle Grenade’ in 1872]. **Figures 3–4.**

The species is characterized by a combination of its usually conspicuously pubescent petioles and the reclining inflorescences. *Adelonema picturatum* is the most widely distributed of all neotropical *Adelonema* species.

Herb to ca. 1 m long; **internodes** short, 1.5–5 cm diam; **cataphylls** 8–10 cm long, reddish-brown; **petioles** pubescent, 25–60 cm long, semiterete & sulcate, 0.5–1.5 cm in diam., green to red-violet with grey-white trichomes; sheaths 8–11 cm long, well developed, ± auriculate and

subequal at apex; **blades** membranaceous, ovate-cordate to oblong-lanceolate, (12)25–50(65) cm long, (5.5)12–30(42) cm wide, posterior lobes subrotund to auriculate, apex acuminate, apiculate; **midrib** prominent; **primary lateral veins** 30–45 pairs; **upper surface** glabrous, medium green, occasionally with irregular white stripe along midrib; **lower surface** lighter-colored, pubescent. INFLORESCENCES with **peduncles** 5.5–13 cm long, (7)1.5–8 cm in diam., densely pilose, reddish-maroon; **spathe** 6–16 cm long, 1–2.5 cm wide at the middle, outer surface matte, green to reddish-maroon, inner surface semiglossy, lighter in color, tube to 7 cm long, 3.2 cm diam, to 2.1 cm diam at constriction, spathe blade open at anthesis, apex acuminate; **spadix** 6–14 cm long, pistillate portion 1.9–3.5 cm long, 0.7–1.8 cm diam., adnate adaxially to the spathe for 0.6–1.5 cm, white; staminate portion 2.9–6 cm long, 5–9 mm in diam. at base, 11 x 12 mm diam midway, narrowing toward the bluntly pointed apex, to 3–6 mm in diam., cream-colored, staminodial zone 7–9 mm long, these irregular rhombic, 2–3 mm long, 1–2 mm in diam., truncate; pistillate flowers with ovary 3–5-locular, slightly obovoid, cream to yellow-orange, 1.4–2 mm long, 1–1.5 mm wide at the broadest point; ovules ca. 10 per locule; placentation parietal; stigma sessile, pilose, discoid, depressed in the center, 0.7–1.5 mm in diam., slightly brownish, staminodes absent; staminate flowers consisting of 4–5 stamens, ellipsoidal to rhombic in view from above, 1–2.3 x 0.8–1.8 mm, distal ones smaller, connective truncate, surface irregularly

rhomboidal, 1–1.6 x 0.4–0.5 mm, 0.8–1.8 mm high, thecae lateral, roundish, ca. 0.6 mm in diam., opening by pore, pollen ellipsoidal, inaperturate, ca. 26 wide, exine scabrous.

INFRUCTESCENCES containing many berries; **berries** cylindrical, 4.5–5 mm long, ca. 2 mm in diam., green, crested by the old stigma, many-seeded; **seeds** ellipsoidal, 0.6–1 mm long, 0.5–0.7 mm in diam., testa ribbed, white, semitransparent.

Adelonema picturatum ranges from Panama and Colombia to Peru, disjunct to Guyana, Surinam, and French Guiana at 130–1170 m in *Tropical moist forest*, *Tropical wet forest*, *Premontane wet forest*, and sometimes *Premontane moist forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Región de la Cordillera del Cóndor, cuenca del Río Coangos, Comunidad Shuar de Kuankus, sendero que conduce hacia la comunidad Yunkumas, 03°02'36"S, 78°13'03"W, 850 m, 14 June 2005, *Carlos Morales 1210* (MO, QCNE). **Zamora-Chinchi:** Along the road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 10.7 km E of Los Encuentros, 03°40'40"S, 78°38'28"W, 1066 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89462* (MO, Q, QAP); Along road between Zumbi (on Río Zamora, 7.7 Km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritza, 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Mark Menke 89550* (MO, QCNE); Along road between Zumbi on Río Zamora and summit of Cordillera del Condor

beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 91206* (MO, QCNE); Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 91249* (MO, QCNE); Along road from El Pangui to Zamora, in vicinity of El Pincho, 12.3 km S of El Pangui, left along road to Río Zamora, steep forested hills above Río Zamora, ca. 3.5 km E of El Pincho, 03°34'S, 78°34'W, 800 m, 7 Sep. 2002, *Thomas B. Croat 87237* (MO, QCNE); Along road between Zamora and Gualaquiza, 70.9 km N of bridge over Río Zamora in Zamora, between Los Encuentros and El Pangui, 03°42'S, 78°36'W, 935 m, 4 May 1992, *Thomas B. Croat 72720* (MO, QCNE); Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from the military outpost to Condor Mirador military outpost, 7.1 km S of junction in road to Tandaime, San Marcos and Ecuacoriente copper mine headquarters, 03°36'42"S, 78°28'02"W, 1128 m, 12 Apr. 2006, *Thomas B. Croat 96964* (MO, QCNE); Cordillera del Cóndor region, Parroquia Zurmi, vicinity Las Orquídeas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquídeas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006,

Thomas B. Croat 97143 (MO, QCNE); Cordillera del Cóndor region, parroquia Zurmi, vicinity of Las Orquideas, Cabañas Yancuam, 6 km N of Las Orquideas, 12.1 km S of Zurmi, 19.6 km S of Guayzimi, along steep stream, 04°31'54"S, 78°33'48"W, 869 m, 19 Apr. 2006, *Thomas B. Croat 97276* (MO, QCNE); Along Río Nangaritza, between Las Orquideas and Miasi, 04°17'53"S, 78°39'00"W, 872 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98800* (MO, , QCNE, UB); Valle del Río Nangaritza, Miazzi, sendero al Hito de Miazzi, al este del campamento militar, 04°18'S, 78°40'W, 1000–1100 m, 11 Dec. 1990, *Walter A. Palacios & David A. Neill 6758* (MO, QCNE).

Anthurium Schott, *Wein. Zeitschr. Kunst* 3: 828. 1829 (3rd Quart).
LECTOTYPE: *Anthurium acaule* (Jacq.) Schott. *Pothos acaulis* Jacq., Enum. syst. pl. 31. 1760.

Herbs, usually epiphytic, sometimes terrestrial; stems short to elongate; internodes short to elongate; roots usually numerous at each node; cataphylls usually lanceolate, persistent or deciduous, usually promptly weathering to fibers. Leaves commonly clustered near the end of the stem; petioles usually firm, stiff or flexible, briefly sheathed at base, geniculate at apex, cross-sectional shape highly variable; blades usually subcoriaceous, rarely thin or coriaceous, extremely variable in form, simple and usually ovate, elliptic, or lanceolate, frequently cordate at base or digitately lobed with the lobes united or

divided to the base into distinct segments, net-veined, midrib stout, the primary lateral veins and the basal veins often forming a collective vein along the margin, basal veins often joined to form a posterior rib. Inflorescence one per node, pedunculate; spathe usually flat, inserted on the peduncle at an oblique angle, sometimes decurrent at base, usually lanceolate, rarely ovate or naviculiforme, usually not convolute at the base, usually persistent, usually free before anthesis, usually spreading or reflexed, sometimes erect, sometimes hooding spadix, often colored; spadix uniform, usually gradually tapered to apex, sometimes cylindroid, rarely clavate or globose, sessile or stipitate, many flowered, variously colored; flowers perfect, usually protogynous, closely aggregated in spirals, truncate at apex, the apex usually rhombic, sometimes quadrangular or 4-lobed in outline; the sides of the apex straight or sigmoid to jaggedly sigmoid; tepals 4, flattened throughout most of their length, broader and truncate at apex, usually triangular at apex, the lateral pair covering partly the anterior and posterior pair; pistil usually exposed between the 4 tepals, simple, 2-celled, included or exerted at anthesis; stigma usually a slit-like depression in the apex of the pistil; ovules usually or 2 per cell, rarely 3 or more; stamens 4, usually weakly exerted at anthesis, with only a small part of the filament exposed, the filaments flattened and fleshy, promptly shrinking and withdrawing the anther to the surface of the tepals, less commonly with the stamens protruding well above the tepals, then often persisting, not retracting,

usually the lateral pair of stamens emerging first, followed by the anterior then the posterior stamen; anthers 2-celled, usually broader than long, opening by a longitudinal slit, pollen variously colored. Infructescence usually pendent, sometimes erect; berries ovoid, oblong-ovoid, oblong or obovoid, succulent and juicy, variously colored, 2-celled, usually with one seed per cell;

pericarp moderately thin, mesocarp usually translucent, sweet; seeds usually somewhat flattened, usually with a sticky appendage on at least one end.

Tropical and subtropical America, Mexico to Argentina; Estimated 3000 species.

Key to *Anthurium* species

1. Plants with compound leaves, with segments separated to the base (sect. *Dactylophyllum*).
 2. Blades palmately compound, with 5 or more segments.
 3. Blades with 5–7 leaflets, leaflets either not sinuate or only weakly so *Anthurium pseudoclavigerum* Croat
 3. Blades with at least 7 leaflets.
 4. Large plant with blades with 7–11 leaflets, leaflets broadly sinuate; spathe and spadix dark violet-purple *Anthurium clavigerum* Poepp.
 4. Small plant with blades with 11–15 leaflets, leaflets linear-lanceolate; spathe and spadix green *Anthurium polyschistum* R.E.Schult. & Idrobo
 2. Blades trisect, with 3 segments completely free at the base.
 5. Blades with leaflets linear-lanceolate, 7–9 times longer than wide; petioles red-punctate *Anthurium cutucuense* Madison
 5. Blades with leaflets elliptic to lanceolate, less than 7 times longer than wide; petioles green.
 6. Blades often conspicuously bullate; peduncle purplish red and densely greenish speckled; spadix short, green to purplish *Anthurium arisaemoides* Madison

6. Blades never bullate; spadix cream-colored or green, never purplish.
7. Spadix cream-colored; leaflets lanceolate, 3.5–4.5 times longer than wide.
Anthurium warintsense Croat
7. Spadix green; leaflets elliptic, 2.4–3.0 times longer than wide *Anthurium triphyllum* Brongn. ex Schott
1. Plants with leaves entire, sometimes deeply lobed but the lobes not completely free at the base.
8. Blades trilobed, with anterior and lateral lobes separated almost to the base (sect. *Semaeophyllum*).
9. Blades deeply trilobed with central and lateral lobes slender, linear to oblong, more than 4 times longer than wide, the lateral lobes arcing toward the apex; spadix green; plant drying dark blackish brown *Anthurium grex-avium* Madison
9. Blades with broader lobes, with the lateral lobes projecting mostly outward.
10. Spadix purple, at least when mature.
11. Petiole reddish and square in cross-section; tertiary veins prominent on the upper surface *Anthurium moronense* Croat & Carlsen
11. Petiole green; anterior lobe markedly constricted at the base; tertiary veins not prominent on the upper surface *Anthurium constrictum* Croat & Carlsen
10. Spadix green *Anthurium truncicola* Engl.
8. Blades not deeply divided into three lobes separated almost to the base; ovate, elliptic, lanceolate, cordate, sagittate, subhastate or hastate.
12. Blades hastate, with short and broad medial and lateral lobes, lateral lobes projecting at a 90° angle, sometimes barely lobed at the base; spadix green; plant drying dark blackish brown *Anthurium bomboizense* Croat

12. Blades not hastate with short and broad anterior and lateral lobes.
13. Blades with strong basal veins projecting upward toward the tip of the blade (sect. *Digittinervium*).
14. Blades ovate-triangular, subcordate or truncate at the base, widest at the level of the petiolar plexus; spadix dark purple *Anthurium weberbaueri* Engl.
14. Blades ovate, rounded or truncate at the base, sometimes subcordate, widest at the petiolar plexus; spadix green or lilac.
15. Blades narrowly ovate to oblong-ovate, 1.7–2.7 times longer than wide, drying dark yellow above; spadix green or grayish lilac *Anthurium lingua* Sodiro
15. Blades ovate, 1.2–2.0 times longer than wide, drying greenish to olive above; spadix green *Anthurium ovatifolium* Engl.
13. Blades without strong basal veins projecting upward toward the tip of the blade.
16. Blades ovate, elliptic or lanceolate, sometimes subcordate, never deeply lobed at the base.
17. Plants with large lanceolate or oblanceolate blades forming a dense rosette; stem short, petioles usually much shorter than the blades (sect. *Pachyneurium*).
18. Small plants (for that section) with blades 17–57 cm long, drying light grayish-brown; inflorescences small, with a short and stubby green spadix *Anthurium curtispadix* Croat
18. Larger plants with blades longer than 30 cm; spadix dark purple, sometimes green when immature.
19. Plants of medium size, with blades up to 65 cm long.

20. Primary lateral veins drying orangish on lower blade surface, separated by interprimary veins *Anthurium ernestii* Engl. var. *ernestii*
20. Primary lateral veins drying concolorous with the blade, interprimary veins absent *Anthurium uleanum* Engl.
19. Large plants with blades up to 190 cm long.
21. Spathe entirely purple; blades tapering, rounded or sometimes deeply lobed at the base, drying medium brown *Anthurium barlingianum* Croat
21. Spathe green, often heavily tinged purple.
22. Blades drying pale green or yellowish green.
23. Tertiary veins conspicuously etched above (when fresh); spathe green heavily tinged with purple at margins to purple-red throughout . . . *Anthurium atropurpureum* R.E.Schult. & Maguire
24. Blades 11–75 cm long, (3)5–14 cm wide; collective veins arising from near the base or near the apex; plants occurring as a terrestrial plant in open areas. *Anthurium atropurpureum* var. *atropurpureum*
24. Blades larger (16)45–80(100) cm long, 8–25 cm wide; collective veins usually arising from the middle to upper 1/3 of the blade; plants occurring typically in as an epiphyte or understory plant in forest. *Anthurium atropurpureum* var. *arenicola* Croat
23. Blades prominently pale-pustular on both surfaces, drying yellowish green; spathe green; plants very large *Anthurium banderasense* Croat
22. Blades drying brown or greenish-brown.

25. Blades often pustular or glandular on the lower surface; tertiary veins conspicuously etched above (when fresh). *Anthurium pachylaminum* Croat
25. Blades lacking pustules or glands; tertiary veins not at all etched, mostly obscure. *Anthurium dombeyanum* Brongn. ex Schott
17. Smaller plants often with an elongated stem and with the blades not forming a dense rosette at the base.
26. Blades linear-lanceolate, more than 9 times longer than wide.
27. Blades rounded or obtuse at the base, margins parallel through most of the blade's length; spadix red to violet .. *Anthurium valenzuelae* Croat
27. Blades long-tapering, forming an acute angle at the base, margins rounded; spadix green or yellowish.
28. Leaves with long petioles, drying medium brown *Anthurium fornicifolium* Croat
28. Leaves with short petioles, drying dark grayish-green *Anthurium ceronii* Croat
26. Blades ovate, elliptic or lanceolate, less than 9 times longer than wide.
29. Blades lanceolate, 5–9 times longer than wide.
30. Small plants with blades less than 25 cm long; spathe and spadix maroon *Anthurium achupallense* Croat
30. Larger plants with blades longer than 25 cm; spathe green, sometimes tinged violet.

31. Spadix pale green or yellowish green with the berries early-emergent; blades drying medium grayish-green *Anthurium muyunense* Croat
31. Spadix dark purple.
32. Medium-size plants with the blades lanceolate, drying medium olive-green or brown; spadix thin, drying 3–4 mm diam *Anthurium nangaritense* Croat
32. Larger plants with blades drying light to medium grayish-green; spadix thicker.
33. Large plants with the stems short and thick and short internodes; blades to 160 cm long *Anthurium fasciale* Sodiro
33. Smaller plants with the stems elongate, to 50 cm long; blades to 63 cm long *Anthurium soukupii* Croat
29. Blades ovate or elliptic, less than 5 times longer than wide
34. Small plants with blades less than 30 cm long.
35. Vining plants with long internodes; blades ovate-lanceolate, cordulate at the base, 1.9–3.5 times longer than wide, drying medium green *Anthurium patens* Croat
35. Plants with shorter internodes; blades only rarely cordulate at the base.
36. Plants with elongate stems bearing small blades usually less than 15 cm long (sometimes to 20 cm), with the inflorescences arising from multiple axils along the stem.
37. Spadix purplish or dark purple.

38. Blades thin, drying medium grayish green; inflorescences with a very long peduncle (to 21 cm long) and a very slender spadix *Anthurium clarkei* Croat
38. Blades coriaceous, drying medium brownish green; inflorescences with a short peduncle and a thicker spadix.
39. Blades ovate-elliptic, rounded or obtuse at the base, glandular-punctate on both surfaces *Anthurium bogneri* Croat
39. Blades ovate-lanceolate to linear-lanceolate, tapering and acute at the base *Anthurium obtusum* (Engl.) Grayum
37. Spadix yellow-green; blades with the lower surface brown-punctate *Anthurium scandens* (Aubl.) Engl.
36. Plants larger, blades usually more than 15 cm long, with the inflorescences arising from the apex of the stem.
40. Blades lanceolate-elliptic, obtuse or acute at the base; spadix green, orange, red or purplish . . . *Anthurium mindense* Sodiro
40. Blades ovate to ovate-lanceolate; spadix green or yellow-green.
41. Petioles with very long geniculum, to 5 cm long; blades rounded at the base, long-acuminate to almost aristate at apex; drying medium green or brownish green *Anthurium longegeniculatum* Engl.
41. Petioles with geniculum at most 1.5 cm long.
42. Blades with veins deeply sunken above, raised below, drying greenish brown; tertiary veins prominently reticulate below *Anthurium microspadix* Schott

42. Blades with veins only narrowly sunken above, drying medium green; tertiary veins not prominently reticulate below . . . *Anthurium amoenum* Kunth & C.D. Bouché
34. Larger plants with blades longer than 30 cm.
43. Blades oblong-elliptic, long-tapering into the petiole, drying green or greenish-brown; primary lateral veins 24–43 pairs, closely spaced . . . *Anthurium penningtonii* Croat
43. Blades ovate-elliptic or lanceolate-elliptic, never long-tapering into the petiole primary lateral veins at most 21 pairs.
44. Blades lanceolate-elliptic, narrowly pointed at the apex, 2.8–5 times longer than wide, drying medium brown or medium green (sometimes dark brown) . . . *Anthurium longiusculum* Croat
44. Blades ovate-elliptic, obtuse at the apex, 1.4–3 times longer than wide, drying dark brown or blackish . . . *Anthurium michelii* Guillaumin
16. Blades cordate, sagittate, subhastate, or hastate with prominent lateral lobes.
45. Small plants with thin creeping stems and long internodes; blades at most 45 cm long.
46. Blades subhastate with a deep constriction between the anterior and short posterior lobes, 17–31 cm long . . . *Anthurium dolichocnemum* Croat
46. Blades ovate-cordate, broadly rounded, 15–45 cm long . . . *Anthurium ionanthum* Croat
45. Much larger plants with large blades, short thick stems and short internodes.
47. Cataphylls persisting intact, at least at upper nodes (sect. *Calomystrium*).
48. At least the lower blade surface conspicuously dark glandular-punctate.

49. Both blade surfaces conspicuously dark-glandular punctate, upper surface minutely reddish-brown speckled; cataphylls persisting intact but soon rotting; spadix purple *Anthurium corrientense* Croat
- 49 Only the lower blade surface conspicuously dark-glandular punctate; cataphylls persisting semi-intact; spadix whitish or yellow-green, turning purple after anthesis.
50. Blades narrowly ovate-lanceolate sagittate, 1.4–2.9 times longer than wide, widest near the base . . . *Anthurium effusispathum* Croat
50. Blades broadly ovate-cordate, 1.3–1.5 times longer than wide, widest near the middle *Anthurium longistrorsum* Croat
48. Blade surfaces not glandular-punctate.
51. Blades lanceolate-sagittate or subhastate, 1.7–2.3 times longer than wide, widest near the base.
52. Blades lanceolate-subhastate with posterior lobes projecting outward *Anthurium miaziense* Croat
52. Blades lanceolate sagittate with posterior lobes curving inward *Anthurium walterlewisianum* Croat
51. Blades ovate-cordate or ovate-sagittate, 1.1–1.7 times longer than wide, widest near the middle; spadix pinkish-magenta *Anthurium walbertii* Croat
47. Cataphylls deciduous or weathering into a mass of fibers, sometimes remaining intact on upper nodes.
53. Blades strongly bullate, ovate-triangular-sagittate; tertiary veins prominent on both surfaces; spadix medium green *Anthurium lapoanum* Croat, D.P.Hannon & Hormell
53. Blades not strongly bullate.

54. Blades ovate-cordate-sagittate, widest near or just below the middle.
55. Stem elongate, to 1 m long; blades large, 44–100 cm long, drying dark brown or blackish
Anthurium nigrolaminum Croat & D.E.Weber
55. Stem short; blades smaller, 20–69 cm long, drying medium brown or green.
56. Petioles tinged violet-purple, 4–5-sided or 4–5 winged, the ribs prominent; spathe persisting intact in infructescence *Anthurium sagittatum* (Sims) G.Don
56. Petioles green, not ribbed; spathe not persisting in infructescence.
57. Cataphylls deciduous, with only a few fibers remaining at the base; blades 36–40 cm long; spadix olive-green to green, becoming dark purple *Anthurium breviscopum* Kunth
57. Cataphylls persisting semi-intact at upper nodes, as long pale fibers at lower nodes; blades 47–69 cm long; spadix green, creamy white or yellow to yellowish
Anthurium versicolor Sodiro
54. Blades ovate-, lanceolate- or triangular-sagittate, subhastate or hastate, widest near the base (sect. *Belolonchium*).
58. Small plants with blades narrowly triangular-sagittate or elongate, 1.8–4.7 times longer than wide.
59. Internodes shorter than broad; blades very narrow, 16–54 cm long, to 4.7 times longer than wide; spathe purple with greenish lines; spadix usually purplish with prominently exerted stamens.

60. Primary lateral veins 9–14 pairs, arising at a 50–70° angle; sinus semi-circular to hippocrepiform or spatulate, sometimes closed at the end; blades drying reddish-brown on the lower surface *Anthurium variegatum* Sodiro
60. Primary lateral veins 6–9 pairs, arising at a 30–50° angle; sinus parabolic to arcuate; blades brownish-green on the lower surface *Anthurium flavolineatum* Sodiro
59. Internodes longer than broad; blades less narrow, 20–30 cm long, 2.3–4 times longer than wide; spathe usually green or green tinged with purple; spadix usually green, sometimes purple or red tinged *Anthurium oxybelium* Schott
58. Blades wider, at most twice as long as wide.
61. Blades triangular-sagittate, without a marked constriction at the junction between the anterior and posterior lobes; spadix yellow *Anthurium chloron* Croat
61. Blades with a marked constriction between the anterior and posterior lobes.
62. Blades hastate with long lateral lobes projecting outward and arcing only slightly backward, drying dark greenish brown above, medium brown below; spadix purplish violet *Anthurium effusilobum* Croat
62. Blades sagittate, subhastate or hastate with posterior lobes projecting markedly backward or inward, at least at the tip.
63. Blades triangular-subhastate or hastate, with posterior lobes projecting outward then curving markedly backward; sinus arcuate, broadly open.
64. Blades drying dark reddish-brown above, medium reddish-brown below; spadix reddish-violet *Anthurium berthae* K. Krause

64. Blades not drying dark reddish-brown; spadix greenish.
65. Blades very large (88–94 cm long) with the posterior lobes directed toward base but turned up prominently at 45° angle to midrib; spadix greenish-yellow tinged faintly violet-purple
Anthurium yankuamense Croat
65. Blades smaller (34–53 cm long) with the posterior lobe not turned up at the rib; spadix pale green to cream
. . . *Anthurium pallidispadix* (Croat) Delannay et al.
63. Blades ovate-triangular-sagittate with the posterior lobes curving inward; sinus reniform or hippocrepiform, sometimes arcuate.
66. Tertiary veins prominently raised below; posterior rib strong, broadly curved, naked 10 cm; blades drying reddish-brown *Anthurium ferrya* Croat
66. Tertiary veins not prominently raised below; blades not drying reddish-brown.
67. Spadix dark violet-purple.
68. Inflorescences long-pedunculate with a large ovate spathe and the spadix to 23 cm long, stipitate 1.5 cm.; collective veins arising from one of the upper primary lateral veins
Anthurium wainwaimense Croat
68. Inflorescences much smaller, with the spathe lanceolate and the spadix sessile or only slightly stipitate.

69. Collective veins arising from the middle to lower primary lateral veins; sinus hippocrepiform, open
Anthurium losencuentrosense Croat

69. Collective veins arising from the 1st pair of basal veins; sinus reniform or closed, rounded *Anthurium ivanportillae* Croat

67. Spadix green or yellow-orange at anthesis.

70. Blades drying dark brownish-green above; spadix green or yellow-orange at anthesis *Anthurium toasae* Croat

70. Blades drying medium grayish-brown above; spadix pale green . . . *Anthurium jamboense* Croat

Anthurium achupallense Croat,
Willdenowia 40: 123. 2010. Type:
 Ecuador, Morona-Santiago:
 Campamento Achupalla, Cordillera
 del Cóndor, 15 km E of Gualaquiza,
 03°27'S, 78°22'W, 2090 m, 21 July
 1993, *A. Gentry* 80287 (holotype:
 MO; isotypes: F, K, QCNE, US).
Figures 5 & 6.

The species is a member of what is probably an undescribed section but is closest to *Anthurium* sect. *Decurrentia*. It is characterized by its terrestrial habit, internodes longer than broad, its coriaceous, erect-spreading, short-petiolate leaves, oblong, epuncate blades with blunt apex with a short nipple as well as by its maroon spathe and \pm cylindroid maroon spadix.

Terrestrial, **stem** to 30 cm or more, elongate and shortly erect; **roots** lax; **internodes** 2.1–5.5 cm long, 1.5–2.6 cm diam. (averaging 3.9×2 cm), variable in length, drying light brown to dark brown-black, matte, prominently ribbed (sometimes closely and regularly ridged on lower internodes); **cataphylls** 5.7–9.5 cm long, drying intact, tan to dark reddish brown, matte to semiglossy, weathering toward base. LEAVES scattered along stem, \pm erect; **petiole** 4.4–20.7 cm long (averaging 12.4 cm) and 0.2–0.4 cm diam., cross section terete, obtusely sulcate, slightly ribbed, drying light brown to reddish brown, upper surface sulcate and lower surface rounded, petiole margins obtusely raised; geniculum 5–10 mm long, 3–5 mm diam., prominent, slightly wider than petiole, acutely sulcate, drying dark reddish



Figure 5. *Anthurium achupallense* Croat (Gentry 80287, MO-4604328). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.



Figure 6. *Anthurium achupallense* Croat (Gentry 80287, MO-4631346). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and infructescence.



Figure 7. *Anthurium amoenum* Kunth & C.D. Bouché (Croat *et al.* 97990). Live plant showing leaf blades, adaxial surfaces, and inflorescences.

brown to dark brown; **blade** oblong, 18.6–25.4 cm long, 2.5–5.1 cm wide (averaging 22.1×3.2 cm), 4.9–9.2 \times longer than wide, 1.1–4.3 \times longer than petiole, acute at apex with a short protruding nipple, apex gradually acuminate and weakly emarginate, acute at base, coriaceous, somewhat bicolorous, matte, drying yellowish brown to light brown or dark brown and matte above, brown to dark reddish brown and matte below; upper surface longitudinally

irregularly short-ridged; lower surface densely dark speckled with warty bumps and pale granulations along and on major veins; margins prominently revolute; **major veins** sometimes purplish below; **midrib** narrowly raised and concolorous above, forming deep valley upon drying, narrowly raised and paler below, rounded, drying longitudinally ridged, light brown; **primary lateral veins** 8–9 pairs, departing midrib at a 30–35° angle, drying concolorous and

weakly raised on upper surface, weakly raised and concolorous on lower surface; **collective veins** arising from base, 3–5 mm from margin, drying sunken above, bluntly raised below, antimarginal veins present, not visible above, bluntly raised below, much more prominent than primary lateral veins, **basal veins** 1–2 pair, both free to base, **collective vein** arising from the primary or uppermost basal vein. INFLORESCENCES erect; **peduncle** 27.5–32.3 cm long (averaging 29.2 cm), drying dark brown to reddish brown, matte, with deep folds, slender with irregular ridging; **spathe** reflexed- spreading, ovate-lanceolate, 3-dimensional shape fully expanded (as opposed to boat shape), 3.7–5.4 cm long, 1–1.7 cm wide (averaging 4.6×1.4 cm), maroon; **spadix** 0.25–0.75 cm stipitate, 3.3–9.7 cm long, 5–8 mm diam. (averaging 5.8×0.63 cm), cylindroid, maroon; **flowers** 5–6 visible per spiral, 1.8–2 mm long and wide, tepals matte, minutely granular, 1.4–1.8 mm wide, outer margin 2–3-sided, inner margin broadly rounded, stamens emerging just above tepals, 0.4 mm long, 0.6 mm wide, promptly retracting beneath tepals; **berry** color and seed number not known.

Anthurium achupallense is endemic to the Cordillera del Cóndor, known only from Morona-Santiago and Zamora-Chinchipec at 2090–2420 m in a *Premontane wet forest* life zone on exposed ridges in nearly level sandstone with very dense, dwarf montane forest and low dense montane scrub.

Specimens seen: ECUADOR. **Zamora-Chinchipec:** Centinela del Cóndor, Cordillera del Cóndor, Machinaza plateau summit area, adjacent to obelisk-shaped border marker, at end of trail from upper Río Paquisha military post, precisely at Ecuador-Peru border, 03°53'50"S, 78°28'40"W, 2420 m, 15 Mar. 2008, *D. Neill & N. Quizhpe* 16170 (MO, NY, QCNE, US); *D. Neill & N. Quizhpe* 16173 (MO, NY, QCNE, US);. Cordillera del Cóndor, the Machinaza plateau, one of the highest-elevation Hollín sandstone plateaus in the Cóndor region, about 500 m west of the Ecuador-Peru international border, near end of trail from Paquisha Alto military post, 03°54'06"S, 78°28'57"W, 2315 m, 23 June 2009, *David A. Neill & Camilo Kajakai* 16941 (AAU, B, ECUAMZ, F, LOJA, MO, NY, QCNE, S).

Anthurium amoenum Kunth & C.D. Bouché, *Index Sem. (Berlin)* 1848:1. 1848. Type: Venezuela. Tovar [Colonia Tovar], Moritz 325 (B, not seen). **Figures 7–10.**

The species is a member of the section *Xialophyllum* and is characterized by its small size, ovate-elliptic blades, and by its inflorescences with a green spathe and a spadix medium green or yellow-green with the pistils early-emergent.

Terrestrial; **stem** to 0.5 m; **internodes** 2–5 cm long, 7–8 mm diam., medium to dark green, weakly glossy, **cataphylls** deciduous. LEAVES with

petioles 11–23 cm long, 2 mm diam., medium green, tinged purplish, weakly glossy, sulcate weakly adaxially, narrowly flattened adaxially; **blades** moderately thin, ovate-elliptic, 19–31 cm long, 5.5–10.5 cm wide, 2.2–3.6 times longer than wide, 1.35–1.75 times longer than petiole, obtuse or rounded at the base, long-acuminate at the apex, dark green and matte-subvelvety above, paler and matte below, drying medium green above, light yellowish green below; **midrib** narrowly raised and concolorous in deep valley above, narrowly round-raised and paler below; **primary lateral veins** 8–13 pairs, arising at a 35–50° angle, narrowly sunken and concolorous above, bluntly acute and slightly paler below; **collective veins** arising from the 2nd pair of primary lateral veins, running 3–5 mm from margin; **tertiary veins** flattened and darker than surface. INFLORESCENCE erect; **peduncle** 7.5–29.5 cm long; **spathe** lanceolate, 2–5 cm long, 4–12 mm wide, green, reflexed, purple at base; **spadix** 2.5–7 cm long, 5–7 mm diam., medium green or yellow-green, weakly glossy; pistils early-emergent. INFRUCTESCENCE green; **berries** green.

Anthurium amoenum ranges from western Venezuela to Colombia, Ecuador, Peru and Bolivia in a *Premontane wet forest* life zone.

Specimens seen: ECUADOR. **Morona-Santiago:** Along road into Cordillera del Condor departing from Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via

Numbaime into Cordillera del Condor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 91013* (AAU, B, CAS, F, GB, K, MO, NY, S, SEL, US); Cordillera del Cóndor, Cuangos, 20 km east of Gualaquiza, near disputed Peru-Ecuador border, cloud forest, 03°29'S, 79°14'W, 19 July 1993, *Alwyn H. Gentry 80249* (MO, QCNE). **Zamora-Chinche:** Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from the military outpost to Condor Mirador military outpost, 7.1 km S of junction in road to Tandaime, San Marcos and Ecuacoriente copper mine headquarters, 03°36'42"S, 78°28'02"W, 1128 m, 12 Apr. 2006, *Thomas B. Croat 96931* (MO, QCNE); Cordillera del Cóndor region, parroquia Zurmi, vicinity of Las Orquideas, Cabañas Yancuam, 6 km N of Las Orquideas, 12.1 km S of Zurmi, 19.6 km S of Guayzimi, along steep stream, 04°31'54"S, 78°33'48"W, 869 m, 19 Apr. 2006, *Thomas B. Croat 97270* (MO, QCNE); 10 km E of Paquisha, lumber tracks in primary forest, 03°55'00"S, 78°37'00"W, 1400–1500 m, 13 Apr. 1985, *Gunnar Wilhelm Harling & Lennart Andersson 24062* (MO, QCA); Along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89486* (MO, QAP); Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July



Figure 8. *Anthurium amoenum* Kunth & C.D. Bouché (Croat *et al.* 97990). Close-up view of stem with adventitious roots and bases of petioles.

2004, Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntia Katan 91180 (AAU, GB, K, MO, NY, S, US); Along the road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 10.7 km E of Los Encuentros, 03°40'40"S, 78°38'28"W, 1066 m, 26 May 2003, Thomas B. Croat & Mark Menke 89458 (MO, QCNE); Thomas B. Croat & Mark Menke 89461 (MO, QCNE); Along road from near Paquisha south to Las Orchídeas, and end of river at Río

Nangaritzza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 37.3 km S of junction, 12.3 km N of Las Orchídeas, 04°08'25"S, 78°38'31"W, 886 m, 17 July 2004, Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntia Katan 91414A (MO, QCNE); Along road between Los Encuentros and El Sarsa, 4.7 km E of Los Encuentros, 03°46'42"S, 78°38'32"W, 822 m, 26 May 2003, Thomas B. Croat & Mark Menke 89440 (MO, QCNE); Along



Figure 9. *Anthurium amoenum* Kunth & C.D. Bouché (Croat *et al.* 97990). Close-up view of leaf blade, adaxial surface.

road from near Paquisha, south to Las Orchídeas, and end of road at Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 47.0 km S of Intersection near Paquisha, 2.6 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91353* (MO, QCNE); Along road from near Paquisha south to Las Orchídeas and end of road on Río

Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91248* (MO, QCNE); Cordillera del Cóndor, parroquia Zurmi, vicinity of Las Orquídeas, Cabañas Yancuam, ca. 3 km S of Las Orquídeas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1128–1250 m, 18



Figure 10. *Anthurium amoenum* Kunth & C.D. Bouché (Croat *et al.* 97990). Close-up view of inflorescence showing green spathe and green spadix with early-emergent pistils.

Apr. 2006, *Thomas B. Croat* 97201 (MO, QCNE); Parroquia Guayzimi, Campamento Militar Miazzi, al sur del río Nangaritzza, Bosque muy húmedo premontano, topografía ligero colinada, Transectos de 50 x 2 m (0.1 ha.), 04°16'S, 78°42'W, 1060–1100 m, 21 Oct. 1991, *Carlos E. Cerón, Marcelo Chango, Valdano Tapur & Gerardo Aymard* 16966 (MO); Along road between Namirez on Río Zamora to Nambija, 7.9 km E of San Carlos, 04°03'42"S,

78°47'51"W, 1733 m, 19 July 2004, *Thomas B. Croat* 91485 (MO, QCNE); Along road from Namirez to Nambija, along mining road, 10.0 km S of Namirez and Río Zamora, vicinity of Nambija, along road to mine headquarters ca. 5 km long, just south of Nambija, 04°03'44"S, 78°47'29"W, 23 July 2004, *Thomas B. Croat* 92049 (AAU, B, GB, MO, , QCNE, S). PERU. **Amazonas:** Cordillera del Condor, Puesto de Vigilancia Alfonso Ugarte (PV 3), cabeceras del Río



Figure 11. *Anthurium arisaemoides* Madison (Croat *et al.* 88692). Live plants showing petioles and trisect blades, adaxial and abaxial surfaces.



Figure 12. *Anthurium arisaemoides* Madison (Croat *et al.* 88692). Close-up view of inflorescence showing green spathe and purple spadix.

Comainas, tributario al oeste del Río Cenepa, Quebrada abajo del campamento, 03°55'S, 78°25'W, 1200 m, 20 July 1994, *Hamilton Beltrán & Robin B. Foster 1121* (MO).

Anthurium arisaemoides Madison, *Selbyana* 2(2–3): 249. 1978. Type: Ecuador: Morona-Santiago: Cordillera de Cutucú, general region of 02.46'S, 78.06'W, elev 1700 m, Nov 1976, *M. T. Madison, M. Bush & Davis 3433* (holotype, SEL). **Figures 11 & 12.**

The species is a member of section *Dactylophyllum* and is recognized by its trisect blades with all segments attenuated at the base and usually with a noticeable petiolule, by having the peduncle longer than the petioles and a short green to purplish spadix. The lateral segments are usually markedly inequilateral with 2–3 primary lateral veins clustered near the base of the blade with all but the innermost merging with the margin in the lower 1/3–1/2 of the blade. The species is highly variable in the texture of the blades with some populations having conspicuously bullate upper blades surfaces.

Epiphytic creeper or terrestrial herb usually low to the ground but sometimes erect to 1.5 m, sometimes an epiphytic creeper to between 30 cm and 1.5 m; **stems** usually moderately short; **internodes** elongate (1)3–10.5 cm long, 6–10 (15) mm diam., medium to dark green or gray-brown,

matte to semiglossy; **cataphylls** 4–7.5 cm long, green tinged purple, uppermost intact, deciduous or persisting as white membranaceous fibers at upper nodes. **LEAVES** evenly spaced along an elongate stem; **petioles** 9–41 cm long, 2–3 mm diam., terete or obtusely D-shaped or flattened, narrowly and shallowly or bluntly sulcate abaxially, slightly paler and rounded abaxially, dark yellow-green to medium green to purple-violet, weakly glossy to semiglossy; geniculum 12 mm long, swollen, especially abaxially, narrowly sulcate adaxially; **blades** trisect, 8–29.5 cm long, 2–11 cm wide (2–4 times longer than wide), broadest at the middle, conspicuously bullate, subcoriaceous, light green to dark green and semiglossy to matte or weakly glossy above, moderately paler, matte to weakly glossy and net-sunken below; **midrib** narrowly or bluntly acute or raised and concolorous above, thicker than broad, narrowly rounded and slightly paler or reddish purple below; **primary lateral veins** 5–8 per side, departing midrib at a 30–40 degree angle, thicker than broad, etched-sunken and concolorous above, bluntly acute, narrowly raised, convex and concolorous below; **tertiary veins** moderately obscure, weakly etched or deeply sunken above, obscure or raised below. **INFLORESCENCES** axillary, erect; **peduncle** half as long as petiole, terete, erect, purplish red, densely greenish speckled, 5 mm diam., weakly glossy; **spathe** ovate to oblong-linear, 5–8.3 cm long, 1–2.5 cm wide, reflexed, oblong, shorter than spadix, pale to medium green, tinged purple, erect-spreading, semiglossy

outside, weakly glossy inside, reflexed; **spadix** sessile or with stipe 2–5 mm long, tapered, erect, 3–9 cm long, 6–8 mm diam. near base, 5–6 mm diam. at 1 cm from apex, dark yellow-green to pink, usually becoming purple at anthesis, matte. INFRUCTESCENCE with **spadix** purplish violet, with **berries** green, early emergent, ovoid, medium green, dark green at tip.

Anthurium arisaemoides ranges from Ecuador (Pastaza, Morona-Santiago, Zamora-Chinchipe) to Peru (Loreto) at 300–2000 m in *Tropical moist forest* and *Tropical wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** NW range of Cordillera del Cóndor; a short distance N and NW of base camp overlooking Río Zamora at headwaters of Río Piuntza, 1830 m, 6 Jan. 1972, *MacBryde 996* (MO); Cordillera del Condor, Valle del Río Coangos, Río Tsurim entre los centros Shuar de Numpatkain y Banderas, 03°20'44"S, 78°14'08"W, 1100 m, 21 Oct. 1999, *P. Fuentes et al 1135* (MO, QCNE); Along road into Cordillera del Condor departing from Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via Numbaime into Cordillera del Condor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Croat et al. 91002* (AAU, CAS, GH, HUA, M, MEXU, MO, QCNE, RSA, S, SEL, TEX); *Croat et al. 91011* (K, MO, QCNE); Limón, Indanza, Cordillera del Cóndor región, Valley of Río Coangos, E of Shuar village of Tinkimints, 03°15'25"S, 78°12'50"W,

1000 m, 25 Mar. 2001, *Neill & Manzanares 13209* (MO, QCNE); Cordillera del Cóndor, trail from Comunidad Warints to camp 1 towards crest of Cordillera del Cóndor, 03°13'58"S, 078°15'11"W, 830–1200 m, 11 Dec. 2002, *Clark et al. 6945* (MO, QCNE, US); Cordillera del Condor, trail from camp 2 to camp 1, ca. 15–20 km S/SE from the Comunidad Warints) 03°13'S, 78°16'W, 1400–1900 m, 16 Dec. 2002, *Clark 7048* (MO, QCNE, US); Cordillera del Cóndor, Parroquia Santa Susana, Kuankus, comunidad Shuar, Cumbre del Cerro Chuank Naint, 03°03'40"S, 78°14'21"W, 1250 m, 19 June 2005, *Tuntiak Katan et al. 308* (QCNE, MO). **Zamora-Chinchipe:** Cordillera del Condor, Los Encuentros to Military outpost via Paquisha Alto, 03°49'S, 78°36'W, 1350 m, 11 Nov. 1995, *Thomas B. Croat 78249* (MO, QCNE); Along road from Tandaime to Condo Mirador, 18.4 km beyond the turnoff near the military check point near Tundaime, 03°38'12"S, 78°25'49"W, 1570 m, 20 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98889* (MO, QCNE); Vicinity of Ecuacorrientes copper mine concession, vicinity of mine site, along trail above parking area near end of road, 03°34'54"S, 78°26'06"W, 1330–1360 m, 21 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98974* (MO, QCNE); Condor Mirador, provisional old botanical garden near road, along old ill-defined trail to summit, on right side below current landslide blocking road, 03°38'12"S, 78°25'49"W, 1400 m, 23 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 99123* (MO, QCNE); Vic. El Pangui, hills west of town, 03°40'S, 78°37'W, 1200 m, 7 Sep. 2002, *Croat 87185* (MO, QCNE);

Cordillera del Condor, SE of Los Encuentros, 16 Apr. 1996, *Croat 75196* (MO, QCNE); Along road from Namirez (22.3 Km S of Yanzaza) to Nambija, 8.1 km S of San Carlos, 04°03'37"S, 78°47'25"W, 1524 m, 28 May 2003, *Croat & Menke 89634* (MO, QCNE); Along road from Namirez on Río Zamora and Nambija, 17.9 km E of Río Zamora, 04°03'57"S, 78°47'36"W, 1790 m, 19 July 2004, *Croat 91525* (MO, QCNE). Nangaritza, Parroquia Guayzimi, camino al Hito de Pachicutza desde el Campamento Militar, 04°07'S, 78°37'W, 1050–1100 m, 19 Oct. 1991, *Cerón et al. 16829* (MO). El Pangui, vicinity of Ecuacorrientes copper mine development, valley of Río Waiwaime, 8.1 km S of mine headquarters on road to mine site, 03°35'51"S, 78°25'57"W, 1291 m, 7 Apr. 2006, T. *Croat, C. & S. Davidson 96739* (CUVC, MO, QCNE).

Anthurium atropurpureum R.E.Schult. & Maguire, *Bot. Mus. Leaflet. Harvard Univ.* 16: 60. 1953.

Anthurium atropurpureum var. **atropurpureum**. Type: Colombia. Amazonas: Quebrada Agua Preta, Black & R.E. Schult 46–375 (holotype, GH). **Figure 13.**

This species is a member of sect. *Pachyneurium* and is characterized by its elliptic leaf blades, with the tertiary veins conspicuously etched above (when fresh), by its adaxially sulcate petioles, and its purple, scarcely tapered spadix subtended by

a purple-tinged spathe that withers at anthesis.

Terrestrial or rarely epiphytic; **stem** to 30 cm long, 1.5–2 cm diam.; **roots** mostly descending, 3–30 cm long, 2–4 mm diam.; **cataphylls** subcoriaceous to coriaceous, 1–7 cm long, narrowly acute at apex, drying pale brown, persisting intact, sometimes as a reticulum of fibers with the apex remaining intact. LEAVES erect; **petioles** 2–25 cm long, 2–8 mm diam., bluntly D-shaped or terete to subterete, obtusely or narrowly sulcate, sometimes weakly flattened adaxially, rounded abaxially, surface sometimes pale-speckled; geniculum thicker and paler than petiole, concolorous when dried, becoming fissured transversely with age, occasionally to 2.5 cm remote from the base of the blade, 0.5–1.5 cm long; **blades** subcoriaceous to coriaceous, mostly elliptic, often narrowly so, acuminate at apex (the acumen flat), attenuate or acute at base, 11–75 cm long, (3)5–14 cm wide, broadest at or near the middle, the margins flat to undulate; upper surface semiglossy to glossy, medium green, lower surface matte to semiglossy, sometimes paler, drying pale green; **midrib** convexly raised to angular at base, becoming narrowly raised toward the apex above, broadly acute at base below, becoming conspicuously and acutely raised to narrowly raised toward apex, paler than surface when dried; **primary lateral veins** 5–11 per side, departing midrib at (30)50–60° angle, mostly arcuate-ascending, rarely straight to the collective vein, raised above, prominently convexly raised below; **interprimary veins** rarely present, etched



Figure 13. *Anthurium atropurpureum* R. Schultes & Maguire var. *atropurpureum* (Croat 85747). Live plant showing leaf blades, adaxial and abaxial surfaces, and inflorescence.

above, flat below; **tertiary veins** visible, usually weakly etched above, prominulous and darker than surface below; **collective vein** arising from near the base or near the apex, sunken above, raised below, 5–10 mm from margin. INFLORESCENCES erect, shorter than or equaling leaves; **peduncle** (8)15–47.5 cm long, 2–5 mm diam., 1.3–4 x as long as petiole, terete; **spathe** spreading to reflexed, withering at anthesis, subcoriaceous, streaked with raphides when dried, green heavily tinged with purple at margins to purple-red throughout, lanceolate to linear-lanceolate, 2–15 cm long, 0.5–2.2 cm wide, broadest near base,

inserted at 90° angle on peduncle, acute to narrowly acute at apex, acute at base; stipe 3–15 mm long in front, 2–8(12) mm long in back; **spadix** usually deep purple, sometimes maroon to brown, cylindroid to long-tapered, erect, 2–14 cm long, 3–8 mm diam. near base, 2–4 mm diam. near apex, broadest at the base; **flowers** rhombic or 4-lobed, 1.6–2.2 mm in both directions when fresh, 1.8–2.4 mm in both directions when dried, the sides straight or smoothly to jaggedly sigmoid, 4–8(10) flowers visible in either spiral; tepals matte, muricate, weakly to conspicuously and minutely papillate, the papillae maroon; tepal surface olive-green;

lateral tepals 0.6–1.5 mm wide, the inner margins straight to concave, the outer margins straight to weakly 4-sided; pistils emergent, raised, the exposed portion + square, 0.6–0.7 mm in both directions, dark purple to green tinged with purple; stigma ellipsoid to oblong, 0.5–0.6 mm long, 0.2–0.3 mm wide, papillate, densely brush-like; stamens emerging rapidly from the base, in a scattered pattern, the laterals preceding the alternates by ca. 8 spirals, the 3rd stamen preceding the 4th by ca. 2 spirals, held against the pistil; anthers greenish yellow, 0.4–0.6 mm long, 0.5–0.8 mm wide; thecae ellipsoid, slightly divaricate; pollen yellow-orange, creamy when dried. **INFRUDESCENCE** with **spathe** withered; **spadix** 4–13 cm long, the stipe 0.5 cm long; **berries** dark purple to deep red, globose to ellipsoid, 5–6 mm long, 4–6 mm diam.; pericarp dry, thickened with numerous raphide cells; **seeds** 2 or frequently 1 per berry, oblong-ellipsoid, 3.6–4.4 mm long, 1.8–2.4 mm diam., 1.2–1.4 mm thick, with a gelatinous appendage.

Anthurium atropurpureum ranges from southern Colombia to Brazil (Acre) and in western Bolivia, at low elevations (100–1800 m) in *Tropical moist forest* and *Premontane wet forest* life zones.

Anthurium atropurpureum comprises three sympatric varieties. *Anthurium atropurpureum* var. *arenicola* is a forest epiphyte or an understory terrestrial herb and greatly exceeds the typical variety in size. Variety *thomasi* is endemic to the Serrania de Huanchaca in Bolivia.

Anthurium atropurpureum var. *atropurpureum* ranges from southern Amazonas Dept. in Colombia to Maynas Province (Dept. Loreto) in Peru, as well as Acre and the eastern edge of Amazonas in Brazil, at low elevations in a *Tropical moist forest* life zone. It is distinguished from var. *arenicola* by its much smaller leaves with the collective veins arising from near the base instead of from the upper 1/2 and to 1/3 of the blade. The varieties *atropurpureum* and *arenicola* share similar soil preference and geographical ranges, although the former is more often terrestrial.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Al norte del centro Shuar-Shaime, topografía colinada, sustrato hojarasca, Entisol, 04°21'S, 78°40'W, 1000–1100 m, 27 Oct. 1991, *Carlos E. Cerón* 17234 (MO); Vicinity of El Pangui, east of El Pangui, across Río Pachicuza, 0.5 km east of river, disturbed virgin forest along stream, 03°39'48"S, 78°34'11"W, 900 m, 6 Sep. 2002, *Thomas B. Croat* 87149 (MO, QCNE); Vicinity of Las Orquídeas, near Cabañas Yankuam, along Río Nangaritzza, Los Tepuis Conservation Area, 04°15'08"S, 78°39'53"W, 1220 m, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* *Thomas B. Croat & Geneviève Ferry* 98715 (MO, QCNE, UB).

Anthurium atropurpureum* var. *arenicola
Croat, *Ann. Missouri Bot. Gard.* 78: 604–606, 1991. Type: Ecuador. Napo: Road between Lago Agrio and Río San Miguel, 3 km N of Lago Agrio, 00°05'N, 76°50'W, 450 m, 3 Oct., 1980, *Thomas B. Croat* 50303



Figure 14. *Anthurium atropurpureum* R. Schultes & Maguire var. *arenicola* Croat (Croat *et al.* 105843). Live plant showing leaf blade, adaxial surface, and inflorescence with light purple spadix.

(holotype: MO; isotypes: AAU!, B!, BM!, CAS!, CM!, COL!, G!, GH!, IBE!, INPA!, K!, NY!, QCA!, RSA!, SEL!, US!, W!). **Figures 14 & 15.**

Anthurium atropurpureum var. *arenicola* is distinguished vegetatively by its mostly oblanceolate leaf blades, which dry greenish and often bicolorous and are usually long-attenuate with straight margins toward the base and acuminate at the apex. The spadix may be violet-purple or maroon, or green

tinged (usually heavily) with these colors, and the spathe is withered at anthesis.

Terrestrial or epiphytic; **stem** to 30 cm long, 1–3.5 cm diam.; leaf scars obscured by root mass and cataphylls, 1.5–2 cm wide; **roots** numerous, dense, mostly descending, uppermost ascending, gray or green, smooth to densely pubescent, elongate, blunt, 5–30 cm long, 3–6 mm diam.; **cataphylls** moderately thin to subcoriaceous, bluntly 1-ribbed near the apex, 5–12 cm long, narrowly acute to acute



Figure 15. *Anthurium atropurpureum* R. Schultes & Maguire var. *arenicola* Croat (Croat et al. 105843). Live plant showing leaf blade, abaxial surface, and inflorescence with light purple spadix.

at apex, tinged with red, drying tan, persisting with apex remaining intact, eventually deciduous. **LEAVES** erect-spreading, rosulate or scattered along stem; **petioles** 4–63 cm long, 3–12 mm diam., erect, slightly thicker than broad to D-shaped, shallowly sulcate adaxially, sometimes obtusely V-sulcate, the margins moderately sharp, rounded abaxially, the surface pale-speckled, tinged with red near the base; geniculum markedly thicker than petiole, slightly paler, 1–3 cm long; **blades** coriaceous to subcoriaceous, narrowly to

broadly oblanceolate, less often elliptic, acute to abruptly acuminate, sometimes gradually acuminate at apex (the acumen to 4 cm long, inrolled), long-attenuate or rarely acute at base, sometimes making geniculum seem remote, occasionally acute to obtuse, (16)45–80(100) cm long, 8–25(41) cm wide, broadest at or above the middle, the margins undulate; upper surface weakly glossy to glossy, medium green, lower surface semiglossy to matte, only slightly paler and mostly eglandular, rarely weakly pustulate, both surfaces drying green and

paler below, matte; **midrib** flat at base, becoming acute-raised to convexly raised toward the apex above, higher than broad to prominently acute-raised below; **primary lateral veins** 5–13 per side, departing midrib at (30)40–65(70)° angle, usually weakly arcuate, ascending to the collective vein, sunken to convexly raised above, prominently and convexly raised below, paler than surface; **interprimary veins** etched above, weakly raised below, prominulous when dried; **tertiary veins** conspicuously etched above, flat to prominulous below; **collective vein** arising from about the middle or in the upper 1/3 of blade, sometimes arising in lower 1/2, sunken above, raised below, flat above when dried; **antimarginal vein** visible on live plant, running close to margin from the base; 1st collective vein 9–12 mm from margin. INFLORESCENCES erect to spreading, shorter than or equaling leaves (rarely longer than leaves); **peduncle** (12)20–73 cm long, 2–8 mm diam., 1–4 x as long as petiole, green to green heavily tinged with purple, terete; **spathe** spreading to reflexed and recurled or twisted, withering at anthesis, subcoriaceous, matte on both surfaces, pale to medium green, heavily tinged with red-violet, sometimes maroon to purple, lanceolate to narrowly lanceolate, 4–22 cm long, 0.6–2.5 cm wide, broadest near the base, inserted at 45° angle on peduncle, long-acuminate at apex, broadly acute, decurrent to 2 cm at base, the margins meeting at ca. 45° angle; **spadix** green heavily tinged with violet-purple, to dark purple or maroon, cylindroid to tapered, sessile or stipitate to 16 mm, erect,

4–26 cm long, 3–8 mm diam. near base, 3–5 mm diam. near apex, broadest at the base; **flowers** square to rhombic, 1.5–2.6 mm long, 1–2.5 mm wide, the sides straight to sigmoid, 5–8 flowers visible in principal spiral, 5–10 in alternate spiral; tepals matte, weakly to densely and minutely papillate, muricate, lateral tepals (0.5)0.8–1 mm wide, the inner margins pale, thin, pinkish, straight to weakly convex, the outer margins 2–3-sided; pistils weakly emergent before stamens emerge, + square, green, developing a maroon tinge, sometimes somewhat papillate; stigma ellipsoid, 0.2–0.6 mm long, depressed medially, lightly or densely papillate, droplets appearing 7–11 days before anthesis; stamens emerging in a regular sequence from the base, lateral stamens followed by alternates in rapid succession (7 days), the laterals preceding the alternates by 5–10 spirals, held over and obscuring pistil, 3rd barely preceding 4th; anthers yellow, 0.2–0.6 mm long, 0.8 mm wide, held at edge of the pistil, only partially exerted; thecae oblong-ellipsoid, 0.2–0.4 mm wide, not divaricate or only slightly divaricate; pollen yellow fading to cream, faintly sweet- or yeasty-scented. INFRUCTESCENCE spreading to pendent; **spathe** withered or absent; **spadix** 14–35 cm long, 1–2.5 cm diam., bearing berries in the basal portion only, the stipe to 1.5 cm long; **berries** white to greenish white basally, violet-purple in apical 1/2, subglobose, rounded at apex, 6–8 mm long, 4–6 mm diam.; pericarp somewhat thickened, with raphide cells; mesocarp with raphides, thickly gelatinous; **seeds** 1–2 per berry, pale green becoming purple, oblong-

ellipsoid, 3–6 mm long, 2–3 mm diam., 1.4–1.6 mm thick, with a basal mucilaginous appendage at radicle end.

Anthurium atropurpureum var. *arenicola* ranges from southern Colombia (Putumayo and Amazonas) to western Brazil (Amazonas, Acre, and western Rondonia), Ecuador (Morona Santiago, Napo, Pastaza and Zamora-Chinchipe), Peru (Amazonas, Loreto, and Madre de Dios), and Bolivia (La Paz), at 100–560 m. It is principally found in *Tropical moist forest* life zones, in mature forest on white sand soils (hence the name); the variety is both terrestrial and epiphytic.

This variety is distinguished from the typical variety by its larger size and occurrence in the forest understory, commonly as an epiphyte, rather than as a terrestrial plant in open areas.

Specimen seen: ECUADOR. **Zamora-Chinchipe:** Miazzi, detrás del Campamento Militar, bosque primario nublado, cubierto de musgos, suelos con gran acumulación de materia orgánica, suelos septisoles, 04°16'S, 78°42'W, 970 m, 20 Oct. 1991, *Walter A. Palacios, I. Vargas & M. Ruiz 8510* (MEXU, MO).

Anthurium banderasense Croat, *Aroideana* 36: 59. 2013. TYPE: Ecuador. Morona-Santiago: Gualaquiza Canton, Cordillera del Cóndor, ridge top above Banderas, near disputed Ecuador-Peru border, primary forest, 03°28'S, 78°15'W,

1350 m, 17 July 1993, *A. Gentry 80000* (holotype, MO-4624315; isotype QCNE!) **Figure 16.**

The species is a member of the section *Pachyneurium* characterized by its terrestrial habit, short internodes, moderately elongated pale yellow-brown drying, sharply C-shaped petioles which have margins that dry sharply and narrowly acute, are flattened adaxially with a medial rib and several ribbed abaxially, with a short geniculum, yellowish green-drying blades with prominently pale-pustular surfaces, weakly raised primary lateral veins and collective veins that arise from one of the lower primary lateral veins as well as by the green reflexed spathe, and weakly tapered spadix with magenta berries.

Terrestrial; **internodes** very short; **cataphylls** not seen; LEAVES 130.3 cm long with **petioles** 44.3 cm long, 0.8 cm diam., drying light tan, sharply C-shaped adaxially with margins acute narrow and curled under, flattened abaxially with a medial rib, drying yellowish with 5 prominent ribs abaxially, geniculum 1 cm long, about as broad as shaft; **blade** 86 cm long, 16.3 cm wide, widest near the middle of the blade, lanceolate, narrowly acuminate at apex, narrowly attenuate at base, 5 times longer than wide, 1.9 times longer than petiole; **midrib** drying convex, minutely many-ridged, drying sharply acute, finely ribbed and conspicuously granular-pustular below: **primary lateral veins** 19 pairs, arising at 60–70° angle from the midrib, drying weakly and narrowly rounded,



Figure 16. *Anthurium banderasense* Croat (Gentry 80000, MO-4624315). Herbarium specimen showing petiole, leaf blade, adaxial and abaxial surfaces, and inflorescence.



Figure 17. *Anthurium bogneri* Croat (Croat & Menke 89485). Live plant showing stems, petioles and leaf blades, abaxial surface.



Figure 18. *Anthurium bogneri* Croat (Croat & Menke 89485). Live plant showing stem, leaf blades, adaxial surface, and inflorescence with reflexed spathe and purple-violet spadix.

slightly lighter than blade on both surfaces; **basal veins** 1 pair margining out in a few centimeters, **collective veins** arising from one of the lower primary lateral veins, running 3–8 mm from the blade margin to the apex; **upper surface** drying medium dark yellowish green, semi-glossy, minutely granular; **lower surface** slightly lighter yellowish green, semi-glossy, minutely granular (including on the tertiary veins, both surfaces epunctate but abundantly pale-pustular. INFLORESCENCE 54.4 cm long with **peduncle** 41.9 cm long, 4 mm diam., drying coarsely ribbed, light tan;

spathe 7 cm long, 1.9 cm wide, lanceolate, reflexed, drying slightly orangish brown; **spadix** post-anthesis, sessile, 12.4 cm long, 1.8 cm diam., weakly tapered; **berries** magenta, emergent, 3 mm x 3mm.

Anthurium banderasense is endemic to the Cordillera del Cóndor in Ecuador (but is undoubtedly to be found in the same region on the Peruvian side of the border) at 1350 m. in a *Premontane wet forest* life zone.

Anthurium bogneri Croat, *Willdenowia* 40: 125, 2010. Type: Ecuador. Zamora-

Chinchipe: Cordillera del Cóndor, along road from Los Encuentros to El Sarsa, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, T.B. Croat & M. Menke 89485 (holotype, : MO-5715065; isotype: AAU!, B!, COL!, FI!, G!, HUA!, K!, M!, NY!, PSO!, QCNE!, S!, SEL!, US!, USM!, VEN!).

Figures 17 & 18.

The species is a member of sect. *Tetraspermium* and is characterized by its scandent habit, elongated internodes, weakly and narrowly sulcate petioles, more or less ovate-elliptic glandular-punctate leaf blades, the reflexed, usually green spathe, and especially by the usually stipitate purple-violet spadix.

Terrestrial vine or epiphytic vine, sprawling or erect to 1 m; **stem** long, roots lax (long internodes); **internodes** 1.5–15.2 cm long (averaging 10.7 cm), 3–4 mm diam., medium green to yellow-brown to light brown, matte to semiglossy, drying mostly dark red-brown, sometimes drying light grayish brown; **cataphylls** 2.9–8.5 cm long (averaging 4.3 cm), marcescent, persisting semi-intact at upper nodes, fibrous with fibers parallel, drying light grayish red brown or reddish brown to dark red-brown, rarely very light tan. **LEAVES** scattered along stem, erect spreading; **petioles** 1.8–10.3 cm long, 0.1–0.2 cm diameter, medium green, semiglossy, subterete or obtusely to acutely flattened, weakly and narrowly sulcate, the margins bluntly acute, sometimes entire petiole is geniculate,

drying grayish olive-green-brown or brown to dark brown rarely light tan; geniculum 0.6–1.7 cm long (averaging 1 cm), sometimes runs from base of blade to sheath, drying greenish brown to brown or dark brown to almost black, rarely concolorous with petiole; **blades** 5.5–17.3 cm long, 2.5–9.1 cm wide (averaging 10.8 x 5.3 cm), 1.3–2.7 times longer than broad, narrowly ovate to narrowly elliptic or ovate-elliptic, apex gradually acuminate, base acute or rounded, moderately coriaceous, moderately bicolorous, dark green and semiglossy to weakly glossy above, moderately paler and weakly glossy below, drying light grayish green to medium olive-green or grayish red-brown to medium reddish brown, rarely light grayish tan; both surfaces conspicuously glandular-punctate; **midrib** bluntly acute to narrowly raised and concolorous above, narrowly rounded and paler below, drying concolorous above and below, sometimes rarely paler; **primary lateral veins** 6–8 pairs, arising from midrib at a 50–55° angle, etched and concolorous above, weakly raised and slightly darker below; **tertiary veins** weakly developed with only a few raised; basal veins 2 rarely 3 all free to base; **collective veins** arising from base upper basal vein), 4–10 mm from margin. **INFLORESCENCE** erect; **peduncle** 3.7–12.4 cm long (averaging 7.5 cm), light maroon, drying reddish brown to dark brown; **spathe** 0.9–2.1 cm long, 0.7–1.1 cm wide (averaging 1.5 x 0.88 cm), shape when flattened oblong, green to reddish green, and recurled-reflexed to reflexed, drying light reddish brown to dark reddish brown, persisting intact and living

during infructescence; **spadix** stipitate 3–8 mm (averaging 6 mm), sometimes sessile, 1.9–3.9 cm long (averaging 2.9 cm), 4–6 mm in diam., cylindroid in shape, dark purple-violet; **flowers** 6 per spiral, 2.6–2.8 mm long, 2–2.3 mm wide; tepals finely granular, semiglossy; lateral tepals 1.5 mm wide, the outer margins 2-sided; stamens held briefly above tepals; anthers 0.3 mm long, 0.5 mm wide; thecae broadly divaricate. Seeds per locule unknown; **berries** dark violet-purple.

Anthurium bogneri ranges from Ecuador (Morona-Santiago, Napo, Pastaza, Tungurahua, Zamora-Chinchipe Provinces) to northern Peru (Amazonas, Cajamarca, Piura) at 750–2100 m in *Tropical moist forest*, *Montane moist forest* and *Premontane wet forest* life zones.

Additional specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Condor, trail from camp #1 to camp #2 towards crest of Cordillera del Condor, ca. 10–15 km S/SE of Shuar village, Warints, Premontane wet forest, 03°14'S, 78°16'W, 1200–1800 m, 13 Dec. 2002, *John L. Clark 6962* (QCNE, US); Región de la Cordillera del Cóndor, cuenca del Río Coangos, Comundidad Shuar de Kuankus, sendero desde la base hacia la cima del Cerro Chuank Naint, Bosque primario enano no mayor a 7 m, sobre piedra arenisca, Informantes: José & Alonso Saant, 03°03'40"S, 78°14'21"W, 1260 m, 16 June 2005, *Carlos Morales 1264* (MO, QCNE). **Zamora-Chinchipe:** Cordillera del Cóndor, bosque montano sobre roca arenisca, cerca del destacamento militar Cóndor Mirador,

en la frontera Ecuador-Perú, 03°38'28"S, 78°23'13"W, 1800 m, 15 Dec. 2000, *Jorge Caranqui & et al. 206* (MO, QCNE); Cordillera del Cóndor, destacamento militar 'Cóndor Mirador', a 1 km al norte del destacamento, 03°37'41"S, 78°23'42"W, 1975 m, 6 Sep. 2003, *Eric F. Rodríguez Rodríguez, David A. Neill, Wilson Quizhpe, Jürgen Homeier & C. Padilla 2633* (HUT, LOJA, MO, QCNE); Vicinity of Ecuacorrientes copper mine concession, vicinity of mine site, along trail above parking area near end of road, 03°34'54"S, 78°26'06"W, 1330–1360 m, 21 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98966* (MO, QCNE); Along road from Zamora to Romerillos, 13.3 km E of bridge over Río Bombuscaro at Zamora, 0.4 km N of Pituca along river, 04°08'02"S, 78°56'31"W, 975 m, 30 May 2003, *Thomas B. Croat & Mark Menke 89801* (AAU, M, MO, QCNE); Cantón El Pangui, Cordillera del Cóndor, vicinity of Ecuacorrientes copper mine region, valley of Río Waiwaime, 5.9 km above gate near copper mine camp near Río Quimi, along trail to summit above parking area at end of road, 03°34'54"S, 78°26'06"W, 1331 m, 5 Apr 2006, *Croat 96661* (CAS, F, GB, K, MO, QCNE, VEN); Condor Mirado, old botanical garden near road, along trail to summit, 03°38'12"S, 78°25'49"W, 1400 m, *Croat & Ferry 99120* (MO, QCNE); Crest of Cordillera on Ecuador-Perú border, 1 km S of Destacamento military, Cóndor Mirador, Hito de la Paz, 13, 03°37'26"S, 78°23'35"W, 1800 m, 15 Dec 2000, *M. Cuascota & Grupo Post-Grado MO-QCNE 333* (MO, QCNE); Vicinity of Ecuacorrientes copper mine

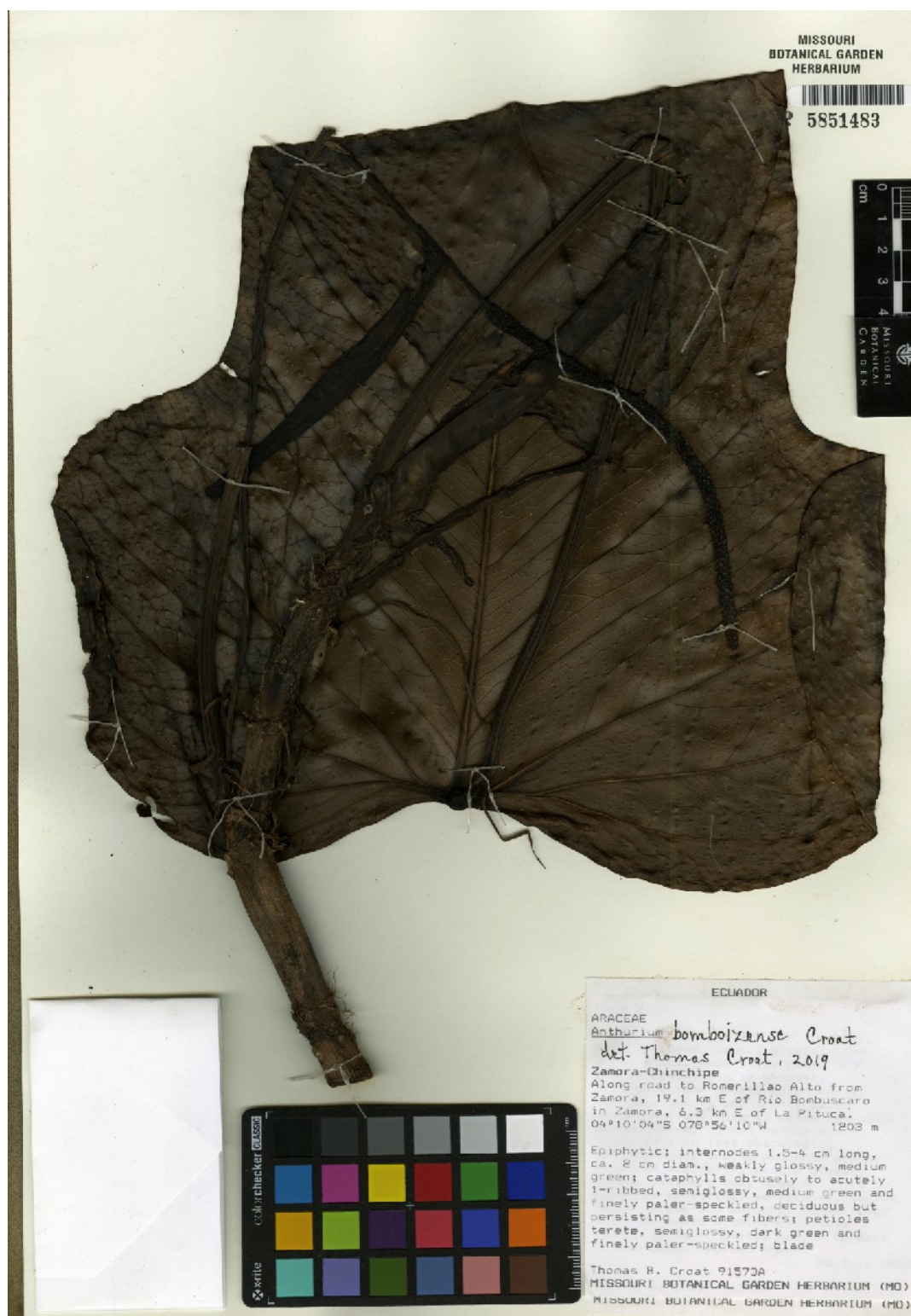


Figure 19. *Anthurium bomboizense* Croat (Croat 91573A, MO-5851483). Herbarium specimen showing stem, petiole, leaf blade, adaxial and abaxial surfaces, and inflorescence.



Figure 20. *Anthurium bomboizense* Croat (Croat 91573A). Live plants showing stems, petioles, leaf blades, abaxial surface, and inflorescence.



Figure 21. *Anthurium bomboizense* Croat (*Croat 91573A*). Close-up view of leaf blades, adaxial and abaxial surfaces.

development, valley of Río Waiwaime, along road to mine site, 9.5 km from mine headquarters, 6.5 km S of locked gate, 03°35'07"S, 78°26'05"W, 1280–1530 m, 10 Apr 2006, *Croat 96881* (MO, QCNE). PERU. **Amazonas:** Condorcanqui, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), headwaters of Río Comainas, tributary E of Río Cenepa, ridge behind the camp, 3°53'35"S, 78°25'30"W, 1200 m, 15 July 1994, *H. Beltrán & R. Foster 818* (MO).

***Anthurium bomboizense* Croat, sp. nov.**

Type: Ecuador. Zamora-Chinchipec: Along road to Romerillao Alto from Zamora, 19.1 km E of Río Bombuscaro in Zamora, 6.3 km E of La Pituca, 04°10'04"S, 78°56'10"W, 1203 m, 20 July 2004, *T.B. Croat 91573A* (holotype: MO- 5851483; isotype: QCNE). **Figures 19–22.**



Figure 22. *Anthurium bomboizense* Croat (Croat 91573A). Close-up view of inflorescence showing green spathe and spadix and elongated stipe.

The species is a member of sect. *Semaephyllum* and is characterized by its dark-brown-drying hastate, usually matte subvelvety blades with short and broad posterior lobes projecting at a 90° angle, and by its long-pedunculate inflorescences with a long green spathe and a long and thin green or yellow spadix.

Terrestrial or epiphyte; **internodes** 1–4 cm long 1.3–2.8 cm diam., dark green

and semiglossy, becoming gray-brown; **cataphylls** obtusely to acutely 1-ribbed, semiglossy, medium green and finely paler-speckled, deciduous but persisting as some fibers. LEAVES with **petioles** terete, 30–38 cm long, 6–9 mm diam., dark green, semiglossy, densely short pale-lineate; geniculum 3.5 cm long; **blades** hastate, 28–37 cm long, 24–30 cm wide, 1–1.5 times longer than wide, 0.93–1.16 times as long as petiole, broadly lobed at the base, broadly

obtuse and short-acuminate at the apex, moderately coriaceous, dark green and matte-subvelvety above, paler and semiglossy below, drying dark blackish brown; **anterior** lobe short and broad, 15–23 cm long; **posterior lobes** short and broad, 12–18 cm long, 8–14 cm broad, projecting at a 90° angle; **midrib** narrowly rounded and concolorous above, narrowly round-raised and paler below; **primary lateral veins** 9–10 pairs, arising at a 40–60° angle, weakly raised in slight valleys, concolorous above, bluntly angular and concolorous below; **basal veins** 4–5 pairs, mostly free to the base, sometimes 2 or 3 of them fused for 1–1.5 cm at the base; **posterior rib** not present; **tertiary veins** obscure. **INFLORESCENCE** erect; **peduncle** 28–38 cm long, acutely 1-ribbed abaxially, weakly glossy, medium yellow-green; **spathe** linear-lanceolate, reflexed-spreading and recurled, 12–19 cm long, 1.1 cm wide, medium yellow-green and obtusely many-ribbed outside, matte inside; **spadix** prominently stipitate, medium to dark green, yellow-green, or yellow, semiglossy, 10.3–30 cm long, 5–10 mm diam.; stipe 2.5–3 cm long, glossy; **flowers** 5 visible per spiral, 2–2.2 mm long, 1.5–1.7 mm wide; tepals 0.7–1 mm wide; inner margin broadly rounded to concave; outer margin usually obtusely 3-sided; stamens held at level of tepals 0.6 mm long and wide; thecae moderately divaricate; pollen cream.

Anthurium bomboizense is endemic to Ecuador, found in Pastaza and Zamora-Chinchipe provinces at 250–1500 m in a *Premontane moist forest* life zone.

Anthurium bomboizense is a close relative of *A. truncicola* Engl. with which it shares the somewhat scandent habit, black-drying vegetation and weakly 3-lobed leaf blades but that species differs by its more robust, more high-climbing habit, typically more prominently 3-lobed, glossier leaf blades and more robust less long-tapered spadices. The species also somewhat resembles *A. effusilobum* Croat but the latter differs by its narrower and more elongated anterior and lateral lobes with a deeper constriction between them, and by its dark violet-purple spadix rather than being medium to dark green or yellow-green in the case of *A. bomboizense*.

The species is named for the town of Bomboiza in Zamora-Chinchipe province, near which some of the specimens were found.

Paratypes: ECUADOR. **Sucumbios:** Lago Agrio, Dureno, Territorio Cofan, E of Lago Agrio, south side of Río Aguatico, 00°00'43"N, 76°40'17"W, 250 m, 25 May 2007, *Corine Vriesendorp* 162 (QCNE). **Zamora-Chinchipe:** Along road between El Pangui and Monterrey, 5.8 km E of Monterrey, 11.9 km W of main Gualaquiza-Zamora Road, 03°32'26"S, 78°37'16"W - 03°32'26"S, 78°37'16"W, 950 m, 25 May 2003, *Thomas B. Croat & Mark Menke* 83396 (MO, QCNE); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritza, 03°54'18"S, 78°35'W - 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Mark Menke*

89517 (MO, QCNE); Along road between Los Encuentros and El Sarsa, 4.7 km E of Los Encuentros, 03°46'42"S, 78°38'32"W - 03°46'42"S, 78°38'32"W, 822 m, 26 May 2003, *Thomas B. Croat & Mark Menke* 89573 (MO, QCNE); Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritzza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wabliert & Tuntia Katan* 91295 (MO, QCNE); Along road from Zamora to Romerillos along Río Jambué, 13.3 km E of Río Bombuscaro bridge in Zamora, 0.3 km E of Pituca, 04°08'03"S, 78°56'37"W, 1068 m, *Thomas B. Croat* 91772 (MO, QCNE); Along graveled road roughly paralleling the Chuchumbleza-Yantzaza Highway, E along Río Chuchumbleza, then SW to Chicaña and back to main highway (entering road from main highway 4.8 km S of Río Chuchumbleza and re-entering main highway 9.6 km N of plaza in Yantzaza) via Guisme, Miasi, Uwents, Kunki, El Oso, and Chicaña, vicinity of Uwents, 21.5 km N of Chicaña, 6.2 km N of Kunki and Río Uens del Kunki bridge, 1500 m, 03°36'02"S, 78°41'16"W, 14 Apr. 2006, *Thomas B. Croat* 97068 (MO, QCNE); Along Río Nangaritzza, between Las Orquídeas and Miasi, 04°17'53"S, 78°39'00"W, 872 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 98777 (MO, QCNE); Parroquia Guayzimi, Campamento Militar, Transectos de 50 x 2 m x 5. (0.05 Ha.), Bosque secundario, extraído maderas importantes, topografía

colinada, Shaimi, Bosque húmedo Premontano, 04°21'S, 78°40'W, 1050–1150 m, 24 Oct. 1991, *Carlos E. Cerón, Marcelo Chango, Valdano Tapur, Gerardo Aymard & Joaquina Albán C.* 17168 (QCNE).

Cultivated plants: ECUADOR. **Sucumbios:** Cultivated at Missouri Botanical Garden, received 10 Nov. 2003, date of collection unknown, original label Hannon 97–085, *Croat* 90200 (MO, QCNE).

Anthurium breviscapum* Kunth, *Enum. Pl.* 3: 78. 1841. Type: *E.F. Poeppig* 1283, no date, Peru (W). **Figures 23–25.*

Anthurium indecorum Schott, *Osterr. Bot. Zeitschr.* 387. 1858. Type: Peru. Huanuco?: Cuchero, *E.F. Poeppig* 1283 (W, lectotype, designated here.).

Anthurium acrobates Sodiro, *Anal. Univ. Quito* 15 (108): 13. 1901. Type: Ecuador. Napo: between Baeza and Cuyujua, banks of Río Masfa (Río Papallacta) July 1901, *L. Sodiro s.n.* (~~Holo~~lecto, G!, isolecoto, QPLS!, designated here)

Anthurium huamaliesense Engl., *Das Pflanzenreich* 4 (23Db): 193. 1905. Type: Peru. Huanuco: Prov. "Huamalies" <no longer exists>, between the village of Monzon and the Río Huallaga, 600–700 m, flowering in September, *A. Weberbauer* 3666 (holotype, B).



Figure 23. *Anthurium breviscapum* Kunth (Croat & Trujillo 98175). Live plant showing climbing stem, petioles and leaf blades, adaxial and abaxial surfaces.



Figure 24. *Anthurium breviscopum* Kunth (Croat & Trujillo 98175). View of narrower leaf blade type, adaxial surface.

Anthurium igarapeum G.S.Bunting, *Acta Bot. Venez.* 10: 269. 1975. Type: Venezuela. Amazonas: Cerro de la Neblina, Río Yatua, 5 Jan. 1958, B. Maguire, J. Wurdack & C. Maguire 42594 (holotype, : NY!).

The species is a member of section *Cardiolonchium* and is characterized by its medium-brown-drying ovate-sagittate blades with a hippocrepiform to parabolic

sinus, 10–14 pairs of primary lateral veins and the midrib drying acute and moderately raised above, and by the long-pedunculate inflorescences with a green spathe sometimes curled in a spiral and a green spadix. The species is unusual in having two very distinct petiole cross-sectional shapes. The shape can be obtusely and narrowly sulcate or sharply and shallowly sulcate and both petiole shapes have been known to occur within the same population.



Figure 25. *Anthurium breviscapum* Kunth (Croat & Trujillo 98175). Close-up view of inflorescence with green spathe and purple spadix.

Terrestrial, epiphyte, or hemiepiphyte at 1.0–4.0 m; **internodes** (6.0–13 cm, without leaves) and short (0.5 cm, with leaves), (0.1)0.8–2.3 cm diam., elongate, obtusely and deeply sulcate, weak to prominent, alternating between long, medium green or dark green to gray-green, sometimes tinged violet-purple when young, becoming gray in age, weakly glossy to semiglossy, terete, narrowly sulcate, obtusely flattened on one side; **cataphylls** 7.0–16 cm long, green (sometimes purple when fresh), 2-ribbed, marcescent, persisting briefly adhering to stem at upper node more or less intact, then mostly deciduous except part of base with pale, parallel fibers persisting and sometimes fragments. LEAVES with **petioles** 32.4–43.6 cm long, 4.0–7.0 mm wide, 5.0–9.0 mm diam., terete or subterete, C-D-shaped, slightly thicker than broad, flexible and firm, sheathed to one-fourth to one-half its full length, usually obtusely and narrowly sulcate or sometimes sharply and shallowly sulcate, sometimes obtusely flattened adaxially with sharp more or less spreading margins and 2 obtuse ribs and a medial sulcus medium to dark yellow-green, red-purple short-lineate, densely pale-speckled, weakly glossy to matte; geniculum 1.0–2.8 cm long, 4.0–7.0 mm wide, sulcate adaxially; **blades** moderately thin to subcoriaceous, ovate-sagittate, 38.6–39.8 cm long, 17.9–27 cm wide, 1.5–2.1 times longer than broad, both surfaces somewhat weakly glossy to semiglossy, moderately bicolorous, dark green and weakly glossy above, slightly paler and semiglossy below, drying medium brown on both surfaces; **posterior lobes** 9.2–12.4 cm long, 7.0–9.0 cm wide, directed

at 140°–141° angle; **sinus** hippocrepiform to parabolic, 7.6–10.0 cm deep, 4.8–5.0 cm wide; **major veins** acute to narrowly raised above, convex and paler below; **basal veins** (5)7 pairs, 1st pair free to base, 2nd pair fused (0.4)0.6–0.9 cm, 3rd pair fused (1.4)1.8–3.1 cm, 4th pair fused (3.2)5.6–6.0 cm; **posterior rib** 5.4–6.0 cm long, naked 1.8–4.3 cm; **midrib** drying acute, moderately raised above, broadly round, significantly raised, lightly scaly below; **primary lateral veins** (7–9)10–14 pairs, arising at a 45–50° angle, acutely to narrowly raised and concolorous to slightly paler above, bluntly acute to narrowly raised and concolorous to slightly paler below; tertiary veins obscurely visible above, weakly raised below; **collective veins** arising from 1st to 3rd basal and rarely from 1st or 2nd primary vein, 1.0–8.0 mm from margin. INFLORESCENCE erect to spreading; **peduncle** (8.8)14.4–46 cm long, 0.2–0.6 cm wide at base, 8.0 mm diam., weakly glossy, medium green and sparsely darker-lineate, terete; **spathe** reflexed-spreading, sometimes curled in a spiral, medium green to yellow green, sometimes tinged purple, lanceolate, 8.0–14.4 cm long, 0.8–1.8 cm wide, glossy outside, weakly glossy inside, margins meeting at an obtuse angle; **spadix** sessile to stipitate, olive-green to green, becoming dark purple, weakly glossy to semiglossy, long-tapered, 11.8–23.3 cm long, 5.0–9.0 mm in diam.; **flowers** (5–6)7–10 visible per principal spiral, 1.9–3.8 mm long, (1.6)2.2–2.9 mm wide; tepals drying dark brown to black, granular surface; lateral tepals (1.1)1.4–1.9 mm wide, inner edge rounded, outer margin 2-sided; **stamens** light brown, 0.4–0.6 mm long,

0.5–0.6 mm wide, held above level of tepals; pollen whitish to pale orange. INFRUCTESCENCE with **berries** reddish or pink-purple, **seeds** whitish.

Anthurium breviscopum ranges from Colombia (Amazonas, Caquetá, Cesar, Meta, Narino, Putumayo, Valle del Cauca, Vaupes) to Ecuador (Azuay, Bolívar, Loja, Morona-Santiago, Napo, Orellana, Pastaza, Sucumbios, Tungurahua, Zamora-Chinchipe) Peru (Amazonas, Cajamarca, Cusco, Huanuco, Junin, Loreto, Madre de Dios, Pasco, Puno, San Martín) Brazil (Acre), and Bolivia (La Paz) and Venezuela (Amazonas) at 100–3000 m in *Tropical moist forest*, *Tropical wet forest* and *Premontane wet forest* life zones.

Specimens seen: **Morona-Santiago:** East side of Río Zamora, 03°32'S, 78°30'W, 800 m, 21 Sep. 1983, *Brandbyge & Balslev 42276* (AAU, MO); 50.3 km E of Santiago, 03°02'22"S, 78°05'00"W, 300 m, 10 Sep. 2002, *Croat 87392* (MO, QCNE); 9.7 km east of Santiago, 03°00'55"S, 77°56'35"W, 450 m, 11 Sep. 2002, *Croat 87482* (MO, QCNE); Cordillera del Condor, alrededores del Centro Tiink, cerca Bomboiza. 600 m, 7 Aug. 1985, *Jimpikit RBAE2013* (MO); Cuenca del Río Coangos, camino entre el Río Tsuirim y Numpatkain, 03°20'58"S, 78°14'34"W, 1100 m, 27 Oct. 1999, *Fuentes et al. 1257* (MO, QCNE); 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Croat et al. 91029* (AAU, MO); Cordillera del Cóndor, Cuangos, 20 km east of Gualaquiza, 03°29'S, 78°14'W, 1500 m, 19 July 1993, *Gentry 80250* (MO); Cordillera

del Cóndor, Cuangos, 03°29'S, 78°14'W, 1400–1500 m, 20 July 1993, *Gentry 80264* (MO); Limon Indanza, Cordillera del Condor: 03°13'54"S, 78°15'10"W, 1190 m, 13 Dec. 2002, *Neill & Shuar conservation interns 14124* (QCNE); Cordillera del Cóndor, 03°13'54"S, 78°15'10"W, 1190 m, 13 Dec. 2002, *Neill & Shuar 14125* (MO, QCNE); *Neill & Shuar 14129* (MO, QCNE). Cordillera del Condor, Cerro Winchinkian, 03°05'24"S, 77°57'10"W, 1100 m, 18 Aug. 2002, *Neill & Shuar 14043* (MO, QCNE). Cordillera del Condor, Centro Shuar Kaputna, al lado sur del Río Santiago, 03°01'23"S, 77°55'22"W, 300 m, 11 Oct. 2003, *Kajekai & Shuar 98* (MO, QCNE). **Zamora-Chinchipe:** Centro Yayu, Río Numpatakaime, bosque primario intervenido, Centro Yayu, Río Numpatakaime, 900 m, 29 Jan. 1997, *Veerle Van den Eyden, Pablo Lozano, Ingrid Lauweers & Omar Cabrera 907* (MO); Río Nangaritza, centro Shuar Shaim, bosque primario intevenido, 04°18'54"S, 78°40'06"W, 900 m, 31 Jan. 1997, *Veerle Van den Eyden, Pablo Lozano, Ingrid Lauweers & Omar Cabrera 920* (MO); Río Nangaritza, centro Shuar Shayme. Huerta, 04°19'05"S, 78°39'57"W, 930 m, 12 Apr. 1996, *Veerle Van den Eyden, Eduardo Cueva & Omar Cabrera 662* (MO); Cresta de la Cordillera del Cóndor en la frontera Ecuador - Perú, 1 km al sur del destacamento militar Cóndor Mirador, 03°38'32"S, 78°23'36"W, 2000 m, 15 Dec. 2000, *Wagner Ramírez, David A. Neill, Marco Cerna & Grupo Post-Grado MO-QCNE 50* (F, MO, QCNE); Along road between El Panguí and Monterrey departing main highway (Zamora-Gualaquiza), 8.5 km N of

El Pangui, 03°32'26"S, 78°37'16"W, 730 m, 25 May 2003, *Thomas B. Croat & Mark Menke 89361* (MO, QCNE); Along road between Los Encuentros and El Sarsa, 4.7 km E of Los Encuentros, 03°46'42"S, 78°38'32"W, 822 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89441* (MO, QCNE); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritza, 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Mark Menke 89525* (MO, QCNE); Along road between Los Encuentros and El Sarsa, 4.7 km E of Los Encuentros, 03°46'42"S, 78°38'32"W, 822 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89577* (MO, QCNE); In the vicinity of the mining camp at the Río Tundaime, along road to military base El Condor, 03°37'31"S, 78°26'26"W, 1000 m, 5 Nov. 2004, *H. van der Werff, Bruce Gray, Juan C. Ronquillo & Wilson Quizhpe 19348* (MO); Along road between Zamora and Gualaquiza, 29 km N of Yangzatzza, 04°10'S, 78°50'W, 890 m, 19 Oct. 1980, *Thomas B. Croat 50771* (MO, QCA); Along road between Gualaquiza and Zamora, 5 km S of El Pangui. 03°40'S, 78°36'W, 800 m, 20 Oct. 1980, *Thomas B. Croat 50805* (MO, QCA); Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 91290* (MO, QCNE); Along road to Romerillao

Alto from Zamora, 19.1 km E of Río Bombuscaro in Zamora, 6.3 km E of La Pituca, 04°10'04"S, 78°56'10"W, 1203 m, 20 July 2004, *Thomas B. Croat 91575* (MO, QCNE); *Thomas B. Croat 92002* (MO, QCNE); Along road from Namirez to Nambija, along mining road, 10.0 km S of Namirez and Río Zamora, vicinity of Nambija, along road to mine headquarters ca. 5 km long, just south of Nambija, 04°03'44"S, 78°47'29"W, 1779 m, 23 July 2004, *Thomas B. Croat 92086* (AAU, MO, QCNE); Vicinity of Ecu-Corrientes copper mine development, Río Waiwaime drainage, along road to minesite 3.3 km above gate, 6.3 km E of mine headquarters, 03°34'37"S, 78°25'37"W, 1308 m, 7 Apr. 2006, *Thomas B. Croat 96723* (CUVC, HUA, MO, QCNE); Vicinity of Ecu-Corrientes copper mine development, valley of Río Waiwaime, 8.1 km S of mine headquarters on road to mine site, 03°35'51"S, 78°25'57"W, 1291 m, 7 Apr. 2006, *Thomas B. Croat 96750* (MO, QCNE); Cordillera del Cóndor region, vicinity of Ecu-Corriente copper mine development, Valley of Río Waiwaime, along road to mine site; 9.5 km from mine headquarters, 6.5 km S of locked gate, 03°35'07"S, 78°26'05"W - 03°25'25"S, 78°26'19"W, 1280–1530 m, 10 Apr. 2006, *Thomas B. Croat 96900* (MO, QCNE); Cordillera del Cóndor, vicinity of Río Zamora and Río Quime, vicinity of Ecu-Corriente copper mine development, drainage of Río Waiwaime, along road to mine site, 12.6 km S of mine headquarters, 03°34'08"S, 78°26'09"W, 12.6 km S of mine headquarters, 1100 m, 13 Apr. 2006, *Thomas B. Croat 97036* (MO, QCNE, UB); Along

graveled road roughly paralleling the Chuchumbleza-Yantzaza Highway, E along Río Chuchumbleza, then SW to Chicaña and back to main highway (entering road from main highway 4.8 km S of Río Chuchumbleza and re-entering main highway 9.6 km N of plaza in Yantzaza) via Guisme, Miasi, Uwents, Kunki, El Oso, and Chicaña, vicinity of Uwents, 21.5 km N of Chicaña, 6.2 km N of Kunki and Río Uens del Kunki bridge, 03°36'02"S, 78°41'16"W, 1500 m, 14 Apr. 2006, *Thomas B. Croat 97072* (HUA, MO); Along road from Tundaime to Condor Mirador, 20.5 km beyond main junction near military post near Tundaime, 03°37'47"S, 78°26'35"W, 1465 m, 20 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98914* (MO, QCNE); Vicinity of Ecuacorrientes copper mine concession, vicinity of mine site, along trail above parking area near end of road, 03°34'54"S, 78°26'06"W, 1330–1360 m, 21 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98978* (MO, NY, QCNE, S, US); Vicinity of Ecuacorrientes mining company, Valley of Río Quime, trail along Río Waiwaime near its mouth at Río Quime, 03°33'45"S, 78°27'47"W, 1000 m, 23 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 99104* (CUVC, MO, PMA, QCNE); Along road between Los Encuentros and El Sarsa, 10.7 km E from Los Encuentros, beyond bridge over Río Zamora, 03°46'40"S, 78°38'28"W, 1066 m, 14 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98591* (MO, QCNE); Pachicutza, sendero hacia el Hito, 04°09'00"S, 78°38'00"W, 1000–1200 m, 18 Oct. 1991, *Jaime L. Jaramillo 14082* (NY); Cordillera del Cóndor, Cantón El Pangui,

Parroquia Tundayme, Valle del Wawaime, afluyente del Río Quimi, desbroce de la nueva carretera hacia la futura mina de Ecuacoriente, 03°34'14"S, 78°25'40"W, 1210 m, 9 Oct. 2006, *Carlos Morales & Diego Reyes 2040* (MO, QCNE); Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from the military outpost to Condor Mirador military outpost, 7.1 km S of junction in road to Tundaime, San Marcos and Ecuacoriente copper mine headquarters, 03°36'42"S, 78°28'02"W, 1128 m, 12 Apr. 2006, *Thomas B. Croat 96966* (MO, QCNE); Vicinity of Las Orquídeas, near Cabañas Yankuam, along new trail to Summit of Los Tepuis Conservation Area, just above road from Las Orquídeas to new ferry, 04°14'55"S, 78°39'36"W, 970 m, 18 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98840* (MO, QCNE); Parroquia Zurmi, Comunidad Centro Shaime (along Río Nangaritza), forest 2–4 km NW of Centro Shaime, 04°04'S, 78°54'W, 1000 m, 15 Dec. 2001, *John L. Clark 6533* (MO, QCA, QCNE, US); Parroquia Guayzimi, Campamento Militar Miazí, al sur del río Nangaritza, transectos de 50 x 2 m (0.1 Ha.), 04°16'S, 78°42'W, 1060–1100 m, 21 Oct. 1991, *Carlos E. Cerón, Marcelo Chango, Valdano Tapur & Gerardo Aymard 16880* (MO); Río Nangaritza, Miazí, rocky river banks and adjacent forest, 04°18'S, 78°40'W, 1000 m, 10 Dec. 1990, *David A. Neill 9672* (MO); Río Nangaritza, Shaime, confluence of Nangaritza and Numpatakaime rivers, 04°20'S, 78°40'W, 1000 m, 7 Dec. 1990, *David A. Neill 9570* (MO); *David A. Neill 9573* (MO); Río Nangaritza, Pachicutza, Camino al hito de

Pachicutza, 04°07'S, 78°37'W, 900–1000 m, 18 Oct. 1991, *Walter A. Palacios et al.* 8229 (MO); Cordillera de Nanguipa, along road to Cerro Colorado, about 6 km south of Nambija, 20 km southeast of Zamora, 04°05'51"S, 78°47'43"W, 1930 m, 19 Feb. 2002, *Tom Delinks* 1361 (MO, QCNE); PERU. **Amazonas:** Condorcanqui, Cordillera del Condor, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), cabeceras del Río Comainas, tributario al oeste del Río Cenepa, cuchillo atrás del campamento, bosque intacto, muy húmedo, 03°53'35"S, 78°25'30"W, 1200 m, 15 July 1994, *Hamilton Beltrán & Robin Foster* 785 (MO, USM).

Anthurium ceronii Croat, *Rodriguésia* 56:17–20. 2005. Type: Ecuador. Napo: 5.7 km W of Tena at Rio Tena, 00°01'S, 77°51'W, ca. 500 m, *T. B. Croat* 58849 (HT: MO-3154535; IT: AAU, NY, QCA, US). **Figure 26.**

This epiphyte is a member of section *Decurrentia* and is characterized by its pendent habit, conspicuously sheathed petioles, long, narrow leaf blades, quadrangular peduncles, spreading spathe, stipitate spadix with flower tepals turning red and fruits maturing white.

Epiphyte; **stems** pendent, ca. 20 cm long, to 1 cm diam.; **internodes** 0.5–1.5 cm long, 0.4–1.8 cm diam.; **cataphylls** 5–8 cm, green, 1-ribbed and acuminate at apex, persisting more or less intact at upper nodes, drying brown into brittle fibers at lower nodes. LEAVES with **petioles** 3.5–18

cm long, spreading pendent, sheathed to between 1/2 and 3/4 their length; geniculum upturned, thicker and drying darker than petiole; **blades** linear-lanceolate or lanceolate, (6.2)16–20 cm long, 4–8 times longer than petiole, 30–60 cm long, 2–4.5 cm wide, broadest at 2/3 to 3/4 the length from base, moderately coriaceous, narrowly acuminate with acumen 2–4 cm, attenuate at base, both surfaces matte, upper surface dark green, drying dark grayish-green above, much paler and brownish below; **midrib** convexly raised above, much larger below; **primary lateral veins** 12–18 per side, departing midrib at 35° angle, raised slightly more below than above; interprimary veins only slightly less prominent than primary veins; **collective veins** arising from the base, with same prominence as primary lateral veins, 2–5 mm from margin. INFLORESCENCE spreading, shorter than leaves; **peduncle** 16–25 cm long, 3 mm diam., pale green, quadrangular, the margins winged; **spathe** spreading, subcoriaceous, yellowish green, linear or narrowly lanceolate, 6–10 cm long, 1–1.5 cm wide, broadest near base, inserted at a 60° angle on petiole, the apex acuminate with acumen inrolled, 5 mm long, the base margins meeting acutely at 50° angle, **spadix** olive-green at anthesis, paler prior to anthesis, long ellipsoid, scarcely, bluntly tapered at apex, curved upwards away from spathe, 6–13 cm long, 4 mm diam. at base and at middle, 3 mm diam. at apex, turning reddish, producing white berries; stipe 12–20 mm long in back; **flowers** slightly rhombic, 2.8 mm long, 2.2–2.4 mm wide, 5 in principal spiral, 3 in alternate spiral, the



Figure 26. *Anthurium ceronii* Croat (Croat 58849, MO-3154535). Herbarium specimen showing petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

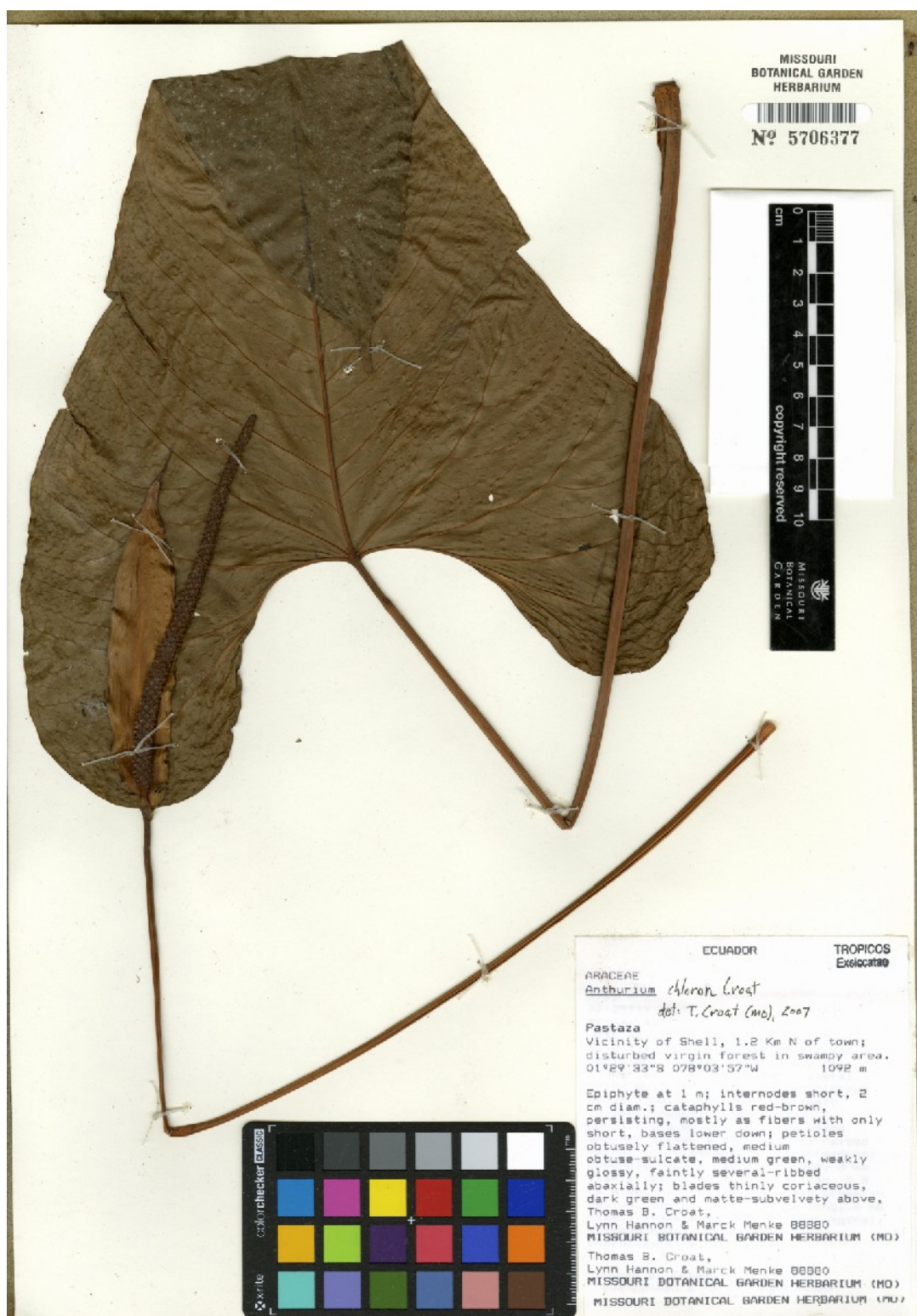


Figure 27. *Anthurium chloron* Croat (Croat et al. 88880, MO-5706377). Herbarium specimen showing petiole, leaf blade, adaxial and abaxial surfaces, and inflorescence.

sides nearly straight to slightly sigmoid; tepals matte pre-anthesis, 1.2 mm wide, inner margins rounded, outer margins 2-sided, pistils raised before stamens emerge, green, stigma slit-like, raised, droplets appearing several days before anthesis, 0.5 mm long, slightly papillate; stamens emerge in unusual manner, the alternates preceding laterals by 2 spirals, barely emerging above tepal level, closely circling pistil but not obscuring pistil; anthers white; 0.6–0.7 mm long, 0.4 mm wide; thecae 0.2–0.3 mm wide; pollen white.

Anthurium ceronii ranges from southern Colombia to Ecuador and northern Peru, and ranges throughout the eastern foothills of the Andes Mountains in *Tropical wet forest*, *Premontane wet forest*, and *Premontane rain forest* life zones at 450–1600 m.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Condor, W slope above Valle del Rio Quimi, 03°30'38"S, 78°24'55"W, 1600 m, 11 Dec. 2000, *Freire et al.* 4317 (MO, QCNE). **Zamora-Chinchi:** Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritzza bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntia Katan* 91157 (MO, QCNE). PERU. **Amazonas:** Cordillera del Condor, headwaters of Río Comainas, tributary of Río Cenepa, 03°54.1'S, 78°25.6'W, 1300–1500 m, 16 July 1994, *Beltrán & Foster* 850 (MO).

***Anthurium chloron* Croat, sp. nov.** Type: Ecuador. Pastaza: Vicinity of Shell, 1.2 km N of town, disturbed virgin forest in swampy area, 01°29'33"S, 78°03'57"W, 1092 m, 9 May 2003, *Thomas B. Croat, Lynn Hannon & Mark Menke* 88880 (holotype, MO-5706377; isotype, QCNE). **Figure 27**

The species is a member of section *Belolochium* characterized by its terrestrial habit, short internodes, persistent cataphyll fibers, subterete, sulcate petioles, narrowly ovate-sagittate to obpyriform, grayish drying blades with the anterior lobe straight to weakly concave and a parabolic sinus as well as by the green, erect-spreading spathe and the long-pedunculate yellow-green spadix.

Epiphyte at 1.0–3.0 m to terrestrial; **internodes** short, 1.0 cm long, (0.8)2.0–3.0 cm diam.; **cataphylls** 2.0–21.5 cm long, red to red-brown, persisting as red-brown fibers semi-intact at apex, fibrous at base, sometimes persisting mostly as fibers with only short cataphyll bases lower down, sometimes persisting as mushy semi-intact fragments, the fibers reddish brown, mostly closely parallel. LEAVES with **petioles** 28.8–85 cm long, 3.0–7.0 mm diam., subterete, obtusely flattened to obtusely and narrowly sulcate adaxially, pinkish at base, medium green, weakly glossy, faintly several-ribbed abaxially (especially near the base), pinkish at base, sometimes tinged burgundy throughout, drying yellowish brown or medium brown; **blades** thinly coriaceous or subcoriaceous to coriaceous, triangular-ovate to slightly constricted triangular-

sagittate-hastate, abruptly acuminate at apex (acumen to 1.7 cm), prominently lobed at base, 22.8–44.4 cm long, 14.3–28 cm wide (averaging 33 x 22), 1.37–1.70 (averaging 1.51) times longer than broad, broadest at petiole attachment, 0.6–0.9 (averaging 0.8) times long as petioles; **upper surface** dark green and semiglossy or matte to matte-subvelvety above, drying subcoriaceous to coriaceous, olive-brown to dark brown, sparsely and weakly granular and matte above; **lower surface** slightly to moderately paler and weakly glossy below, drying yellowish brown to medium brown, sparsely and weakly granular and semiglossy below, epunctate; **anterior lobe** 17.1–34.8 cm long, with straight or slightly concave margins, the distal margin rounded, gradually acuminate apex with tip pointing downward; **posterior lobes** 8.1–21.1 cm long, 4.9–12.3 cm wide, directed downward and inward; **sinus** parabolic, 4.7–15.8 cm deep, 5.1–13.6 cm wide at middle; **midrib** narrowly acute and concolorous in deep valley (especially acute near base), semiglossy, sometimes tinged violet-purple above, narrowly round-raised and slightly paler with medium rib and an additional weaker lateral rib on either side below (sometimes weakly tinged purplish), drying sparsely granular, narrowly rounded, finely ribbed and slightly darker above, narrowly rounded, medially ribbed and concolorous below; **primary lateral veins** 9(10) pairs, arising at 45–55° angle, quilted-sunken in valleys near base, nearly sunken and concolorous toward apex above (the larger veins narrowly raised to acutely raised), bluntly angular to acute, pleated-raised and concolorous (sometimes tinged

violet-purple) below, drying sparsely granular, narrowly rounded, slightly darker above, narrowly rounded and concolorous below; tertiary veins obscure above (in part sunken above), a few slightly raised below; **basal veins** (5)6–7 pairs, 1st pair free to base, 3rd pair fused to 3.0 cm, 4th and 5th pair fused to 3.5 cm, or 2nd–5th pairs fused 0.5–1.5 cm; **posterior rib** gradually curved, naked to 3.0–3.5 cm; **collective veins** arising from the 4th pair of basal veins, 1.0–2.0 mm from margin, arising from the lowermost basal veins and loop connecting to the primary lateral veins, concolorous, inconspicuous above. **INFLORESCENCE** erect-spreading to pendant, 26 cm long; **peduncle** 14.6–47.5 cm long, 2.0–3.0 mm diam., terete, drying coarsely ribbed, medium brown; **spathe** medium green, semiglossy, (sometimes tinged violet-purple), elliptic to narrow elliptic, hooding, 6.9–16.9 cm long, 0.7–3.8 cm wide, elliptic to narrow elliptic, drying yellowish to reddish brown, or dark brown; **spadix** stipitate to 1.1 cm, pale yellow, pale greenish yellow to greenish, to yellow-brown, semiglossy to weakly glossy, nodding, pendent, very long and weakly tapered, 10.8–13.5 cm long, 3.0–8.0 mm diam., drying medium yellowish brown; **flowers** (4)6–7 visible per principal spiral, drying 2.3–2.8 mm long, 1.9–2.4 mm wide; tepals drying glossy, minutely granular to papillate on drying, medium brown; lateral tepals 1.5–1.8 mm wide, the outer margins 2-sided to obtusely 3-sided, inner margin rounded to broadly rounded; pistils greenish, weakly emergent; stamens shortly exerted, weakly divergent above the tepals, rather tightly

clustered around pistil; anthers 0.2–0.8 mm long, 0.2–0.5 mm wide, oblong-elliptic, drying blackened on the dorsal surface medially with a light brown perimeter, the ventral surface with normally developed thecae; thecae these not at all divaricate, to slightly divaricate. INFRUCTESCENCE immature, yellow-green, pistils green, weakly emergent.

Anthurium chloron is known only from SE Ecuador, ranging from Pastaza and Tungurahua south to Morona-Santiago and Zamora-Chinchipe, from 935 to 1551 m elevation, primarily in *Premontane wet forest*, *Premontane rain forest* and *Lower montane wet* life zones.

In the Lucid *Anthurium* key the species keys to *A. ecuadorensis* Engl. which differs in having a much narrower blades up to 3.5 times longer than broad with a narrow, V-shaped sinus as well as by having a proportionately longer spadix; *A. orientale* Sodiro, which has a much larger ovate-sagittate blade that dries brown and a narrowly spatulate sinus and *A. sagittale* Sodiro, differing in having more narrowly triangular blades 2.3 times longer than wide with narrower, hippocrepiform sinus.

The species epithet is from the Greek “chloros” (meaning green) referring to the greenish spadix which is unusual in section *Belolonchium* to which this species belongs.

Paratypes: ECUADOR. **Morona-Santiago:** Cordillera de Cutucú, western slopes, along

trail from Logroño to Yaupi, in the general region, 02°46'S, 78°06'W, Nov. 1976, *M.T. Madison, E.O. Bush, III & E.W. Davis 3293* (SEL); *M.T. Madison 3436* (MO); Along road between Gualaquiza and Indanza, 12 km S of Indanza along river, 03°11'47"S, 78°33'06"W, 1250 m, 8 Sep. 2002, *Thomas B. Croat 87309* (MO, PMA, QCNE); Méndez-Paute, 43.7 km W of Méndez, 02°36'36"S, 78°28'12"W, 12 July 2004, *Thomas B. Croat, Lynn P. Hannon, Greg Walbert & Tuntiak Katan 90950* (MO, QCNE). **Napo:** El Chaco, Proyecto Hidroeléctrico Coca, Punto ST4, Río Quijos, ca 10 km al sur de Reventador, 00°08'S, 77°30'W, 6–10 Oct. 1990, *Walter Palacios 6082* (MO, QCNE). **Pastaza:** 8 km al NE de Mera on road to Río Pastaza, 01°24'14"S, 78°04'16"W, 15–16 Mar. 1985, *Marc Baker, D. Neill, W. Palacios & J. Zaruma 5733* (MO, QAME); Vicinity Shell, ca. 1 km north of town, along Río Claro, 00°29'39"S, 78°03'52"W, 29 Aug. 2002, *Croat & Lynn P. Hannon 87105* (MO, QCNE); Mera, 01°27'42"S, 78°05'52"W, 21 Nov. 1955, *Asplund 18546* (S); near Mangayacu, 01°27'42"S, 78°05'52"W, 14 Nov. 1955, *Asplund 18418* (S) **Zamora-Chinchipe:** Between San Carlos and Nambija on mining road E off of main San Carlos-Nambija road beginning 6 km S of San Carlos, 0.9 km up road toward mining operation at end of road (2.4 km from road), 04°02'18"S, 78°47'52"W, 23 July 2004, *Thomas B. Croat 92001* (MO, QCNE); Along road between Zamora and Gualaquiza, 70.9 km N of bridge over Río Zamora in Zamora, between Los Encuentros and El Panguí, 03°42'S, 78°36'W, 4 Mar 1992, *Thomas B. Croat 72717* (MO, QCNE).



Figure 28. *Anthurium clarkei* Croat (Palacios 8601; MO-4312399, sheet 1). Herbarium specimen showing stems, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescences.



Figure 29. *Anthurium clavigerum* Poepp. (Croat *et al.* 105849). Life plant showing epiphytic habit, stems, petioles and leaf blades, adaxial surface.

Anthurium clarkei Croat, *Willdenowia* 40: 127. 2010. Type: Ecuador. Zamora-Chinchi: Cantón Nangaritza, Miazí, margin of Río Nangaritza, primary forest with outcrops of calcareous rocks, canopy at 30 m, “suelos entisoles”, 78°42'W, 04°16'W, 930 m, 26 Oct. 1991, *W. Palacios, I Vargas & M.M. Ruiz* 8601 (holotype?, MO; iso?, QCNE). **Figure 28.**

The species is a member of sect. *Xialophyllum* and is characterized by its elongate internodes, the cataphylls soon

deciduous, terete, weakly sulcate petioles, the ovate matte subvelvety greenish drying blades, green spathe and purplish, cylindroid spadix.

Terrestrial vine, sprawling; **stem** elongated, arising up to 1.5 meters; **internodes** 2.7–10.2 cm long, 3–7 mm wide, long, medium green, weakly glossy, drying pale brown; **roots**; long and slender, drying dark brown, loose and spreading; **cataphylls** 5.3–8.0 cm long, drying mostly intact to semi-intact, light greenish-brown to light brown, deciduous, with only a few



Figure 30. *Anthurium clavigerum* Poepp. (Croat et al. 105849). Close-up of stem rooting at the nodes and petioles.



Figure 31. *Anthurium clavigerum* Poepp. (Croat et al. 105849). Close-up of leaf blade, adaxial surface.

pale loose fibers persisting at base. LEAVES widely scattered on stem; **petioles** 6.2–8.3 cm long (averaging 7.2 cm), medium green, semiglossy, terete, narrowly and weakly sulcate, drying greenish-brown to light brown; **blades** 11.2–15.0 cm long, 6.7–10.2 cm wide (averaging 13.7 x 8.2 cm), 1.5–2.0 times longer than broad, 1.5–2.3 times longer than petiole, ovate, acute at apex and abruptly acuminate, rounded at base, subcoriaceous, dark green, matte-subvelvety above, moderately paler and matte below, drying grayish green above, light yellowish green below; **midrib** acute and more or less concolorous above, narrowly rounded and darker below, drying concolorous above, concolorous to slightly paler below; **basal veins** 3–4, free to base, 1st and 2nd continuing to apex, 3rd and 4th continuing 2/5 of blade and merging with margin; **primary lateral veins** obscure, 5–8, arising at 40–50° angle, weakly sunken and concolorous above, weakly raised and concolorous below, drying concolorous to slightly paler above and below; **collective veins** arising from 1st basal vein, 9–15 mm from margin near base, 3–6 mm from margin at 2nd and 3rd primary lateral veins, gradually getting closer to margin as it nears apex; INFLORESCENCE with **peduncle** 7.7–21 cm long (averaging 14.4 cm); **spathe** green, 2.5–4.5 cm long, 6–7 mm wide (averaging 3.6 cm x 7 mm); **spadix** narrowly cylindroid, slender, 3.0–5.5 cm long (averaging 4.4 cm), purple; **flowers** 5–6 visible per spiral, 1.4–1.6 mm long, 2.4–2.6 mm wide, tepals minutely granular, lateral tepals 0.6–0.7 mm wide, 2–3 sided, usually ± shield-shaped.

Anthurium clarkei is apparently endemic to SE Ecuador in Zamora-Chinchipe Province in the Cordillera del Cóndor at 900–1250 m in a *Premontane wet forest* life zone.

Other specimens seen: ECUADOR. **Zamora-Chinchipe:** Pachicutza, sendero hacia el Hito, vegetación tropical con árboles que fluctúan entre los 12 y 18 m, Vegetación representativa de: Ficus, Columnea, Capparis y Clusia, 04°09'S, 78°38'W, 900–1200 m, 17 Oct. 1991, Jaime Jaramillo 13975 (QCA), Nangaritza, Parroquia Zurmi, Comunidad Centro Shaime (along Río Nangaritza), forest 2–4 km NW of Centro Shaime, forest on limestone outcrop (i.e., presence of sinkholes, rocks, and caves), evergreen wet forest, 04°04'S, 78°54'W, 1000 m, 13 Dec. 2001, J. L. Clark, K. Elmers, Lucia, A. Terry, M. Sharupe (guide), M. 6470 (QCNE, QCA, US); Río Nangaritza, Shaime, Bosque muy húmedo Premontano, 04°20'S, 78°40'W, 1000 m, 8 Dec. 1990, Walter Palacios 6632 (MO, QCNE); Cordillera del Cóndor region, Parroquia Zurmi; vicinity Las Orquideas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, Thomas B. Croat 97137 (K, MO, QCNE, S, US).

Anthurium clavigerum Poepp., *Nov. Gen. Sp. Pl.* 3: 84. 1845. Type: Peru. Huanuco: Pampayacu, Oct. 1829, E.F. Poeppig 1429 (holotype?, W). **Figures 29–31.**



Figure 32. *Anthurium constrictum* Croat & Carlsen (Palacios 6622; MO-3842197). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

The species is a member of sect. *Dactylophyllum* and is characterized by its large compound leaves with 7–11 leaflets broadly sinuate on margins, and by its large inflorescences with the spathe dark purple and the spadix dark violet.

Epiphyte or hemiepiphyte; **internodes** short, 1.5–4 cm long, 2–4 cm diam., dark green, weakly glossy; **cataphylls** persisting semi-intact above, with only fragments lower down, drying dark brown; **petioles** 66–91 cm long, medium green, sometimes densely and minutely speckled, weakly glossy, subterete, obtusely and narrowly sulcate; **blades** subcoriaceous, compound, 7–11 foliolate; leaflets broadly sinuate, 24–44 cm long, 8–16 cm wide, dark green and weakly glossy above, paler and glossy below; **major veins** narrowly convex and slightly paler above, round-raised and moderately paler below; **tertiary veins** in part raised below. INFLORESCENCE erect; **peduncle** 20–44 cm long, terete; **spathe** linear-lanceolate, erect-spreading, 14–41 cm long, 1–2 cm wide, dark purple; **spadix** 16–60 cm long, 0.7–3.5 cm diam., dark violet. INFRUCTESCENCES pendent; **berries** early-emergent, dark violet-purple.

Anthurium clavigerum is found from Central America (Belize to Panama) to the Amazon Basin (Brazil, Colombia, Ecuador, Peru, Bolivia) and also in Venezuela and the Guianas at 0–1600 m in *Tropical moist forest* and *Premontane wet forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, vic. of Río Zamora and Río Quime, vic. of Ecuacorriente copper mine development, drainage of Río Waiwaime, along road to mine site 0.5 km S of mine headquarters, 03°33'S, 78°27'W, 1000 m, 13 Apr. 2006, *Thomas B. Croat 97025* (MO, QCNE); In the vicinity of the mining camp at the Río Tundaime, pastures along Río Quimi with small patches of disturbed forest, 03°31'10"S, 78°25'53"W, 900–1000 m, 3 Nov. 2004, *H. van der Werff, Bruce Gray, Juan C. Ronquillo & Wilson Quizhpe 19246* (GB, MO); Vicinity of Ecuacorrientes mining company, Valley of Río Quime, trail along Río Waiwaime near its mouth at Río Quime, 03°33'45"S, 78°27'47"W, 1000 m, 23 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 99067* (MO, QCNE); Cordillera del Cóndor, vertiente occidental, Parroquia Tundayme, cuenca del Río Wawaime, afluyente del Río Quimi, Bosque muy humedo montano bajo, bosque intervenido, a lo largo de la carretera desde el campamento de Ecuacorriente hacia el sitio de la futura mina de cobre, 03°33'59"S, 78°26'29"W, 1000 m, 29 Sep. 2006, *Wilson Quizhpe & Abel Wisum 2370* (CUCV, MO, QCNE); Cordillera del Cóndor, Parroquia Tundayme, Valle del Río Quimi, Bosque muy húmedo premontano, bosque maduro, intervenido por actividad ganadera y minera, 03°33'29"S, 78°27'55"W, 820 m, 8 Oct. 2006, *Carlos Morales & Diego Reyes 1977* (MO, QCNE); Valle del Río Quimi, parroquia Tundayme, cuenca alta del Río Wawaime, alrededores de la plataforma de la futura mina de cobre de Ecuacorriente, 03°34'44"S, 78°26'07"W,

1320 m, 7 Oct. 2006, *Diego Reyes & Carlos Morales* 1226 (MO, QCNE).

Anthurium constrictum Croat & Carlsen, *Novon* 14(4): 401–412. 2004. Type: Ecuador. Zamora-Chinchi: Nangaritza Cantón, Río Nangaritza, Shaime, margen derecho del río, bosque muy húmedo premontano, 04°20'S, 78°40'W, 1000 m, 8 Dec. 1990, *Walter Palacios* 6622 (holotype: MO; isotype: QCNE). **Figure 32.**

The species is a member of sect. *Semaephyllum* and is characterized by its caniculate to D-shaped petiole, its deeply trilobed blade with a constriction at the base of the central lobe and with spreading lateral lobes with rounded apices, and its inflorescences with a sessile, dark purple and slender spadix.

Terrestrial, hemiepiphytic or epiphytic to 2.5 m; **internodes** short, ca. 1 cm diam., medium green, weakly glossy; **cataphylls** yellowish green, 5–9(–17) cm long, with apiculum 2–4 mm long, persisting intact at uppermost nodes. LEAVES erect; **petiole** 16–31(–46) cm x 2–4 mm, medium green, semiglossy, sharply flattened-sulcate, margins acute (adaxial surface with medial sulcus and to submarginal obtuse ribs), densely pale-lineate; geniculum 1–1.5(–3) cm x 2–4 mm; **blades** deeply trilobed to 2–4(–6) cm from the base, coriaceous to subcoriaceous, 13–27(–35) x 17–36(–40) cm, dark green and semiglossy above, moderately paler and

glossy below, very few raphides above, denser and conspicuous below, base truncate to cuneate; central lobe broadly obovate, 12–24(–30) x 7.5–14(–24) cm, 2–4(–6) cm across at base, apex cuspidate; **midrib** moderately paler and weakly raised to sunken above, slightly paler and raised below, angled; **primary lateral veins** 9–13 per side, concolorous straight, weakly raised, rounded above, raised and very conspicuous below, darker than the surface and departing midrib at 40–50° angles; **tertiary veins** prominulous; **collective veins** arising from one of the lowermost primary lateral veins, usually the third pair, 4–5 mm from the margin, weakly raised to sunken above, raised below; lateral lobes spreading to slightly falcate, 60–70° from central lobe, 8.5–20(–25) x 5–10(–16) cm, apex broadly rounded, slightly turned forward, inner margin concave to straight, outer margin concave; **basal veins** 4–5 pairs, joined for 1.5–4 cm, all of them separating at the same distance; posterior ribs straight, 80–90° from midrib, naked for up to 4 cm. INFLORESCENCE erect; **peduncle** 20–29 cm x 3–5 mm, longer than or equal to petiole; **spathe** pale green to green, matte inside, semiglossy outside, lanceolate, reflexed, erect, 5–7(–25.5) x 0.6–1.2(–5) cm, apex long acuminate (tip inrolled), base acute; **spadix** sessile, pale green or dark purple, cylindric, 5–9.5 cm x 4–6 mm; 4–5 flowers per principal spiral, rhombic, 2.4–3.2(–14) x 1.6–2.8 mm, sides weakly sigmoid; tepals thin and velvety, lateral tepals 0.8–1.1 mm wide, inner margin rounded, outer margin angled; stamens weakly exserted; anthers ca. 0.6 x 0.4 mm,

thecae elliptic, slightly divaricate; pistils exposed even in very immature inflorescences; stigma round to elliptic, ca. 0.3 mm across. INFRUCTESCENCE dark purple, 3.1 cm long, 2.8–3 cm diam.; **fruits** purple, rounded, covered by scale-like, brownish tepals, ca. 2 mm diam., pistils acute, purplish.

Anthurium constrictum occurs in eastern Ecuador and Peru at 800–2200 m in *Premontane* and *Montane wet forest* life zones.

Additional specimens seen: ECUADOR. **Zamora-Chinchipe:** Vicinity of El Pangui, east of El Pangui, across Río Pachicuza, 0.5 km east of river, disturbed virgin forest along stream, 03°39'48"S, 78°34'11"W, 900 m, 6 Sep. 2002, *Thomas B. Croat 87152* (MO, QCNE); Cordillera del Cóndor, Shaimi, SE de Camp. Militar, Río Nangaritzza, 04°18'S, 78°43'W, 930 m, 27 Oct 1991, *Palacios et al. 8755* (MO, QCNE); Río Nangaritzza, Shaime, márgen derecho del río, Bosque muy húmedo premontano, bosque primario, 04°20'S, 78°40'W, 1000 m, 8 Dec. 1990, *Walter A. Palacios 6622* (MO, QCNE); Cordillera del Cóndor, along road from Namirez (22.3 km S of Yanzaza) to Nambija, 8.1 km S of San Carlos, 1524 m, 04°03'37"S, 08°47'25"W, 28 May 2003, *Thomas B. Croat & Mark Menke 89638* (MO, QCNE).

***Anthurium corrientense* Croat, sp. nov.**
Ecuador. Zamora-Chinchipe:
Cordillera del Condor, vicinity of
Ecuacorrientes copper mine

concession, vicinity of mine site, along trail above parking area near end of road. 03°34'54"S, 78°26'06"W, 1330–1360 m, 21 Sep. 2007, *T.B. Croat & G. Ferry 98963* (holotype, MO-6057849–50; isotype, QCNE). **Figures 33–36.**

The species is a member of sect. *Calomystrium* characterized by its terrestrial habit, short internodes, cataphylls persisting intact but soon rotting, terete petiole, semiglossy ovate-sagittate brown-drying blades conspicuously dark-punctate on both surfaces with 5(6) pairs of basal veins, a single free pair of basal veins, the posterior rib naked to 3 cm as well as by the oblong-lanceolate green spreading spathe and long cylindroid-tapered lavender purplish long-cylindroid tapered spadix,

Terrestrial; stems less than 20 cm long; **internodes** short, 2.5–3.0 cm diam.; **cataphylls** persisting intact but soon rotting, dark brown, 18 cm long; LEAVES with petioles 74–83 cm long, 5–8 mm diam. midway, terete, narrowly and obtusely sulcate, medium green, semiglossy, drying lighter yellowish brown; geniculum 2.5–3 cm long, 4–7 mm diam., concolorous to slightly darker than petiole; **blades** ovate-sagittate, 45–55 cm long, 20–26 cm wide, widest ca. 2 cm above or below the petiolar plexus, short acuminate (acumen 5 mm) and aristate, 2.16–2.25 longer than wide, 0.7 times as long as petiole, subcoriaceous, dark green and semi-glossy above, moderately paler and glossy below, drying medium yellowish brown and matte above, slightly



Figure 33. *Anthurium corrientense* Croat (Croat & Ferry 98963; MO-6057850, sheet 2). Herbarium specimen showing leaf blade, adaxial and abaxial surfaces.



Figure 34. *Anthurium corrientense* Croat (Croat & Ferry 98963; MO-6057849, sheet 1). Herbarium specimen showing petiole and inflorescence.



Figure 35. *Anthurium corrientense* Croat (Croat & Ferry 98963). Close-up view of leaf blade, adaxial surface.



Figure 36. *Anthurium corrientense* Croat (Croat & Ferry 98963). Close-up view of inflorescence with pale-green spathe and purplish spadix.



Figure 37. *Anthurium curtispadix* Croat (not collected). Live plant showing petioles and leaf blades, adaxial and abaxial surfaces.

darker and semi-glossy below; **upper surface** dark glandular-punctate or glandular dotted, minutely reddish-brown speckled; **lower surface** more prominently dark glandular-punctate or dark dotted, minutely granular; **anterior lobes** 39.5–44.5 [36.5–42 averaging 38.5 dried] cm long, margin weakly concave in middle 1/3; **posterior lobes** 10–13 cm averaging 11.5 cm long, 7.5–9.5 cm averaging 8.5 cm wide, parallel to sometimes weakly turned inward; **midrib** narrowly rounded and moderately paler above, prominently raised and narrowly convex and paler with acute

medial ridge and acute lateral ridges below; **primary lateral veins** 9–10 pairs, arising at a 48–59° angle, narrowly raised and slightly paler above and below; **tertiary veins** convex above, narrowly rounded and more prominent below; **collective veins** originating from the 1st or 2nd basal veins (lower basal veins margin out to ca. 1/3 up the blade), 1–2 mm from margin; **basal veins** 5(6) pairs, 1st pair free to base, the remainder coalesced 3.5–5 cm, 2nd pair branching off at 1–2 cm the remainder branching at end of posterior rib, narrowly rounded with strong medial rib; **posterior**



Figure 38. *Anthurium curtispadix* Croat (not collected). Close-up view of inflorescence with green spathe and spadix.

rib 3.5–5 cm long, naked from 2.5–3.5 cm, weakly curved; **sinus** hippocrepiform to parabolic, 8.5–10 cm deep. INFLORESCENCES erect; **peduncle** 23.5 cm long, 6 mm diam. noticeably tapered, significantly shorter than petioles, drying mid yellowish brown, 1.6 times longer than spathe; **spathe** 15–19 cm long, 2–3.6 cm wide, oblong-lanceolate and narrowly acuminate, subcoriaceous, spreading, pale green, drying mid yellowish brown inside semiglossy, outside glossy; **spadix** sessile, 19.7 cm long, drying to 18.5 cm long, 11 mm diam. midway and 7 mm diam. at 1 cm from tip, drying to 7 mm diam., cylindroid-tapered, purplish, matte, drying dark brown; **flowers** 13–14 per spiral, 1.6–1.9 mm long, 1.2–1.5 mm wide, tepals 1.0–1.2 mm wide, outer margin 2-sided, inner margin broadly rounded drying almost straight, surface minutely granular, stamens and thecae not yet emergent.

Anthurium corrientense is endemic to Ecuador, known only from the type locality in the Cordillera del Condor in the valley of the Río Waiwaime at 1330–1360 m elevation in a *Premontane wet forest* life zone.

In the Lucid *Anthurium* key the species keys to *A. boomii* Croat as well as *A. effusispathum* Croat, differing in having a broad, more or less whitish, spreading spathe and *A. macrolonchium* Sodiro, both of which occur in the Lita-San Lorenzo region. *Anthurium boomii* differs in having the blades broadest well above the petiolar plexus and in having a prominently stipitate spadix whereas *A. macrolonchium* differs in having

longer cataphylls (20–25 cm long), having blades more narrowly long-acuminate at apex, and by having a parabolic sinus.

The species is named for the Ecuacorrientes Copper Company which made it possible for me to work in the area of the new copper mine facilities and provided food and lodging while working there. Without their generous cooperation it would not have been possible to find this new species.

Anthurium curtispadix Croat, *Ann. Missouri Bot. Gard.* 78(3): 639. 1991. Type: Ecuador. Pastaza: Puyo, cultivated at Missouri Botanical Garden, originally collected by Mickey Carmichael, *T.B. Croat 55207* (holotype: MO 3104658; isotypes: AAU, B, K, M, NY, RSA, U, US). **Figures 37 & 38.**

This species is a member of section *Pachyneurium* and is distinguished by its short, spreading inflorescence with an erect, short, stubby spadix (hence the name) with many (9–15) flowers per spiral.

Stem to 21 cm long, ca. 3 cm diam.; leaf scars conspicuous or obscured by root mass, 0.5–1 cm high, 0.6–0.8 cm wide; **roots** ascending to spreading to descending, green to light brown, smooth to sometimes weakly pubescent, tapered, elongate, 4–7 mm diam.; **cataphylls** subcoriaceous, weakly 1-ribbed near the apex, 5–8 cm long, narrowly acute and apiculate at apex, drying

tan to reddish brown, persisting semi-intact, eventually as a reticulum of fibers with the apex remaining intact. LEAVES erect to spreading; **petioles** 3.5–14 cm long, 4–9 mm diam., D-shaped to C-shaped, slightly sulcate adaxially, with the margins sharply to obtusely raised, rounded to sometimes obscurely 1–2-ribbed abaxially, the surface obscurely short-lineate; geniculum paler and thicker than petiole, becoming minutely and transversely fissured and scurfy abaxially, (0.7)1–2.2 cm long; **blades** subcoriaceous, elliptic to oblanceolate, gradually acuminate at apex (the acumen apiculate), narrowly acute to obtuse to weakly rounded at base, 17–67 cm long, 7.5–20 cm wide, broadest at or above the middle, the margins weakly undulate; **upper surface** semiglossy, medium green, **lower surface** matte to weakly glossy, paler, drying greenish to yellowish green; **midrib** flat at base with blunt medial rib, narrowing and acute toward the apex above, convexly raised and paler than surface below; **primary lateral veins** 5–7 pairs, departing midrib at 30–45° angle, more or less straight, raised and weakly paler than surface above, convex below; interprimary veins absent; **tertiary veins** obscure above, visible below; reticulate veins obscure above, darker than surface below; **collective veins** arising from near the apex, weakly sunken above, prominulous below, 2–9 mm from margin. INFLORESCENCES spreading, usually several present at once; **peduncle** 5–10 cm long, 4 mm diam., equaling to usually ca. 0.5 times as long as petioles, green, terete; **spathe** reflexed-spreading, coriaceous, pale green, sometimes weakly tinged with red,

oblong-lanceolate, 3–3.5 cm long, 1.5–2 cm wide, broadest in the lower third, inserted at 75° angle on peduncle, gradually to abruptly acuminate at apex (the acumen inrolled, hooked), acute to decurrent at base, the margins strongly downturned, meeting at 60–80° angle; **spadix** pale, dull green, somewhat tinged with brown, sessile, cylindroid to sometimes weakly clavate, erect, held at ca 90 degree angle from peduncle, 3.5–4.7 cm long, 6–7 mm diam. near base, 3–4 mm diam. near apex, broadest at the base; **flowers** rhombic to 4-lobed, 1.7–2.3(2.6) mm long, 1.3–2.3 mm wide, the sides straight to jaggedly sigmoid; 13–15 flowers visible in principal spiral, 9 in alternate spiral; tepals matte, minutely papillate; lateral tepals 1.5–1.8 mm wide, the inner margins broadly rounded, the outer margins irregularly 3-sided; pistils weakly emergent, purplish violet; stigma linear, slit-like, 0.3 mm long; stamens emerging in a prompt, erratic sequence, the laterals extending to the apex in a scattered pattern before the 3rd stamen emerge, laterals followed by alternates in a rapid succession but very irregularly on the spadix (sometimes the 4th stamen appearing first); anthers white, 0.6 mm long, 0.7 mm wide, obscuring pistil; thecae ellipsoid, not divaricate; pollen drying white.

Anthurium curtispadix is known only from two localities in Ecuador (Pastaza and Zamora-Chinchi) in a *Premontane wet forest* life zone.

Specimen seen: ECUADOR. **Zamora-Chinchi:** Cordillera del Cóndor, entrance

of the Quimi Valley, more or less 1 km from mining camp. Lower montane forest and scattered trees in pasture, 03°31'41"S, 78°25'33"W, 950 m, 2 Nov. 2004, *H. van der Werff, Bruce Gray, Juan C. Ronquillo & Wilson Quizhpe* 19176 (MO).

Anthurium cutucuense Madison, *Selbyana* 2(2–3): 256. 1978. Type: Ecuador. Morona-Santiago, Cordillera Cutucú, general region of 02°46'S, 78°46'W, elev. 1830 m, *M.T. Madison, M. Bush & E.W. Davis* 3386 (holotype: SEL; isotype: US). **Figures 39–42.**

The species is a member of sect. *Dactylophyllum* and is characterized by its trisect blades with the blade segments linear-lanceolate, metallic blue-green, strongly bullate and pendent from rigidly horizontal, red-punctate petioles. This species has long internodes and single leaflets on thin wiry stems. As it climbs towards brighter light and a better view, *A. cutucuense* develops its characteristic trisect leaves and the internodes begin to get closer together.

Hemiepiphytic or epiphytic (occasionally terrestrial) vine, growing to 8 m; **stem** smooth, 1–2 cm diam.; **internodes** elongate, 2–10 cm long, 1 cm diam., reddish with green spots (sometimes dark green), semiglossy; **cataphylls** 8–13.3 cm long, persisting at upper nodes as fibers with fragments of epidermis intact, narrowly rounded at apex with very slender, 1.5–2 mm long, subapical epiculum. **LEAVES**

with **petioles** 14–54.5 cm long (averaging 27.3 cm), red to dark purple, densely pale-green-speckled (sometimes pale green mottled red to densely red-punctulate) weakly glossy, terete, narrowly and weakly to deeply sulcate, punctate; **blades** trisect with medial lobes slightly longer and wider than lateral lobes, 15–50 cm long, 8–22 cm wide (averaging 29.7 x 14), 1.3–2.8 times longer than wide (averaging 2.1), 0.8–1.3 times longer than petiole but averaging as long as petiole, subcoriaceous to coriaceous, strongly bullate, dark green and matte-subvelvety above, sometimes shiny, metallic blue-green, paler green to silvery green and matte below, upper surface deeply bullate, the primary lateral veins prominently horizontal; lower surface pleated-raised with prominently raised primary lateral veins; **medial lobes** linear-lanceolate, acuminate at apex, acute at base, 15–50 cm long, 1.7–5.9 cm wide (averaging 29.1 x 3.4); **lateral lobes** linear-lanceolate, falcate, acuminate at apex, acute at base, nearly equal, 11.4–42.5 cm long, 1.3–5.9 cm wide (averaging 26.1 x 3.0); **midrib** acute and bright red to deep red concolorous, deeply sunken above, narrowly to acutely raised and semiglossy, red, rose or purple below, thicker at base, becoming narrower towards apex; **primary lateral veins** deeply quilted-sunken above, narrowly convex and pleated-raised below; **collective veins** arising from the base, 0–1 mm from the margin, as prominent as primary lateral veins, sunken above, raised below; **tertiary veins** in part raised and concolorous on both surfaces. **INFLORESCENCE** with **peduncle** 19–36.5 cm long (averaging 25.8 cm), dull



Figure 39. *Anthurium cutucuense* Madison (not collected). Close-up view of stem and red petiole bases densely speckled light green.



Figure 40. *Anthurium cutucuense* Madison (Croat 92105). Close-up view of leaf blade, adaxial surface.

lavender, pale green or reddish with dull green, red or puple mottling, flattened, weakly and broadly sulcate; **spathe** 10–12.5 cm long (averaging 10.8), 10–21 mm wide (averaging 12.8 mm), dull green to green suffused purple, reflexed; **spadix** 8.5–16.7 cm long (averaging 13.1 cm), 7–13 mm wide (averaging 10 mm), dull lavender to greenish purple. INFRUCTESCENCE with spathe and spadix green.

Anthurium cutucuense is endemic to Ecuador occurring in Morona-Santiago and Zamora-Chinchipec at 1542–3000 meters in *Montane moist forest* and *Montane wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor región, cloud forest along ridge above and east of Tikimints, valley of Río Coangos (on topo maps and known locally as "Ijiach Naint" in



Figure 41. *Anthurium cutucuense* Madison (Croat 92105). Close-up view of leaf blade, abaxial surface.

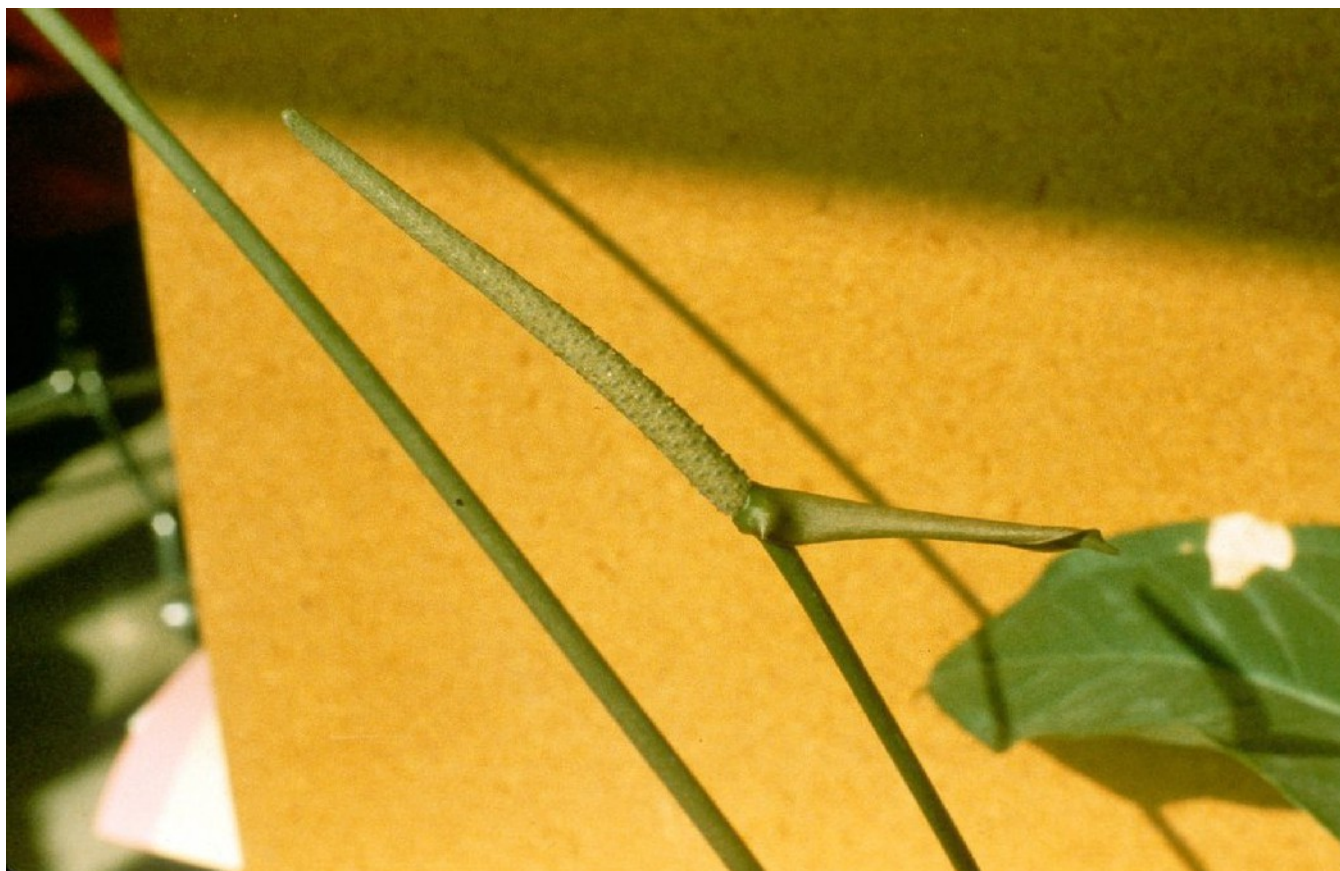


Figure 42. *Anthurium cutucuense* Madison (not collected). Close-up view inflorescence with green spathe and spadix.

Shuar, meaning "Ridge of the Grubs"), 03°16'28"S, 78°11'18"W, 1750 m, 19 Mar. 2001, *Paul E. Berry & David A. Neill* 7627 (MO). **Zamora-Chinchipe:** NW range of Cordillera del Cóndor, base camp overlooking Río Zamora at headwaters of Río Piuntza, ca. 1 hr. by trail E from base camp, 04°15'S, 78°35'W, 1850 m, 7 Jan. 1972, *B. MacBryde* 1017 (MO); El Panguí, Cordillera del Condor, Cresta de la Cordillera, en la frontera Ecuador-Perú, 1 km S of destacamento militar Cóndor Mirador, Hito de la Paz, 13, 03°37'26"S, 78°23'35"W, 1800 m, 15 Dec. 2000, *Cuascota*

et al. 334 (QCNE, MO); Cordillera del Cóndor, near Cóndor Mirador military post, on Ecuador-Peru border, at low point of summit ridge, below sandstone outcrops, 03°38'20"S, 78°23'29"W, 1760 m, 8 Sep. 2003, *Neill et al.* 14504 (MO, QCNE).

Anthurium dolichocnemum Croat, *Aroideana* 31: 47–50. 2008. Type: Ecuador. **Zamora-Chinchipe:** Cordillera del Cóndor, along road from Namirez to Nambija, along mining road, 10.0 km S of Namirez and Río Zamora, vic. of Nambija,



Figure 43. *Anthurium dolichocnemum* Croat (Croat & Menke 89700). Live plant showing elongated stem, petioles and leaf blade, adaxial surface, and inflorescence.

along road to mine headquarters ca. 5 km long, just S of Nambija, 04°03'44"S, 78°47'29"W, 1779 m, 23 July 2004, T. B. Croat 92058 (holotype: MO; isotypes: AAU, B, BR, CAS, COL, CUV, DUKE, GH, HUA, INB, F, G, GB, K, L, M, MEXU, MICH, NY, P, PMA, QCA, QCNE, RJ, RSA, S, SEL, TEFH, TEX, U, UB, US, USCG, USM, VEN, W). **Figures 43–45.**

The species is a member of sect. *Xialophyllum* and is characterized by its

generally terrestrial creeping habit, elongated internodes sub-3-lobed leaves with outward-projecting lobes, 6–10 pairs of primary lateral veins, and collective veins arising from the first pair of basal veins as well as by its violet spadix.

Terrestrial with creeping rhizome, sometimes epiphyte; **internodes** 1–13 cm long, 3–6 mm diam., medium green, matte or weakly glossy, soon light gray-brown; **cataphylls** thin, 3–7 cm long, bluntly 1-ribbed, weathering brown, mostly deciduous or with a few weak fibers persisting;



Figure 44. *Anthurium dolichocnemum* Croat (Croat & Menke 89700). Close-up view of leaf blade, adaxial surface.



Figure 45. *Anthurium dolichocnemum* Croat (Croat & Menke 89700). Close-up view of inflorescence with caducous spathe and purplish spadix.



Figure 46. *Anthurium dombeyanum* Brongn. ex Schott (Croat 58204). Live plant showing petioles, leaf blades, adaxial surfaces, and inflorescence.



Figure 47. *Anthurium dombeyanum* Brongn. ex Schott (Croat 58204). Close-up view of inflorescence showing spathe green heavily tinged red-violet, and dark pink spadix.

LEAVES drying green; **petioles** subterete, narrowly and obtusely sulcate (the margins bluntly acute), medium green, matte to weakly glossy, 12–29 cm long, 3 mm diam.; geniculum 1 cm long, 4 mm diam., broadly sulcate; **blades** sagittate-subhastate, with lobes projecting outwards, concave near the base, acuminate, 17–31 cm long, 6–20 cm wide, averaging 23 x 15 cm, 1.2–2.6 times longer than wide, 0.8–1.7 times as long as petioles, thinly coriaceous, dark green and matte-subvelvety above, light green and matte below; **midrib** narrowly raised and slightly paler above, narrowly raised and slightly paler below; **primary lateral veins** 6–10 pairs, arising at 45–60° angle, loop-connected to the connective veins, deeply sunken and concolorous above, narrowly raised and slightly paler below; **tertiary veins** in part weakly raised below; **collective veins** arising from the 1st basal vein, 4–8 mm from margin; **basal veins** 4–6, first 2 free to base, the remainder coalesced to varying degrees and branching from the posterior rib; **posterior rib** straight or slightly curved, naked 8–27 mm; **sinus** broadly to narrowly hippocrepiform. INFLORESCENCES erect-spreading; **peduncle** generally longer than petiole, terete, 18–46 cm long, 2–3 mm diam.; **spathe** green, lanceolate, caducous, ca. 7 cm long, 1.3 cm diam.; **spadix** sessile, tapered, dark green and glossy when immature, turning violet and matte when mature, 2.3–6.5 cm long, 4–5 mm thick; **flowers** 4–5 visible per spiral, 2.4–2.6 mm long and wide; lateral tepals 2.2–2.4 mm wide, the outer margin 2-sided, inner margin broadly rounded. INFRUCTESCENCES with

berries green, early-emergent, mature berries not seen.

Anthurium dolichocnemum is found in Ecuador (Morona-Santiago, Napo, Zamora-Cinchipe) and Peru (Cajamarca) at 1000–2000 m elevation in *Montane moist forest*, *Montane wet forest* and *Premontane wet forest* life zones.

Additional specimens seen: ECUADOR. **Zamora-Chinchipe:** Región de la Cordillera del Condor, Parroquia Surmi, Comunidad Yawi, Faldas de la Cordillera del Cóndor, bosque primario, denso, alto-piemontano, 04°29'52"S, 78°38'30"W, 1500 m, 12 June 2005, *Wilson Quizhpe, V. Granda, D. Veintimilla, H. Salas & P. Wampash* 1401 (K, LOJA, MO, NY); Cordillera de Nanguipa, along road to Cerro Colorado, about 6 km south of Nambija, 20 km southeast of Zamora, cloud forest on slopes, 04°05'51"S, 78°47'43"W, 1930 m, 19 Feb. 2002, *Tom Delinks* 1364 (QCNE); Cuenca del Río Jamboe, Romerillos Bajo, sendero hacia la Cordillera de Curintza, pastizales arbolados y Selva Andina Baja y Alta, 04°15'S, 78°55'W, 1600 m, 27 Aug. 1999, *Patricio Fuentes, P. Conza & P. Villa* 1005 (MO, QCNE); Along road between Zamora and Romerillos Alto, via Jaumbué, 23.2 km E of Río Bombuscaro Bridge in Zamora, 10.4 km E of Pituca, 04°12'15"S, 78°56'19"W, 1425 m, 20 July 2004, *Thomas B. Croat* 91641 (AAU, B, CAS, F, GB, IBE, K, MEXU, MO, NY, QCNE, SEL, TEX, US).

Anthurium dombeyanum Brongn. ex Schott, *Prodr.* 477–478. 1860. Type: Peru. without exact locality, *J. Dombey s.n.* (holotype, P). **Figures 46 & 47.**

Anthurium cymatophyllum K. Koch & Sello in K. Koch, 1221 xi. 276. 1868. Type: destroyed, locality unknown, of cultivated origin said to be from Brazil (a tracing at Kew prepared by Masters from Koch's type specimen in Berlin serves as the type).

Anthurium agoyanense Sodiro, *Anales Univ. Centr. Ecuador* 19: 286. 1905. Type: Ecuador. Tungurahua: Agoyan waterfalls in Rio Pastaza, slopes of Volcan Tungurahua, 1,550 m, date?, *L. Sodiro s.n.* (holotype, B!).

Anthurium agoyanense var. *eleutheroneuron* Sodiro, *Anales Univ. Centr. Ecuador* 19: 287, 1905. Type: Ecuador, Tungurahua: slopes of Volcan Tungurahua, vic. Machay, date?, *L. Sodiro s.n.* (holotype, B!).

Anthurium rigidissimum Engl., *Pflanzenr.* IV. 23B(Heft 21): 292. 1905. Type: Peru. Junin: Tarma, above Huacapistana, 1,900–2,000 m, *A. Weberbauer 2007* (holotype, B).

Anthurium rigidissimum var. *mutatum* Engl., *Pflanzenr.* IV. 23B(Heft 21): 292. 1905. Type: Peru. Junin: Tarma, above Huacapistana, 1,900–2,000 m, *A. Weberbauer 2158* (holotype, B).

The species is a member of sect. *Pachyneurium* and is characterized by its short-petiolate, coriaceous, usually markedly undulate oblong-lanceolate blades, and its long-pedunculate inflorescence with a moderately short-tapered, usually purple spadix, thick, green, lanceolate reflexed spathe and minutely papillate tepals with a more or less erose inner margin.

Terrestrial or epilithic, rarely epiphytic; **stem** 20–30 cm long, 2–6 cm diam.; **roots** dense (the root mass to 20 cm wide), greenish to pale reddish, grayish when dried, sometimes with raphide cells on the surface, elongate, blunt at apex, to 40 cm long, 4–10 mm diam.; **cataphylls** subcoriaceous, lanceolate, 5–25 cm long, narrowly rounded to bluntly acute at apex, pale green, drying brown, persisting semi-intact at upper nodes, otherwise as coarse linear fibers, sometimes with the apex remaining intact. LEAVES erect to spreading; **petioles** (3)10–30 cm long, 5–18 mm diam., erect to spreading, D-shaped, slightly thicker than broad in juveniles and lacking the medial rib adaxially, sulcate in age with an obtuse to acute medial rib, rounded (rarely 1–2-ribbed) abaxially, the surface pale-speckled; geniculum slightly thicker and paler than petiole, 0.5–2.5 cm long; sheath 3–11 cm long, extending halfway or throughout the petiole in smaller leaves; **blades** subcoriaceous to thickly coriaceous, oblong-lanceolate to oblanceolate or narrowly obovate, often elliptic in smaller leaves, bluntly acute or acuminate at apex (the acumen minutely apiculate), long-attenuate to obtusely

rounded or subcordate at base, (10)40–190 cm long, (2)10–35 cm wide, broadest above or near the middle, the margins flat in smaller leaves or markedly undulate especially in larger leaves; upper surface glossy to semiglossy, dark to medium green, occasionally developing a bluish, glaucous covering with age, lower surface usually semiglossy, rarely matte, concolorous or paler than upper surface; **midrib** above acutely raised, below obtusely ribbed at base, becoming acutely angled in upper '3, and then convexly rounded toward the apex, paler than surface or concolorous with it; **basal veins** usually present and aggregated in subcordate leaves, arcuate-ascending, free to base; **primary lateral veins** (7)10–20(24) per side, departing midrib at (18)40–60(70)° angle, usually gently arcuate-ascending to within 1 cm of the margin, then abruptly ascending to the margin, convexly raised above; **tertiary veins** scarcely visible above, moderately to distinctly visible below, sometimes darker than surface, very weakly raised below or flat, drying raised and conspicuously visible; **collective veins** arising from near the base to near the apex, less prominent than primary lateral veins, sunken to weakly raised above, raised below, 2–10 mm from margin. **INFLORESCENCES** erect-spreading to spreading-arching, shorter than or almost equaling leaves; **peduncle** (15)30–65(90) cm long, 2–11 mm diam., (2)3–7(10)x as long as petiole, pale green, sometimes tinged with red-violet, green to dark brown when dried, subterete, sometimes 1-ribbed, flexible; **spathe** spreading to reflexed at anthesis, recurled, subcoriaceous to coriaceous,

green, sometimes tinged with red-violet, speckled with raphide cells, linear-lanceolate, 7–20 cm long, 1–3.5 cm wide, broadest near base, acute at apex, decurrent at base; **spadix** olive-green to grayish, becoming dark pink or maroon to purplish at anthesis, weakly to moderately tapered, rarely cylindroid, sessile to stipitate to 2.5 cm, erect, rigid, held at 130–180° angle from peduncle, 4–28 cm long, 4–17 mm diam. near base, 3–11 mm diam. near apex, broadest near the base; **flowers** squarish to 4-lobed, to 3 mm long when fresh, 1.6–2.6 mm long when dried, to 2.5 mm wide when fresh, 1.4–2.2 mm wide when dried, the sides straight to smoothly sigmoid; 4–14 flowers visible in principal spiral, 3–8 in alternate spiral; tepals matte; lateral tepals 1–1.6 mm wide, the inner margins tinged with pink, becoming purplish, broadly convex, the outer margins 2–4-sided; pistils scarcely emergent, green, with raphide cells; stigma oblong, slit-like, 0.4–0.6(1.0) mm long; stamens emerging irregularly from the base of the spadix in a scattered pattern, slightly exserted, lateral stamens emerging to midway, the laterals preceding the alternates by 5–18 spirals, inclined over and obscuring pistil; filaments tan, with raphide cells, exserted ca. 0.5 mm, 1–2 mm long, 0.6–0.9 mm wide; anthers pinkish, 0.6–1.1 mm long, 0.5–1 mm wide, inclined over the pistil; thecae obovoid, scarcely or not divaricate; pollen pale orange to pale yellow fading to cream, yeasty scented. **INFRUCTESCENCE** semi-erect; **spathe** persisting; **spadix** 5–27 cm long, 1.5–2.5 cm diam., with berries scattered throughout; **berries** violet-purple to reddish violet,

obovoid, bluntly rounded at apex, 6–8 mm long, 5–6 mm diam.; pericarp with raphide cells; mesocarp pulpy, white; seeds 1–2 per berry, green, oblong, 3.5–8 mm long, 2.5 mm diam., with a gelatinous appendage at apex.

Anthurium dombeyanum ranges from Ecuador (Imbabura, Loja, Morona-Santiago, Tungurahua, Zamora-Chinchipe) to Peru (Amazonas, Cajamarca, Cusco, Huánuco, Junín, Pasco, San Martín) and Bolivia (Beni, Chuquisaca, Cochabamba) at 400–3700 m in *Lower montane moist forest*, *Premontane moist forest*, *Montane moist forest* and *Premontane dry forest* life zones. The species occurs in seasonally dry habitats and often inhabits rocky or extremely precipitous sites, with low nighttime temperatures.

Specimens seen: ECUADOR: PERU: **Amazonas:** Cordillera Del Condor, Puesto de Vigilancia Alfonso Ugarte (PV 3), cabeceras del Río Comainas, tributario al oeste del Río Cenepa, cuchillo atrás del campamento al norte, pendiente arriba de quebrada rocosa, suelos de arcilla roja o amarilla, bosque heterogeneo, 20–30 m, alta densidad de epífitas sobre troncos, 03°54'S, 78°25'W, 1300–1500 m, 16 July 1994, *Hamilton Beltrán & Robin B. Foster 861* (MO).

Anthurium effusilobum Croat [in Vasquez et al., *Arnaldoa* 9(2): 51. 2003, nom. nud.], *Willdenowia* 35: 346–348. 2005. Type: Ecuador. Pastaza: Puyo-Diez de Agosto-Arajuno, 18 km NE of main Puyo-Macas rd., 8.2 km NE of

Diez de Agosto, 01°27'S, 77°51'W, 970 m, 4 May 1984, *T.B. Croat 59063* (HT: MO; IT: AAU, NY, QCA, QCNE, S, US). **Figures 48–50.**

The species is a member of section *Belolonchium* and is characterized by its cataphylls that persist as a net-like reticulum of fibers sheathing the stem, the brown-drying, bicolorous hastate leaves, and the moderately short, spreading or pendent spadices that are hooded by a narrowly ovate green spathe.

Terrestrial or epiphytic; **stems** erect up to 60 cm long; **internodes**, 2–3 cm in diam.; **cataphylls** 8–12 cm long, ca. 1 cm wide before weathering, persistent as a dense net-like reticulum of reddish-brown fibers that collectively envelop the entire stem. LEAVES erect; **petioles** 37–56 cm long, ca. 4 mm in diam., weakly flattened to sharply C-shaped, narrowly and obtusely or V-sulcate; geniculum 1.5–2 cm long, slightly swollen and paler than petiole in fresh material, usually drying only slightly darker than petiole; **blades** hastate, erect to spreading or pendent (lateral lobes held extended outward), 28–40 cm long, 24–40 cm wide, 0.8–1.45 times as long as wide, 0.65–0.75 times as long as petiole, deeply 3-lobed, subcoriaceous, drying dark greenish brown above, medium brown below; **median lobe** 24–33 cm long (measured from point of petiole attachment to lobe apex), 7–9 cm wide at junction with lateral lobes, narrowly acuminate (acumen 1–1.5 cm long), **lateral lobes** (very short in some juveniles) 12–19 cm long, 8–13 cm wide,



Figure 48. *Anthurium effusilobum* Croat (Croat et al. 105551). Live plant showing climbing habit, petioles, leaf blades and inflorescence.



Figure 49. *Anthurium effusilobum* Croat (Croat *et al.* 105551). Close-up view of leaf blade, adaxial surface.



Figure 50. *Anthurium effusilobum* Croat (Croat et al. 105551). Close-up view of inflorescence with light green spathe and pendent purple spadix.

broadest in upper third to the apex, departing median lobe at 90–110° angle, arcing slightly backward, the leaf margin down-folded at junction of lateral and median lobes, both surfaces moderately semiglossy and bicolorous, drying dark brown-green above, lighter brown below; **midrib** convex to raised above, distinctly and acutely raised to rounded below; **primary lateral veins** 11–13 pairs, arising at 45–55° angle and slightly curving to collective vein, etched sunken above, raised below; interprimary veins scarcely etched-sunken above, scarcely raised below; **basal**

veins 5–8 pairs, all entering the lateral lobes, fused into a 3.0–8.0 cm long naked basal rib, and departing at 1.0–2.0 cm intervals, equal in prominence to primary lateral veins; **collective veins** arising from the 3rd or 4th from highest order basal vein, 3.0–7.0 mm from margin. **INFLORESCENCE** erect; **peduncle** 17–23 cm long, ca. 2 mm in diam.; **spathe** erect to spreading and hooding the spreading or pendent spadix, 6.5–11 cm long, 2–2.5 cm wide, green, broadly ovate, acuminate at apex with acumen to 1.0 cm long; **spadix** pendent, 7–10 cm long, 4–6 mm diam., purplish violet,



Figure 51. *Anthurium effusispathum* Croat (Croat et al. 91000). Live plant showing leaf blades, adaxial surface, and inflorescence.



Figure 52. *Anthurium effusispathum* Croat (Croat et al. 91000). Close-up view of inflorescence with white spathe and pink spadix.

cylindrical to slightly tapered, rounded at apex, stipe 3–8 mm long; **flowers** square, 7–8 visible per principal spiral, 5–8 in alternate spiral, 1.5–1.8 mm long and wide, with straight sides; tepals semi-glossy; lateral tepals 0.8 mm long, 0.5–0.7 mm wide, the inner margins straight to convex, the outer ones 2-sided; pistils weakly emergent before maturity, **stamens** with anthers red or cream and drying reddish; pollen (dried), cream or light yellow to pale yellow-green. INFRUCTESCENCE with **berries** orange, red or purple.

Anthurium effusilobum ranges on the eastern slopes of the Andes from Ecuador (Morona-Santiago, Napo, Pastaza, Zamora-Chinchipe) to Peru (San Martín), at 400–2200 m, almost exclusively in the *Premontane rain forest* life zone.

Specimens seen: ECUADOR: **Morona-Santiago:** Cordillera del Cóndor region. Valley of Río Coangos, lower valley slopes, east of Shuar village of Tinkimints, forest and cultivated areas, 03°15'25"S, 78°12'50"W, 1000 m, 21 Mar. 2001, *David A. Neill & José M. Manzanares 13207* (MO, QCNE); Cordillera del Cóndor, Cuenca del Río Coangos, Centro Shuar Maikuants, cerca al Río Akas, al sur de la comunidad, Bosque húmedo tropical, 03°07'45"S, 78°15'39"W, 870 m, 16 Mar. 2006, *Abel Wisum 351* (MO, QCNE); Cordillera del Cóndor, Cuenca del Río Coangos, Centro Shuar Maikuants, Cerro Wishiwishi Naint, Bosque húmedo premontano, 03°06'49"S, 78°16'26"W, 1140 m, 17 Mar. 2006, *Abel Wisum 373* (QCNE). **Zamora-Chinchipe:**

Cordillera del Condor, vicinity of Ecuacorrientes copper mine region, valley of Río Waiwaime, 2 km above entrance gate near Río Quimi, 03°34'13"S, 78°25'17"W, 1172 m, 5 Apr. 2006, *Thomas B. Croat 96611* (MO, QCNE); Cordillera del Cóndor, Cresta de la Cordillera, en la frontera Ecuador-Perú, 1 km al sur del destacamento militar Cóndor Mirador, Hito de la Paz 13, 03°37'26"S, 78°23'35"W, 1800 m, 15 Dec. 2000, *M. Cuascota & Grupo Post-Grado MO-QCNE 340* (MO, QCNE).

Anthurium effusispathum Croat, *Aroideana* 31: 50–52. 2008. Type: Ecuador. Morona-Santiago: Macas-Riobamba between Proaño and Parque Nacional Sangay, 12.1 km west of Proaño, 02°16'59"S, 78°11'06"W, 1185 m, 13 Aug. 2002, *T. B. Croat, L. Hannon & P. Schmidt 86523* (holotype: MO; isotype: AAU, B, COL, F, GB, GH, HUA, K, NY, QCNE, RJ, RSA, S, SEL, US, VEN, UB, US). **Figures 51 & 52.**

The species is a member of sect. *Calomystrium* and is characterized by its large size, persistent, red-brown cataphylls, terete petioles, narrowly ovate-sagittate blades with 11–17 pairs of primary lateral veins, the broad, inward-projecting posterior lobes with 6–7 basal veins, a thick, broadly curved posterior rib and the collective veins arising from the 3rd–4th pair of basal veins. Also characteristic is the large whitish erect-spreading spathe surrounding the back and sides of the spadix and the thick spadix turning purplish-violet at maturity.

Terrestrial or epiphytic; **internodes** short, ca. 1 cm long, 2–5.3 cm diam.; **cataphylls** persisting intact or semi-intact, red-brown or dark brown, 17–30 cm long, up to 8 cm wide at the base when flattened. LEAVES clustered at the base of the plant; **petioles** terete, weakly and obtusely sulcate, geniculate at apex, (27)56–128 cm long, ca. (0.6)1–2 cm diam. midway, medium to dark green, matte to semiglossy, sometimes minutely and densely speckled; geniculum ca. 3 cm long; **blades** narrowly ovate-sagittate, cuspidate at apex, with broad posterior lobes projecting inward and often overlapping, (28)50–84 cm long, (13)21–41 cm wide, averaging 70 x 32 cm, 1.4–2.9 times longer than wide, 0.5–1.0 times as long as petioles, subcoriaceous, dark green and matte-subvelvety or semiglossy above, paler green and glossy, with dark punctations often clearly visible below; drying somewhat grayish, sparsely and inconspicuously glandular-punctate, conspicuously granular on surface and on veins above, drying moderately smooth, yellow-brown, densely and minutely reddish brown-speckled with the punctations distinct, blackened, smoothly rounded, flat to weakly raised below; **midrib** convex and slightly paler above, acute and moderately paler below, prominently raised and 3-ribbed or quadrangular on older plants; **primary lateral veins** 11–17 pairs, rising at a 45–80° angle, weakly and narrowly raised, slightly paler in deep valleys above, acute and paler or almost concolorous below; **tertiary veins** mostly flattened and slightly darker below; **collective veins** arising from 3rd–4th pair of basal veins, 0–3 mm from

margin; **basal veins** (5)6–7, first (1)2–3 pairs free to base, the remainder coalesced to varying degrees and regularly branching from the posterior rib; **posterior rib** thick, broadly curved, naked (1–)3–5 cm; **sinus** spatulate, with the posterior lobes markedly turned inward and often overlapping. INFLORESCENCES erect or erect-spreading; **peduncle** terete, shorter than petioles, (32)53–99 cm long, 0.9–1.7 cm diam., medium yellow-green, semiglossy; **spathe** erect-spreading, broadly ovate to lanceolate, surrounding back and sides of spadix, sometimes hooding, 12–25 cm long, 4–17 cm diam., 1.8–2.2 times longer than wide, 2.2–6.2 times shorter than peduncles, abruptly acuminate at apex, rounded to subcordate at base, coriaceous, white or pale to medium green and glossy outside, moderately paler, white or greenish white and semiglossy, sparsely glandular-punctate inside; **spadix** stipitate 5 mm, thick and tapering towards the apex, creamy white, creamy gray-white or pale yellow-green, becoming brownish green, pinkish, reddish violet or dark lavender after anthesis, matte, 11–31 cm long, 9–3.0 mm diam., to 1.3 cm diam. at 1.0 cm from tip; **flowers** 13–15–23 visible per spiral, 3.6–3.8 mm long, 3–3.2 mm wide; pistils weakly emergent; tepals glossy, drying matte, minutely papillate, lateral tepals 1.8–2.0 mm wide, the outer margin 2-sided, the inner margin broadly rounded; **stamens** 6 mm wide, 0.4 mm long, the thecae narrowly ovate, slightly divaricate; pollen creamy white. INFRUCTESCENCES erect, to 31 cm long, 3 cm diam., spathe green, spadix

turning purplish violet at maturity, weakly glossy; **berries** purplish red, 6 mm long.

Anthurium effusispathum is at present known only from Ecuador (Morona-Santiago, Napo, Zamora-Chinchi), at 610–1875 m elevation mostly in *Premontane wet forest* but also in *Premontane moist forest*, *Lower montane moist forest* and *Lower montane wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor, along road into Cordillera del Cóndor departing from Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via Numbaime into Cordillera del Cóndor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Croat, L. Hannon, Walbert & Tuntiak Katan Jua 91000* (MO, QCNE). **Zamora-Chinchi:** Vicinity of Ecuacorrientes copper mine development, valley of Río Waiwaime, 5.3 km above locked gate on road to mine, 8.3 km S of mine headquarters, 1310 m, 00°34'40"S, 78°26'01"W, 7 Apr 2006, *Thomas B. Croat, C. Davidson & S. Christoph 96734* (MO, QCNE); Namirez (22.3 Km S of Yanzaza)-Nambija, 8.1 km S of San Carlos, 04°03'37"S, 78°47'25"W, 1524 m, 28 May 2003, *Croat & Menke 89626* (MO, QCNE); Along road between Zumbi on Río Zamora and summit of Cordillera del Cóndor beyond Paquisha, 10.1 km beyond Río Nangaritzza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Croat, L. Hannon, Walbert & Tuntiak Katan Jua 91205* (MO, QCNE); Near

Nambija, along road to the gold mining area, about 20 km east of Zamora, Cordillera de Nanguipa, cloud forest on slopes, 04°03'40"S, 78°47'49"W, 1700 m, 20 Feb. 2002, *David A. Neill, Wilson Quizhpe, José M. Manzanares, Alexander Hirtz, Tom Delinks & Carla J. Cole 13842* (QCNE); Carretera Los Encuentros - destacamento El Cóndor, bosque primario, 03°52'26"S, 78°31'27"W, 1660 m, 29 May 2002, *José M. Manzanares, E. Patterson & M. de Navarro 7565* (MO, QCNE).

Anthurium ernestii Engl., *Pflanzenr.*, IV. 23B (Heft 21): 80. 1895.

Anthurium ernestii Engl. **var. ernestii.**

Type: Peru. San Martin: Pongo de Cainarachi, Sep. 2002, *E.H.G. Ule 6325* (lectotype, B, designated by Croat, 1991). **Figures 53 & 54.**

This species is a member of sect. *Pachyneurium* and is characterized by its fine, thin, pale brown to pale tan network of cataphyll fibers with the uppermost cataphylls often skeletally intact or nearly so and by its oblanceolate leaf blades which generally dry green or greenish brown with the primary lateral veins more or less orange (especially on the lower surface). Also characteristic is the generally short peduncle and especially the cylindroid spadix which is about 5–8 X (rarely to 13 X) longer than broad and often has a minutely prickly appearance owing to the tight clusters of stamens and the upturned tepals on dried



Figure 53. *Anthurium ernestii* Engl. var. *ernestii* Croat (Croat 57988). Live plant showing petioles and leaf blades, adaxial and abaxial surfaces.



Figure 54. *Anthurium ernestii* Engl. var. *ernestii* Croat (Croat 57988). Close-up view of inflorescence with green spathe and purplish spadix.

collections (or more rarely the exerted styles).

Epiphytic; **stem** 6–20 cm long, 1–3 cm diam.; **roots** dense, green, whitish when dried, velutinous, 2–5 mm diam.; **cataphylls** subcoriaceous, 2-ribbed, 3–12 cm long, acuminate at apex, drying reddish brown to light brown, persisting intact, eventually as reticulum of fine, straw-colored fibers with the apex remaining intact. LEAVES erect-spreading; **petioles** 4–30 cm long, 3–13 mm diam., D-shaped, sulcate and with a medial rib adaxially, the margins acute, rounded to 1–5-ribbed abaxially; geniculum thicker and paler than petiole, 0.5–2.3 cm long; sheath 1.5–6 cm long; **blades** subcoriaceous, elliptic to oblanceolate to oblong-oblanceolate, acute to acuminate at apex (the acumen flat), attenuate to obtuse, rarely rounded at base, (25)40–60(131) cm long, (6)7–20(36) cm wide, broadest at or above the middle, the margins broadly undulate, frequently concave in the lower part of the blade; both surfaces matte to semiglossy, generally drying green; **midrib** broadly and acutely raised at base, becoming flat toward the apex above, acutely raised below with a prominent central ridge at base, becoming slightly convex at apex; **primary lateral veins** 6–15 pairs, departing midrib at 30–70° angle, straight to arcuate-ascending to the margin, prominently raised near the midrib, flat to sunken near the margin above, prominently raised below, drying orangish; **tertiary veins** prominulous, raised on both surfaces; **collective veins** arising in the upper 1/3 of the blade, 5–13 mm from margin. INFLORESCENCES erect;

peduncle 3–25(45) cm long, 2–6 mm diam., 0.5–3(5.7)x as long as petiole, pale green, terete; **spathe** erect to reflexed or recurled, subcoriaceous, green to green tinged with red at base, lanceolate to broadly lanceolate, 4–12 cm long, 1–3(4) cm wide, broadest near base or sometimes at or near middle, inserted at 4–80° angle on peduncle, abruptly acuminate to acute at apex, acute at base; **spadix** pinkish to magenta to purplish or green at anthesis, sessile, rarely stipitate to 0.5–1 cm, cylindroid, slightly tapered, erect, slightly curved, 3–11(20) cm long, 3–14 mm diam.; **flowers** 4-lobed, 1–1.9 mm long, 1.4–1.7 mm wide, the sides sigmoid; 5–8(17) flowers visible in principal spiral, 7–11(16) in alternate spiral; tepals matte, densely papillate; lateral tepals 0.4–1 mm wide, the inner margins straight to convex, the outer margins 2–3-sided; pistils raised, the exposed portion rectangular to squarish, often reddish violet, darker than tepals; stigmas slit-like to ellipsoid, 0.2–0.6 mm long; stamens emerging in a regular sequence, the laterals preceding the alternates by up to 27 spirals, the 3rd stamen preceding the 4th by up to 25 spirals; filaments ca. 0.6 mm long, 0.8 mm wide; anthers purplish or pinkish to pinkish white, 0.2–0.7 mm long, 0.4–0.6 mm wide, inclined over and obscuring the pistil; thecae ellipsoid, not divaricate; pollen pale yellow fading to white. Infructescence spreading; spathe withered; berries red-violet to violet, subglobose to obovoid, rounded at apex, 4–10 mm long, 3–6 mm diam.; seeds 1–2 per berry, obovoid, 2–4 mm long, 1.5–2.5 mm diam., creamy brown, with sticky appendage

at apex; mesocarp grayish, juicy, somewhat mealy.

Anthurium ernestii var. *ernestii* ranges throughout western Amazonia, from southern Colombia (Putumayo) to Peru (Amazonas, Loreto, San Martín, Huanuco, Pasco, and Madre de Dios), and western Brazil (Acre and Amazonas as far east as the Rio Madeira), mostly below 500 m (rarely to 800 m) in *Tropical moist*, *Premontane wet*, and *Tropical wet forest* life zones.

Like most of the widespread species of sect. *Pachyneurium*, *A. ernestii* var. *ernestii* is quite variable overall and is not easily understood when only specimens representing a portion of the geographical and/or morphological extremes are at hand. Among the most variable characters for the species are spadix and fruit color. Spadix color has been reported as greenish yellow, pale green, pale olive-green, orange-buff, pink, pinkish, yellowish pink, grayish pink, light purplish pink, reddish, reddish brown, light pink-brown, purplish white, light violet, violet, pale purple, purple, reddish cream, or cream turning magenta. It is generally not a dark color (at least at anthesis), nor a color easily qualified. As in many species of *Anthurium*, the spadix often changes color during the course of anthesis. Fruits are variously described as violet, dark violet, bright purple, purple, or red. The morphological plasticity of *Anthurium ernestii* is rather remarkable and is geographically clinal in nature, with plants increasing in size from north to south. In Ecuador, most notably in Napo, plants tend

to be relatively small with short petioles and small inflorescences and leaves mostly drying distinctly green with the characteristic orangish primary lateral veins. Additionally, leaf blades are proportionately narrower in Ecuador (averaging 4.6 x longer than broad) than in Peru (averaging 3.4 x longer than broad).

Anthurium ernestii comprises two varieties, with var. *ernestii* encompassing the range of the species. Variety *oellgaardii*, which occurs in central Ecuador in Pastaza, differs from the typical variety in having a proportionately more slender, tapered spadix, a spreading, rather than erect, peduncle, and leaves which dry bright green.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Along road from Quime Ferry Crossing on road leading to summit of Cordillera del Condor, 23.2 km above the crossing at Río Zamora on road leading to summit, 03°38'00"S, 78°26'03"W, 1552 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91040* (MO, S); Along road from near Paquisha, south to Las Orquídeas, and end of road at Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 47.0 km S of Intersection near Paquisha, 2.6 km N of Las Orquídeas, 04°12'48"S, 78°38'41"W, 875 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91354* (MO, QCNE); Cordillera del Cóndor region, vicinity of Las Orquídeas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquídeas, slopes W of Río Nangaritza,



Figure 55. *Anthurium fasciale* Sodiro (Palacios 10502). Herbarium specimen showing stem base, cataphylls, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.



Figure 56. *Anthurium ferryaе* Croat (Croat & Ferry 98984, MO-4605743). Herbarium specimen showing stem base, cataphyll fibers, petiole and leaf blade, adaxial and abaxial surfaces.

04°15'01"S, 78°39'33"W, 1130–1140 m, 16 Apr. 2006, *Thomas B. Croat 97094* (MO, QCNE); Along Río Nangaritzza, between Las Orquídeas and Miasi, 04°18'00"S, 78°39'10"W, 864 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98825* (MO, QCNE); Parroquia Guayzimi, Campamento Militar, Transectos de 50 x 2 m x 5. (0.05 Ha.), bosque secundario, extraído maderas importantes, topografía colinada, Shaimi, Bosque húmedo Premontano, 04°18'S, 78°43'W, 1050–1150 m, 24 Oct. 1991, *Carlos E. Cerón, Marcelo Chango, Valdano Tapur, Gerardo Aymard & Joaquín Albán C. 17153* (MO).

Anthurium fasciale Sodiro, *Anales Univ. Centr. Ecuador* 19: 288. 1905. Type: Ecuador. Tungurahua, *L. Sodiro s.n.* (holotype: B; isotype: G; photo: F). **Figure 55.**

The species is a member of sect. *Multinervium* and is characterized by its short, thick stems with the cataphylls weathering to a pale reticulum of fibers, its pale-speckled, U-shaped petioles flattened adaxially and with prominently raised margins, its long-lanceolate blades, and its inflorescences with a green spathe and a dark purple spadix.

Epiphyte or terrestrial on steep bank; **stems** short and thick; **internodes** short, 2–8 cm diam.; **cataphyll** prominently 1-ribbed, 13–18 cm long, weathering to a pale reticulum of fibers. **LEAVES** spreading-pendent; **petioles** 10–40 cm long, 5–15 mm

diam, U-shaped, narrowly rounded abaxially, flattened adaxially with acute, prominently raised margins, medium to dark green, matte, pale-speckled; geniculum much paler and weakly ribbed; **blades** subcoriaceous, long-lanceolate, 45–160 cm long, 8–18 cm wide, acute at the apex, rounded at the base, dark green and matte-subvelvety above, moderately paler and semiglossy below; **midrib** convex and much paler above, triangular and concolorous below; **primary lateral veins** narrowly raised and concolorous above, weakly raised and slightly darker below; **collective vein** equal to primary lateral veins; **minor veins** pale-speckled;. **INFLORESCENCE** erect-spreading; **peduncle** 25–40 cm long, 5–8 mm diam., medium green, terete, short; **spathe** erect or reflexed, 8–10 cm long, 2–3 cm wide with edges rolled up to look cup-shaped, medium green, apiculate; **spadix** cylindrical, 9–12 cm long, 8–10 mm diam., dark purple, slightly tapered, directed at 50° angle, stipe thick. **INFRUDESCENCE** spreading to pendent; **spadix** 10 cm long, 3 cm diam., reddish; tepals matte; stamens exerted, pollen orange; pistils greenish, weakly exerted; **berries** orange, obovoid-ellipsoid, 8–9 mm long, 4.5–5.5 mm wide; **seeds** translucent, 2 per locule, elongated, 6 x 2 mm.

Anthurium fasciale is found on the eastern slopes of the Andes in Ecuador (Azuay, Imbabura, Morona-Santiago, Napo, Pastaza, Tungurahua, Zamora-Chinchipe) and Peru (Amazonas) at 860–1600 m in *Premontane moist forest* and *Premontane wet forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, Quime Crossing at Río Zamora (site 11), originally collected by Lynn Hannon (#96–091) in March 1996, 862 m, 5 Aug 1999, *Croat 82953* (MO, QCNE). PERU. **Amazonas:** Cordillera del Cóndor, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), cabeceras del Río Comainas, tributario al oeste del Río Cenepa, cuchillo atrás del campamento. bosque intacto, muy húmedo, 03°53'35"S, 78°25'30"W, 1200 m, 15 July 1994, *Hamilton Beltrán & Robin B. Foster 809* (F, USM).

Anthurium ferryae Croat, *sp. nov.* Type: Ecuador. Zamora-Chinchipe: Cordillera del Condor, vicinity of Ecuacorrientes copper mine concession, vicinity of mine site, along trail above parking area near end of road, 03°34'54"S, 78°26'06"W, 1330–1360 m, 21 Sep. 2007, *T.B. Croat & G. Ferry 98984* (holotype, MO-6060865–66; iso, QCNE). **Figure 56.**

The species is a member of sect. *Belolonchium* characterized by its epiphytic habit, short internodes, cataphyll fibers persisting closely parallel with fragments of epidermis, petioles sharply flattened with weakly flaring acute marginal ribs, ovate-triangular-sagittate dark brown-drying blades which are markedly constricted in the lower 2/5th of the anterior lobe, with posterior lobes inturned with a reniform sinus, a well developed posterior rib which is naked throughout much of its length, a collective vein arising from the 5th pair of

basal veins on the mature leaves, primary lateral veins that are narrowly acute below, rather prominently raised tertiary veins as well as a long-pedunculate inflorescence with a, reflexed spathe and more or less cylindroid spadix.

Epiphyte; **internodes** short 2.5–3.5 cm diam.; **cataphylls** 14.4–26.8 cm long, persisting at closely parallel fibers with moderately long fragments of epidermis; **petioles** terete, smooth, 43.8–81.7 cm long, 6.5 mm wide, 8 mm thick midway, obtusely and narrowly sulcate toward apex, rounded abaxially, sharply flattened adaxially with weakly flaring, acute margins, medium green, semiglossy, drying reddish brown; geniculum 1.1–1.8 cm long, drying darker than petioles; **preadult blades** ovate-sagittate, 28.6 cm long, 23.8 cm wide, the sinus 8.5 cm deep, narrowly rounded at the apex; **blades** ovate-triangular-sagittate, 40.7–68.6 cm long, 32.9–45.8 cm wide (averaging 54 x 39), 1.26–1.51 (averaging 1.40) times longer than broad, broadest at petiole attachment, 0.6–0.9 (averaging 0.8) times long as petioles, gradually acuminate at apex, (acumen to 3 cm long), prominently lobed at base, subcoriaceous, dark green and semiglossy above, paler and matte below, drying subcoriaceous, dark reddish-brown and matte above, medium reddish-brown and semiglossy below, epunctate; **upper surface** smooth above; **lower surface** densely and minutely speckled below; **anterior lobe** 30.5–50.9 cm long, markedly constricted in the lower 2/5th of the anterior lobe, the distal margin straight; **posterior lobes** 16.6–25.1 cm long, 7.8–

15.1 cm wide, directed downward and inward; **midrib** narrowly rounded and paler above, thickly convex, drying acute and wing-ringed, paler with 2–4 winged ribs below, drying darker above and below; **primary lateral veins** 16 pairs, arising at 65° angle, narrowly raised in deep valleys, concolorous above, narrowly acute and paler below, drying paler above and concolorous below; **tertiary veins** in part sunken above, weakly raised below, drying prominently raised below; **collective veins** arising from 5th pair of basal veins, 4 mm from margin; **basal veins** 7–8 pairs, 1st pair almost free to base, 1st pair fused to 1.1 cm, 3rd pair fused to 6.2 cm, 5th and 6th pair fused to 11.2 cm; **posterior rib** broadly curved, naked 10 cm; **sinus** reniform, sometimes arcuate, 9.3–18.8 cm deep, 12.6–16.8 cm wide. INFLORESCENCE with **peduncle** 54.2 cm long; **spathe** green, reflexed, linear-lanceolate, withered 14 cm long, prominently reflexed, 2.3 cm diam. near base, drying moderately coriaceous, dark brown; **spadix** stipitate 5 mm, cylindrical, rounded at apex, 19.5 cm long, 9 mm diam. at base, 1.4 cm diam. midway, 1.2 cm diam. at 1 cm from apex, drying reddish dark brown; **flowers** 8 visible per spiral, drying 2.2–2.4 mm long and 2.3–2.5 wide; tepals brown, pistils medium green, early emergent, minutely granular on drying; lateral tepals 1.3 mm wide, the outer margins 2-sided, inner margin rounded; stamens not exerted.

Anthurium ferrya is endemic to Ecuador, known only from the Cordillera del Cóndor region of Zamora-Chinchipe

Province at 1330–2100 m elevation in a *Premontane wet forest* life zone.

Anthurium ferrya is similar to *A. wainwaimense* Croat from the same region as the type locality but differs in having blades much more constricted on anterior lobe, no free basal veins, collective veins arising from the upper primary lateral veins rather than the lower basal veins, only about 5 pairs of primary lateral veins, a narrowly ovate spathe rather than a linear-lanceolate spathe and a prominently stipitate spadix.

In the Lucid *Anthurium* key *A. ferrya* tracks to *A. lloense* Sodiro, differing by scabrid veins on the upper surface; *A. macbridei* K. Kr. and *A. monzonense* Engl., both of which differ in having the anterior lobe convex along margin; *A. maclearii* Schott, differing in having a less conspicuously concave and in having a stipe 3–4 cm long; *A. schunkei*, differing in having terete petioles and a broader spathe (to 3.5 cm wide) and more prominently stipitate spadix; *A. obpyriforme* Leimbeck, differing in drying gray rather than brown; *A. pluricostatum* Sodiro, differing by having prominently ribbed petioles; *A. prealtum* Sodiro, differing in having blades with margins convex and with several basal veins free to the base and the spathe 20–25 cm long; and *A. striatipes* Sodiro from the western slopes of the Andes in Pichincha Province differing in having blades that dry more pale reddish brown, have a more or less terete petioles and lack ribbing on major veins on the lower surface.

The species is named in honor of Geneviève Ferry from the Nancy Botanical Garden in France who is a specialist with Araceae and has developed one of the finest collections of Araceae in Europe. Our friend Geneviève has been a frequent field assistant, especially in Ecuador where she helped in the collection of the type species. She assists with research on Araceae by growing plants, collecting and describing material from her own collection

Paratype: ECUADOR. **Morona-Santiago**: Campamento Achupalla, Cordillera del Cóndor, 15 km east of Gualaquiza, dense tangled forest with few large trees, Transect # 3, 03°27'S, 78°22'W, 2100 m, *Abnyn H. Gentry* 80388 (MO).

Anthurium flavolineatum Sodiro, *Anales Univ. Centr. Ecuador*. 20(138): 24. 1905. Type: Ecuador. Tungurahua: Volcan Tungurahua, Dec. 1904, *L. Sodiro s.n.* (holotype: B; isotype: QPLS). **Figures 57 & 58.**

The species is a member of section *Belolonchium* and is characterized by its persistent or deciduous cataphyll fibers, terete petiole, lanceolate-sagittate or subhastate blades with the posterior lobes broadly spreading at 115–145° angle and with the collective veins arising from one of the lowermost basal veins as well as by the short purplish spadix and especially by the purplish hooding spathe with whitish or pale green veins.

Terrestrial or epiphytic; **stems** usually less than 30 cm long, to 1–2 cm diam.; **internodes** short or to 2.5–3 cm long, 1.5–1.7 cm diam; **cataphylls** 5–8 cm long, persistent or deciduous, fibrous, reddish-brown; **petioles** obtusely shaped and narrowly sulcate or terete, reddish, (23–)30–55(–69) cm long; **geniculum** sulcate, (0.8–)1.5–3 cm long. **LEAVES** with **blades** lanceolate-sagittate or subhastate, (20–)25–53(–62) cm long, 2.3–3 times longer than wide, drying greenish-brown; **anterior lobe** elongate, (3–)5–9.5 cm wide in the middle and 6.6–20(–26) on the bottom of the constricted portion, concave along the margin, (15–)20–48.5(–50) cm long; **posterior lobes** held +/- erect, the surfaces matte, directed somewhat outward at (98–)115–145° angle, 6–16 cm long, 2.3–8 cm wide in the middle and 2.5–8.1 cm wide near the base of posterior lobe; **sinus** arcuate to hippocrepiform, sometime parabolic, mostly broadly rounded at apex, sometimes narrowly rounded, (3–)6–13 cm deep, (1.7–)3–10(–13) wide at the middle; **midrib** drying acute and slightly darker above, bluntly acute and darker below; **basal veins** 5–8 pairs, 1st pair sometimes free to the base, (2–)3–5 fused to (1–)2–6.2(–8.8) cm; posterior rib broadly curved, naked 1–4.5 cm; **primary lateral veins** 6–12 pairs, narrowly rounded, convex and joining into collective veins; **collective veins** arising from lowermost pair of basal veins, 2–5 mm from margin. **INFLORESCENCE** spreading or erect-spreading; **peduncle** 15–44 cm long, medium green, semi-glossy; **spathe** (5–)8–18.5 cm long, (1–)2–5 cm wide, with stipe



Figure 57. *Anthurium flavolineatum* Sodiro (Croat 100718). Live plants showing petioles and leaf blades, adaxial surface.



Figure 58. *Anthurium flavolineatum* Sodiro (Croat 100718). Close-up view of inflorescence with spathe deep maroon with light green stripes and reddish-violet spadix.

1–1.7 cm, hooding, green, heavily tinged with purple or deep maroon, brown, striped light green or white; **spadix** 4.5–15.2 cm long, 0.3–1.5 mm diam. midway, reddish-violet or deep maroon; **flowers** 7–8 visible per spiral, 3.5–3.8 mm long, 2.4–3.6 mm width, tepals 3-sides, inner margin broadly rounded, stamen prominently exserted, 4–5 mm above the pistil on drying minutely, papillate stigma sessile, oblong-elliptic, 7–9

mm long, anthers white. INFRUDESCENCE with **berries** red.

Anthurium flavolineatum ranges from southeast Colombia (Putumayo) to Ecuador (Loja, Morona-Santiago, Napo, Pastaza, Sucumbíos, Tungurahua) at 650–2475 m in cloud forests in *Tropical wet forest*, *Premontane wet forest*, *Premontane rain forest*, *Montane moist forest* and *Montane rain forest* life zones.



Figure 59. *Anthurium fornicifolium* Croat (Croat *et al.* 105647). Live plant with elongated roots, long arcing petioles and pendent leaves.



Figure 60. *Anthurium fornicifolium* Croat (Croat *et al.* 105647). View of leaf blades, adaxial and abaxial surfaces, and inflorescence.



Figure 61. *Anthurium fornicifolium* Croat (Croat *et al.* 105647). Close-up view of inflorescence with green spathe and yellow spadix.

Specimen seen: ECUADOR. **Morona-Santiago:** NW range of Cordillera del Cóndor, W side overlooking Río Zamora, 2000 m, 5 Jan. 1972, *MacBryde 1021* (MO).

81400 (holotype: MO!; IT!: AAU!, B!, CM!, F!, K!, NY!, QCA!, QCNE!, RSA!, S!, SEL!, US!, WU!). **Figures 59–61.**

Anthurium fornicifolium Croat, *Willdenowia* 35: 350–352. 2005. Type: Ecuador. Morona-Santiago, Serranía de Cutucú, 800–1000 m, from a cultivated plant at Marie Selby Botanical Gardens, #76–28–13, originally collected by M.T. Madison in 1976, vouchered as *T.B. Croat*

The species is a member of sect. *Leptanthurium* and is characterized by its slender, long-petiolate leaves with the petiole sheath closely clasping the peduncle, and the blades and petiole together forming a large arc. Additional characters are the matte-subvelvety upper blade surface with the primary lateral veins pleated to weakly



Figure 62. *Anthurium grex-avium* Madison (Madison 3477; SEL-14887). Herbarium specimen showing base of plant, petiole, leaf blade, abaxial surface, and inflorescence.

quilted, the red, intact cataphylls, spadices that ultimately become bright yellow at anthesis, and the orange-red berries.

Epiphyte; **stems** short; **internodes** short and 0.9–1.2 cm in diam., **roots** white; cataphylls and old petioles persisting; **cataphylls** 5.5–7.5 cm long, persisting semi-intact, heavily tinged reddish, drying brown. **LEAVES** arched with **petioles** erect-spreading, 14–28 cm long, 2–3.5 mm in diam., slightly thicker than broad, obtusely C-shaped, narrowly and obscurely sulcate, sheathed 0.10–0.25 % of its length, closely ensheathing peduncle, dark green, semi-glossy; sheath 2.2–10 cm long; geniculum sulcate, paler, conspicuously swollen; **blades** arcuate, 27–59 × 1.9–6.6 cm (averaging 42 × 3.7 cm), oblong-linear to narrowly oblanceolate, stiffly subcoriaceous to coriaceous, occasionally somewhat quilted above, dark green and weakly matte-subvelvety to weakly glossy above, slightly paler and weakly glossy below, narrowly acuminate at apex, narrowly acute at base, with the margins turned somewhat upward; **midrib** concolorous, bluntly acute at base, more acute and thicker than broad toward apex, sometimes narrowly round-raised toward apex above, narrowly rounded to weakly raised and concolorous to slightly paler than surface below; **primary lateral veins** weakly raised to narrowly convex and concolorous on upper surface, often pleated-raised and appearing somewhat acute above, scarcely raised on lower surface, only slightly darker than surface, sometimes scarcely visible on either surface; **tertiary veins** moderately obscure on lower

surface; **collective veins** 1 pair, 3–6 mm from margin, moderately obscure on both surfaces, less conspicuous than primary lateral veins. **INFLORESCENCE** erect or nearly so at anthesis, becoming spreading, sometimes with the spadix erect; **peduncle** 17–40 cm long at anthesis (to 50 cm long in fruit); **spathe** green, 2–3.6 cm × 6–8 mm, green, tinged reddish purple in age, erect-spreading, often twisted toward apex, sometimes recurled, sometimes arched inward toward spadix; **spadix** slightly tapered, 5–9 cm long, 3–5 mm in diam., pink, becoming somewhat olive-green, ultimately bright yellow at anthesis; **flowers** 5–6 per spiral, 1.8–2.2 mm long and wide, the lateral margins straight to weakly sigmoid; lateral tepals 2–3-sided, 1–1.2 mm wide, weakly glossy; pistils medium green, moderately acute, weakly protruding; stamens held in tight cluster, the anthers contiguous or nearly so. **INFRUDESCENCE** spreading-pendent; **spadix** dark green; **berries** orange-red, obovoid, 5–7 mm long, 5–6 mm in diam.

Anthurium fornicifolium is endemic to Ecuador (Morona-Santigao, Napo, Sucumbíos) at 800–1800 m in a *Premontane rain forest* life zone.

Specimen seen: ECUADOR. **Morona-Santiago:** Centro Shuar Yukutais, E side of Río Yukutais, 03°30'S, 78°10'W, 950–1020 m, 6 Nov. 1988, *Bradley C. Bennett & Patricia Gómez A. 3533* (NY).

Anthurium grex-avium Madison, *Selbyana* 2: 258. 1978. Type: ECUADOR. MoronaSantiago: Cordillera de Cutucú, western slopes along a trail from Logroño to Yaupi, 1600 m, November 1976, *M.T. Madison et al.* 3477 (holotype: SEL!; isotype: MO!, GH!, US!). **Figure 62.**

The species is a member of section *Semaephyllum* and is distinguished by its climbing habit, internodes 4–12 cm long, its slender, linear to oblong central and lateral lobes, a single conspicuous basal vein running in the middle of lateral lobes, and its stipitate green spadix.

Climber; **internodes** (4-)6–12 x 0.6–1.5 cm; **cataphylls** brown, (3-)5–10 cm long, persisting semi-intact at upper nodes. LEAVES spreading; **petioles** 13–23 cm x 2–4 mm, subterete, weakly flattened adaxially; geniculum 1–2 cm x 2–4 mm; **blades** deeply trilobed to 2.5–5.0 cm from the base, coriaceous, 12–25 x 14–22 cm, deep green above, paler below, semiglossy both surfaces, drying black to dark brown, base hastate; **central lobe** narrowly lanceolate, 10–22 x 2.5–5.0 cm, apex acuminate; **midrib** raised above, angled, raised below, rounded; **primary lateral veins** 6–7 per side, arcuate, raised above and below, departing midrib at 60–70°; **tertiary veins** inconspicuous; **collective veins** arising from either one of the lower or middle pairs of primary lateral veins, 3–7 mm from the margin, weakly raised on both surfaces; **lateral lobes** falcate (spreading), 55–60° (80–100°) from central lobe, (7–)

10–22 x 2.5–6.5 cm, apex narrowly rounded, inner margin concave, outer margin convex; **basal veins** 1–3 pairs, joined for (2.5–)5.0–8.5 cm, the most conspicuous running along the middle of the lateral lobes to the apex; **posterior ribs** curved forward, 45–60° from midrib, winged. INFLORESCENCE erect; **peduncle** 20–31 cm x 2–5 mm, longer than petiole; **spathe** green, lanceolate, (4-)9–13 x (0. 7-) 1.0–1.5 cm, apex acuminate, base acute; stipe 0.5–2.0 cm long; **spadix** green, cylindric to weakly tapered, (4-)8–16 cm x 4–8 mm; 4–6 flowers per principal spiral, 4-lobed, ca. 2.8 x 2.0 mm, sides sigmoid; tepals glossy, lateral tepals ca. 1.2 mm wide, inner margin rounded, outer margin bluntly angled; stamens weakly exserted; anthers ca. 0.4 x 0.8 mm, thecae elliptic, slightly divaricate; pistils not emergent; stigma elliptic, ca. 0.8 mm across. INFRUCTESCENCE green; **spadix** up to 17 cm long, 1.0–1.2 cm diam.; **fruits** obovate, 4x3 mm.

Anthurium grex-avium ranges found southeastern Ecuador to Peru. It grows in *Premontane moist forests* and *Premontane wet forests* at 1400–2000(–2250) m.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Rio Nangariza, behind the military station of Miazzi, primary forest, 04°15'S, 78°41'W, 1000 m, 21 Oct. 1991, *Birgitte Bergmann & M. Ruiz* 97868 (AAU).

Anthurium harlingianum Croat, *Ann. Missouri Bot. Gard.* 659–661. 1991.

Type: Ecuador. Napo: Along road between Baeza and Lago Agrio, at Río Oyacachi, 00°20'S, 77°50'W, 1620 m, 2 Oct. 1980, *T.B. Croat 50290* (holotype: MO; isotype: K!, NY!, QCA!, RSA!, USM!). **Figure 63.**

The species is a member of sect. *Pachyneurium* and is characterized by its large size, mostly epiphytic habit, leaves with long ovate-lanceolate blades that are tapering, rounded or sometimes deeply lobed at the base, and by its large inflorescences with a purple spathe and a greenish brown or dark purple spadix.

Terrestrial on steep slope or epiphyte; **internodes** short 3–5 cm diam.; **roots** dense, 3–4 mm diam.; upward pointing, \pm acute at apex; **cataphylls** 21 cm long, hook-shaped, medium green, persisting at fibers and mushy tissue. LEAVES in a rosette; **petioles** 12–42 cm long, sharply D-shaped with erect, blunt margin and bluntly acute medial rib 2 cm diam., medium green, weakly to semiglossy; ribs to 3 on each side; geniculum 1.5 cm long, shaped as petiole; **blades** subcoriaceous to coriaceous, ovate-lanceolate, sometimes sagittate on larger blades, 68–105 cm long, 20–54 cm wide, 1.9–3.4 times longer than wide, 2.4–5.6 times longer than petiole, tapering, rounded or deeply lobed at the base, obtuse at the apex, semiglossy, slightly bicolorous; **midrib** bluntly acute and paler above, obtusely angular and paler below; **primary lateral veins** narrowly rounded and paler on both surfaces; **tertiary veins** weakly raised below, concolorous. INFLORESCENCE

spreading; **peduncle** 9–37 cm long, 6–12 mm diam.; **spathe** spreading, recurled, deciduous, purple; **spadix** 25–45 cm long, 7–25 mm diam., long-tapered, greenish brown or dark purple; **pistils** green, weakly emergent; **pollen** pale yellow.

Anthurium harlingianum is found on the eastern slopes of the Andes from central Colombia to Ecuador, Peru and northern Bolivia at 200–1900 m in a *Premontane wet forest* and *Lower montane moist forest* life zone.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor, trail from Comunidad Warints to camp #1 towards crest of Cordillera del Cóndor, Premontane wet forest, 03°13'58"S, 78°15'11"W, 830–1200 m, 11 Dec. 2002, *John L. Clark, Wilson Quizhpe, Elsa R. Toapanta & Tuntia Katan 6944* (MO, QCNE, US). **Zamora-Chinchipe:** Cordillera del Cóndor, vic. of Ecu-Corriente copper mine development, valley of Río Waiwaime, along road to mine site; 9.5 km from mine headquarters, 6.5 km S of locked gate, 03°35'07"S, 8°26'05"W, 1280–1530 m, 10 Apr. 2006, *Thomas B. Croat 96896* (MO, QCNE); Cordillera del Cóndor, vic. of Las Orquideas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritz, 04°15'01"S, 8°39'33"W, 1130–1140 m, 16 Apr. 2006, *Thomas B. Croat 97105* (MO, QCNE); Valley of Río Yacuambi, along road between La Saquea and 28 May, 31.4 km NW of La Saquea, 13.1 km SE of 28 May, 03°43'02"S, 78°53'47"W, 993 m, 20 Apr. 2006, *Thomas B. Croat 97303* (MO,



Figure 63. *Anthurium harlingianum* Croat (Croat 96825). Live plant with dense cluster of roots at the base, short petioles and leaf blades, adaxial and abaxial surfaces.



Figure 64. *Anthurium berthae* K. Krause (Croat *et al.* 90398). Live plant with view of stem, petioles, leaf blades, adaxial surface, and inflorescence.

QCNE); Along road between Gualaquiza and Zamora, 5 km S of El Pangui, Premontane wet forest, 04°21'S, 78°50'W, 800 m, 20 Oct. 1980, *Thomas B. Croat 50816* (MO, QCA, RSA); *Thomas B. Croat 50817* (MO, QCA); Along Río Nangaritza, between Las Orquídeas and Mias, 04°17'53"S, 78°39'00"W, 872 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98816* (MO, QCNE); 31 km N of Yangzatzza, Lower montane moist forest,

04°11'S, 78°49'W, 1000 m, *Thomas B. Croat 50786* (CM, MO, QCA); Lower slopes of Cordillera del Cóndor, above Pachicutza, Río Nangaritza valley, Premontane Wet Forest, primary forest, 04°07'S, 78°38'W, 1000–1200 m, 6 Dec. 1990, *David A. Neill & Walter A. Palacios 9560* (MO); Cordillera de Nanguipa, along road to Cerro Colorado, about 6 km south of Nambija, 20 km southeast of Zamora, cloud forest on



Figure 65. *Anthurium herthae* K. Krause (Croat *et al.* 90398). Base of live plant with fibrous cataphyll remnants and petioles.



Figure 66. *Anthurium herthae* K. Krause (Croat *et al.* 90398). View of leaf blades, adaxial and abaxial surfaces.

slopes, 04°05'51"S, 78°47'43"W, 1930 m, 19 Feb. 2002, *Tom Delinks 1370* (QCNE).

Anthurium herthae K.Krause, *Notizbl. Bot. Gart. Berlin-Dahlem* 15: 38–39. 1940. Type: ECUADOR. Pastaza: 1000 m, 10 Sep. 1938; A., A. & H. *Schultze-Rhomb* 2808 (B!). **Figures 64–67.**

The species is member of sect. *Belolonchium* characterized by having deeply lobed hastate blades with broadly spreading

lobes and the long-tapered reddish-violet spadix.

Epiphyte to 3.5 m or sometimes terrestrial; **stems** to 70 cm long; **internodes** short 1.5–4.3 cm diam.; **cataphylls** persisting in a close, mostly parallel, net-like reticulum, reddish brown. LEAVES with **petioles** 63–88 cm long, subterete, obtusely and narrowly sulcate to acutely sulcate, medium green, semi-glossy, faintly short-lineate; **blades** hastate, deeply lobed, 46–62



Figure 67. *Anthurium berthae* K. Krause (Croat *et al.* 90398). Close-up view of inflorescence with green spathe and reddish-violet spadix.

cm long, 28–54 cm wide, 1.1–1.7 times longer than wide, 0.6–0.73 times as long as petiole, broadly lobed at the base, long acuminate at apex, subcoriaceous, dark green and weakly glossy above, paler and semiglossy below, drying dark reddish-brown above, medium reddish-brown below; **anterior lobe** 33–52 cm long; **lateral lobes** 19–29 cm long, 13–15 cm wide, projecting outward at close to a 90° angle from the anterior lobe then curving

backward, forming a deep constriction at the junction with the anterior lobe; **sinus** very broad, U-shaped; **midrib** convex to acute and concolorous to moderately paler, becoming narrowly rounded toward apex above, acute and concolorous below; **primary lateral veins** 15–18 pairs, arising at a 40–60° angle, quilted, narrowly raised and concolorous to slightly paler in valleys above, bluntly acute and slightly concolorous to paler below; **basal veins** 7–



Figure 68. *Anthurium ionanthum* Croat (Croat 92059). Live plant showing stem rooting at the nodes, petioles and leaf blades, adaxial surface.

10 pairs, the first pair free to the base; **posterior rib** strong, broadly arcing, 5–11 cm long; **collective veins** arising by loop connections at least from 2nd or 3rd basal veins, from 1st basal veins on younger blades; **tertiary veins** in part sunken above, darker and raised below. **INFLORESCENCE** spreading to erect; **peduncle** 34–47 cm long; **spathe** 8–10 cm long, 1–3 cm wide, pale green to yellowish green, semi-glossy, hooding; **spadix** curved

downward, 11–22 cm long, 6–12 mm diam., reddish-violet, dark violet-purple or faintly purple-violet to red-brown, matte to semi-glossy; **stipe** 1–1.3 cm long; **pollen** pale yellow; **berries** pale orange, 3 mm diam.

Anthurium herthae is endemic to eastern Ecuador (Napo, Pastaza, Tungurahua, Morona-Santiago and Zamora-Chinchipec) at 800–1250 m in a *Premontane rain forest* life zone.

Specimen seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, Nangaritza Cantón, Pachicutza, trail to Hito, 04°07'S, 78°37'W, 1000–1100 m, 19 Oct. 1991, *Walter A. Palacios, Gerardo Aymard & Efraín Freire 8339* (MO, QCNE).

Anthurium ionanthum Croat, *Aroideana* 31: 52–54. 2008. Type: Ecuador. Zamora-Chinchipe: Cordillera del Cóndor, Namiera-Nambija, 10 km S of Namirez and Río Zamora, along road to mine headquarters ca. 5 km long, just south of Nambija, 04°03'44"S, 78°47'29"W, 1779 m, 23 July 2004, *T.B. Croat 92059* (holotype: MO; isotype: QCNE!, AAU!, B!, BR!, CAS!, COL!, CUVCI!, DUKE!, F!, G!, GB!, GH!, HUA!, INB!, K!, L!, M!, MEXU!, MICH!, NY!, P!, PMA!, QCA!, QCNE!, RJ!, RSA!, S!, SEL!, TEFH!, TEX!, U!, UB!, US!, USCG!, USM!, VEN!, W!). **Figure 68.**

The species is a member of sect. *Xialophyllum* and is characterized by its generally terrestrial habit, elongated internodes, broadly cordate leaves, moderately puberulent to granular-puberulent veins, 9–13 pairs of primary lateral veins, collective veins arising from the 1st–3rd pair of basal veins, and a short and stubby purple or violet spadix.

Terrestrial or hemiepiphyte; **internodes** 2–16 cm long, 5–15 mm diam., medium green, matte, soon light gray-brown, very weakly glossy; **cataphylls** thin,

6–13 cm long, medium green, matte, marcescent, mostly deciduous or with a few pale fibers persisting. **LEAVES** drying green; **petioles** 10–66 cm long, 2–4 mm diam., subterete, narrowly and obtusely sulcate, medium green, matte, the margins bluntly acute; **blades** broadly ovate to ovate-lanceolate, cordate with deep lobes at the base, acute at the apex, thinly coriaceous, dark green and velvety above, moderately paler and matte below, 15–45 cm long, 10.5–27 cm wide, averaging 31 x 19 cm, 1.2–1.9 times longer than wide, 0.5–1.4 times as long as petioles, dark green and matte-subvelvety above, moderately paler and matte below; all **veins** moderately puberulent to granular-puberulent; **midrib** acute in deep valley, concolorous above (slightly paler towards base), narrowly round-raised and paler below; **primary lateral veins** 9–13 pairs, rising at an acute angle then spreading 40–45° angle, loop-connected to the connective veins, deeply and obtusely sunken, concolorous above, bluntly acute to narrowly round-raised and concolorous to slightly paler below; **tertiary veins** in part sunken above, raised below; **collective veins** arising from the 1st–3rd pair of basal veins, 3–6 mm from margin; **basal veins** 5–8, first 2 free to base, the remainder coalesced to varying degrees and branching from the posterior rib; **posterior rib** broadly curved, naked 8–35 mm; **sinus** broadly hippocrepiform. **INFLORESCENCES** erect-spreading; **peduncle** terete, 11–51 cm long, 2–3 mm diam.; **spathe** medium green, to 7 cm long, 1.5 cm wide, promptly rolled and twisted, readily falling off; **spadix** weakly tapered to

apex, initially pale yellow-green, matte, finally lilac, light purple or violet, 5–10 cm long, 4–8 mm wide, 10–14 times longer than broad, stipitate 1–9 mm. Flowers 6 visible per spiral, weakly 4-lobed, 2 mm wide in both directions; lateral 1–1.2 mm wide, the outer margins 2–3-sided, minutely papillate on magnification, matte; **stamens** 0.7 mm long, 0.5 mm wide, held just above the tepals and persisting, not retracting; **pollen** white.

Anthurium ionanthum is endemic to Ecuador (Azuay, Loja, Morona-Santiago, Zamora-Cinchiipe) at 1200–2700 m elevation in *Lower montane wet forest* and *Premontane wet forest* life zones.

Additional specimens seen: ECUADOR. **Zamora-Chinchiipe:** Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from the military outpost to Condor Mirador military outpost, 7.1 km S of junction in road to Tandaime, San Marcos and Ecu-Corriente copper mine headquarters, 03°36'42"S, 78°28'02"W, 1128 m, 12 Apr. 2006, *Thomas B. Croat 96962* (MO, QCNE); 10 km E of Paquisha, lumber tracks in primary forest, 03°55'00"S, 78°37'00"W, 1400–1500 m, 13 Apr. 1985, *Gunnar Wilhelm Harling & Lennart Andersson 24078* (GB, MO, QCA); Along road from Namirez to Nambija, along mining road, 10.0 km S of Namirez and Río Zamora, vicinity of Nambija, along road to mine headquarters ca. 5 km long, just south of Nambija, 04°03'44"S, 78°47'29"W, 1779 m, 23 July 2004, *Thomas B. Croat 92059* (MO, QCNE); Región de la

Cordillera del Cóndor, Parroquia San Francisco de Vergel, valle del Río Vergel, Santa Clara, sector de Los Palmales, bosque intervenido, Bosque muy húmedo montano bajo, 04°37'50"S, 79°01'06"W, 1600 m, 9 Mar. 2007, *Wilson Quiñhpe & Abel Wisum 2559* (MO, QCNE); Región de la Cordillera del Cóndor, sector sur, Parroquia San Francisco de Vergel, Margen izquierdo del Río Vergel, pantano, Bosque muy húmedo montano bajo, 04°43'01"S, 78°57'47"W, 1800 m, 13 Mar. 2005, *Wilson Quiñhpe 998* (HUA, LOJA, MO).

***Anthurium ivanportillae* Croat, sp. nov.**

Type: Ecuador. Zamora-Chinchiipe, Cordillera del Cóndor. Quime crossing of Río Zamora, S of Los Ecuencos, 03°35'05"N, 78°31'14"W, 765–862 m, originally collected by Lynn Hannon (96–058) in Mar. 1996, vouchered from private collection of Lynn Hannon 2 Mar. 1998, *T. B. Croat 81472* (holotype, MO-4901608; isotypes, AAU!, B!, COL!, F!, K!, NY!, QCNE!, S!, SEL!, USM!).

Figure 69.

The species is a member of sect. *Belolonchium* characterized by its short internodes, persistent red-brown cataphyll fibers, subterete obtusely and shallowly sulcate petioles, sub-trilobed blades with a very elongated and narrow anterior lobe, inturned posterior ribs, 7–8 pairs of basal veins, none of them free to the base, the collective veins arising from the 1st pair of basal veins as well as by the green reflexed



Figure 69. *Anthurium ivanportillae* Croat (Croat 81472; MO-4901608). Herbarium specimen showing petiole, leaf blade, adaxial and abaxial surfaces, and inflorescences.

broadly lanceolate spathe and the short-tapered purple to maroon spadix.

Terrestrial on steep bank; **internodes** short, 2–3.5 cm diam., **cataphylls** 14.5–17.6 cm long, fibers persistent, drying reddish brown, semi-intact toward apex, retained temporarily as intact reticulum of fibers; **petioles** 31.1–45.5 cm long, terete, obtusely and shallowly sulcate, medium green, semiglossy to matte, finely and densely short-lineate, drying yellowish brown; geniculum reddish, drying 1.3 cm long, slightly darker than petioles; **blades** triangular-sagittate, 52–72 cm long, 26–32.5 cm wide, (averaging 57 x 28), 1.99–2.4 (averaging 2.07) times longer than broad, broadest below petiole attachment, 1.4–1.7 (averaging 1.5) times longer than petioles, gradually acuminate at apex, (acumen to 1 cm long), prominently lobed at base, subcoriaceous, moderately bicolorous, dark green and semiglossy above, moderately paler and almost matte below, drying subcoriaceous, yellowish to reddish brown and weakly glossy above, yellowish to reddish brown and semiglossy below, epunctate; **upper surface** densely and minutely granular; **lower surface** densely and minutely granular (including on minor veins); **anterior lobe** prominently constricted toward base, 39.1–57 cm long, 12.5 cm wide midway; **posterior lobes** 10.9–18 cm long, prominently directed inward, 10.9–12.9 cm wide; **midrib** slightly paler, narrowly rounded at base, bluntly acute toward apex in deep valley above, narrowly round-raised and paler below, acute toward apex, drying narrowly convex

and paler above, narrowly raised and darker below; **primary lateral veins** 16 pairs, arising at 60° angle, narrowly raised and inconspicuous in valleys, concolorous above, bluntly acute and paler below, drying weakly and narrowly raised, concolorous above, narrowly rounded and darker below; **tertiary veins** in part weakly raised and concolorous below; **collective veins** arising from the 1st pair of basal veins, 2–3 mm from margin; **basal veins** 7–8 pairs, 1st pair fused to 1.7 cm, 3rd pair fused to 5.3 cm, 6th pair fused to 6.5 cm; **posterior ribs** gradually curved, naked 6 cm, ca. $\frac{3}{4}$ its length; **sinus** reniform or closed, rounded, 12.1–13.2 cm deep, 7.6–7.7 cm wide. INFLORESCENCE erect with **peduncle** light green and terete, 22 cm long; **spathe** green to light green, reflexed, drying 8.7–9.6 cm long, 2.2–2.5 cm wide, lanceolate, drying moderately coriaceous, yellowish brown; **spadix** dark purple to maroon, slightly stipitate, weakly tapered, 8.2–9.7 cm long, 7–8 mm diam., drying reddish dark brown; **flowers** about 7 visible per spiral, drying 2 mm long, 1.8 mm wide; tepals papillate-granular on drying; lateral tepals 1.3 mm wide, inner margin rounded, outer margins 2-sided; **stamens** not yet emergent.

Anthurium ivanportillae is endemic to Ecuador, known only from SE Ecuador in Zamora-Chinchipe Province at 862–974 m in a *Premontane wet forest* life zone.

Anthurium ivanportillae is most similar to *A. losencuentrosense* Croat which is also found in the Cordillera del Cóndor but the latter differs by its sinus hippocrepiform

and open (rather than being reniform and mostly closed for *A. ivanportillae*) and by its collective veins arising from the middle to lower primary lateral veins (instead of the 1st pair of basal veins for *A. ivanpostillae*). The species also resembles *A. toasae* Croat that has a decidedly less 3-lobed blade and has a spadix that is pale yellow-orange at anthesis.

The species is named in honor of Ivan Portilla who collected and cultivated the species in El Panguí near where the type plant was collected. Portillo works with Ecuagenera a company specializing in the cultivation and sale of orchids but in recent years the company has developed an interest in Araceae as well and raised many interesting and new species.

In addition to the holotype and the isotype listed here the species has been collected live by Lester Lapo at approximately 1000 m near El Oso, Yantzaza (Ron Kaufman, pers. com.).

Paratype: Ecuador. **Zamora-Chinchipe**: Along graveled road roughly paralleling the Chuchumbleza-Yantzaza highway east along Río Chuchumbleza, then SW to Chicaña, via Guisme, Miasi, Monterey, Kunki and Chicaña back to main road, departing main road S of Chuchumbleza 4.8 km S of Río Chuchumbleza and entering main road 9.6 km N of plaza in Yantzaza, 2 km S of Monterey, 974 m, 03°24'12"S, 78°40'29"W, 14 Apr. 2006, T. B. Croat 97047 (MO, QCNE).

***Anthurium jamboense* Croat, sp. nov.**

Type: Ecuador. Zamora-Chinchipe: 10 km S of Zamora, on road along left shore of Río Jamboé, 1100 m, 12 Apr. 1985, G. Harling & L. Andersson 24044 (holotype, GB-0011535; iso QCA!). **Figures 70 & 71.**

The species is a member of sect. *Belolonchium* and is characterized by its reddish brown closely aligned persistent cataphyll fibers, narrowly sulcate petiole, triangular-sagittate blades with prominently concave lateral margins on the anterior lobe and with the collective veins arising from the 4th pair of basal veins as well as by the green hooding spathe and the short, weakly tapered green spadix.

Epiphyte, to ca. 5 m above ground; **internodes** terete, short, 1–3 cm diam.; **cataphylls** 10–12 cm long, acute, persisting semi-intact at apex, becoming fibrous with fragments of red-brown epidermis, the fibers eventually manila; **petioles** subterete, narrowly and obtusely sulcate, 33–41 cm long, drying 3 mm diam., light reddish brown to yellowish brown on drying; geniculum 1.5 cm long, drying darker than petioles; **blade** triangular-ovate-sagittate, 45.5–48 cm long, 32.5–38.2 cm wide (averaging 47 X 34), 1.25–1.43 (averaging 1.37) times longer than broad, broadest at petiolar plexus, 1.1–1.2 times longer the petioles, gradually long-acuminate at apex (acumen to 2.2 cm long), prominently lobed at base, broadest slightly below petiole attachment, drying grayish brown and weakly glossy above, yellowish red-brown



Figure 70. *Anthurium jamboense* Croat (Harling & Andersson 24044; GB-0011535). Herbarium specimen showing base of stem, petiole, leaf blade, adaxial and abaxial surfaces, and inflorescence.



Figure 71. *Anthurium jamboense* Croat (Harling & Andersson 24044; QCA). Herbarium specimen showing leaf blade, adaxial and abaxial surfaces.



Figure 72. *Anthurium lapoanum* Croat, D.P. Hannon & R. Hormell (*Sparre* 18990; S). Herbarium specimen showing stem, bases of petioles, leaf blade, adaxial and abaxial surfaces, and inflorescence.



Figure 73. *Anthurium lapoanum* Croat, D.P. Hannon & R. Hormell (*Croat 103718*). View of leaf blades, adaxial surface.



Figure 74. *Anthurium lapoanum* Croat, D.P. Hannon & R. Hormell (Croat 103718). View of leaf blade, abaxial surface.

and semiglossy below; **anterior lobe** 32–35 cm long, with concave lateral margins; **posterior lobes** 16–20 cm long, 12.3–14.1 cm wide, directed downward and sometimes inward; **midrib** drying narrowly rounded and slightly paler above, narrowly raised to round-raised and darker, and coarse ribbed to almost winged below; **primary lateral veins** 9–10 pairs, arising at 40–60° angle, drying weakly and narrowly raised, more or less concolorous above, narrowly rounded and bluntly acute to acute with an additional pair of ribs and darker than surface below; **collective veins** arising from 1st–3rd pair of

basal veins, 4–7(10) mm from margin: **basal veins** 7–8 pairs, 1st pair usually free to base, 2nd pair fused to 2.7–3.2 cm, 5th–6th and higher fused 5.5–6.2 cm; **posterior rib** gradually curved, naked 6–6.5; **sinus** hippocrepiform 13.3–14.5 cm deep, 7.5 cm wide. INFLORESCENCE with **peduncle** 24.5–28.5 cm long; **spathe** 8 cm long, 2.4 cm wide, narrow ovate-elliptic, pale green; **spadix** cylindroid, 8.7 cm long, 6 mm diam., pale green; **flowers** 9–10 visible per spiral, 1.7–1.9 mm long and wide; lateral tepals 1.2–1.3 mm wide; inner margin broadly rounded, outer margin 2-sided;



Figure 75. *Anthurium lapoanum* Croat, D.P. Hannon & R. Hormell (Croat 103718). Close-up view of inflorescence with green spathe and green spadix.

stamens held at level of tepals; anthers 0.6 mm long and wide; thecae weakly divaricate. INFRUCTESCENCE with **spadix** red, 13.2 cm long, 1.2 cm diam. in early fruit.

Anthurium jamboense is endemic to Ecuador, found so far only in the Cordillera del Cóndor region of Zamora-Chinchipe province at 1100–1500 m in a *Premontane wet forest* life zone.

Anthurium jamboense resembles *A. toasae* Croat that also occurs in the Cordillera del Cóndor region, but that species differs

by its blades drying dark brownish-green and by its spadix green or yellow-orange at anthesis, bright red in fruit.

The species is named for Río Jamboé along which the type specimen was collected.

Paratype: ECUADOR. **Zamora-Chinchipe:** 10 km E of Paquisha, 1400–1500 m, 13 Apr. 1985, G. Harling & L. Andersson 24109 (GB, QCA).

Anthurium lapoanum Croat, D.P.Hannon & R.Hormell, **sp. nov.** Type: Ecuador. Zamora-Chinchi: Cordillera del Cóndor, along road from Los Encuentros to El Sarsa, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, T.B. Croat & M. Menke 89469 (holotype MO-2330874–75; iso, AAU!, B!, COL!, HNT!, K!, NY!, QCNE!, S!, US!). **Figures 72–75.**

The species is a member of section *Cardiolonchium* characterized by being a small terrestrial plant with conspicuously bullate, ovate-triangular blades and a cylindrical, yellowish spadix.

Small sized erect terrestrial herb; ca. 50 cm high; **internodes** 1–2 cm long, (4)9–14 mm diam., medium to dark green, clothed with sparse remnants of cataphyll fibers; cataphylls 10–13 cm long, soon weathering to a few fibers at base. **LEAVES** with **petioles** narrowly to sharply flattened to shallowly channeled adaxially with margins obtuse or acute distally and on geniculum, 20–30(51) cm long, 3–5(7) mm diam. midway, minutely roughened (like microscopic lenticels), medium to dark green, matte to weakly glossy; geniculum (1.1)2–2.5 cm long, (2)–4–6 mm diam., slightly thicker than the petiole; **blades** ovate-triangular, strongly bullate, 21–30(44) cm long, 14–20(27) wide, within the area of 1/5 of the lower anterior portion of the blade and the point of petiole attachment, 1.6–2.2 times longer than wide, dark green and weakly glossy above, paler and matte

below, subcoriaceous, drying green to olive-green, posterior lobes hippocrepiform, apex gradually acuminate; anterior lobe 18–29.8 cm long, 14.0–19.4 cm wide; posterior lobes 9.0–14 cm long, 7.2–13.5 cm wide; sinus (4)6–11 cm deep, (3)–6–8 cm wide; **midrib** weakly to prominently and sharply raised and slightly paler in deep valley above, acute and concolorous above and below; **primary lateral veins** (5)7–9(10) pairs, scarcely more conspicuous than interprimary veins, deeply sunken to narrowly raised and concolorous above, acute and slightly darker below; **tertiary veins** conspicuously sunken above, raised and concolorous below, **basal veins** (3)5–6 pairs, 1st and sometimes 2nd vein free to base; **posterior rib** naked for 1.8–4.3 cm; **collective veins** distinct, 2–6 mm from the blade margin, arising from the 2nd to the last basal vein of posterior lobe. **INFLORESCENCE** erect, shorter than leaves; **peduncle** terete, drying green, 16–32 cm long, 4–7 mm diam. at base, (3)4–6 mm midway; **spathe** spreading to reflexed-recurled, linear-oblong to lanceolate-elliptic, weakly cuspidate apex, (3)5–6(11) cm long, 1.3–2(3.5) cm wide midway, slightly wider at base, margins narrowly inrolled, matte inside, semiglossy outside, light green with darker major and minor striations; **spadix** tapered, pale yellow to yellowish green [need to see photos], 4–6(8.2) cm long, 4–7(10) mm diam.; **flowers** 4–5(7) visible per spiral, 1.9–2 mm long and wide; tepals smooth, semiglossy, 1.9–2 mm wide; tepals; pistils weakly emergent; stamens 0.2 mm long, 0.6 mm wide. held just below the level of the tepals.

Anthurium lapoanum endemic to Ecuador (Morona-Santiago, Napo, Zamora-Chinchipe) at 840–2500 m. in a *Tropical wet forest* life zone.

A. lapoanum is most similar to *A. versicolor* Sodiro, which differs in being leaf blades which are must less bullate and has the major veins on the upper surface typically very narrowly raised and *A. rugulosum* Sodiro, though equally bullate differs in having much larger more ovate leaves with a dark violet spadix

The species is named in honor of Ecuadorian plantsman Lester Lapo who collected the species for the first time while employed with Ecuagenera. Lester accompanied Tom Croat on a field trip to the Amazon lowlands and was a prodigious and skillful collector. He now works independently in the plant business in his hometown of El Pangui in Zamora-Chinchipe Province in Ecuador.

Paratypes: ECUADOR. **Morona-Santiago:** Along rd. to Cordillera del Condor, 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via Numbaima to Cordillera del Condor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Walbert & Tuntiak Katan* 91028 (COL, CUV, HUA, M, MO, PMA, SEL); Río Zamora, Los Encuentros, on limit to prov. Zamora, at Río Zamora, primary rain forest, 840 m, 26 Sep. 1967, *Benkt Sparre* 18990 (S). **Napo:** Cordillera de

Guacamayos, ca. 6 km SE of Cosanga, 1940 m, 00°38'S, 77°50'W, 5 Oct. 2006, *S. Trogisch, S. Moaitz & J. Homeier* 38 (GOET, MO, QCNE). **Zamora-Chinchipe:** Cordillera del Cóndor, along road between Namirez on Río Zamora to Nambija, 14.7 km E of Namirez and Río Zamora, 5.9 km above San Carlos, 04°03'11"S, 78°47'48"W, 917 m, 19 July 2004, *Thomas B. Croat* 91427 (MO, PMA, QCNE); Cordillera del Cóndor, 03°53'59"S, 78°37'42"W - 03°59'52"S, 78°34'27"W, 7 Sep. 2002, *Thomas B. Croat* 95632 (MO, QCNE); Parroquia Valladolid, southern slopes of the Cordillera de Sabanilla (headwaters of Río Chinchipe), Tapichalaca Reserve (Fundación Jocotoco), Sendero Tangaro to Sendero Quebrada Honda, cloud forest, 04°29'42"S, 79°07'55"W, 2500 m, 3 Apr. 2005, *John L. Clark* 9049 (MO, US).

Cultivated species: ECUADOR, **Zamora-Chinchipe:** Cultivated at Huntington Botanical Garden. Origin: along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 5 May 2012, *Thomas B. Croat* 103718 (MO).

Anthurium lingua Sodiro, *Anales Univ. Centr. Ecuador* 19(137): 317. 1905. Type: Ecuador: Tungurahua: Volcán Tungurahua, *Sodiro s.n.* (holotype: B; isotypes: G !, QPLS!). **Figure 76 & 77.**

The species is a member of sect. *Digitinervium* and is characterized by



Figure 76. *Anthurium lingua* Sodiro (Croat *et al.* 88030). Live plant showing petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.



Figure 77. *Anthurium lingua* Sodiro (Croat *et al.* 88030). Close-up view of inflorescence with green spathe and purple spadix.

its terrestrial habit, leaves with ovate blades rounded to weakly subcordate at base, and inflorescence with a green spathe and the spadix green to grayish lilac, less frequently red to violet-red.

Terrestrial on steep bank; **internodes** short (1.5–)3–4.2 cm diam.; **cataphylls** 12–17 cm long, persisting semi-intact to intact, dark reddish-brown, persisting intact at apex, shredding to loose fibers near base. LEAVES with **petioles** 10.5–66.7 cm long (averaging 35 cm), 7–9 mm thick, 7–9 mm wide, subterete, to narrowly U-shaped, V-sulcate or deeply and sharply sulcate with shallow medial sulcus and 1–2 ribs along the side (at least sometimes drying obtusely and shallowly sulcate), green to dark green, matte, densely pale-speckled or faintly and densely white striate, tinged purplish toward apex, sharply; **blades** narrowly ovate to oblong-ovate to ovate, 15.8–51.8 cm long, 5.8–29.4 cm wide, averaging 15.8 x 33.4 cm, 1.7–2.7 (averaging 2.1) times longer than wide, 0.77–1.5 (averaging 0.9) times longer than blade, usually emarginate with a weak apiculum, rarely narrowly rounded at apex, rounded to weakly subcordate at base with the sinus arcuate with a decurrent petiole, subcoriaceous to coriaceous, moderately to strongly bicolorous, medium to dark green and weakly glossy to glossy above,

slightly paler and weakly glossy below, drying dark yellow-above, slightly paler and yellow-brown below; **midrib** narrowly raised to convex, bluntly to sharply acute or broadly rounded and slightly paler above and below; the lower midrib sometimes reddish to dark purple, densely pale-speckled below; **basal veins** narrowly raised in deep valleys, slightly paler above, reddish and acute above; **primary lateral veins** moderately quilted-sunken and etched, slightly paler above (concolorous on both surfaces), narrowly convex to bluntly acute and pleated below, reddish purple; interprimary veins etched-sunken, concolorous above, weakly raised, reddish purple below; transverse scalariform veins etched and concolorous above, not apparent below; tertiary veins in part sunken above, weakly raised below. INFLORESCENCE erect to erect-spreading; **peduncle** sharply sulcate on one side; **spathe** 3.7–15 cm long, 1.1–4.3 cm wide (averaging 8.1 x 2.2 cm), narrowly triangular-lanceolate, acute at apex, inequilateral at base, one side acute, the other rounded, reflexed, sometimes curled, medium green, tinged along margins and on main veins with violet-purple, matte; **spadix** 5.1–17.3 cm long (averaging 10.8 cm), 4–6 mm diam., more or less cylindroid to weakly long-tapered, usually medium green to grayish lilac, less frequently red to violet-red, matte post-anthesis, 10 flowers

visible per spiral, tepals green. INFRUCTESCENCE with **berries** early-exserted, quadrangular, initially white becoming red and protruding at maturity.

Anthurium lingua ranges from Colombia (Huila) to Ecuador (Cañar, Loja, Manabí, Morona-Santiago, Napo, Pastaza, Tungurahua, Zamora-Chichipe) and Peru (Amazonas, Cajamarca, Huanuco, Loreto, San Martín, Pasco, Piura) at 1000–2600 m in a *Premontane moist forest*, *Premontane wet forest*, *Premontane rain forest*, *Lower montane moist forest*, *Montane Moist Forest*, *Montane wet forest* and *Lower montane rain forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Condor, along road into Cordillera del Condor departing from Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via Numbaime into Cordillera del Condor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 90964* (MO, QCNE); Cordillera del Cóndor, ridge top above Banderas, near disputed Ecuador-Peru border, 03°28'S, 78°15'W, 1350 m, 17 July 1993, *Gentry 79976* (MO, QCNE); Cordillera del Cóndor, Cresta de la Cordillera, arriba del Valle del Río Quimi, Bosque enano sobre meseta de roca arenisca, 03°30'45"S, 78°24'33"W, 2000 m, 11 Dec. 2000, *Cuascota et al. MO-QCNE 267* (B,MO,QCNE). Limon Indanza, Cordillera

del Cóndor, Centro Shuar Warints, 03°09'16"S, 78°14'50"W, 1020 m, 5 Oct. 2002, *David Neill & Shuar conservation interns 14092* (MO, QCNE); Trail from Camp towards crest of summit, 15–20 km SSE of Comunidad Warints, 03°15'S, 78°19'W, 2400–2700 m, 16 Dec. 2002, *Clark 7020* (MO, QCNE); Región de la Cordillera del Cóndor, Cuenca del Río Coangos, Comundidad Shuar de Kuankus, sendero desde la base hacia la cima del Cerro Chuank Naint, Informantes: José & Alonso Saant, 03°03'40"S, 78°14'21"W, 1260 m, 16 June 2005, *C. Morales & M. Tupiza 1248* (MO, QCNE); Cordillera del Cóndor, Centro Shuar Yunkumas, Asociación Nunkui, Cerro Chuank Naint, 03°03'34"S, 78°14'45"W, 1150 m, 19 Dec. 2005, *C. Morales, A. Wisum & C. Kajekai 1609* (MO, QCNE). San Juan Bosco, Comunidad Shuar Numpatkaim, sendero desde los 2700 hasta 2490 m, 03°15'23"S, 78°18'57"W, 2490 m, 24 Jul 2005, *C. Morales & T. Embrey 1394* (MO, QCNE). **Zamora-Chinchipe:** Condor Mirador, provisional old botanical garden near road, along old ill-defined trail to summit, on right side below current landslide blocking road, 03°38'12"S, 78°25'49"W, 1400 m, 23 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 99119* (MO, QCNE); Cordillera del Cóndor, 1 km south of Cóndor Mirador military post, on Ecuador-Peru border, 03°38'44"S, 78°23'44"W, 1970 m, 7 Sep. 2003, *David A. Neill, Eric F. Rodríguez Rodríguez, Wilson Quizhpe & Jürgen Homeier 14479* (MO, QCNE); Cordillera del Cóndor, Ridge crest, on sandstone substrate, 2 km north of Cóndor Mirador military post, low forest or

dense shrubby vegetation, 03°37'41"S, 78°23'42"W, 1975 m, 6 Sep. 2003, *David A. Neill, Eric F. Rodríguez, Rodríguez, Wilson Quizhpe & Jürgen Homeier 14411* (QCNE); Along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89489* (MO, QCNE); Cordillera del Cóndor, Machinaza plateau summit area, adjacent to obelisk-shaped border marker, at end of trail from upper Paquisha military post, precisely at Ecuador-Peru border, 03°53'50"S, 78°28'49"W, 2420 m, 15 Mar. 2008, *David A. Neill & Wilson Quizhpe 16171* (MO, QCNE); *David A. Neill & Wilson Quizhpe 16172* (MO, QCNE); *David A. Neill & Wilson Quizhpe 16174* (MO, QCNE); Cordillera del Cóndor, The Machinaza plateau, one of the highest-elevation Hollín sandstone plateaus in the Cóndor region, about 500 m west of the Ecuador-Peru international border, near end of trail from Paquisha Alto military post, 03°54'06"S, 78°28'57"W, 2315 m, 23 June 2009, *David A. Neill & Camilo Kajekai 16943* (ECUAMZ, LOJA, MO, QCNE); Cordillera del Cóndor, Reserva Biológica Cerro Plateado, herbaceous and low shrubby vegetation on sloping sandstone plateau or "tepui", ridge along trail 100 m below summit, first biological expedition to Cerro Plateado, 04°36'55"S, 78°47'20"W, 2790 m, 24 Aug. 2012, *David A. Neill, Mercedes Asanza & Eduardo Cueva 17521* (ECUAMZ); Namirez on Río Zamora-Nambija, 7.9 km E of San Carlos, 04°03'42"S, 78°47'51"W, 1733 m, 19 July 2004, *Thomas B. Croat 91487* (MO, QCNE). Nangaritza, Pachicutza,

Camino al Hito, Cordillera del Cóndor, bosque primario, 04°07'S, 78°37'W, 1200–1300 m, 20 Oct. 1991, *Palacios & Exp. Tratado Cooperación Amazónica 8424* (MO); Cordillera de Nanguipa, Cerro Colorado, about 8 km by air SSE of Nambija, 20 km ESE of Zamora, montane forest and dense shrubby vegetation on exposed ridges, quartz rock substrate, 04°07'29"S, 78°46'25"W, 2700 m, 18 Feb. 2002, *Neill, W. Quizhpe, J. Manzanares, A. Hirtz, DeLinks & C. Cole 13740* (MO, QCNE); Cordillera del Condor, Cordillera de Nanguipa, along road to Cerro Colorado, about 6 km south of Nambija, 20 km southeast of Zamora, 04°05'51"S, 78°47'43"W, 1930 m, 19 Feb. 2002, *DeLinks 1365* (HUA, MO, QCNE); Cordillera del Cóndor, Cresta de la cordillera, arriba del valle del Río Quimi, bosque enano sobre meseta de roca arenisca, 03°30'45"S, 78°24'33"W, 2000 m, 11 Dec. 2000, *Caranqui, Pabón & Grupo de Post-Grado MO-QCNE 192* (QCNE, MO); Cordillera del Cóndor, sandstone plateau of Contrafuerte Tres Patines, west of main Cóndor ridge, above "Jardín Botánico" of Ecuacorriente copper company, south of Km 15 of Cóndor Mirador military road, dwarf, dense forest, canopy 4–10 m tall, thick root mat and humus layer over sandstone substrate, 03°37'48"S, 78°26'50"W, 1685 m, 9 Dec 2005, *Neill & W. Quizhpe 15075* (MO, QCNE).

Anthurium longegeniculatum Engl. *Bot. Jahrb. Syst.* 25: 379. 1898. Type: Colombia. Cauca: La Ceja, eastern slopes of Andes of Popoyan, F.C.



Figure 78. *Anthurium longigeniculatum* Engler. (Sarria 1021; MO-6713793). Herbarium specimen showing stem, cataphylls, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

Lehmann 5328 (holotype, B; iso, F).
Figure 78.

This species is a member of sect. *Leptanthurium* and is characterized by its long, slender, reddish brown internodes, its cataphylls forming a nested mass, by its semiglossy, ovate leaf blades with a sunken midrib and moderately obscure pale round punctations on the lower surface and by its small yellow-green spadix.

Terrestrial or epiphytic, stiffly erect or scandent, vine-like; **aerial roots** 1–4 per node, not very conspicuous, drying gray-black, 5–8 cm long, weakly branched or not at all branched; **stem** to ca 30 cm long, 0.5–1.8 cm diam., reddish; **internodes** short, 1–10(19) cm long, (3.5)5–8 mm diam., dark brown, smooth, weakly glossy to semiglossy; **cataphylls** 2.5–3.5 cm long, persisting intact as fibers, usually in mass as nest, brown to reddish brown to dark brown, marcescent. LEAVES clustered on erect stem; **petioles** sharply C-shaped to terete, sulcate, medium green to pale green-brown (tinged with red), semiglossy, sometimes adaxially, (10)12–20 (45) cm long, 1.5–5 mm diam.; geniculum distinctly swollen, 3–5 cm long, 2–4 mm diam; **blades** ovate to ovate-elliptic, rarely weakly cordate, sometimes bullate, narrowly long-acuminate to almost aristate at apex, rounded at base, 9–24 cm long, 4–7(13) cm wide (averaging 13.3 x 6 cm), 1.5–2.5(4.4) times longer than broad, 0.7–1.1 times as long as the petioles, broadest below middle, bicolorous, medium to dark green, semiglossy above, paler and glossy to semiglossy below; **midrib** slightly

paler, acutely raised or convex, often in valleys, more or less concolorous above, slightly raised to acutely and paler below; **primary lateral** 8–11 per side, arising from midrib at about 30°–50° angle, etched and weakly quilted above, weakly pleated-raised below, as conspicuous as the collective vein; **collective veins** arising from lower-most primary lateral vein, 2–10 mm from margin; **basal veins** 1(2) usually extends to margin up to apex; **tertiary veins** somewhat obscure above, obscure and reticulate below. INFLORESCENCE erect; **peduncle** longer than petiole, 21–53 cm long, 1.5–4 mm diam., terete; **spathe**, green to reddish (pink), heavily tinged with violet-purple, reflexed or erect-spreading; **spadix** erect, cylindroid to slightly tapered, 2.5–9.2 cm long, 2.5–3 mm diam at base, 0.2–2.5 cm diam.at apex, medium to dark green or yellow-green, semi-glossy to glossy, becoming pale orange, matte; **stipe** ca. 3 cm long, minutely ribbed longitudinally–green; **pistils** weakly exserted; **pollen** white; **flowers** yellow-green.

Anthurium longegeniculatum ranges from Colombia and western Venezuela to Ecuador and northern Peru at 2000–3500 m in *Premontane wet forest*, *Premontane moist forest*, *Montane wet forest*, and *Lower montane dry forest* life zones. In Ecuador and Peru the species ranges only as high as 3000 m.

Specimens seen: ECUADOR: **Morona-Santiago:** Gualaquiza, Cordillera del Condor, Campamento Achupalla, 15 km east of Gualaquiza, 03°27'S, 78°22'W, 2100 m, 24 July 1993, *A. Gentry 80437* (MO).

Cordillera del Cóndor, Cerro Chankinias, south of Río Warintza, east of main ridge of Cordillera, 03°15'13"S, 78°19'18"W, 2500 m, 16 Dec. 2002, *Neill & Shuar 14170* (QCNE). **Zamora-Chinchipe:** Nangaritza, Cordillera del Condor, Cordillera de Nanguipa, Cerro Colorado, 8 km SSE of Nambija, 20 km ESE of Zamora, 04°07'35"S, 78°46'36"W, 2700 m, 18 Feb. 2002, *Tom Delinks 1383* (QCNE).

***Anthurium longistrorsum* Croat, sp. nov.**

Type: Ecuador. Pastaza: 5 km N of Mera on road to Río Tigre, 01°28'30"S, 78°08'00"W, 1000–1200 m, 27 Aug. 2002, T.B. Croat & L. Hannon 87028 (hol, MO-5745944-45; iso, ~~+14 others~~ AAU!, B!, CAS, ! COL!, F!, GB!, GH!, HUA!, K!, NY!, QCA!, QCNE!, UB!, USM!, VEN!).

Figures 79–82.

The species is a member of section *Calomystrium* and is characterized by its typically terrestrial habit, short internodes, persistent, more or less intact reddish brown cataphylls, extremely long petioles often several times longer than the blades, the ovate-cordate blades usually 1.3 times longer than wide with the collective vein extending along much of the margin as well as by the more or less greenish, broad, erect spathe and the whitish spadix that turns maroon after anthesis.

Usually terrestrial on steep banks (rarely epiphytic), 1.5–2 m tall; **internodes** short, 1–3 cm long, 3–4.8 cm diam.;

cataphylls red-brown, persisting intact, sometimes becoming mushy and persisting semi-intact at upper nodes. **LEAVES** with **petioles** (60)80–117 cm long, usually much longer than blades, 1.3–1.9 times longer than blades, terete, semiglossy to glossy, medium green, sometimes tinged purplish, moderately glossy, sometimes rather densely covered with raised lenticels; **blades** ovate-cordate, (40)51–70 cm long, (29)36–51 cm wide, 1.3–1.5 times longer than wide, subcoriaceous, moderately glossy, weakly bicolorous, medium to dark green above, slightly paler below, drying yellowish brown and weakly glossy to semiglossy above, slightly paler and semiglossy below, with punctations conspicuous on lower surface; **anterior lobe** 31–45 cm long, broadly rounded, abruptly acuminate; **posterior lobes** (13)21–23 cm long, (10.5)16.5–19 cm wide, broadly rounded, directed toward the base; **basal veins** 7–8 pairs, the 1st & 2nd free to the base, the 5th and higher fused to 5 cm; **sinus** hippocrepiform, (8)13–16 cm deep, 4–7 cm wide; **posterior rib** naked 2–5.5 cm; **midrib** bluntly acute to narrowly raised to narrowly rounded, in valleys and paler to concolorous above, acute and paler below; **primary lateral veins** 5–9 pairs, arising at an acute angle then spreading at 45–50°(60°) angle; narrowly raised to bluntly acute, in valleys, moderately paler above, narrowly rounded to acute, pleated-raised and paler below; **tertiary veins** in part sunken above, raised below; **collective veins** rising from 1st–3rd (sometimes to as low as the 6th pair) of basal veins, (1)2–8 mm from margin. **INFLORESCENCE** erect; **peduncle** 35–75 cm long; **spathe**



Figure 79. *Anthurium longistrorsum* Croat (Croat & Ferry 98892; MO-6421105). Herbarium specimen showing leaf blade, adaxial and abaxial surfaces.



Figure 80. *Anthurium longistrorsum* Croat (Croat & Ferry 98892; MO-6421105). Herbarium specimen showing plant base, petiole and inflorescence.



Figure 81. *Anthurium longistrorsum* Croat (Croat *et al.* 87774). Live plants showing growth habit and leaf blades, adaxial surface.



Figure 82. *Anthurium longistrorsum* Croat (Croat et al. 87774). Close-up view of inflorescence with green spathe and creamy-white spadix, and infructescence with reddish-violet spadix.

oblong-elliptic, 13–25(30) cm long, 3.5–5.5 cm wide, moderately coriaceous, glossy, medium green outside with white margins, greenish white to whitish inside, drying yellow-brown; **spadix** sessile, 9–16 cm long, 1.5–2.0 cm diam., creamy white to grayish white, yellow-green or pale yellow (sometimes green at tip), glossy with protruding pistils; **flowers** ca. 15 per spiral, more or less square, 2.8–3.2 mm long and wide, the tepals 1.5–1.8 mm wide, becoming conspicuously covered with warty excrescences, the inner margin broadly rounded, the outer margins narrowly

rounded; pollen creamy white. **INFRUCTESCENCE** to 20 cm long, 2.5 cm diam., purplish violet to reddish violet or maroon; **berries** acutely exserted, becoming reddish orange.

Anthurium longistrorsum ranges on the eastern side of the Andes from southern Colombia (Putumayo) to Ecuador (Azuay, Morona-Santiago, Napo, Pastaza, Sucumbíos, Tungurahua, Zamora-Chinchipe) and Peru (Amezonas, Ayacucho, Cajamarca, Pasco, San Martín) at 500–2500

m in in *Premontane moist forest*, *Premontane wet forest* and *Lower montane moist forest* life zones.

The species is similar to and has been confused with *Anthurium formosum* Schott, a species common on the Pacific slope of South America and in Central America but that species has proportionately much shorter petioles and berries that are dark violet-purple versus somewhat reddish orange in *A. longistrorsum*.

The epithet “longistrorsum”, meaning extremely long, refers to the very elongated petiole.

Paratypes: COLOMBIA. **Putumayo:** Mocoa, along Río Mocoa 4 km east of Mocoa, 01°08'56"N, 76°38'52"W, 800 m, 14 Nov. 1968, *Timothy C. Plowman* 2033 (F, GH, MO). ECUADOR. **Azuay:** Along road from Paute to Mendez (Santiago de Mendez), 84.3 km E of Paute, 5.5 km NE of Ama Luza, vic. of junction of Río Mangan and Río Negro with Río Paute, 02°32'36"S, 78°33'46"W, 1524 m, 20 May 2003, *Thomas B. Croat & Mark Menke* 89068 (MO, QCNE). **Morona-Santiago:** Loma San José Grande-Sendero San José-Río Bomboiza, Bosque húmedo Premontano. Vegetación de potreros y bosques secundarios, 02°38'S, 78°27'W, 1300–1600 m, 21 Apr. 1991, *Carlos E. Cerón* 14386 (MO, QCA, QCNE); Cantón Macas, Parque Nacional Sangay, sendero que une la Laguna Sardina y Volcán al Upano, propiedad de la Sta. Lusmila Vele, 02°04'40"S, 78°13'41"W - 02°05'57"S, 78°09'06"W, 1340–1730 m, 27

May 2003, *Carlos E. Cerón & et al.* 48765 (MO); Along road Indanza-Don Bosco, ravines and wet forest, 1000–1100 m, 2 Mar. 1993, *Gunnar Wilhelm Harling* 26871a (S); Cumandá, 6 km W of Mera, montane rain forest and riverside thickets, 01°27'05"S, 78°09'10"W, 1000 m, 14 Mar. 1980, *Gunnar Wilhelm Harling & Lennart Andersson* 17277 (GB, MO); Along highway between Méndez - Paute, 7.4 km SW of Méndez, 02°41'35"S, 78°23'29"W, 1015 m, 23 Aug. 2015, *Thomas B. Croat* 106365 (A, MO); Along road from Limón and San Juan Bosco, 10.1 km of Plan de Milagro jct to Gualacea, 5.4 km S of Indanza, 03°03'27"S, 78°30'01"W, 1033 m, 25 Aug. 2015, *Thomas B. Croat* 106399 (MO, QCNE); Along road between Gualaquiza and Indanza, along Río Sambo Rancho, ca. 15 km S of San Juan Bosco, 03°11'28"S, 78°33'04"W, 1500 m, 7 Sep. 2002, *Thomas B. Croat* 87269 (CUVC, K, MO, PMA, QCNE, US); 29.6 km W of Proaño W, 02°14'32"S, 78°16'40"W, 1659 m, 23 Aug. 2002, *Thomas B. Croat* 86855A (MO, QCNE); Along road from Gualaceo and Gualaquiza; 45.6 km SE of plaza in Sigsig, 3.7 km NW of Chigüinda, 2.7 km NW of La Libertad, 03°12'52"S, 78°44'39"W, 1662 m, 13 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 98560 (MO, QCNE); Along road between Macas and Riobamba, Parque Nacional Sangay, 22.4 km W of airport in Macas, 8.0 km SE of 9 de Octubre, 30.8 km E of Zumil, 02°14'13"S, 78°12'51"W, 161 m, 26 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 99210 (MO, QCNE); Road from Macas to Riobamba (Guamote), 29.6 km west of Proaño, at river which was uncrossable and the current end of the

road, 02°14'32"S, 78°16'40"W, 1659 m, 23 Aug. 2002, *Thomas B. Croat & Lynn P. Hannon 86889* (MO, QCNE); Along road between Macas and Riobamba and Guamote, between Proaño and 9 de Octubre, 10.5 km west of Proaño, for 12.1 km west of Proaño, 02°17'S, 78°11'W, 1185 m, 22 Aug. 2002, *Thomas B. Croat & Lynn P. Hannon 86784* (MO, QCNE); Along road from Palora to Río Amundalo, 5.3 km NW of Palora, at Río Amundalo, 0.3 km N of San Vicente at Tarquí, 01°43'07"S, 78°02'47"W, 923 m, 25 Aug. 2002, *Thomas B. Croat & Lynn P. Hannon 86944* (ENCB, GB, KRAM, MO, , QCNE, S); Along road between Limón and Gualaquiza, 41.4 km S of Plan de Milagro (jct. with Limón-Gualaceo Rd.), 35.3 Km S of San Juan Bosco, 14.8 km N of Tucumbatza., 03°10'59"S, 78°33'27"W, 1584 m, 23 May 2003, *Thomas B. Croat & Mark Menke 89326* (MO, QCNE); Along road between Limón (Gen. Plaza Gutiérrez) and Gualaceo, 1.2 km N of Limón disturbed roadside banks, 02°58'36"S, 78°26'24"W, 1211 m, 11 Aug. 2002, *Thomas B. Croat, Lynn P. Hannon & Petra E. Schmidt 86481* (MO, QCNE); Along road between Méndez and Paute at Río Achioté, 18.7 km W of Méndez, 02°39'39"S, 78°24'04"W, 1146 m, 12 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 90768* (MO, QCNE); Along road from Méndez to Paute, 43.7 km W of Méndez, 02°36'36"S, 78°28'12"W, 1551 m, 12 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 90956* (MO, QCNE); Gualaquiza, Cordillera del Cóndor, ridge top above Banderas, near disputed Ecuador-

Peru border, primary forest, 03°28'S, 78°15'W, 1350 m, 17 July 1993, *Alwyn H. Gentry 80012* (MO, QCNE); Cordillera del Cóndor, Valle del Río Quimi, bosque alterado y potreros, orillas del Río Quimi, 03°30'24"S, 78°25'35"W, 1090 m, 13 Dec. 2000, *M. Cuascota & Grupo Post-Grado MO-QCNE 289* (MO, QCNE); Along Río Bomboiza at bridge on road from Gualaquiza to Nueva Targuá, 03°26'S, 78°36'W, 1300 m, 6 Mar. 1992, *Thomas B. Croat 72746* (MO, QCNE, USM); Limón Indanza, Región de la Cordillera del Cóndor, al oeste del Río Zamora, Parroquia Santa Susana de Chiviza, en los alrededores y en lomas arriba de la población de El Pescado, suelo arenoso derivado de roca arenisca, Bosque muy húmedo premontano, bosque maduro intervenido por agricultura y ganadería, 02°57'30"S, 78°19'56"W, 1400 m, 31 Mar. 2006, *Carlos Morales & Diego Reyes 1796* (QCNE); Cordillera del Cóndor, Centro Shuar Warints, Valley of Río Warints, 2 km SW of Shuar village, pastures and disturbed forest remnants, 03°10'47"S, 78°16'17"W, 925 m, 6 Oct. 2002, *David A. Neill & et al. 14094* (MO, QCNE); Morona, Parr. Sinai, Caserio Musap, Comunidad Shuar Musap, Bosque siempreverde montano bajo, 02°15'S, 77°33'W, 1150–1500 m, 7 Oct. 1996, *Consuelo Montalvo A., Carlos E. Cerón, Darwin Rivadeneira & Edmundo Silva 29* (QAP); Cordillera del Cutucú, Asociación Shuar Sevilla, Comunidad Angel Ruby, Pie de la Cordillera, Remanente de Bosque Primario junto al Río Uncheim, 02°21'41"S, 78°02'24"W, 1064 m, 26 Mar. 2002, *Linder Suin, Fernando Nicolalde-Morejón, B. Atamaint*

♂ *S. Tserem* 1310 (MO, QCNE). **Napo:** On road from Baeza-Lago Agrio at San Raphael Falls on Río Quijos, 1200 m, Jan. 1979, *Elizabeth L. Besse* & *Kiat W. Tan* 1 (QCA); Puyo-Tena road, Sta. Clara, ca. 30 km N Puyo, at roadside, remnants of tropical forest, 01°18'00"S, 77°53'00"W, 800 m, 2 Mar. 1998, *Michael Schwerdtfeger* 98030207 (MO); Along road E 45A between Narupa and Loreto, 8.3 km E of Narupa, 7.3 km W of Río Hollín, 00°41'35"S, 77°44'06"W, 1352 m, 24 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich* & *M. Rees* 105814 (MO, QCNE); Archidona-Baeza, 12.8 km N of Archidona, 9 km S of turn off to Loreto, steep road bank, 00°48'51"S, 77°46'39"W, 884 m, 19 Apr. 2003, *Thomas B. Croat, Lynn P. Hannon* & *Noel Altamirano* 87774 (MO, QCNE); Along road from Narupa to Coca, 4 km E of Narupa (jct. of Baeza-Tena Rd.), 00°42'54"S, 77°49'W, 1312 m, 20 Apr. 2003, *Thomas B. Croat, Lynn P. Hannon* & *Noel Altamirano* 87826 (MO, QCNE); Along road between Archidona and Baeza, 39.9 km N of Archidona, 18.4 km S of Cosanga, 40.8 km S of jct. with Baeza-Papallacta-Lago Agrio Road, 00°40'55"S, 77°48'05"W, 1486 m, 24 Apr. 2003, *Thomas B. Croat, Lynn P. Hannon* & *Noel Altamirano* 88038 (MO, QCNE); Along road between Archidona and San Vicente Para, vic. San Pablo, 6.5 km E of Archidona, along Río Ollín, 00°56'38"S, 77°45'17"W, 543 m, 23 Apr. 2003, *Thomas B. Croat, Lynn P. Hannon* & *Noel Altamirano* 88007 (MO, QCNE); Along road between Tena and Baeza, 12.6 km N of Narupa (junction of road to Coca), 20.5 km S of Cosanga, 00°39'23"S, 77°51'55"W, 1702 m,

10 Oct. 2007, *Thomas B. Croat, Monica Carlsen* & *Dan Levin* 99600 (MO, QCNE); Cantón El Chaco, Codo Sinclair, Bosque muy húmedo Tropical, bosque primario en el valle del Río Quijos, suelo con enormes rocas superficiales, 00°08'S, 77°27'W, 650 m, 16–20 Sep. 1990, *Walter A. Palacios* 5676 (MO); Archidona, Bosque Tropical Bajo, colección hecha en bosque moderadamente intervenido, a 15 km al Noroeste de la población de Archigona, 00°56'S, 77°50'W, Apr. 2000, *Recalde* 4 (QCA); Along road between Tena and Baeza, 2.7 km N of the turn-off to the Loreto coca Road, 00°42'S, 77°51'W, 1525 m, 2 Mar. 1992, *Thomas B. Croat* 72645 (CUVC, K, MO, PMA, QCNE). **Pastaza:** El Topo, Via Puyo-Mera-Baños, 01°26'S, 78°05'W, 1000 m, 1978, *Jaime L. Jaramillo* 121 (QCA); Shell-Mera rainforest, 2 km N of Shell-Mera, 01°29'S, 78°03'W, 1050 m, 8 June 1968, *L.B. Holm-Nielsen* & *et al.* 506 (F); 1 km N of Shell por el puente de peatones sobre el Río Pindu, bosque pluvial premontano, 01°29'S, 78°02'W, 1100 m, 14 Mar. 1985, *Marc A. Baker* & *Nichole Trushell* 5692 (QAME); Hacienda San Antonio von Humboldt, 2 km NE of Mera, bosque pluvial premontano, 01°27'S, 78°06'W, 1300 m, 4 Mar 1985, *Marc A. Baker, Nichole Trushell, David A. Neill, Walter A. Palacios* & *Jorge Zaruma* 5488 (NY); Along road between Puyo and Baños, 2.7 km W of Mera, 4.6 km W of Shell, 01°27'S, 78°05'W, 1110 m, 5 May 1984, *Thomas B. Croat* 59092 (CUVC, K, MO, PMA, QCNE); Along road between Puyo and Baños at second bridge W of Mera, ca. 3 km W of Mera, in deep gorge along stream and on steep banks above

road, 01°27'00"S, 78°05'00"W, 1160 m, 23 Dec. 1979, *Thomas B. Croat 49719* (MO, QCA); Along road between Tena and Puyo, ca. 12 km N of Puyo; along steep road bank., 01°22'00"S 077°56'00"W, 1130 m, 22 Dec 1979, *Thomas B. Croat 49677* (MO, QCA); Vicinity of Shell, ca. 1 km north of town along Río Claro, 00°29'39"S, 78°03'52"W, 1085 m, 27 Aug. 2002, *Thomas B. Croat & Lynn P. Hannon 87063* (MO, QCNE); Along road from Mera to north of Río Anzu; 3.6 km N of Río Anzu, 01°23'15"S, 78°03'14"W, 1167 m, 11 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich, T. K. Croat & R. Qualls 105541* (MO, QCNE); Mera, along Río Allpayacu, riverside thickets, 01°28'00"S, 78°08'00"W, 1000 m, 6 Mar. 1980, *Gunnar Wilhelm Harling & Lennart Andersson 16965* (GB, MO); Mera, 01°28'00"S, 78°08'00"W, 1100 m, 25 May 1968 – 6 June 1968, *Gunnar Wilhelm Harling, G.T. Storm & Bertil Ström 9736* (GB, MO); Selva, near mission station, 01°28'00"S, 78°08'00"W, 13 Aug. 1957, *Harriet G. Barclay 4812* (MO); Río Pastaza, river bank, 01°28'00"S, 78°08'00"W, 19 Apr. 1969, *Hólguez Lugo S. 1131* (MO); Along road between Puyo and Baños, 4.3 km W of center of Shell., 01°26'S, 78°09'W, 1180 m, 5 Apr 1992, *Thomas B. Croat 73555* (MO, OOM); Along road between Puyo and Baños, along creek ca. 5 km W of Mera, 01°26'S, 78°08'W, 1100 m, 7 Mar. 1992, *Thomas B. Croat 72834* (MO, QCNE); Along road from Mera to Río Anzu, 6 km N of Mera, 01°25'57"S, 78°05'24"W, 1370 m, 6 May 2003, *Thomas B. Croat, Lynn P. Hannon & Mark Menke 88626* (MO, QCNE). **Sucumbíos:** Colecciones en el sector Norte

Oeste de la Cascada San Rafael, 00°07'S, 77°34'W, 1300 m, 11 Oct. 1990, *Jaime L. Jaramillo & Elena Grijalva 13215* (QCA); Vicinity of Lago Agrio and Coco on new CEPE, ferry road 7.2 km S of South bank of Río Aguarico, 00°02'N, 76°51'W, 270 m, 28 Apr. 1984, *Thomas B. Croat 58635* (F, MO, QCA); Above road between Baeza and Lago Agrio, between Manuel Galindo and El Reventador along old road to San Rafael Falls on Río Quijos, departing main Baeza-Lago Agrio road 14.8 km SW of El Reventador, 00°06'13"S, 77°35'28"W, 1332 m, 18 Aug. 2004, *Thomas B. Croat, Geneviève Ferry & Christopher Davidson 93572* (MO, QCNE); Above road from Lumbaqui to La Bonita, departing main Baeza-Lago Agrio road, just E of Río Aguarico bridge E of Lumbaqui, 5.8 km NW of jct. with main highway, 00°23'57"N, 77°20'49"W, 400 m, 18 Aug. 2004, *Thomas B. Croat, Geneviève Ferry & Christopher Davidson 93623* (MO, QCNE); Along to Río Bermejo and beyond, N of bridge over Río Bermejo, departing main Lumbaqui-Lago Agrio Highway, 7 km E of middle of Río Aguarico Bridge, ca. 8 km N of main Lumbaqui-Lago Agrio highway, 00°07'49"N, 77°19'19"W, 31 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich & M. Rees 105976* (MO, QCNE); Along road from Lumbaqui to Santa Barbara, 3.5 km N of junction with bridge over Río Aguarico near Lumbaqui, 1.9 km N of Flor de Valle, 00°03'51"N, 77°19'26"W, 483 m, 5 Oct. 2007, *Thomas B. Croat, Monica Carlsen & Dan Levin 99319A* (MO, QCNE). **Tungurahua:** Road Baños-Mera, 35 km from Baños, clearing and rain forest along line from Television Plant to

antenna (along Río Cashaurco., 01°25'S, 78°10'W, 1450–1550 m, 4 Sep. 1976, *Benjamin Øllgaard & H. Balslev* 9298 (AAU); Vicinity of Río Margaritas, 1225 m, 19 Mar. 1939, *C.W.T. Penland & Robert H. Summers* 147 (US); Valley of Río Pastaza, between Río Topo and La Victoria, 01°25'S, 78°11'W, 1300 m, 25 Aug. 1939, *Erik Asplund* 8565 (QCA); Río Negro, montane rain forest and rastrojos, 01°24'00"S, 78°13'00"W, 1200 m, 13 Mar. 1980, *Gunnar Wilhelm Harling & Lennart Andersson* 17219 (GB, MO); Southern side of Río Pastaza, ca 5 km east of Baños, 01°24'00"S, 78°22'00"W, 2 May 1969, *Hólgner Lugo S.* 1291 (GB, MO); Colonia México, in the vicinity of El Topo, ca 10 km NW of Mera, northern side of Río Pastaza, 01°25'00"S, 78°10'00"W, 5 Mar. 1969, *Hólgner Lugo S.* 653 (MO); Km 10, Baños - Puyo road, roadside, 01°44'S, 78°19'W, 1400 m, 28 Mar. 1986, *P.M. Jørgensen & J. M. Olesen* 61220 (AAU); Along road from Río Negro on Río Pastaza to Parque Nacional Sangay, 3 km south of Río Negro, 01°26'37"S, 78°13'30"W, 1400 m, 19 Aug. 2002, *Thomas B. Croat & Lynn P. Hannon* 86655 (HUA, M, MEXU, MO, NY, QCNE); Along old road between Baños and Puyo, this now mostly abandoned segment 3.1 km long, departing just after Km 70 when going N from Puyo, 1.8 km S of north junction of this road with main Baños-Puyo Road, 01°25'48"S, 78°10'26"W, 1299 m, 13 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich, T. K. Croat & R. Qualls* 105599 (MO, QCNE); Along road from Río Negro to La Estancia and Parque Nacional Sangay, 1.8 km S of bridge over Río Pastaza, 01°25'24"S, 78°13'01"W,

1335 m, 4 May 2003, *Thomas B. Croat, Lynn P. Hannon & Mark Menke* 88511 (MO, QCNE); Along road between Baños and Puyo, vic. Río Verde, 01°23'S, 78°17'W, 1661 m, 4 May 2003, *Thomas B. Croat, Lynn P. Hannon & Mark Menke* 88457 (MO, QCNE, USM); Baños, along road between Puyo and Baños, 3.5 km E of Río Verde (village and river by the same name), 01°23'S, 78°16'W, 7 Mar. 1992, *Thomas B. Croat* 72847 (MO, QCNE). **Zamora-Chinchipe:** Podocarpus National Park, plot near Trail T2, S of Estacion Científica San Francisco, 30 km E of Loja near Sabanilla, Wet montane forest, 03°58'S, 79°03'W, 2000 m, 12 July 2000, *R. Leimbeck & B. Windeballe* 477; About 30 km N of Zamora, S of Guadalupe, near the village Conchay at Río Yacuambi, wet forest along small creek W of the village, 03°52'S, 78°52'W, 1000 m, 12 Nov. 2000, *R. Leimbeck, Jens E. Madsen, B. Windeballe & C. Rosales* 382 (AAU); Along road from Namirez to Nambija, along mining road, 10.0 km S of Namirez and Río Zamora, vicinity of Nambija, along road to mine headquarters ca. 5 km long, just south of Nambija, 04°03'44"S, 78°47'29"W, 1779 m, 23 July 2004, *Thomas B. Croat* 92088 (MO, QCNE); Cordillera del Cóndor region, along road from Tandaima to Valle del Quime, along right bank of Río Quime, 4.2 km from bridge over Río Waiwaime near headquarters of Ecuacoriente copper mine, 03°31'55"S, 78°27'10"W, 1200 m, 13 Apr. 2006, *Thomas B. Croat* 96994 (MO, QCNE); Vicinity of El Pangui, east of El Pangui, across Río Pachicuza, 0.5 km east of river, disturbed virgin forest along stream, 03°39'48"S, 78°34'11"W, 900 m, 6 Sep.

2002, *Thomas B. Croat 87155* (MO, QCNE); Along graveled road roughly paralleling the Chuchumbleza-Yantzaza Highway, E along Río Chuchumbleza, then SW to Chicaña and back to main highway (entering road from main highway 4.8 km S of Río Chuchumbleza and re-entering main highway 9.6 km N of plaza in Yantzaza) via Guisme, Miasi, Uwents, Kunki, El Oso, and Chicaña, vicinity of Uwents, 21.5 km N of Chicaña, 6.2 km N of Kunki and Río Uens del Kunki bridge, 03°36'02"S, 78°41'16"W, 1500 m, 14 Apr. 2006, *Thomas B. Croat 97065* (AAU, F, MO, QCNE); Along road between Zamora and Romerillos Alto, 23.9 km E of Río Bombuscaro bridge in Zamora, 11.1 km E of Pituca, 04°13'21"S, 78°56'24"W, 1457 m, 20 July 2004, *Thomas B. Croat 91591* (MO, QCNE); Along road from Zamora to Janiero vicinity of municipal garbage dump, along Quebrada Janiero, 1.3 km NW of Bridge over Quebrada Janiero, 04°02'53"S, 78°57'51"W, 1009 m, 22 July 2004, *Thomas B. Croat 91911* (MO, QCNE); Along road between Vilcabamba and Zumba, 11.8 km S of Valladolid, 76.4 km S of Vilcabamba, 04°34'19"S, 79°08'17"W, 1457 m, 26 July 2004, *Thomas B. Croat 92292* (MO, QCNE); Along road between Zumba and Vilcabamba, 57.9 km N of Zumba, 9.2 km S of Santa Ana, 6.3 km N of Palanda, 04°36'39"S, 79°07'42"W, 1243 m, 28 July 2004, *Thomas B. Croat 92507* (MO, QCNE); Along road between Loja and Zamora along Río Zamora near bridge which crosses Río Zamora, 39 km E of Loja, 04°05'S, 79°00'W, 610 m, 18 Oct. 1980, *Thomas B. Croat 50763* (HUA, MO, QCA); Ca. 2 km W

of Zamora on road to Loja, Premontane moist forest, 04°03'S, 78°59'W, 1050 m, 20 Oct. 1980, *Thomas B. Croat 50827* (M, MO, QCA); Vicinity of Tandaime, above the junction to Condor Mirador, military reservation above Tandaime village, sandstone plateau of Cordillera del Condor, dwarf forest with canopy 8–10 m tall, 03°35'54"S, 78°29'14"W, 1420 m, 20 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98863* (MO, QCNE); Along road from Tandaime to Condo Mirador, 18.4 km beyond the turnoff near the military check point near Tundaime, 03°38'12"S, 78°25'49"W, 1570 m, 20 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98892* (MO, QCNE); Valley of Río Waiwaime, near mouth at Río Quime, 03°33'40"S, 78°27'47"W, 1000 m, 22 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 99018* (MO, QCNE); Valley of Río Waiwaime, near mouth at Río Quime, 03°33'40"S, 78°27'47"W, 1000 m, 22 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 99032* (MO, QCNE); Along road from Namirez (22.3 km S of Yanzaza) to Nambija, 8.1 km S of San Carlos, 04°03'37"S, 78°47'25"W, 1524 m, 28 May 2003, *Thomas B. Croat & Mark Menke 89629* (MO, QCNE); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritzza, 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Mark Menke 89524* (MO, QCNE); Along road between Los Encuentros and El Sarsa, 4.7 km E of Los Encuentros, 03°46'42"S, 78°38'32"W, 822 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89575* (MO, QCNE); Along road

from Zamora to Loja, 79.9 km E of summit and border with Loja Province, 03°59'19"S, 79°01'14"W, 1402 m, 31 May 2003, *Thomas B. Croat & Mark Menke 89855* (MO, QCNE); Along road from Quime Ferry Crossing on road leading to summit of Cordillera del Condor, 23.2 km above the crossing at Río Zamora on road leading to summit, 03°38'00"S, 78°26'03"W, 1552 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91044* (MO, QCNE); Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91209* (MO, QCNE); Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 4 9.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91293* (B, CAS, MO, QCNE); Along road from near Paquisha south to Las Orchídeas, and end of river at Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 37.3 km S of junction, 12.3 km N of Las Orchídeas, 04°08'25"S, 78°38'31"W, 886 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91408* (MO, QCNE); El Pangui, vicinity of Ecuacorrientes copper mine development, Río Waiwaime, above gate near Río Quimi,

03°34'50"S, 78°25'57"W, 1445 m, 6 April 2006, *Thomas B. Croat, Christopher Davidson & Sharon R. Christoph 96706* (CUVC, GB, M, MO, PMA, QCNE, RSA, SEL, USM); Nangaritza, vicinity of Las Orquídeas, near Cabañas Yankuam, along new trail to Summit of Los Tepuis Conservation Area, just above road from Las Orcheas to new ferry, 04°14'55"S, 78°39'36"W, 870 m, 18 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98838* (G, MO, QCNE); Palanda, eegión de la Cordillera del Cóndor, Parroquia San Francisco de Vergel, Riberas del Río Vergel, entre Santa Rosa y La Canela, Bosque muy húmedo premontano, 04°39'07"S, 79°01'41"W, 1200 m, 6 Mar. 2007, *Wilson Quizhpe & Abel Wisum 2500* (MO, QCNE); Zamora, Estación Científica San Francisco, above road from Loja to Zamora, cloud forest, in one-hectare forest inventory plot, 03°58'35"S, 79°04'14"W, 2100 m, 23 Feb. 2002, *Tom Delinks 1412* (QCNE). **PERU.** **Amazonas:** Luya Camporedondo, Tullany., 06°09'07"S, 78°21'05"W, 1550 m, 27 Nov. 1996, *Camilo Díaz S. 8733* (MO). **Ayacucho:** Aina, between Huanta and Río Apurímac, open wood., 12°39'00"S, 73°55'00"W, 750–1000 m, 7–17 May 1929, *Ellsworth P. Killip & Albert C. Smith 22563* (MO, NY, US). **Cajamarca:** San Ignacio, Distrito Huarango, Poblado Huarandoza, caserio el Eden, Bosque secundario húmedo lluvioso, en borde de camino, 05°09'58"S, 78°43'31"W, 1583 m, 26 July 2007, *Juan Perea 3428* (HUT, MO, USM). **Pasco:** Oxapampa, Distrito Huancabamba, Parque Nacional Yanachaga-Chemillén, Sector Tunqui, Bosque húmedo montano primario, 10°17'19"S, 75°31'06"W, 1790 m, 22 Sep.

- 2007, *Abel Monteagudo, Antonio Peña, J.L. Mateo, L. Chuck & César Rojas 15251* (MO, USM); Distrito Huancabamba, zona de amortiguamiento del Parque Nacional Yanachaga-Chemillén, parte media de la quebrada Yanachaga, Bosque húmedo montano secundario, 10°23'44"S, 75°28'56"W, 2250 m, 28 Sep. 2007, *Abel Monteagudo, Antonio Peña, Valerio Flores, L. Chuck & César Rojas 15427* (HUT, MO, USM); Distrito Oxapampa, Parque Nacional Yanachaga Chemillén, Refugio el Cedro, bosque primario, 10°32'S, 75°21'W, 2430 m, 21 Nov. 2002, *Abel Monteagudo, Carlos Mateo & Gregorio Ortiz 4386* (HUT, MO, USM); San Alberto, undisturbed montane forest, 10°32'S, 75°21'W, 2400 m, 18 July 2003, *H. van der Werff, Rodolfo Vásquez, Bruce Gray, Rosa Ortiz & Nállarett Dávila 18628* (MO); Along road to Pozuzo-Oxapampa in P.N. Yanachaga, montane forest, 10°11'S, 75°34'W, 1200 m, 2 July 2003, *H. van der Werff, Rodolfo Vásquez, Bruce Gray, Rosa Ortiz & Nállarett Dávila 17954* (K, MO, USM); Distrito Chontabamba, carretera camino a la Suiza nueva, Bosque Montano Primario, 10°33'S, 75°27'W, 2211 m, 04 Apr. 2003, *Jorge Lingán 377* (MO, USM); Distrito Chontabamba, carretera camino a La Suiza antigua (Km 10 a 13). Bosque Montano Primari., 10°33'S, 75°27'W, 2211 m, 28 Mar. 2003, *Jorge Lingán 362* (MO, USM); Distrito Chontabamba, carretera camino a La Suiza antigua (Km 10 a 13), Bosque Montano Primario, 10°33'S, 75°27'W, 2211m, 28 Mar. 2003, *Jorge Lingán 363* (MO, USM); Distrito Chontabamba, carretera camino a La Suiza antigua (Km 10 a 13), Bosque Montano Primario, 10°33'S, 75°27'W, 2211 m, 28 Mar. 2003, *Jorge Lingán 364* (MO, USM); Distrito Pozuzo, PN Yanachaga – Chemillen, Estacion Biologica Huampal. Trocha frente a la estacion, camino al pajonal, Bosque Montano Primario, 10°11'S, 75°34'W, 1150 m, 8 Apr. 2003, *Jorge Lingán 397* (K, MO, USM); Distrito Pozuzo, PN Yanachaga - Chemillen. Estacion Biologica Huampal, Trocha frente a la estacion, camino al pajonal, Bosque Montano Primario, 10°11'S, 75°34'W, 1150 m, 14 Apr. 2003, *Jorge Lingán 430* (MO, USM); Distrito Oxapampa, PN Yanachaga – Chemillen, Sector San Alberto, Refugio el Cedro, Bosque Montano Primari., 10°33'S, 75°22'W, 2450 m, 15 Mar. 2003, *Jorge Lingán, Rodolfo Vásquez, Abel Monteagudo, Jasmin Opisso, R. Gazis, Rolando Francis, Carlos Mateo & Gregorio Ortiz 347* (MO, USM); Distrito Chontabamba, Carretera camino a La Suiza antigua (Km 10 a 13), 10°33'S, 75°27'W, 2211 m, 28 Mar. 2003, *Opisso 362* (MO); Distrito Huancabamba, al borde del camino del Puesto de Control Huampal, Remanente de bosque, 10°11'11"S, 75°34'35"W, 1150 m, 8 June 2007, *Rocío Rojas 4139* (MO, USM); Distrito Huancabamba, Sector Grapanazu, Bosque primario, 10°26'S, 75°23'W, 2310 m, 11 Oct. 2003, *Rocío Rojas, K. Meza, Jorge Lingán, E. Camavilca & M. Villaran 1628* (MO, USM); Dist. Huancabamba, Parque Nacional Yanachaga-Chemillén, Sector San Daniel, Bosque primario, suelo muy húmedo, falda de montaña y pajonal, 10°26'35"S, 75°26'16"W, 2200–2500 m, 14 Mar. 2006, *Rodolfo Vásquez 31178* (MO, USM); Distrito Huancabamba, Sector Muchumayo - Zona de amortiguamiento, 10°18'56"S, 75°32'26"W, 1551 m, 3 Apr.



Figure 83. *Anthurium longiusculum* Croat (Croat & Menke 89719; MO-5703734). Herbarium specimen showing plant base, petioles and leaf blade, adaxial and abaxial surfaces.



Figure 84. *Anthurium longiusculum* Croat (Croat 91970). Live plant showing plant base, petioles, leaf blades, adaxial surface, and inflorescence.



Figure 85. *Anthurium longiusculum* Croat (Croat 91970). View of leaf blade. adaxial surface.



Figure 86. *Anthurium longiusculum* Croat (Croat 91970). View of leaf blade. abaxial surface.



Figure 87. *Anthurium longiusculum* Croat (Croat 91970). Close-up view of inflorescence with twisted and green spathe and green spadix.

2014, *Rodolfo Vásquez, Rocío Rojas & César Rojas 38997* (HOXA); Dist. Chontabamba, La Suiza Nueva, Bosque montano nublado, 10°39'05"S, 75°27'06"W, 2200 m, 17 Oct. 2005, *Samuel Vilca C. 471* (MO, USM). **San Martín:** Rioja, Dist. Pardo Miguel, en el Puente sobre el Río Aguas Verdes, 05°41'00"S, 77°39'00"W, 1020 m, 19 May 2000, *Sánchez 10218* (F).

Anthurium longiusculum Croat, *Aroideana* 31: 54–55. 2008. Type: Ecuador. Zamora-Chinchipe: Zamora-Romerillos, 6.6 km E of bridge over Río Bombuscaro, vic. of La Pituca, 04°04'59"S, 78°56'12"W, 731 m, 30 May 2003, *T.B. Croat & M. Menke 89719* (holotype: MO; isotypes: AAU!, B!, COL!, F!, GB!, GH!, HUA!, K!, M!, NY!, QCNE!, S!, SEL!, UB!, US!). **Figures 83–87.**

The species is a member of sect. *Decurrentia* and is characterized by its long petioles, its lanceolate-elliptic leaves obtuse or tapering at the base and tapering and acuminate at the apex, its 17–21 pairs of weakly raised primary lateral veins, and its collective veins strongly raised below and arising from the 1st–2nd pair of primary lateral veins.

Terrestrial plant, specimens blackening when dried; **caudex** slightly elongated; **internodes** short, 1.5–2.5 cm diam.; **cataphylls** membranaceous, 6–12 cm long, turning dark red-brown, persisting more or less intact as scales surrounding the

caudex. LEAVES subcoriaceous; **petioles** terete, semiglossy, medium to dark green, 62–85 cm long, ca. 5 mm diam.; geniculum obtusely sulcate, sometimes remote and seemingly disconnected from the leaf tissue; **blades** subcoriaceous, lanceolate-elliptic, 36–46 cm long, 7–14 cm wide, averaging 41 x 10.5 cm, 2.8–5.1 times longer than wide, 0.48–0.61 times as long as petioles, obtuse or acute at base, tapering and acuminate at apex, semiglossy, moderately bicolorous, drying yellow-brown to gray-brown and weakly glossy above, grayish yellow-brown to yellow-brown and semiglossy below; **midrib** convex and slightly paler above, narrowly rounded and slightly paler below; **primary lateral veins** 17–21 pairs, quilted-sunken and concolorous above, weakly pleated-raised and darker below, weakly loop-connected into the connective veins; **tertiary veins** obscure; **collective veins** arising from 1st–2nd pair of primary lateral veins, generally more raised below than the primary lateral veins, running 3–15 mm from margin. INFLORESCENCES erect to spreading; **peduncle** 30–67 cm long, 2–3 mm diam.; **spathe** green, 4.8–6.0 cm long, 4–5 mm wide (up to 1.5 cm wide when flattened), 5–12 times shorter than peduncles, membranaceous, deflexed, linear-lanceolate with two acute 4-mm extension on each side of the midrib at the apex, obtuse at base and clasping the base of the stipe, twisted-rolled with margins tightly rolled under, green, tinged purple and matte inside, semiglossy outside; **spadix** stipitate, dark green, semiglossy, 4–5 cm long, 4–5 mm diam., 7.5 times longer than wide; flowers 4–5 visible per spiral, 1.5–1.9 mm

long, 1.7–2 wide; lateral tepals 0.9–1.2 mm wide, minutely granular, outer margin 2–3-sided, inner margin broadly rounded; stamens 0.6 mm long, 0.6 mm wide; anthers oblong, not divaricate. INFRUCTESCENCE erect, to 14.5 cm long, 1.2 cm wide, **berries** rounded, purplish, drying 5–6 mm long, 4–5 diam. diam.

Anthurium longiusculum is believed to be endemic to Ecuador (Zamora-Chinchipe); at 730–1520 m elevation in *Premontane moist forest* life zone.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, Namirez (22.3 km S of Yanzaza) - Nambija, 8.1 km S of San Carlos, 04°03'37"S, 78°47'25"W, 1524 m, 28 May 2003, *Croat & Menke 89642* (AAU, B, CAS, COL, F, GB, HUA, K, M, MO, NY, QCA, QCNE, RJ, S, SEL, UB, US, USM); Vicinity of Las Orquídeas, near Cabañas Yankuam, along Río Nangaritzza, Los Tepuis Conservation Area, 04°15'08"S, 78°39'53"W, 1120 m, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98714* (MO, QCNE); Destacamento Militar Shaime, Parroquia Guaysimi, sendero que conduce al Mirador, sector Este del Campamento, 1080 m, 8 Dec. 1990, *Jaime L. Jaramillo 13471* (NY); Shaime, sendero hacia el Hito, bosque intervenido, suelo franco-limoso, 04°18'00"S, 78°40'00"W, 900–1200 m, 21 Oct. 1991, *Jaime L. Jaramillo 14433* (MO, NY).

Anthurium losencuentrosense Croat, **sp. nov.** Type: Ecuador. Zamora-Chinchipe: Cordillera del Cóndor, vicinity of Los Encuentros, along road into mountains E of bridge over Río Zamora at Los Encuentros, 03°47'S, 78°37'W, 1220 m, cultivated by Richard Cirino, specimens prepared 5 Apr. 2003, *T. B. Croat 87591* (holotype, MO-5754888; iso, K, QCNE). **Figures 88–90.**

The species is a member of sect. *Belolochium* characterized by its short thick internodes, cataphylls fibers dark red-brown persisting with fragments of intact epidermis, petioles about as long as blades and terete, geniculum bluntly 3-ribbed, the narrowly ovate-sagittate blades with deeply concave margins, a hippocrepiform sinus, 9–10 pairs of basal veins, long naked posterior rib and collective veins arising from one of the primary lateral veins in the medial lobe and a single pair of basal veins as well as by the moderately long-pedunculate inflorescence with a nearly erect and broad light yellow-green spathe which exceeds the erect dark violet-purple, narrowly short-cylindroid-tapered matte spadix.

Habit unknown; **internodes** short, 4 cm diam.; **cataphylls** 16.2 cm long, fibers dark red-brown persisting with fragments of intact epidermis, drying reddish brown. LEAVES with **petioles** 85 cm long, 1.5 cm diam. at base, 8 mm diam. midway, 7 mm diam. at apex, medium to dark green, weakly glossy, densely pale short-lineate,



Figure 88. *Anthurium losencuentrosense* Croat (Croat 87591; MO-5754888). Herbarium specimen showing petiole, leaf blade, adaxial and abaxial surfaces, and inflorescence.



Figure 89. *Anthurium losencuentrosense* Croat (Croat 87591). Live plant showing leaf blade, adaxial surface.



Figure 90. *Anthurium losencuentrosense* Croat (Croat 87591). Close-up view of inflorescences showing twisted and whitish spathe and dark violet spadix.

terete midway, sometimes with one weak, acute rib as a continuation of one margin; geniculum 4 cm long, 1 cm diam., bluntly 3-ribbed, slightly thicker and slightly paler than petiole; **blades** narrowly ovate-sagittate, 83.7 cm long, 40 cm wide, 2.09 times longer than broad, broadest at petiole attachment, 1.0 times as long as petioles, gradually acuminate at apex, prominently lobed at base, subcoriaceous, dark green and semiglossy above, moderately paler and matte below, drying subcoriaceous, olive brown and weakly glossy above, yellowish

olive brown semiglossy below, epunctate; **upper surface** minutely and finely granular; **lower surface** moderately smooth, obscurely granular; **anterior lobe** 60.1 cm long, with deeply concave margins, the distal margin slightly rounded; **posterior lobes** 25.6 cm long, 16.8 cm wide, directed downward and inward; **midrib** acute and slightly paler in valleys above, sharply acute and paler below, drying darker above and below; **primary lateral veins** ca. 8 pair, arising at 65° angle, sunken, concolorous above, narrowly raised and concolorous



Figure 91. *Anthurium miaziense* Croat (van der Werff et al. 24827; MO-6472379). Herbarium specimen showing plant base, petiole, leaf blade, mostly abaxial surface, and inflorescence.

below, drying concolorous above, paler below; **tertiary veins** scarcely sunken above, thin part moderately raised below; **collective veins** arising from the middle to lower primary lateral veins, 2 mm from margin; **basal veins** 9–10 pair, 1st free to base, 3rd pair fused to 6.2 cm, 9th and higher pairs fused to 9 cm, the pairs of basal pairs all merging with the margins; **posterior rib** gradually curved, naked 9 cm; **sinus** hippocrepiform, 19.7 cm deep, 13.3 cm wide. INFLORESCENCE with **peduncle** 33 cm long, 8 mm diam.; **spathe** light yellow-green or whitish, semiglossy, 12.5 cm long, 5 cm wide, oblong lanceolate, erect at base, erect-spreading above middle, tinged weakly purplish on inner surface, margins rolled under on one side, drying moderately coriaceous, reddish brown; **spadix** dark violet-purple, matte, sessile, cylindroid and weakly tapered, 12.7 cm long, 1 cm diam cm long, drying reddish brown; **flowers** 12 visible per spiral, drying 1.7 mm long and 1.6 mm wide; tepals minutely papillate-granular on drying; lateral tepals 1.4 mm wide, the outer margins 2–3-sided, inner margin rounded; stamens not exerted.

Anthurium losencuentrosense is endemic to Ecuador, known only from the Cordillera del Cóndor in SE Ecuador, in the Province of Zamora-Chinchipec at 1220 m elevation in a *Premontane wet forest* life zone.

Anthurium losencuentrosense is similar to *A. ivanportillae* Croat which also has leaf blades with markedly concave margins on the blades and dry the same color. However, that species has a much narrower anterior

lobe, a narrower, often closed and reniform sinus and a lack of free basal veins. The species is also similar to *A. exilum* Croat from Morona-Santiago Department in Ecuador. That species differs in having the blades drying more greenish, have collective veins arising from the 5th pair of basal veins and much more remote from the margins as well as by having a greenish yellow, much more stipitate spadices.

The species is named for the type locality near Los Encuentros in Zamora-Chinchipec Province.

Anthurium miaziense Croat, *Willdenowia* 40: 131. 2010. Type: Ecuador. Zamora-Chinchipec: Cantón Nangaritza, Miazzi, margin of Río Nangaritza, “suelos entisoles”, 04°16'S, 78°42'W, 930 m, 26 Oct. 1991, W. Palacios, I. Vargas & M. M. Ruiz 8641 (holotype: MO; isotype: QCNE). **Figure 91.**

The species is a member of sect. *Calomystrium* and is characterized by its epiphytic habit, terete petioles, long-petiolate leaves, lanceolate-triangular-sagittate, dark-brown-drying blades with broadly concave lateral margins as well as by its long-pedunculate inflorescence with green, linear-lanceolate spathe and long, slightly tapered greenish violet spadix.

Epiphyte 2 m from ground; **stem** short; **internodes** short, 2.6–2.9 cm diam. (averaging 2.7 cm); **cataphylls** drying intact

at upper node, greyish green-brown, rust color at base, soon mostly deciduous, with only a layer of short pale fibres persisting, length uncertain. LEAVES erect-spreading with petiole, blade \pm pendent, **petioles** 49.6–56.9 cm long (averaging 52.2 cm), 0.3–0.6 cm diam., terete, adaxial surface sulcate, abaxial surface rounded, margins obtusely raised, drying brown to dark brown, paler at base; geniculum 2.5–2.9 cm long, 4–5 mm wide, concolorous with and of same width as petiole; **blades** lanceolate-sagittate-hastate, 36.5–44.6 cm long, 22.2–26.6 cm wide (averaging 40.6×24.4 cm), 1.7–1.8 times longer than broad, 0.74–0.82 times longer than petiole, broadest at base, moderately coriaceous, drying weakly glossy to matte; upper surface matte and semiglossy, brown to dark greyish brown, lower surface semiglossy, dark brown to dark yellowish brown, moderately bicolorous, drying brownish to dark brown above, brownish to reddish brown below, glands absent; **anterior lobe** 28.7–31.6 cm long, broadly rounded apically, apex gradually acuminate, straight to concave along margin towards base; **posterior lobes** 11.5–16.8 cm long, 7.2–8.2 cm wide, spreading somewhat outward; **sinus** broadly spatulate and parabolic, 8.1–9.7 cm deep, 4.8–6.8 cm wide; **midrib** drying concolorous with blade above, orange-brown to dark red-brown below, bluntly acute and narrowly rounded above, broadly convex or round-raised below; **basal veins** 5–6, usually coalesced into a \pm straight posterior rib, rarely 1st free to base, 3rd and 4th coalesced 8.2–16.6 cm; **posterior rib** 6–10.5 cm long, naked along sinus 2.3–3.8 cm;

primary lateral veins 6–9 pairs, arising at an acute angle, $35\text{--}40^\circ$ toward apex and middle, $70\text{--}90^\circ$ below middle, then spreading at a $70\text{--}90^\circ$ angle, scarcely more conspicuous than interprimary veins, all major lateral veins on upper surface quilted-sunken; **collective veins** arising from 2nd basal vein, 4–6 mm from margin; **upper surface** drying densely and minutely granular with an array of larger pale pustular excretions as well as a dense array of pale short-linear cellular inclusions; **lower surface** drying nearly smooth, sparsely pale short-lineate. INFLORESCENCE spreading; **peduncle** 39.4–61 cm long (averaging 47.9 cm); **spathe** green, 15–16.4 cm long, 1.3–1.6 cm wide, linear-lanceolate, spreading, emerging from peduncle at a 45° angle, 3-dimensional shape fully expanded; **spadix** sessile, 25.1–25.3 cm long, 8–9 mm diam., slightly tapered, greenish violet; **flowers** 7–8 visible per spiral, 3.3–4 mm long; tepals minutely granular to pustulose-granular, lateral tepals 1.7–1.9 mm wide, the outer margin 2-sided, inner margin broadly rounded; stamens 5 mm long, 0.6 mm wide, thecae narrowly ovate, broadly divaricate.

Anthurium miaziense is found in Ecuador (Zamora-Chinchi) and Peru (Amazonas) at 930–1270 m in a *Premontane wet forest* life zone.

Specimen seen: ECUADOR. **Zamora-Chinchi:** Cantón Nangaritza, Miazí, margin of Río Nangaritza, “suelos entisoles”, $04^\circ 16'S$, $78^\circ 42'W$, 930 m, 26 Oct.



Figure 92. *Anthurium michelii* Guillaumin (Croat & Mora 83758). Live plant showing stem apex, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescences.

1991, Palacios, I. Vargas & M. M. Ruiz 8641 (MO, QCNE).

Anthurium michelii Guillaumin, *Bull. Mus. Hist. Nat. (Paris)* 31: 263. 1925. Type: Panama, 1920–1924, Michel F243(P) (holotype, P, barcode P00150203) **Figures 92 & 93.**

The species is a member of sect. *Decurrentia* and is characterized by its cataphylls persisting as a dark brown mass, dark greenish-brown-drying ovate-elliptic blades widest near the middle or in lower

half, and by its inflorescences with the spathe and spadix green and the berries violet.

Terrestrial or epiphyte; **internodes** short, to 1–3 cm diam.; **roots** dense, erect; **cataphylls** sharply 2-ribbed, 4 cm long, medium green, semiglossy, semi-intact and fibrous, persisting as a dark brown mass; **petioles** 30–72 cm long, U-shaped, sulcate with acute margins glossy, medium to green or medium to dark yellow-green, purple-speckled; geniculum 1–3 cm long; **blades** ovate-elliptic, 29–48.5 cm long, 13.5–22.5



Figure 93. *Anthurium michelii* Guillaumin (Croat 83817). Close-up view of leaf blades, adaxial and abaxial surfaces, and inflorescence with the spathe green and the spadix green with a very long stipe.



Figure 94. *Anthurium microspadix* Schott (Croat & Ferry 98289). Live plant showing petioles, leaf blades, adaxial surface, and inflorescence.

cm wide, 1.4–3.1 times longer than wide, 0.7–1.2 times as long as petiole, rounded at the base, obtuse and long-acuminate at the apex, widest near the middle or in lower half, subcoriaceous, dark green and semiglossy above, much paler and weakly glossy below, drying dark greenish-brown; **midrib** convex and moderately paler above, narrowly raised and acutely triangular in basal 1/2 and otherwise convex below and more or less concolorous; **primary lateral**

veins etched-sunken above, weakly raised below and concolorous on both surfaces; minor veins weakly etched above, in part prominulous below. **INFLORESCENCE** erect or spreading-pendent; **peduncle** 29–73 cm long, acutely angular, medium green and weakly glossy; **spathe** 5.5–12 cm long, 8–10 mm wide, erect-spreading, green, semiglossy; **spadix** long-stipitate, 4.5–12 cm long, 5–8 mm diam., green; stipe 0.5–3 cm long; **pollen** whitish; **berries** violet.



Figure 95. *Anthurium microspadix* Schott (Croat & Ferry 98289). Close-up view of leaf blade, abaxial surface, and inflorescence with a green spathe and a green spadix.

Anthurium michelii ranges from Costa Rica and Panama to Colombia (Amazonas, Antioquia, Caquetá, Choco), both sides of the Andes in Ecuador (Cañar, Coropaxi, Esmeraldas, Imbabura, Los Ríos, Morona-Santiago, Napo, Orellana, Pastaza, Pichincha, Sucumbíos, Tungurahua, Zamora-Chinchipe) and Peru (Amazonas, Pasco) at 0–1760 m in multiple life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor, Cerro Winchinkian, the north-easternmost spur of the Cordillera del Cóndor, along Ecuador-Peru border, 3 km south of Río Santiago, sedimentary rock substrate (siltstone?), transition from lowland Amazonian forest to cloud forest, 03°05'24"S, 77°57'10"W, 1100 m, 18 Aug. 2002, *David A. Neill & et al.* 14040 (MO, QCNE); *David A. Neill & et al.* 14042 (MO, QCNE); *David A. Neill & et*

al. 14044 (MO, QCNE); **Zamora-Chinchi**: Cordillera del Cóndor, along road from Quime Ferry Crossing on road leading to summit of Cordillera del Cóndor, 23.2 km above the crossing at Río Zamora on road leading to summit, 03°38'00"S, 78°26'03"W, 1552 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan* 91042 (MO, QCNE); Cordillera del Cóndor, Zamora - Romerillos Alto, via Jaumbue, 23.2 km E of Río Bombuscaro Bridge in Zamora, 10.4 km E of Pituca, 04°12'15"S, 78°56'19"W, 1425 m, 20 July 2004, *Thomas B. Croat* 91640 (MO, QCNE); Along road between Zamora and Gualaquiza, 29 km N of Yangzatta. Lower montane wet forest, 04°10'S, 78°50'W, 890 m, 19 Oct. 1980, *Thomas B. Croat* 50775 (MO, QCA).

Anthurium microspadix Schott, *Oesterr. Bot. Z.* 8(6): 180. 1858 Type: Costa Rica: near Naranjo, *Oersted s.n.* (Type not found; Photo of Schott Aroid Drawing #322, NYBG Neg. #N.S. 3812). **Figures 94 & 95.**

The species is a member of sect. *Xialophyllum* and is characterized by its long internodes, narrowly ovate-elliptic blades and its inflorescences with a green spathe and a short green spadix.

Terrestrial or epiphytic to 1.3 m tall; **internodes** 1.5–6 cm long, 3–8 mm diam., green to gray-green, semiglossy; **cataphylls** to 5.5 cm long, partially persisting at most upper nodes with tan fibrous fragments.

LEAVES clustered near the end of the stem, erect spreading; **petioles** 10 cm long, 2 mm diam., subterete, sharply C-shaped with a faint medial rib, weakly glossy, sulcate; geniculum 1.5 cm long, 3 mm diam., acutely sulcate, drying darker; **blades** narrowly ovate-elliptic, 16–25.5 cm long, 2–8(11) cm wide, broadest at middle, 2–4 times longer than wide, 1–2 times longer than petioles gradually to abruptly acuminate at apex, base variable from weakly cordate to obtuse, thinly coriaceous, matte, dark green and subvelvety above, yellow-green and weakly glossy below, drying medium brown and semiglossy above, grayish brown and glossy below; **midrib** deeply sunken above, round-raised and paler below, drying darker above, paler below; **primary lateral veins** etched-sunken above, convex or narrowly raised below, drying darker above, paler below; **tertiary veins** in part raised below, twisted, darker than surface. INFLORESCENCE erect; **peduncle** 11 cm long, 1.5 mm diam., light green; **spathe** 3–5 cm long, up to 1 cm wide, yellow-green, spreading to reflexed; **spadix** 3–6 cm long, semiglossy when young, matte in age, yellow-green, usually prominently stipitate from 3–10 mm in length, occasionally sessile, pistils weakly emergent; **berries** about 2 mm in diameter, pale green

Anthurium microspadix ranges from Mexico to Bolivia, from (500–700)1000 m to 2300 (2500) m elevation, usually occurring in cloud forest areas in regions of *Premontane wet forest* to *Lower montane wet forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipec:** Cordillera del Cóndor, between mining camp and the valle del Río Quimi, 03°31'41"S, 78°25'33"W, 800 m, 1 Nov. 2004, *H. van der Werff, Bruce Gray, Juan C. Ronquillo & Wilson Quizhpe 19139* (MO); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritza, 03°54'18"S, 78°35'00"W, 792 m, 17 May 2003, *Thomas B. Croat & Mark Menke 89518* (MO, QAP); Along road from Zamora to Romerillos along Río Jambué, 13.3 km E of Río Bombuscaro Bridge in Zamora, 0.3 km E of Pituca, 04°08'03"S, 78°56'37"W, 1068 m, 21 July 2004, *Thomas B. Croat 91826* (MO, QCNE); Parroquia Guayzimi, Campamento Militar Miazzi, al sur del Río Nangaritza, Bosque muy Húmedo Premontano, Transectos de 50 x 2 m (0.1 Ha.), 04°16'S, 78°42'W, 1060–1100 m, 21 Oct. 1991, *Carlos E. Cerón, Marcelo Chango, Valdano Tapur & Gerardo Aymard 16903* (MO); *Carlos E. Cerón, Marcelo Chango, Valdano Tapur & Gerardo Aymard 17002* (MO).

Anthurium mindense Sodiro, *Anales Univ. Centr. Ecuador* 15(108): 17. 1901. Type: Ecuador. Pichincha: valley of Mindo, 1500–2000 m, Date?, *L. Sodiro s.n.* (holotype: B). **Figures 96 & 97.**

The species is a member of sect. *Xialophyllum* and is characterized by its long internodes, oblong-elliptic blades, and its small inflorescences with the spathe white,

yellow or orange and the spadix green, orange or red.

Epiphyte or terrestrial; stem shortly erect; **internodes** longer than broad, 1–12 long; **roots** lax; **cataphylls** persisting intact or persisting as fibers, 1–4 long. LEAVES supervolute; **petiole** shorter than leaf blade, 5–12 long, 0.2–0.3 diam., subterete to terete, C to D-shaped or broader than thick or markedly ribbed, sulcate, flattened or convex adaxially, rounded, 3-ribbed or multi-ribbed abaxially, petiole margins lacking; **blades** oblong or elliptic, 12–40 long, 4–12 wide, abruptly acuminate at apex, acute, obtuse or rounded at base, margins convex, margin undulations absent to weakly present, moderately bicolorous, broadest above petiolar plexus but below middle, matte or matte-subvelvety or velvety above, semiglossy to glossy below, texture smooth above, drying greenish to olive-green, brownish or reddish-brown above, greenish to olive-green, brownish or reddish-brown below, dark glandular punctations absent; **midrib** bluntly acute or narrowly rounded or narrow to sharply acute above, broadly convex or round-raised below; **primary lateral veins** 9–14 pairs, clearly visible or inconspicuous or too numerous to count, sunken or etched above, raised or narrow to sharply acute below; **collective veins** arising from the lowest primary lateral veins, distance from margin 0.3–0.5. INFLORESCENCE shorter than leaves; **peduncle** 8–16 long; **spathe** linear-lanceolate, 3–5 long, 0.6–1.2 wide, 3-dimensional shape fully expanded, erect, spreading or reflexed, green to greenish,



Figure 96. *Anthurium mindense* Sodiro (Croat & Trujillo 98140). Live plant showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and infructescence.

white to cream or yellowish to yellow to orange; **spadix** long-stipitate, cylindroid or tapered, 4–9 cm long, 2–3 mm diam., green, orange to orangish, magenta to purplish to maroon or reddish to red. **INFRUCTESCENCE** yellow to orange or reddish to red or pinkish.

Anthurium mindense ranges from Colombia to Ecuador (on both sides of the Andes), Peru (Amazonas, Cajamarca, Pasco)

and Bolivia (Cochabamba) at 400–2800 m in multiple life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor, ridge top above Banderas, near disputed Ecuador-Peru border, primary forest, 03°28'S, 78°15'W, 1350 m, 17 July 1993, *Alwyn H. Gentry* 80001 (MO, QCNE). **Zamora-Chinchipe:** Cordillera del Condor, vicinity of Ecuacorrientes copper mine region,



Figure 97. *Anthurium mindense* Sodiro (Croat & Trujillo 98140). Close-up view of leaf blade, adaxial surface, and infructescence with reflected green spathe and reddish spadix.

valley of Río Waiwaime, 5.9 km above gate near copper mine camp near Río Quimi, along trail to summit above parking, 03°34'54"S, 78°26'06"W, 1331 m, 5 Apr. 2006, *Thomas B. Croat* 96664 (MO, QCNE); Cordillera del Cóndor, bosque montano sobre roca arenisca, cerca del destacamento militar Cóndor Mirador, en la frontera Ecuador-Perú, 03°38'28"S, 78°23'13"W, 1800 m, 15 Dec. 2000, *Jorge Caranqui & et al.* 199 (MO, QCNE); "Las Orquideas", parte

alta del Tepui, bosque premontano. Bosque maduro, 04°15'01"S, 78°39'36"W, 1120 m, 6 Nov. 2006, *Diego Reyes, David A. Neill & Carlos Morales* 1263 (MO, QCNE); Cordillera del Cóndor region, Parroquia Zurmi, vicinity Las Orquideas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, *Thomas B. Croat* 97114 (MO, QCNE); Vicinity of Las Orquídeas, near Cabañas



Figure 98. *Anthurium moronense* Croat & Carlsen (Croat 91489). Live plant showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

Yankuam, along Río Nangaritza, S of camp, old trail along river and on steep slopes of forest W of River, 04°15'06"S, 78°39'29"W, 877 m, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98681* (MO, QCNE); Río Nangaritza, upper valley, 3 km east of Miazi, near disputed Peru-Ecuador border. primary forest, Premontane Wet Forest, 04°18'S, 78°40'W, 1000 m, 11 Dec. 1990, *David A. Neill & Walter A. Palacios 9698* (MO). PERU. **Amazonas:** Cordillera del

Cóndor, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), cabeceras del Río Comainas, tributario al oeste del Río Cenepa, cuchillo atrás del campamento, bosque intacto, muy húmedo, 03°53'35"S, 78°25'30"W, 1200 m, 15 July 1994, *Hamilton Beltrán & Robin B. Foster 791* (MO, USM); Puesto de Vigilancia Alfonso Ugarte (PV 3), cabeceras del Río Comainas, tributario al oeste del Río Cenepe, 03°54'S, 78°25'W, 1200–1400 m, 18 July 1994, *Hamilton Beltrán & Robin B. Foster*



Figure 99. *Anthurium moronense* Croat & Carlsen (Croat 91489). View of leaf blade, adaxial surface.

940 (MO); Cordillera del Cóndor, cabeceras del Río Comainas, cuchillo abajo del Cerro Machinaza, 03°54'S, 78°26'W, 1800 m, 3 Aug. 1994, *Hamilton Beltrán & Robin B. Foster 1585* (F, USM).

Anthurium moronense Croat & Carlsen, *Novon* 14: 405–407. 2004. Type: Ecuador. Morona-Santiago: Gualaquiza, Misión Bomboiza, Misión Salesiana, 03°25'S, 78°29'W, 700–800 m, 3 Oct. 1967, *Benkt Sparre*

19282 (holotype: S; isotypes: MO!, QCA!). **Figures 98–100.**

The species is a member of sect. *Semaephyllum* and is characterized by its reddish petiole that is square in cross-section, its trilobed blades with spreading lateral lobes with broadly rounded apex and the anterior lobe with acute apex and an apiculum 1–2 mm long, and by its sessile, cylindric and purplish spadix.



Figure 100. *Anthurium moronense* Croat & Carlsen (Croat 91489). Close-up view of inflorescence with pale green spathe and bluish-green spadix.

Terrestrial to climbing epiphyte; **internodes** 1–6 cm x 0.8–2.4 cm, dark green, weakly glossy, sometimes pink when young; **cataphylls** thick, brownish, 7–22 cm long, medium green, matte, persisting intact at least at upper nodes. LEAVES erect; **petioles** 25–45 cm long, 4–5 mm diam., square, reddish; geniculum 1.5–2 cm long, 4–7 mm diam.; **blades** trilobed to 6–12 cm from the base, coriaceous, 21–32 cm long, 26–42 cm wide, pale green below, raphides sunken on upper surface, not easily visible, red-purple dots on a silver-white surface below, base truncate; **anterior lobe** broadly obovate, 15–22 long, 10–17 cm wide, apex acute, apiculum 1–2 mm long; **lateral lobes** spreading 90° from anterior lobe, 15–25 x 8–15 cm, apex broadly rounded, inner margin straight to weakly convex, outer margin concave; **midrib** raised above and below, rounded; **primary lateral veins** 5–6 per side, arising at a 40–50° angle, arcuate-ascending, weakly raised above, rounded, raised below, **basal veins** 4–6 pairs, the first one free, the second joined for up to 1 cm, the rest joined for up to 5.5 cm; **collective veins** arising from the first pair of basal veins, 0.8–1.5 cm from the margin, sunken above, raised below; **posterior ribs** weakly arcuate, 80–90° from midrib, naked for up to 2.5 cm.; **tertiary veins** prominulous below. INFLORESCENCE erect; **peduncle** 12–24 cm x 2–6 mm, shorter than petiole, medium to dark green to reddish, matte; **spathe** lanceolate, 6.5–16 x 0.7–3.2 cm, apex acuminate, base acute, pale green; **spadix** sessile, cylindric, 7–14(–20) cm x 4–33 mm, bluish green to purplish-violet, matte; **flowers** 4–6 per principal

spiral, rhombic to 4-lobed, 2.5–3 x 2–2.5 mm, sides straight to weakly sigmoid; tepals velvety, lateral tepals ca. 1.2 mm wide, inner margin rounded, outer margin bluntly angled; stamens weakly exerted; anthers ca. 0.5 x 0.45 mm, thecae elliptic, slightly divaricate; pistils weakly emergent; stigma rounded, ca. 0.35 mm across. INFRUCTESCENCE with **spadix** purple, 11–20 x 0.7–1 cm; **fruits** red-violet, dark at apex, much paler at base, lanceolate, with a pointed stigma at apex, ca. 4.5 x 2.5 mm.

Anthurium moronense occurs in Ecuador (Morona-Santiago, Zamora-Chinchipe) and Peru, (Amazonas) at 700–1200 m in *Premontane* and *Montane wet forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Pachicutza, sendero hacia el Hito, 04°09'S, 78°38'W, 900–1200 m, 17 Oct. 1991, *Jaramillo 13943* (QCA), Pachicutza, sendero hacia el Hito, 04°09'S, 78°38'W, 1000–1200 m, 18 Oct. 1991, *Jaramillo 14092* (QCA), Parroquia Pachicutza, colecciones en el sector Noreste del campamento military, 04°09'S, 78°38'W, 900 m, 6 Dec. 1990, *Jaramillo 13413* (QCA); Río Nangaritza, Pachicutza, 04°07'S, 78°37'W, 900 m, 3 Dec. 1990, *Palacios & Neill 6474* (MO, QCNE); Pachicutza, camino al Hito, Cordillera del Cóndor, 04°07'S, 78°37'W, 1000–1100 m, 19 Oct. 1991, *Walter A. Palacios, Gerardo Aymard & Efraín Freire 8330* (MO, QCNE); Miazí, detrás del Campamento Militar, 04°16'S, 78°42'W, 970 m, 20 Oct 1991, *Walter A. Palacios, I. Vargas & M. Ruiz 8506* (MO,

QCNE); Cordillera del Cóndor, Namirez on Río Zamora - Nambija, 7.9 km E of San Carlos, 04°03'42"S, 78°47'51"W, 1733 m, July 2004, *Thomas B. Croat* 91489 (AAU, B, CAS, F, IBE, K, MEXU, MO, NY, SEL, TEX, US, VEN). PERU. **Amazonas:** Cordillera del Cóndor, PV. Alfonso Ugarte (PV 3), cabeceras Río Comainas, tributario W Río Cenepa, 03°54'S, 78°25'W, 1200 m, 15 July 1994, *Beltrán & Foster* 795 (MO).

Anthurium muyunense Croat, **sp. nov.**,

Type: Ecuador. Zamora-Chinchipe: Vic. of Ecu-Corrientes copper mine development, Río Waiwaime drainage, along road to mine site 3.3 km above gate, 6.3 km E of mine headquarters, 00°34'37"S 78°25'37"W, 1308 m, 7 Apr 2006, *Thomas B. Croat* 96722 (holotype: MO-4778231; isotypes: K, US).

Figures 101–103.

The species is a member of sect. *Leptanthurium* and is characterized by its leaves with a short petiole nearly fully sheathed and medium-grayish-green-drying lanceolate-elliptic to lanceolate blades acute at the base, and its pendent-arching inflorescences with a very long peduncle, a green, often tinged violet-purple spathe and a thin pale green or yellowish green spadix.

Epiphyte or terrestrial on steep bank; **stems** to 30 cm long; **internodes** short, 1–2 cm diam.; **cataphylls** 7.5–9.5 cm long, persisting intact and pale green at upper nodes, remaining fibers pale brown,

persisting semi-parallel with fragments of pale epidermis; **petioles** 5–17 cm long, 4–5 mm diam., obtusely C-shaped, prominently sheathed for most their length, medium green, matte, smooth, sheath tightly incurled, the margin scarious; geniculum slightly thicker, 0.5–1.5 cm long, 5 mm diam., reddish purple; **blades** lanceolate-elliptic to lanceolate, 16–34 cm long, 4–9 cm wide, 3.6–6.4 times longer than wide, 1.6–6.4 times longer than petiole, abruptly acuminate at apex, acute at the base; subcoriaceous, dark green and matte-subvelvety above, moderately paler and matte below, drying light to medium grayish-green above, slightly lighter below; **midrib** narrowly rounded and paler below, thicker than broad and slightly darker below; **primary lateral veins** 10–12 pairs, arising at 70° angle, flattened, darker than surface to concolorous above, scarcely raised and darker below; **collective veins** about as prominent as primary lateral veins, 2–5 mm from margin; **minor veins**, including cross-veins, slightly raised upon drying, cross-veins oblique. **INFLORESCENCES** pendent-arching; **peduncle** 14–50 cm long, 2.5–5 mm diam., medium green, weakly glossy; **spathe** reflexed-spreading, recurved, 5–10 cm long, 0.5–1.2 cm wide, weakly glossy inside, semiglossy outside, green, often tinged violet-purple with minute greenish speckles, drying brown; **spadix** 12–26 cm long, 5–7 mm diam., pale green or yellowish green, matte. **INFRUCTESCENCE** with **spadix** 26.5 cm long, 1–2.7 cm diam. with berries emerging (spadix proper to 7 mm diam.); **flowers** 3–3.3 mm long, 2–2.5 mm wide;



Figure 101. *Anthurium muyunense* Croat (Smith 2084; WIS-256233). Herbarium specimen showing stem apex, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.



Figure 102. *Anthurium myyunense* Croat (Croat 78343). Live plant showing petioles, leaf blades, adaxial surface, inflorescence and infructescence.

stamens held at surface of tepals, 0.5 mm long, 0.7 mm wide; thecae ovoid, moderately divaricate; **berries** early-emergent, pale orange or red-orange, obovoid, 4–6 mm long, rounded at the apex.

Anthurium myyunense ranges along the Amazon Basin from Ecuador (Morona-Santiago, Napo, Pastaza, Zamora-Chinchipe) to northern Peru (Amazonas, Cajamarca) at 500–2500 m, in *Premontane*

rain forest, *Premontane wet forest* and *Montane wet forest* life zones.

Anthurium myyunense resembles *A. ceronii* Croat and *A. gracile* (Rudge) Schott. *A. ceronii* differs by its dark-grayish-green-drying, much narrower linear-lanceolate blades (to 15 times longer than wide) and by its inflorescences with a much shorter peduncle. *A. gracile* differs by its longer petioles and brown-drying blades. *A. gracile* also occurs on both sides of the Andes in



Figure 103. *Anthurium myyunense* Croat (Croat 78343). Close-up view of inflorescence with spathe tinged violet-purple and spadix yellowish green.

Ecuador, while *A. muyunense* is only present in the Amazon Basin.

Croat & Menke 89311 from Morona-Santiago between Limón and Gualaquiza at 2500 m resembles *A. muyunense* but differs by its longer petioles and its thin blades with the collective veins running up to 1 cm from margin. It probably represents a separate new species.

Croat 81544 from Morona-Santiago between Sucúa and Mejoles at 850 m also resembles *A. muyunense* but differs by its petioles with a broad sheath ending 1.5–3 cm from the tip and its blades with the collective veins running up to 1 cm from margin. It probably represents another new species.

The species is named for the locality of Muyuna in Napo Province of Ecuador, where the author made one of his first collections of it in 1984.

Paratypes: ECUADOR. **Morona-Santiago:** Along road between Sucua and Méndez (Santiago de Méndez), 02°41'00"S, 78°19'00"W, 850 m, June 1994, *B. Feuerstein 15* (MO); Road from Plan del Milagro to 10–15 km past San Juan Bosco, moderate to highly disturbed cloud forest, 03°05'S, 78°40'W, 1470 m, 1 June 1989, *James F. Smith 2084* (QCA); Cordillera del Cóndor, valle del Río Coangos, Río Tsurim entre los Centros Shuar de Numpatkain y Banderas, 03°20'44"S, 78°14'08"W, 1100 m, Oct. 1999, *Patricio Fuentes, Juan C. Ronquillo & A.*

Tankamash 1140 (MO, QCNE); Cultivated Plants at Dewey Fisk's, collected by Neill Carroll, 20 Sep. 2003, *Thomas B. Croat 90036* (MO, QCNE); Cultivated Plants (Aroid Show, 2001), received from Dewey Fisk 4/1/02, collected by Neill Carroll, 26 Sep. 2001, *Thomas B. Croat 84930* (MO, QCNE); Along road from Patuca to Santiago, Cordillera de Cutucú, 11.4 km E from Patuca turnoff on Macas-Limón road, 5.1 km E of Patuca, 02°46'30"S, 78°07'00"W, 944 m, 9 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 90600* (MO, QCNE); Gualaquiza, Cordillera del Cóndor, Valle del Río Quimi, bosque alterado y potreros, orillas del Río Quimi, 03°30'24"S, 78°25'35"W, 1090 m, 13 Dec. 2000, *M. Cuascota & Grupo Post-Grado MO-QCNE 297* (MO, QCNE); Morona, Parr. Sinae, Caserio Musap, Comunidad Shuar Musap, 02°15'S, 77°33'W, 1150–1500 m, 8 Oct. 1996, *Consuelo Montalvo A., Carlos E. Cerón, Darwin Rivadeneira & Edmundo Silva 43* (QAP); Palora, Río Amundaló, Colonia Tarquí, 01°41'S, 78°01'W, 970 m, 10 Apr. 1998, *Carlos E. Cerón, Tatiana Dávila, Miguel Joya, S. Silva & M. Chávez 35687* (QAP); Along the road from the main Puyo-Macas Road to Palora, departing main Puyo-Macas Road 38 km SSE of Puyo, 9.8 km from main road, remnant forest in pasture, 01°44'40"S, 77°54'49"W, 1336 m, 20 Aug. 2002, *Thomas B. Croat & Lynn P. Hannon 86671* (MO, QCNE); Along road between Palora and Llushín, departing main Palora-San Vicente de Tarquí Road, 8.7 km NW of Palora, 3.4 km S of Río Amundalo, 2.1 km E on road to Llushín, 01°41'46"S, 78°01'21"W, 922 m, 25 Aug. 2002, *Thomas*

B. Croat & Lynn P. Hannon 86949 (MO, CNE); Palora, Carretera Pastaza-Palora, Bosque muy Húmedo Premontano, bosque secundario, borde de carretera, 01°35'S, 78°05'W, 1060 m, 6 July 1991, *Edgar Gudiño, S. Flores & Velasco, A. 1504* (MO, QCNE); Along road between Gualaquiza and Indanza, 8.1 km N of Tucumbatza, 50 km S of Indanza, 03°12'50"S, 78°33'39"W, 1400 m, 8 Sep. 2002, *Thomas B. Croat 87261* (MO, QCNE). **Napo:** Along road from Tena, past Muyuna to end of road, where bridge over Río Tena is under construction, disturbed area in vicinity of bridge, ca 2 km W of Muyuna, ca 5.7 km W of Tena, 00°01'S, 77°51'W, 500 m, 1 May 1984, *Thomas B. Croat 58848* (MO, QCA); Along road from Muyuna (near Tena) to municipal water plant, 2.3 km W of bridge over Río Tena near new university, 00°56'21"S, 77°51'58"W, 611 m, 15 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich & M. Rees 105654* (MO, QCNE); Archidona, Bosque Protector de la Comunidad de Mushullacta, Bosque pluvial premontano, suelo de roca calcárea, 00°49'39"S, 77°33'47"W, 1200 m, 25 Feb. 2003, *Noel Altamirano 210* (MO, QCNE), Oeste de la ciudad del Macas, bosque secundario 02°18'S, 78°07'W, 1160 m, 25 Feb. 1986, *Marc A. Baker 6634* (NY); Horse trail Macas-Riobamba, ca. 7 km NW of General Proaño, remnants of mountain rain forest and rastrojos, 1100 m, 30 Mar. 1974, *Gunnar Wilhelm Harling & Lennart Andersson 13040* (GB, MO); 31 km N of Yangzatzza, lower montane moist forest, 03°55'S, 78°46'W, 1000 m, 19 Oct. 1980, *Thomas B. Croat 50783* (MO, QCA); Campamento La Playa,

road consruction camp, 23 km SE of San Juan Bosco, 03°15'57"S, 78°23'23", 1050 m, 28 Jan. 1981, *Alwyn H. Gentry, Carmen Bonifaz B. & Jorge Loor C. 30751* (MO, SEL); Along road between Gualaquiza and Zamora, 5 km S of El Pangui, premontane wet forest, 03°40'S, 78°36'W, 800 m, 20 Oct. 1980, *Thomas B. Croat 50813* (MO, QCA); Received from Neil Carroll, Bluffton Gardens, North Carolina; collected originally in Ecuador: Napo: Cordillera Galeras, along road between Archidona-Tena Road and Coca; Río Jondachi (Río Hollin), cultivated at Missouri Botanical Garden, 00°50'S, 77°42'W, 600–900 m, *Thomas B. Croat 78343* (MO, QCNE). **Pastaza:** Mera, 01°28'00"S, 78°06'00"W, 1100 m, 25 May - 6 June 1968, *Gunnar Wilhelm Harling & et al. 9731* (GB, MO); Along road between Palora and Paroquia San Francisco de Tarquí, 1.1 km S of Río Amundalo Bridge., 01°45'12"S, 78°03'55"W - 01°45'12"S, 78°03'09"W, 1118 m, 9 Oct. 2007, *Thomas B. Croat, Monica Carlsen & Dan Levin 99583* (MO, QCNE); Shell, Bosque húmedo Subtropical, secundario, 01°30'S, 78°04'W, 1200 m, 30 Jan. 1994, *Xavier Cornejo S. & Carmen Bonifaz B. 1450* (GUAY); *Xavier Cornejo S. & Carmen Bonifaz B. 1478* (GUAY); Along road from Puyo to Macas, ca 33 km S of Puyo, 24.9 km S of Veracruz, 16 km S of Escuela Fiscal Cotopaxi, disturbed primary forest, 01°38'S, 77°52'W, 900 m, 3 May 1984, *Thomas B. Croat 58962* (MO, QCA); . **Zamora-Chinchipe:** Cordillera del Condór, Shaimi, SE de Campamento Militar, márgen derecha de Río Nangaritzza, 04°18'S, 78°43'W, 950 m, 27 Oct. 1991, *Walter A. Palacios, I. Vargas &*



Figure 104. *Anthurium nangaritense* Croat (Croat 97133; MO-5931518). Herbarium specimen showing fibrous remnants of cataphylls, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

Efraín Freire 8762 (MO, QCNE); Along road to Romerillao Alto from Zamora, 19.1 km E of Río Bombuscaro in Zamora, 6.3 km E of La Pituca, 04°10'04"S, 78°56'10"W, 1203 m, 20 July 2004, *Thomas B. Croat 91538* (MO, QCNE); Chinchipe, 04°52'00"S, 79°09'00"W, 1993, *J. Bogner 2737* (MO); Parque Nacional Podocarpus, Guardería Río Bombuscaro, Bosque húmedo pre-montano, 04°04'S, 78°57'W, 1100 m, 13 Nov. 1991, *Mario Larrea, Ricardo Viteri & López, L. 41* (QCA); Road from Loja to Zamora, Km 45–51, 1400–1600 m, 20 Nov. 1961, *Calaway H. Dodson & L.B. Thien 1427* (MO), Between Loja and Zamora, coll. 1974 by George Kennedy s.n., cult. at SEL, *M.T. Madison 5511* (SEL). PERU. **Amazonas:** Bagua, Jan. 1877, *M. Vidal-Sénèze 4779* (P); *M. Vidal-Sénèze 4784* (P). **Cajamarca:** San José de Lourdes, Crucero, bosque secundario con relictos de bosque primario, 05°04'12"S, 78°56'07"W, 1000–1100 m, 2 Feb. 1999, *José Campos de la Cruz & et al. 5995* (AAU, B, CAS, GH, MO, QCNE, USM).

Anthurium nangaritense Croat, *Willdenowia* 40: 131. 2010. Type: Ecuador. Zamora-Chinchipe: Cordillera del Cóndor region, Parroquia Zurmi, vicinity Las Orquideas, near Cabañas Yancuam, c. 3 km S of Las Orquideas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, *Thomas B. Croat 97133* (holotype: MO; isotypes: AAU!, B!, COL!, F!, HUA!, K!, NY!, QCNE!, S!, SEL!, US!). **Figure 104.**

The species is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, the network of flaring yellow-brown persistent cataphyll fibers, terete petioles, oblong, matte-subvelvety glandular-punctate blades and the erect inflorescence with a green, reflexed spathe and the slender, dark violet-purple spadix.

Epiphyte ± pendent at 2–4 m; **stem** short; **internodes** short, 1.7–2.5 cm long, 1.5 cm diam.; **cataphylls** (7–)14–18 cm long, persisting as closely parallel fine fibers but ultimately forming a pale yellow-brown network of fibers, these flaring, ± straight, not tightly appressed. LEAVES ± pendent, **petioles** 21–35.7 cm long, 4–5 mm diam., medium green, weakly to semiglossy, terete, faintly and variably sulcate, drying brown to yellowish green-brown; geniculum 1.5–3.9 cm long, 3–6 mm diam., drying dark brown to black-brown; **blades** oblong to weakly oblong-oblongate, 20.5–56 cm long, 3.3–9.3 cm wide (averaging 41.6×5.6), 5.3–5.7 times longer than broad, 1.5–2.6 times longer than petiole, acuminate to narrowly long acuminate at apex, narrowly acute to weakly attenuate at base, subcoriaceous, semiglossy, moderately bicolorous, dark green matte-subvelvety above, moderately paler and semiglossy below, drying olive-green to greyish olive-green above, light greyish-olive-green to dark brownish olive below; **upper surface** eglandular but densely dark-speckled above with the veins obtusely raised, glandular-punctate, irregularly granular-speckled and sparsely pale-pustular below; **midrib** narrowly

rounded at base, bluntly acute toward apex above, slightly paler above, narrowly rounded and slightly paler below, drying finely and irregularly ridged and darker above and below, sometimes paler below, drying concolorous above and below; **primary lateral veins** 7–13 pairs, departing midrib at a 40–45° angle, etched, concolorous and quilted-sunken above, weakly raised and concolorous below, about as prominent as the collective veins; **collective veins** arising from base or from one of the lowermost primary lateral veins, 3–5 mm from margin. INFLORESCENCE erect to pendent; **peduncle** pale green, 14.6–23 cm long, 3 mm diam.; **spathe** 4.2–10.5 cm long, 2–6.4 mm wide, medium green, reflexed, sometimes becoming shriveled and drying 1–2 mm wide; **spadix** sessile and rarely stipitate to 5 mm, cylindroid, 4.5–14.7 cm long, 3–4 mm diam. when dry, dark purple-violet, weakly glossy with pistils weakly protruding; **flowers** 5–6 visible per spiral, 1.3–1.5 mm long, 1–1.3 mm wide, lateral tepals 0.8 mm wide, the outer margin obtusely 2-sided, the inner margin rounded; stamens held just above tepals, 7–8 mm wide and long, the thecae ovoid, weakly divaricate.

Anthurium nangaritense is endemic to Ecuador, known only from the Cordillera del Cóndor region in Zamora-Chinchipe Province, at 600–1120 m in a *Premontane wet forest* life zone.

Specimens seen: Ecuador: **Zamora-Chinchipe:** Nangaritza Cantón, Cordillera del Condor, Río Nangaritza valley, near

Shaime, 04°18'S, 78°40'W, 930 m, 31 July 1993, *Alwyn H. Gentry 80874* (MO, QCNE); Shaime, 04°20'S, 78°40'W, 8 Dec. 1990, *Walter Palacios 6650* (QCNE); Miazí, Río Nangaritza, 04°16'S, 78°42'W, 930 m, 26 Oct. 1991, *Walter A. Palacios, I. Vargas & M. Ruiz 8642* (MO, QCNE); vicinity of Las Orquídeas, near Cabañas Yankuam, along Río Nangaritza, Los Tepuis Conservation Area, 1120 m, 04°15'08"S, 78°39'53"W, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98716* (MO, QCNE); Parroquia Zurmi, vicinity Las Orquídeas, near Cabañas Yankuam, c. 3 km S of Las Orquídeas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, *Thomas B. Croat 97133* (AAU, B, COL, F, HUA, K, MO, NY, QCNE, S, SEL, US).

***Anthurium nigrolaminum* Croat & D. Weber, sp. nov.** Type: Ecuador. Sucumbíos: vic. of Lago Agrio, along S side of lake, ca. 5 km NW of town, ca. 00°5'N, 76°55'W, 280 m, 29 Apr. 1984, *Croat 58682* (holotype, MO-3189413–15; isotypes, B!, COL!, QCNE!, K!, NY!, QCA!). **Figures 105–106.**

The species is an unusual member of sect. *Polyneurium* characterized by its terrestrial habit with an erect stem, short internodes, promptly deciduous cataphylls, terete petioles that are as long as or longer than the cordate-sagittate blades, blades that are nearly a meter long and usually are blackish-drying, as well as by the long-pedunculate inflorescence, the green and



Figure 105. *Anthurium nigrolaminum* Croat & D. Weber (Palacios 4234; MO-3686313). Herbarium specimen showing petiole and leaf blade, adaxial and abaxial surfaces.



Figure 106. *Anthurium nigrolaminum* Croat & D. Weber (Palacios 4234; MO-3686314). Herbarium specimen showing inflorescence.

lanceolate spathe, white to creamy long-tapered spadix and red berries.

Large erect terrestrial herb, on slopes and along stream banks; plant tissues and parts usually drying black to dark brown, **stems** often 60–100 cm long, **internodes** short (ca. 1.5–2 cm long), 3–6(10) cm diam, dark to medium green, semiglossy to glossy, drying black or brownish; **roots** short, smooth and descending; **cataphylls** thick, coriaceous, green, acuminate at apex, deciduous, weathering to fine fibers but promptly deciduous. **LEAVES** long-petiolate; **petioles** terete to subterete, 0.9–1.7(2) m long, 7–17 mm diam. midway, 1.2–1.9 times longer than blade, obtusely and narrowly sulcate, ribbed at base, brittle (snapping rather than bending even when fresh), smooth, moderately glossy to semiglossy, green to olive, sometimes reddish at base, sometimes purplish throughout, pale green toward apex, faintly and densely pale-short-lineate throughout, usually drying black or dark brown; geniculum (2.5) 3.5–7 cm long, 1.4–6.0 mm diam. midway, obscurely sulcate, light green to pale reddish; **blades** ovate-sagittate, (33)44–100 cm long, (22.5)32–71 cm wide at points between 1/4 of the lower anterior portion of the blade and the point of petiole attachment, 1.3–1.9 times longer than wide, acuminate to cuspidate at apex, pendent from erect petioles, thin to moderately coriaceous, slightly bicolorous, dark green, semiglossy to matte above, slightly paler and matte to weakly glossy below, drying black or dark brown and paler along major veins above, dark gray, grayish

black, dark yellow-brown to grayish yellow-brown and sometimes glossier than upper surface below; **anterior lobe** 22.5–40.5(77) cm long, broadly rounded along the margins; **posterior lobes** 14–44(68) cm long, 10–33(43) cm wide, directed usually somewhat inward; **sinus** obovate to widely broadly spatulate to obovate, (10)19–33 cm deep, 3–7(9) cm wide; **midrib** bluntly or narrowly and acutely raised and slightly paler above, narrowly rounded or convex and moderately paler below, drying black or dark brown, usually much darker than the surface; **primary lateral veins** 5–8 pairs, prominent on both surfaces, slightly paler, sometimes tinged purple above, slightly paler, medium green or with reddish tinged below, usually drying black or dark brown, usually darker than the surface, departing midrib at ca. 45–50° midway between the point of attachment of the petiole and the leaf tip, narrowly to bluntly raised and concolorous above, bluntly angular to convex and slightly paler below; **secondary veins** somewhat weakly raised to sunken above, moderately raised below, darker than surface; **tertiary veins** faintly to moderately conspicuous, flat above, weakly raised and darker below; **basal veins** (6)7–8(9) pairs, 1st and 2nd pairs free to base (rarely only the 1st pair), 4th and 5th and higher order veins coalesced 4.0–7.4 cm; **posterior rib** naked for (3)4.5–10 (13) cm; **collective veins** usually arising from the 1st or 2nd pair of primary lateral veins (rarely the 3rd pair or from the 1st or 2nd pair of basal veins), and form an uneven path (<1)3–8 mm from the blade margin. **INFLORESCENCE** long-pedunculate, erect-spreading; **peduncle** 8–

14 mm diam at base, 3–8 mm at midway, 1/3 to 1/2 as long at blades, terete, flattened laterally in some, narrowly and shallowly sulcate both adaxially and abaxially, green to dark olive-green, sometimes heavily tinged dark violet-purple, weakly glossy, drying black, 33–95 cm long; **spathe** lanceolate, 9–27 cm long, (0.5)1.8–3.4 cm wide midway, 1–2.3(4.0) cm at base, subcoriaceous, reflexed to spreading, yellow-green to medium-dark green, semiglossy outside, paler and matte inside, drying dark brown, margins rolled under, the distil 1/3 twisted to one side, long-acuminate at apex, cordate at base, margins surrounding peduncle at base, almost meeting; **spadix** short-stipitate (2–5 mm), long-tapered,), 7–31 cm long, 0.5–1.8 cm wide at the base and midway on spadix, and 0.3–0.8 cm at 1 cm from the apex, white or light yellow to pale yellow-green, sometimes purplish to brownish post-anthesis, turning dark green when maturing, matte at anthesis, reported with sweet odor, brownish post-anthesis, turning green when maturing; **flowers** (17–)22–25 visible per spiral, 3.0 mm long, 2.8 mm wide, 2.5–3.4 mm long, 2.4–2.8 mm wide (drying 1.3–1.5 mm long, 1.5–1.6 mm wide, the sides parallel to the spiral straight, the sides perpendicular to the spiral straight to jaggedly sigmoid; tepals weakly glossy, drying minutely and conspicuously warty, sparsely whitish spotted with a band of purplish violet spots along inner margin; lateral tepals 1.4–6 mm wide (drying 0.9–1.0 mm wide), the inner margin broadly convex to narrowly rounded, turned up prominently against the pistil, translucent along edge on drying, outer margin 3–4-

sided, surface matte, sparsely whitish spotted with a band of purplish violet spots along inner margin; pistils raised, weakly to non-emergent; lateral stamens emerging to midway before alternates emerge near base; stamens 0.8 mm long, 0.6 mm wide; pollen yellow, fading to cream; anthers drying black. INFRUCTESCENCE +/- erect to erect-spreading, 30–40 cm long 1.9–2.4 cm diam. at base and midway, and 0.6–1.4 cm diam. at 1 cm from the apex; spathe of mature infructescence withered; **berries** more or less globose, red to red-purplish, ca. 5 mm diam.

Anthurium nigrolaminum ranges from southern Colombia (Putumayo) to eastern Ecuador (Morona-Santiago, Napo, Orellana, Sucumbios & Zamora-Chinchipe) and northeastern Peru (Amazonas & Loreto) in *Tropical moist forest* and *Tropical wet forest* life zones at 160–950 m. Though most of the collections have been made at less than 1000 m, one was collected at 1160 m in the province of Morona-Santiago of Ecuador, west of the city of Macas.

The species is frequently solitary rather than in large populations. In the field and greenhouse, it has been observed that only one inflorescence develops on an individual specimen at a time. *Anthurium nigrolaminum* grows in diverse environmental and edaphic conditions, sometimes growing in sun, sometimes in full shade, and on sandy or red clayey soils. It occurs in a variety of habitats, ranging from the hilly terrain of upland forests, on fallow and disturbed lands, along floodplains near the

edge of streams and rivers, in successional stages of the development of secondary forests, or in primary rainforests.

Blades of leaves from younger plants tend to be more triangular in shape than in larger more mature plants. The blades are 2.0–2.9 times longer than wide and range in size from 22.5–34.5 cm long and 7.9–15 cm wide. In young plants, collective veins along the margin of blades often arise from the 1st or 2nd pair of basal veins, rather than arising from primary lateral veins that is typical of mature plants. Other characteristics in leaf development do not differ significantly.

In the Lucid key, *A. nigrolaminum* tracks to *A. diversicaudex* Croat, which also has large ovate-sagittate blades drying blackish brown and has the spathe and spadix of similarly color, but the latter has greenish-white or pale yellow-green berries rather than being red to red-purplish in the case of *A. nigrolaminum*. Also, *A. diversicaudex* is found in Esmeraldas Province of Ecuador, on the Pacific slopes of the Andes, rather than being found in the Amazon basin in the case of *A. nigrolaminum*. *A. nigrolaminum* can also be confused with *A. sagittatum* (Sims) G. Don, another terrestrial species in the Amazon basin. That species differs in having blades that dry greenish to grayish green, petioles that are typically winged and berries that are violet-purple, not red.

Buchtien 5347 from Bolivia, collected at Hacienda Simaco along the trail to Tipuni

at 1400 m, resembles *A. nigrolaminum* but differs in having the collective veins very close to the margin. It probably represents another new species.

Colloquial names for *Anthurium nigrolaminum* include “patquina” and “itininga” in Loreto Department of Peru and is commonly called “chopopanga” in the Inga language in Putumayo Province of Colombia. In Ecuador the Cofán call it “atta”, and the Secoya refer to it as “jai ja’o”.

The species was first collected by John Wurdack in October 1962. The epithet “nigrolaminum” refers to the generally blackened color of the dried blade.

Paratypes: COLOMBIA. **Caquetá:** Along old road from Florencia to Neiva, 01°44'10"N, 75°38'19"W, 637 m, 20 Sep. 2012, *Thomas B. Croat, Geneviève Ferry, David Scherberich, Edwin Trujillo & German Oyuela* 103858 (HUAZ, MO); **Putumayo:** 4 km E of town along trail, 01°08'56"N, 76°38'52"W, 600 m, 14 Nov. 1968, *Timothy C. Plowman* 2022 (COL, F, MO, US); Puerto Asis, 2 Feb. 1971, *Helen Kennedy* 793 (DUKE, MO, US). ECUADOR. **Morona-Santiago:** Along road from main Puyo-Macas Rd. to N end of Cordillera del Cutucú and Mucuma ca. 7.5 km E of Río Macuma, 02°07'10"S, 77°47'48"W, 787 m, 16 July 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich & M. Rees* 105677 (MO, QCNE); Along route E-40 from Santiago to Puerto Morona and San José de Morona,

just E of Río Morona near Km marker 139.5, 48.0 km E of Santiago flat area of forest near Río Morona, 02°55'22"S, 77°43'31"W, 201 m, 16 July 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich & M. Rees 105747* (MO, QCNE); Along road between Patuca and Santiago along south edge of Cordillera del Cutucú, entering from main Limón-Macas road at 44.6 km N of Limón, 3.9 km from Bella Unión and jct. to Méndez, 23.9 km from jct, 02°51'58"S, 78°14'51"W, 250 m, 9 Sep. 2002, *Thomas B. Croat 87342* (MO, QCNE); Along road from Patuca to Santiago along south edge of Cordillera de Cutucú, entering from main Limón-Macas road at 44.6 km N of Limón, 3.9 km N of Bella Unión and jct. to Méndez, 74.5 km SE of jct., at Río Kushis, 03°02'23"S, 78°05'W, 250 m, 9 Sep. 2002, *Thomas B. Croat 87362* (MO, PMA, QCNE); Along road between Santiago and Río Morona, vicinity of Río Morona ferry on road to S of San José de Morona, 50.3 km E of Santiago, 03°02'22"S, 78°05'00"W, 300 m, 10 Sep. 2002, *Thomas B. Croat 87374* (COL, ECUAMZ, GH, MO, QCNE, UB, USM); Along road between Santiago and Río Morona, vicinity of Río Morona ferry on road to S of San José de Morona, 50.3 km E of Santiago, 03°02'22"S, 78°05'00"W, 300 m, 10 Sep. 2002, *Thomas B. Croat 87391* (MO, QCNE); Along road between Santiago and Río Morona at Morona, 11.1 km east of Santiago, 03°00'42"S, 77°55'57"W, 450 m, 11 Sep. 2002, *Thomas B. Croat 87479* (CUVC, MO, QCNE); Along road from Patuca to Santiago, Cordillera de Cutucú, 11.4 km E from Patuca turnoff on Macas-Limón road, 5.1 km E of Patuca,

02°46'30"S, 78°07'00"W, 944 m, 9 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 90630* (MO, QCNE); Along road between Santiago and Río Morona, 30.3 km E of Santiago, 02°58'24"S, 77°49'36"W, 322 m, 10 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 90759* (MO, QCNE); Oeste de la ciudad del Macas, bosque secundario, 02°18'S, 78°07'W, 1160 m, 24 Feb. 1986, *Marc A. Baker 6593* (NY); At Río Shinga, 6 km S of Río Tuna Chiguaza (Tunachuaza on sign at river) at its mouth at the Río Pastaza, 01°48'S, 77°45'W, 860 m, 7 Mar. 1992, *Thomas B. Croat 72822* (MO, QCNE). **Napo:** Along road between Coca (San Francisco de Orellana) and Río Tiguino, straight S of Coca, 2.5 km S of middle of bridge over the Río Napo at Coca, 00°27'S, 76°53'W, 1 Mar. 1992, *Thomas B. Croat 72560* (MO, QCNE); Parque Nacional Yasuní, Pozo Petrolero "Cowi" de Conoco, colinas de suelo rojo Dystropept, Bosque muy húmedo Tropical, bosque primario, 00°55'S, 76°20'W, 290 m, 31 Mar. 1988, *Flavio Coello 182* (MO, QCNE); Along road between Lago Agrio and Baeza at Km 43 (43 km E of Lago Agrio), 00°07'N, 77°15'W, 560 m, 6 Oct. 1980, *Thomas B. Croat 50436* (MO, QCA); Limoncocha, 00°24'00"S, 76°37'00"W, 240 m, 17 June 1978, *M. T. Madison 5379* (MO, SEL); Confluence of Río Eno and Río Aguatico, 3–4 km before town Secoya, vic of native reserve, L margin of Río Eno, 00°02'00"N, 76°36'00"W, 3 July 1980, *Jaime L. Jaramillo & Flavio Coello 2743* (AAU, MO, NY); Limoncocha, 00°24'00"S, 76°37'00"W, 240

m, 16 June 1978, *M. T. Madison, Timothy C. Plowman & Elizabeth L. Besse* 5361 (MO, US); Parque Nacional Yasuni, along Río Tiputini, Estación Científica Yasuní field station, ca. 20 minutes from field station dock, 00°40'32"S, 76°22'00"W, 232 m, 29 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich & M. Rees* 105911 (MO, QCNE); Cantón Tena, Estación Biológica Jatun Sacha. Río Napo, 8 km al este de Misahuallí, Bosque muy húmedo Tropical, 01°04'S, 77°36'W, 400 m, 18 May 1989, *Walter A. Palacios* 4234 (MO, QCNE). **Sucumbíos:** Cantón Lago Agrio, Parroquia Dureno, Comunidad indígena Cofán-Dureno, Bosque Húmedo Tropical, 00°02'S, 76°42'W, 350 m, 29–31 Dec. 1987, *Carlos E. Cerón & Miguel Cerón* 3099 (MO); Along road between Lago Agrio and Puerto El Carmen de Putumayo, 9.8 km E of Lago Agrio, 1.2 km E of jct. of road to CEPE ferry over Río Aguatico, 00°07'N, 76°58'W, 240 m, 27 Apr. 1984, *Thomas B. Croat* 58544 (MO, QCA); Along road from Lago Agrio to Tarapoa ca. 30.2 km E of Lago Agrio, 23.2 km from turnoff to Tarapoa E of Lago Agrio, 6.4 km E of Río Dureno in Dureno, 8.2 km W of center of Pacayacu, 00°00'02"N, 76°39'23"W, 270 m, 5 Sep. 2015, *Thomas B. Croat* 106576 (MO, QCNE); Along road from Lago Agrio-Lumbaqui Road to Río Bermejo, 5 km N of Lago Agrio Road, 00°05'54"N, 77°15'55"W, 485 m, 30 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich & M. Rees* 105937 (MO, QCNE); Puerto Bolívar, Comunidad Tarapuya, a 3 horas en canoa del puente del río Cuyabeno, Bosque muy húmedo Tropical, Bosque poco intervenido,

inundado por aguas blancas "Várzea", suelo arcilloso rojizo. Proyecto Etnobotánico del Herbario Nacional, co-financiado por PetroEcuador, 00°05'S, 76°09'W, 280 m, 19–23 Mar. 2004, *Gabriela Moya & Nelson Miranda-Moyano* 324 (MO, QCNE). **Zamora-Chinchipe:** Cordillera del Cóndor, along road from near Paquisha, south to Las Orchídeas, and end of road at Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 47.0 km S of Intersection near Paquisha, 2.6 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 875 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan* 91357 (MO, QCNE); Vicinity of Las Orquídeas, in forest across from Cabañas Yankuam, 04°15'05"S, 78°39'29"W, 870–900 m, 15 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 98620 (MO, QCNE); Vicinity of Las Orquídeas, on Río Nangaritza, along steep slopes on trail to waterfall opposite Cabañas Yankuam, 04°14'56"S, 78°39'36"W, 870–900 m, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 98519 (MO, QCNE). **PERU. Amazonas:** Bagua, along Río Santiago 3–5 km above mouth, 04°24'55"S, 77°38'44"W, 250–300 m, 8–13 Oct. 1962, *John J. Wurdack* 2181 (MO, US); Bagua, Distrito Imaza, Región Nororiental del Marañón, Comunidad de Yamayakat, Río Marañón, bosque transicional, 04°55'S, 78°19'W, 320 m, 13 Aug. 1994, *Rodolfo Vásquez, Nestor Jaramillo & Ricardo Apanú* 18809 (MO). **Loreto:** Picuru-yacu, 03°45'54"S, 73°13'57"W, July 1967, *Richard T. Martin & et al.* 1664 (AMES, F, MO); La Astoria trail in direction of Río mazan, near mouth of Río Nanay,



Figure 107. *Anthurium obtusum* (Engl.) Grayum (Croat et al. 87954). Live plant showing petioles, leaf blades, adaxial and abaxial surfaces, and infructescence.

03°38'33"S, 73°12'45"W, 29 May 1973, Sidney T. McDaniel & Manuel Rimachi Y. 17367 (IBE, MO).

Cultivated plants: ECUADOR. **Napo:** Cultivated, received from Dewey Fisk, origin: Ecuador, Napo Province, 9 July 2005, Thomas B. Croat 95421 (MO, QCNE); Tena, cultivated at Waimea as 82p829 (LA82.1451), collected by Ray Baker, Thomas B. Croat 74117 (MO, QCNE).

Anthurium obtusum (Engl.) Grayum, *Phytologia* 82 (1): 35. 1997. *Anthurium*

trinerve var. *obtusum* Engl., *Bot. Jahrb. Syst.* 25: 357. 1898. Type: Ecuador. Chimborazo: Pallatanga, *Sodiro* 2 (lectotype (designated by Grayum, 1997): B). **Figure 107.**

Anthurium trinerve Miq., *Linnaea* 17: 67. 1843, nom. illeg., not *Anthurium trinervium* Kunth (1841). Type: Suriname. Palmar Awara, *Forbe* 120 (holotype: U).

The species is a member of section *Tetraspermium* and is characterized by its



Figure 108. *Anthurium ovatifolium* Sodiro (Croat et al. 95923). Live plant showing epiphytic habit, petioles, leaf blades, adaxial and abaxial surfaces, inflorescence and infructescence.



Figure 109. *Anthurium ovatifolium* Sodiro (Croat *et al.* 95923). View of leaf blade, abaxial surface, inflorescence with green spathe and green spadix, and infructescence with red berries.

elongate internodes, its cataphylls covering mostly part of stem and persisting as reticulate fibers, by its leaves with short petioles and elliptic-lanceolate, dark-punctate blades, but especially by its persistently erect spathe and short violet spadix.

Epiphyte; **stem** 5–35 cm long, 5–7 mm diam., green, weakly glossy, becoming grayish; **internodes** 5–10 mm long;

cataphylls 2–4 cm long, persisting as intact red-brown fibers throughout most of stem. **LEAVES** erect; **petioles** 1–4.3(–10) cm long, 1.5–3 mm diam., C-shaped in cross-section, flat-sulcate with weak medial rib adaxially yellow-green, weakly glossy; geniculum 3–7(16) mm long; **blades** elliptic-lanceolate, acute at apex and base, 6–14(–21) cm long, 2–4.5(–7) cm, subcoriaceous, dark green above, slightly paler and dark-punctate below, drying dark brown above,

medium to dark yellow to gray-brown below, semiglossy on both surfaces; **midrib** narrowly raised above, obtusely angular below, slightly paler than blade on both surfaces; **primary lateral veins** ca.15 departing midrib at 30–40° angle, visible but obscure, weakly raised on both surfaces; **collective veins** 4–6(–9) mm from margin. INFLORESCENCE erect; **peduncle** 9–10(–20) mm long, to 3.5 mm diam., cylindrical, light green; **spathe** erect-spreading (never reflexed), narrowly ovate, mucronate at apex, 11–16(–30) × 7–8(–19) mm, greenish; **spadix** sessile, 13–15 mm long, 5–7 mm diam., violet; **flowers** square, 3–4 mm, 4–5 visible in the principal spiral; pistils emergent, light green at base and violet at apex, matte. INFRUDESCENCE with **spadix** 3–5 cm long, violet; **berries** ovoid, acute at apex, 5–6 mm diam., white; seeds 4–10, oblong.

Anthurium obtusum ranges from Guatemala to the Guianas, to Central Brazil, and along the Pacific slope and the adjacent lowlands of Colombia and Ecuador. It grows in moist to wet forest from sea level to 800 m.

Specimen seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor, wet cloud forest on sandstone ridge, south of Río Warintza, east of main ridge of Cordillera del Cóndor, 03°14'07"S, 78°16'07"W, 1600 m, 16 Oct. 2002, *David A. Neill & et al.* 14185 (MO, QAP, QCNE).

Anthurium ovatifolium Engl., *Bot. Jahrb. Syst.* 25: 437. 1898, Type: Ecuador. in silvis pr. Corazon, Aug. 1872, L. Sodiro s.n. labeled 38 by Engl. (holotype, ??) **Figures 108 & 109.**

The species is a member of sect. *Digitinervium* and is characterized by its cataphylls becoming a dense mass of thin brownish parallel fibers, its olive-green-drying ovate-cordate blades, and its inflorescences with the spathe green sometimes tinged red to purple, the spadix green sometimes tinged red to purple and the mature berries orange to red.

Terrestrial or epiphytic; **internodes** short, 2–6 cm long, 1–6 cm in diam., dark green to brown and weakly glossy; **cataphylls** intact on upper nodes, becoming semi-intact with thin brownish parallel fibers in a dense mass. **LEAVES** erect; **petioles** 30–70 cm long, to 1.2 cm diam., usually longer than blade, terete, narrowly and obtusely V-sulcate, pale to medium green and matte to semiglossy; geniculum subterete, weakly sulcate, 6 cm long; **blades** ovate-cordate, 20–55 cm long, 20–40 cm wide, 1.2–2 times longer than wide, apex obtuse, coriaceous, bicolorous, dark green, weakly glossy above, paler and semiglossy below, may be punctuate on both sides, drying greenish to olive above and paler below; **midrib** convex and paler above, narrowly rounded to acute and paler below, sometimes with a medial rib, drying darker; **primary lateral veins** etched-sunken, quilted and concolorous above, narrowly raised and concolorous below;

interprimary veins concolorous and etched; **basal veins** etched-sunken and concolorous above, narrowly convex below; **tertiary veins** obscure to partly distinct; **collective veins** from 5–10 mm from margin. INFLORESCENCE erect; **peduncle** 40–60 cm long, terete, many ribbed, drying dark brown; **spathe** 10–15 cm long and about 2 cm wide, pale to medium green sometimes tinged red to purple, subcoriaceous, reflexed to spreading, semiglossy, dries dark brown; **spadix** 10–25 cm long, pale green to golden yellowish-brown, 1–2 cm diam. near base, 5–12 mm diam. at 1 cm from apex, stipitate from 5–20 mm, drying brown; **tepals** matte. INFRUDESCENCE erect; **berries** early emergent, green, changing to purplish at apex when immature, orange to red when mature.

Anthurium ovatifolium ranges from Colombia to Peru, at (1100)1300–2500 (2700) m, usually occurring in cloud forest areas in regions of *Premontane wet forest* to *Lower montane wet forest* life zones.

Specimens seen: ECUADOR: **Morona-Santiago.** Cordillera del Cóndor, ridge top above Banderas, near disputed Ecuador-Peru border, primary forest, 03°28'S, 78°15'W, 1350 m, 17 July 1993, *Alwyn H. Gentry 80005* (MO, QCNE); Región de la Cordillera del Cóndor, Parroquia Santa Susana, Kuankus, comunidad Shuar, Cumbre del Cerro Chuank Naint, 03°03'40"S, 78°14'21"W, 1250 m, 19 June 2005, *Tuntiake Katan & Carlos Morales 303* (MO, QCNE); Cordillera del Condor,

Centro Shuar Warints, Cerro Chikichik Naint, 03°10'08"S, 78°14'33"W, 1220 m, 9 Oct. 2002, *Tuntiake Katan 35* (MO, QCNE); Cordillera del Condor, trail from camp #1 to camp #2 towards crest of Cordillera del Condor, ca. 10–15 km S/SE of Shuar village, Warints, Premontane wet forest, 03°13'S, 78°16'W, 1400–1950 m, 12 Dec. 2002, *John L. Clark 6982* (MO, QCNE, US); Cordillera del Cóndor, along road into Cordillera del Cóndor departing from Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via Numbaime into Cordillera del Cóndor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan 91018* (MO, NY, QCNE, SEL, US, USM); Cordillera del Cóndor, Cresta de la cordillera, arriba del valle del río Quimi, 03°30'45"S, 78°24'33"W, 2000 m, 11 Dec. 2000, *G. Pabon, Jorge Caranqui & Grupo Post-Grado MO-QCNE 327* (QCNE). **Zamora-Chinchipe:** Cordillera del Cóndor, bosque montano sobre roca arenisca, cerca del destacamento militar Cóndor Mirador, en la Frontera Ecuador-Perú, 03°38'29"S, 78°23'14"W, 1800 m, 15 Dec. 2000, *G. Pabon, Jorge Caranqui & Grupo Post-Grado MO-QCNE 342* (MO, QCNE); Cordillera del Condor, vicinity of Ecua-Corrientes copper mine development, valley of Río Waiwaime, 8.1 km S of mine headquarters on road to mine site, 03°35'51"S, 78°25'57"W, 1291 m, 7 Apr. 2006 *Thomas B. Croat 96751* (MO, QCNE); Cordillera del Cóndor region, vic. of Ecua-Corriente copper mine development, valley of Río

Waiwaime, along road to mine site, 9.5 km from mine headquarters, 6.5 km S of locked gate, 1280–1530 m, 03°35'07"S, 8°26'05"W, 10 Apr. 2006, *Thomas B. Croat 96902* (MO, NY, QCNE); Cordillera del Cóndor, vertiente occidental, Cantón El Panguí, parroquia Tundayme, Cuenca del Río Quimi, Bosque muy húmedo montano bajo, 03°34'45"S, 78°25'20"W, 1180–1400 m, 5 Apr. 2006, *Wilson Quijipe 2145* (LOJA, MO, QCNE); Parroquia Guayzimi, camino al Hito de Pachicutza desde el Campamento Militar, Bosque muy Húmedo Premontano, Transectos de 50 x 2 m x 10 (0.1 Ha.), 04°07'S, 78°37'W, 1050–1100 m, 17 Oct. 1991, *Carlos E. Cerón, Marcelo Chango & Valdano Tapur 16767* (MO); Cordillera del Cóndor, vertiente occidental, Vía Pindal, al noreste de Los Encuentros, bosque muy húmedo, intervenido, 03°46'S, 78°35'W, 1100 m, 30 Mar. 2008, *Wilson Quijipe & Oscar Jaramillo 3008* (MO, QCNE); Cordillera del Cóndor región, Río Machinaza watershed, east of Los Encuentros, summit area of Hollín sandstone plateau, northwest of "big bend" of Río Machinaza, "Colibrí" mining concession area of Kinross Aurelian Corp, 03°45'06"S, 78°31'23"W, 1720 m, 26 June 2009, *David A. Neill & Camilo Kajekai 16970* (MO, QCNE); Cordillera de Nanguipa, along road to Cerro Colorado, about 6 km south of Nambija, 20 km southeast of Zamora, cloud forest on slopes, 04°05'51"S, 78°47'43"W, 1930 m, 19 Feb. 2002, *Tom Delinks 1362* (MO, QCNE); Along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 26 May

2003, *Thomas B. Croat & Mark Menke 89490* (MO, PMA, QCNE, S, US).

Anthurium oxybelium Schott, *Oesterr. Bot. Wochenbl.* 7(39): 310. 1857. Type: Colombia. Nueva Granada: Río Hacha, exact location unknown, *Purdie s.n.* (holotype, K). **Figures 110–111.**

Anthurium lividispica Sodiro, *Anales Univ. Centr. Ecuador* 15(108): 14. 1901. Type: Ecuador. Pichincha: El Corazón, 2800 m, Mar. 1900, *Sodiro s.n.* (specimen lost). Ecuador. Cotopaxi: El Corazón, Jan. 1901. *Sodiro s.n.* (holoneotype, G; isoneotype, QPLS).

Anthurium luteolum Sodiro, *Anales Univ. Centr. Ecuador* 15(108): 13. 1901. Type: Ecuador. Pichincha: Oyacachi, ca. 2800 m, *Sodiro s.n.* (holotype, Q).

Anthurium patulum Sodiro, *Anales Univ. Centr. Ecuador* 15(108): 14. 1901. Type: Ecuador. Napo: Oyacachi, Jan. 1900, *Sodiro s.n.* (holotype, B; isotypes, G, QPLS).

Anthurium psilurum Sodiro, *Anales Univ. Centr. Ecuador* 15(108): 14. 1901. Type: Ecuador. Pichincha: Oyacachi, ca. 2800 m, *Sodiro s.n.* (holotype, B; isotypes, G, QPLS).

Anthurium puelanum Sodiro, *Anales Univ. Centr. Ecuador* 15(108): 17. 1901.



Figure 110. *Anthurium oxybelium* Schott (Croat *et al.* 103786). Live plant showing rooting stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.



Figure 111. *Anthurium oxybelium* Schott (Croat *et al.* 103786). Close-up view of inflorescence with green spathe and purplish spadix.

Type: Ecuador. Chimborazo: Volcán Tungurahua, Puela, *Sodirot* s.n. (holotype, B; isotype, G).

Anthurium sclerophyllum Sodiro, *Anales Univ. Centr. Ecuador* 15(108): 14. 1901. Type: Ecuador. Napo: Papallacta–Cuyujua, Feb. 1901, *Sodirot* s.n.

(holotype, QPLS; isotypes, G, Q).

Anthurium stans Sodiro, *Anales Univ. Centr. Ecuador* 15(108): 17. 1901. Type: Ecuador. Pichincha: Volcán Paschoa, 3000–4200 m, *Sodirot* s.n.

Anthurium albaretii J. F. Macbride, *Candollea* 5: 348. 1934. Type: Ecuador. Pichincha: Volcán Paschoa, *Sodirot* s.n. [28] (holotype, B).

The species is a member of sect. *Belolochium*. and is highly variable, even within a single population, as is indicated by the fact that Sodiro described so many species from a single locality at Oyacachi. Despite high variability, these plants share certain things in common. Typically, the internodes are longer than broad, though larger or older plants appear to have thicker stems with shorter internodes. Most cataphylls are persistent, and at least the upper ones are usually intact, but they are mainly fibrous at the base. Petioles are subterete and obtusely and narrowly sulcate. The moderately coriaceous blades vary greatly in shape, being primarily narrowly triangular to narrowly ovate with a usually

obovate or rarely hippocrepiform sinus and an acuminate apex. The margins of the anterior lobe are variable, most commonly straight or broadly convex, though sometimes concave. Basal vein numbers are mostly 4–6 per side, the first or sometimes the second pair is free to the base, and several of the remainder are coalesced to 4 cm. The posterior rib is naked along much of its length. The inflorescences are long-pedunculate, and while the peduncles average about as long as the petioles, they may be shorter, as long as, or longer than the petioles. Spathes are variable, usually lanceolate to narrowly elliptic, sometimes elliptic, usually green or green tinged with purple, sometimes purple with green veins. The spadix is usually green, but sometimes purple or red tinged, typically short and weakly tapered to the apex, generally about as long as the spathe or shorter. The spadix is commonly 10–17 times longer than wide, but on the stubbier forms it may range up to little more than 5 times longer than wide. Flowers are large for the genus, usually 3.5–4 mm diam. with the stamens exerted at anthesis.

Terrestrial or sometimes epiphytic, 0.3–1(–1.5) m tall; **internodes** mostly 4–6 cm long, 1.5–2 cm diam., except much shorter, usually about 1 cm long near apex, sometimes much longer on older stems, to 16 cm long; **cataphylls** 8–13 cm long, persisting red-brown, intact to semi-intact toward apex, becoming red-fibrous, eventually deciduous at lower nodes. LEAVES with **petioles** subterete, sharply sulcate, 19–64 cm long, 4–5 mm diam.,

often red near apex; **blades** narrowly ovate to triangular or weakly panduriform, (12–)20–30 cm long, (4–)10–26 cm wide, (1.3–)2.3–4 times longer than wide, usually deeply cordate at base, moderately coriaceous, semiglossy, slightly bicolorous, usually drying red-brown on both surfaces, sometimes gray-green; **anterior lobes** with margins convex to straight or concave; **posterior lobes** (2–)4.5–15(–20) cm long, 2.7–8(–13) cm wide, directed toward the base or slightly outward, sometimes markedly curved inward and overlapping; **midrib** concolorous, narrowly raised in valley above, convex and paler below; **primary lateral veins** (5)8–11 pairs, etched-sunken above, convex below, spreading at 50–75° angle; **tertiary veins** etched above, slightly darker than lower surface; **collective veins** arising from 3rd basal veins, sometimes from the first basal veins, 3–4 mm from margin; **basal veins** (3)4 to 9 pairs, the 1st and sometimes 2nd free to the base, the 3rd and 4th coalesced to (0.5–)2–4 cm; **posterior rib** naked for 1–3.5 cm along the sinus; **sinus** oblong to closed to hippocrepiform, rarely parabolic. INFLORESCENCE erect to erect-spreading, held at about the level of the leaves; **peduncle** 10–50 cm long; **spathe** usually held horizontally and hooding spadix, 6–16 cm long, 1–3.5 cm wide, green, sometimes tinged with red to greenish purple, rarely reddish or red, long-acuminate to acicular (the acicular portion to 1.5 cm long); stipe 1–3 cm long; **spadix** (4–)8–17 cm long, 7–15 mm diam., (5.7–)9–17 times longer than wide, often curved downward, green, olive-green, greenish purple, dark

purple, purplish green, greenish brown, brown in age; **pistils** early exserted; tepals 3.5–4 mm long (diameter in longitudinal direction); stamens are exserted at anthesis.

Anthurium oxybelium ranges from Colombia (and probably Venezuela) to Ecuador (Sucumbios, Napo, Morona-Santiago, Zamora-Chinchipe, Carchi, Imbabura, Pichincha, Cotopaxi, Tungurahua, Cañar, Azuay, Loja) and Peru (Amazonas, Cajamarca, Pasco, Cuzco) at 1400–4300 m elevation.

Specimens seen: ECUADOR. **Morona-Santiago:** Cima de la Cordillera del Cóndor, Centro Shuar Numpatkaim, 03°16'08"S, 78°19'06"W, 2700–2820 m, 22 July 2005, *Tuntiak Katan & Carlos Morales 403* (MO, QCNE). **Zamora-Chinchipe:** Cordillera de Nanguipa, Cerro Colorado, 8 km SSE of Nambija, 20 km ESE of Zamora, dwarf forest on high ridges, cloud forest on slopes, 04°07'35"S, 78°46'36"W, 2700 m, 18 Feb. 2002, *Tom Delinks 1348* (MO, QCNE, UB); *Tom Delinks 1349* (MO, QCNE); *Tom Delinks 1350* (MO, QCNE); *Tom Delinks 1352* (MO, QCNE); *Tom Delinks 1353* (MO, QCNE); *Tom Delinks 1382* (MO, QCNE); Cordillera de Nanguipa, Cerro Colorado, about 8 km by air SSE of Nambija, 20 km ESE of Zamora, 04°07'29"S, 78°46'25"W, 2700 m, 18 Feb. 2002, *David A. Neill, Wilson Quizhpe, José M. Manzanares, Alexander Hirtz, Tom Delinks & Carla J. Cole 13746* (MO, QCNE).



Figure 112. *Anthurium pachylaminum* Croat (Croat 50990). Live plant showing rooting stem, leaf blades, adaxial surface, and inflorescence.

Anthurium pachylaminum Croat, *Ann. Missouri Bot. Gard.* 78: 693. 1991 Type: Peru. San Martín, Moyobamba-Chachapoyas, Km 430–431, E of Naranjos at Río Naranjos, 05°38'S, 77°25'W, 770 m, 12 Apr. 1984, *Croat 58161* (holotype: MO; isotypes: AAU!, B!, CAS!, F!, GH!, K!, M!, NY!, P!, QCA!, SEL!, U!, US!, USM!). **Figures 112–114.**

The species is a member of sect. *Pachyneurium* and is characterized by its unusually large, coriaceous leaf blades (hence the name), with the tertiary veins etched into the upper surface (when fresh) and the primary lateral veins departing the midrib at an acute angle and running more or less straight to the margin. The leaf blades of *A. pachylaminum* are often pustular or glandular on the lower surface, and the spathe does not wither at anthesis, but often



Figure 113. *Anthurium pachylaminum* Croat (Croat 50990). Close-up view of base of leaf, adaxial surface, showing short petiole.

persists and remains in a weathered condition on the fruiting spadix.

Epiphytic, sometimes terrestrial; **internodes** to 8 cm long, 1.5–6 cm diam.; **roots** numerous, dense, spreading, the uppermost ascending, gray when dried, drying short-pubescent, 2–10 cm long, 2–5 mm diam.; **cataphylls** coriaceous to subcoriaceous, broadly lanceolate, 5–7 cm long, acute at apex, drying reddish brown,

persisting semi-intact at the upper nodes. **LEAVES** erect-spreading; **petioles** 8–20(32) cm long, ca. 8 mm diam., D- to C-shaped, broadly to narrowly sulcate adaxially, with the margins blunt, rounded abaxially; geniculum 1–2 cm long; sheath to 6 cm long; **blades** coriaceous, elliptic to broadly elliptic or oblanceolate, acuminate at apex (the acumen to 2 cm long), occasionally obtuse at base, but mostly acute to decurrent, 40–112 cm long, (11)17–43 cm



Figure 114. *Anthurium pachylaminum* Croat (Croat 50990). Close-up view of base of inflorescence showing decurrent spathe and young purplish spadix.



Figure 115. *Anthurium pallidispadix* (Croat) Delannay, N. Hartley & Croat (*Croat 50764*). Live plant showing leaf blade, adaxial surface.



Figure 116. *Anthurium pallidispadix* (Croat) Delannay, N. Hartley & Croat (*Croat 50764*). Close-up view of inflorescence.

wide, broadest at or above the middle, the margins flat to broadly undulate, **upper surface** glossy, dark green, **lower surface** glossy to matte, paler, often sparsely to moderately pustulate or glandular, both surfaces drying yellowish green; **midrib** flat at base, becoming convexly raised toward the apex above, obtuse to acute-raised below; **primary lateral veins** 6–9 per side, departing midrib at 25–50° angle, mostly ascending, straight to the margin, sometimes loop-connecting in the uppermost portion of the blade, raised above and below; **tertiary veins** etched above, weakly raised below; **collective veins** arising from near the apex or absent, sunken above, raised below. **INFLORESCENCES** erect; **peduncle** 36–95 cm long, 3–10 mm diam., 2–9 times as long as petiole, olive-green, terete; **spathe** linear-lanceolate, 10–23 cm long, 1–2.5 cm wide, spreading-reflexed, recurled, subcoriaceous, green heavily tinged with maroon especially on the inner surface, with raphide cells, broadest near the base, acute at apex, decurrent at base; **spadix** cylindroid to tapered, erect, 11–39 cm long, 6–7 mm diam. near base, 4 mm diam. near apex, broadest at the base or near the middle, sessile or stipitate to 10 mm, dark red to dark violet-purple; **flowers** rhombic, ca. 2.4 mm long, ca. 1.4 mm wide, the sides straight, 7–9 flowers visible in principal spiral, 8–10 in alternate spiral; **tepals** matte, papillate; lateral tepals 1–1.4 mm wide, the inner margins straight to broadly convex, the outer margins 2–3-sided; **pistils** not emergent; stigma linear, 0.4–0.6 mm long, appearing granular; stamens emerging in a regular sequence from the base, the laterals

preceding the alternates by 28 spirals, the 3rd stamen preceding the 4th by 6 spirals, inclined over and obscuring pistil; anthers 0.4–0.6 mm long, 0.6–0.8 mm wide; thecae ovoid, slightly divaricate; pollen pale orange. **INFRUDESCENCE** pendulous; **spathe** withered or absent; **spadix** 22–53 cm long, 1.4–1.7 cm diam., mostly bearing berries in the basal portion only; stipe to 10 cm long; **berries** brown to purplish-violet.

Anthurium pachylaminum is known from Ecuador (Zamora-Chinchipe) and Peru (Amazonas, Huánuco, Loreto, San Martín, Pasco) at 240–1700 m. It may be epiphytic or terrestrial in sandy, on inundated soils and on steep slopes in *Tropical moist forest* and *Premontane wet forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Along road from near Paquisha, south to Las Orchídeas, and end of road on Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 38.5 km S, 11.1 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 878 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan 91401* (AAU, GB, MO); Vicinity of Ecuacorrientes copper mine development, valley of Río Waiwaime, 5.3 km above locked gate on road to mine, 8.3 km S of mine headquarters, 03°34'40"S, 78°26'01"W, 1310 m, 7 Apr. 2006, *Thomas B. Croat 96726* (MO, QCNE).

Anthurium pallidispadix (Croat)

Delannay, N. Hartley & Croat, **comb. nov.** Basionym: *Anthurium effusilobum* Croat ssp. *pallidispadix* Croat, *Willdenowia* 35: 348–350. 2005. Type: Ecuador. Zamora-Chinchi: Loja-Zamora, Río Zamora near bridge, 39 km E of Loja, 04°05' S, 79°00' W, 610 m, 18 Oct. 1980, *Thomas B. Croat 50764* (holotype, MO-2824582–83; isotypes, AAU!, B!, K!, NY!, QCA!, US!). **Figures 115–116.**

The species is a member of *Anthurium* sect. *Belolonchium* and is characterized by its cataphylls that persist as a net-like reticulum of fibers sheathing the stem, weakly flattened to sharply C-shaped, weakly to deeply sulcate petioles, the brown-drying triangular-subhastate deeply lobed blades, and the pale green to cream cylindroid to slightly tapered spadices that are hooded by a narrowly ovate, green spathe.

Terrestrial or epiphytic; **stems** erect up to 60 cm long; **internodes** short, 2–3.5 cm diam., **cataphylls** persisting as a dense net-like reticulum of reddish-brown fibers. LEAVES with petiole subterete, 52–70 cm long, 4–8 mm diam., weakly flattened to sharply C-shaped, weakly to deeply sulcate, tinged reddish toward apex; geniculum 2 cm long, slightly swollen and paler than petiole in fresh material, usually drying only slightly darker than petiole; **blades** triangular-subhastate, 34–53 cm long, 28–48 cm wide, 1.1–1.2 times longer than wide, 0.65–0.76 times as long as petiole, deeply lobed at the

base, medium green and semiglossy above, moderately paler and semiglossy below, drying dark greenish-brown above, lighter brown below, deeply lobed; **anterior lobe** 27–28 cm long, 9–10 cm wide at junction with posterior lobes, obtuse and narrowly acuminate at the tip (acumen ca. 2 cm long); **posterior lobes** 15 cm long, 10.5 cm wide, broadest in upper third, departing median lobe at 90–110° angle and then curving backward, the leaf margin down-folded at junction of lateral and median lobes; **sinus** widely open, arcuate to broadly hippocrepiform, 10–12 cm wide in the middle, 7–13 cm deep, **midrib** acute, moderately paler above and below; **primary lateral veins** 9–11 pairs, departing midrib at 45–55° angle and slightly curving to collective vein, etched-sunken above, raised below; interprimary veins scarcely etched-sunken above, scarcely raised below; **secondary and tertiary veins** sharply raised below; **basal veins** 8–10 pairs, all entering the lateral lobes, fused into a 5–10 cm long naked basal rib, equal in prominence to primary lateral veins; **collective vein** 3–7 mm from margin, arising from the 3rd- or 4th-from-highest-order basal vein. INFLORESCENCE with **peduncle** erect, 39–52 cm long, 2–3 mm diam.; **spathe** erect to spreading and hooding the spreading or pendent spadix, broadly ovate, 9.5–12 cm long, 2 cm wide, apex with acumen to 1 cm long, green; **spadix** stipitate (stipe c. 5 mm long), cylindrical to slightly tapered, rounded at apex, 11–12 cm long, 6–7 mm diam., pale green to cream, sometimes weakly tinged pinkish; **flowers** 8–9 visible per spiral, 1.8–

2.1mm wide, 1.7–1.8 mm wide; tepals faintly granular; lateral tepals 1.3–1.5 mm wide; inner margin broadly rounded, outer margin 2–3-sided; stamens included; anthers 0.5 mm long, 0.6 mm wide; thecae ovate, scarcely divaricate.

Anthurium pallidispadix ranges from eastern Ecuador (Morona-Santiago, Pastaza, Zamora-Chinchipe) to northern Peru (Amazonas) at 100–1100 m in *Premontane wet forest* and *Lower montane moist forest* life zones.

Anthurium pallidispadix was previously named *Anthurium effusilobum* Croat subsp. *pallidispadix* Croat, but the authors are elevating it here to a full species status due to some major differences with *A. effusilobum* subsp. *effusifolium*. As noted in the original subspecies description *A. pallidispadix* has the spadix pale green to greenish-white, whereas the spadix is dark violet-purple in the case of *A. effusilobum* subsp. *effusifolium*. In addition to this trait, the blade shapes are also quite different: *A. effusilobum* subsp. *effusifolium* has the blades hastate with the lateral lobes projecting at close to a 90° angle without curbing markedly backward, while *A. pallidispadix* has the blades triangular-subhastate with the posterior lobes projecting out in the beginning but then turning backward. *Anthurium pallidispadix* also has a larger inflorescence with a longer spadix.

Paratypes: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor región, Valley of Río

Coangos, lower valley slopes, east of Shuar village of Tinkimints, forest and cultivated areas, 03°15'25"S, 78°12'50"W, 1000 m, 25 Mar. 2001, *David A. Neill & José M. Manzanares* 13207 (MO, QCNE). **Pastaza:** Along road from Puyo to Macas, ca 33 km S of Puyo, 24.9 km S of Veracruz, 16 km S of Escuela Fiscal Cotopaxi, disturbed primary forest, 01°38'S, 77°52'W, 900 m, 3 May 1984, *Thomas B. Croat* 58969 (MO, QCA). **Zamora-Chinchipe:** Cordillera del Cóndor, 3 km E of Paquisha, disturbed primary forest, 03°55'48"S, 78°38'50"W, 1100 m, 11 Apr. 1985, *Gunnar Wilhelm Harling & Lennart Andersson* 23985 (GB, MO); Cordillera del Cóndor, 04°04'00"S, 79°06'00"W, *Thomas B. Croat* 75368 (MO, QCNE); Río Nangaritza, Shaime, márgen derecho del río, Bosque muy húmedo Premontano, 04°20'S, 78°40'W, 100 m, 8 Dec. 1990, *Walter A. Palacios* 6658 (AAU, CAS, CM, MO, QCA). PERU. **Amazonas:** Bagua, Distrito Imaza, Región del Marañón, Comunidad de Yamayakat, Quebrada Kusu - Chapi, Río Marañón, bosque primario colinas (20–40%), Area permanente 500 x 500 m, Parcela "E", 04°55'S, 78°19'W, 550 m, Feb. 1995, *Rodolfo Vásquez, Nestor Jaramillo, Ricardo Apanú & R. Kugkumas* 19606 (MO).

Cultivated plants: ECUADOR. Collected by Strobel, exact locality unknown, *Munich Botanical Garden* 322/74 (MO).

Anthurium patens Croat, *Willdenowia* 40: 131. 2010. Type: Ecuador. Pastaza: vicinity of Shell, along Río Pindo, c. 1.5 km N of Shell, 01°29'39"S,

78°03'52"W, 1085 m, 5 May 2003, T. B. Croat, L. Hannon & M. Menke 88583 (holotype: MO; isotypes: AAU!, B!, COL!, F!, GB!, HUA!, K!, M!, NY!, QCNE!, S!, SEL!, US!, VEN!). **Figures 117 & 118.**

The species is a member of *Anthurium* sect. *Xialophyllum* and is characterized by its sprawling or semi-erect grown, long internodes, mostly deciduous cataphylls, sharply C-shaped petioles, narrow green-drying blades that are tapered below the middle with a narrow cordulate base.

Terrestrial or hemiepiphytic, vine-like, sprawling, 1–1.3 m tall; **stems** often arching; **internodes** medium gray-green to dark green, matte to weakly glossy, 3–4 mm diam., nodes conspicuously swollen, drying light grayish green to tan; **cataphylls** 3.5–6 cm long, medium green to green, bases brown, mostly deciduous. **LEAVES** spreading; **petioles** 1.1–5.6 cm long (averaging 3.5 cm), narrowly and sharply sulcate, C-shaped, flat adaxially with sharp, erect margins, medium green, weakly glossy, drying light tan and light green to olive-green; geniculum only weakly swollen, sharply sulcate, drying concolorous to slightly darker than petiole; **blades** oblong-elliptic to elliptic-obovate, with the lower half of the blade tapering to a cordulate base, 5.2–17.6 cm long, 1.9–6.9 cm wide (averaging 12.6 × 4.6 cm), 1.9–3.5 times longer than broad, 1.8–5.7 times longer than petiole, thinly coriaceous, weakly bicolorous, dark green and matte-subvelvety to weakly

glossy above, moderately paler and matte below, **upper surface** drying yellowish brown to greyish green, **lower surface** light greenish brown to medium green; **midrib** bluntly acute, narrowly raised and concolorous above, narrowly round-raised and slightly paler below, drying slightly darker to concolorous above, slightly lighter to concolorous below; **primary lateral veins** 4–6 pairs, scarcely more prominent than interprimary veins, departing midrib at a 40–55° angle, weakly quilted, sunken to weakly raised in valleys above, prominently and narrowly raised below, drying slightly darker to concolorous above, slightly lighter to concolorous below; **basal veins** 2–3 pairs (rarely 4 pairs), 1st and 2nd free to base, 3rd and 4th sometimes coalesced 3–4 mm; **tertiary veins** weak to distinct, slightly darker than surface, in part etched and moderately obscure to moderately prominent above, in part weakly raised below; **collective veins** arising from 1st basal vein, 7–13 mm from margin at base to 1st primary lateral vein, 5 mm from margin at 2nd primary lateral vein, gradually getting closer to margin as it nears apex. **INFLORESCENCE** erect-spreading; **peduncle** 6.2–12.3 cm long (averaging 8.7 cm), acutely flattened on one side with 2 ribs, spreading with the spadix turned upward usually at a 90° angle to the peduncle; **spathe** 2–5 cm long, 3–7 mm wide (averaging 3.5 cm × 5 mm), spreading at 90° angle to peduncle, medium green to green, weakly glossy; **spadix** sessile or stipitate to 2–3 mm, 2.5–5.9 cm long (averaging 4.1 cm), pale green to dark green, weakly glossy, 3.5 mm diam.; pollen pale



Figure 117. *Anthurium patens* Croat (Croat *et al.* 105549). Live plant showing stem, leaf blades, adaxial surfaces, and inflorescence.

yellow to white; pistils acute, dark green, semiglossy; **flowers** 4 visible per spiral, 1.8–1.9 mm long, 1.6–1.7 mm wide; tepals semiglossy, drying conspicuously granular, yellowish green; lateral tepals mostly 2-sided, sometimes 3-sided, inner margins rounded, thin and scarious-undulate. **INFRUCTESCENCE** with **berries** dark green, glossy, early emergent, round at apex.

Anthurium patens ranges throughout the lower slopes east of the Cordillera Oriental in Ecuador from Napo to Zamora-Chinchipe and in northern Peru (Cajamarca,

Junín, Pasco) at 200–2100 m in *Premontane moist forest*, *Tropical moist forest*, *Premontane wet forest*, *Lower montane wet forest* and *Premontane rain forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Along road from Tandaime to Condo Mirador, 18.4 km beyond the turnoff near the military check point near Tundaim, 03°38'12"S, 78°25'49"W, 1750 m, 20 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98890* (CUVC, HUA, M, MO); Along road between Los Encuentros and El Sarsa, 10.7 km E from Los Encuentros, beyond



Figure 118. *Anthurium patens* Croat (Croat et al. 105549). Close-up view of inflorescence with green spathe and green spadix.

bridge over Río Zamora, 03°46'40"S, 78°38'28"W, 1066 m, 14 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 98588 (MO, QCNE); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritza, 03°54'18"S, 78°35'W, 972 m, 27 May 2003, *Thomas B. Croat & Mark Menke* 89528 (MO, QCNE); Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July

2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan* 91211 (MO, QCNE); Along road from Namirez on Río Zamora and Nambija, 17.9 km E of Río Zamora, 04°03'57"S, 78°47'36"W, 1790 m, 19 July 2004, *Thomas B. Croat* 91529 (MO, PMA, QCNE); Along road from Namirez (22.3 km S of Yanzaza) to Nambija, 8.1 km S of San Carlos, 04°03'37"S, 78°47'25"W, 1524 m, 28 May 2003, *Thomas B. Croat & Mark Menke* 89635 (MO, QCNE); Parroquia Zurmi, Comunidad Centro Shaime (along Río Nangaritza), forest 2–4 km NW of Centro



Figure 119. *Anthurium penningtonii* Croat (Croat 91638). Live plant showing petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.



Figure 120. *Anthurium penningtonii* Croat (Croat 91638). Close-up view of inflorescence with light green spathe and purplish-brown spadix.

Shaim, forest on limestone outcrop, 04°04'S, 78°54'W, 1000 m, 15 Dec. 2001, *John L. Clark 6527* (MO, QCA, QCNE, US); Along road from Zamora to Romerillos, 13.3 km E of bridge over Río Bombuscaro at Zamora, 0.4 km N of Pituca along river, 04°08'02"S, 78°56'31"W, 975 m, 30 May 2003, *Thomas B. Croat & Mark Menke 89802* (MO, QCNE, USM); Cordillera del Cóndor, parroquia Zurmi, vicinity of Las Orquideas, Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritzza, 04°15'01"S, 78°39'33"W, 1128–1250 m, 18 Apr. 2006, *Thomas B. Croat 97179* (MO, QCNE); Between San Carlos and Nambija on mining road E off of main San Carlos-Nambija road beginning 6 km S of San Carlos, 0.9 km up road toward mining operation at end of road (2.4 km from road), 04°02'18"S, 78°47'52"W, 1465 m, 23 July 2004, *Thomas B. Croat 91997* (CUVC, HUA, M, MO, PMA, QCNE).

Anthurium penningtonii Croat, *Ann. Missouri Bot. Gard.* 78(3): 701. (1991). Type: Ecuador. Napo: between Quito & Baeza, S of road above jct. of road to Baeza & to Lago Agrio, 00°26'56"S, 77°53'00"W, 1800 m, 25 Apr. 1984, *Thomas B. Croat 58491* (holotype: MO; isotype QCA!, VEN!, RSA!, K!, US!). **Figures 119 & 120.**

The species is a member of sect. *Multinervia* and is characterized by its broadly elliptic, green-drying leaf blades with sharply raised (knife-edge) major veins, and by its rather remote collective vein (1–1.5 cm from the margin).

Terrestrial, rarely epiphytic; **stem** to 50 cm long, 1–3 cm diam.; **roots** dense, drying whitish to tan, moderately elongate; **cataphylls** thin, lanceolate, 6–13 cm long, acuminate at apex, drying reddish brown, persisting semi-intact, quickly weathering to straw-colored fibers. **LEAVES** erect-spreading; **petioles** 11–31 cm long, 4–8 mm diam., subterete to triangular, flattened to broadly convex adaxially, sometimes with the margins sharp, rounded or sharply 1-ribbed abaxially; geniculum slightly paler and scarcely thicker than petiole, (0.6)1–3 cm long; sheath 1.5–3 cm long; **blades** broadly elliptic, rarely somewhat oblanceolate, 35–61 cm long, 10–19 cm wide, broadest near the middle, shortly acuminate at apex, acute to narrowly acute at base, coriaceous to subcoriaceous, the margins flat to slightly revolute; **upper surface** weakly glossy to semiglossy to glossy, dark to medium green, **lower surface** semiglossy, conspicuously paler; **midrib** convexly raised at base, becoming sharply acute toward the apex above, slightly paler than surface, acutely raised below; **primary lateral veins** 24–43 per side, departing midrib at 40–60° angle, straight to the collective vein, usually prominently and sharply raised above, flat to sunken below; interprimary veins almost as conspicuous as primary lateral veins; **collective vein** arising from the base, equally as prominent as primary lateral veins, 10–15 mm from margin: **tertiary veins** obscure, prominulous above and below on drying; reticulate veins not visible. **INFLORESCENCE** erect; **peduncle** 21–52 cm long, 3–4 mm diam., 1–2.2 times as

long as petiole, green to purple, terete, sometimes with many weakly to prominently raised striations; **spathe** oblong-lanceolate, reflexed or rarely spreading, 3.5–7 cm long, 0.6–1.3 cm wide, broadest near the base, acute to abruptly acuminate at apex, acute at base subcoriaceous, green, usually tinged with purple; **spadix** sessile or stipitate to 2 mm, scarcely tapered, erect, 2.5–5.5 cm long, 3–5 mm diam. midway, 3–4 mm diam. near apex, green, usually tinged with purple to purplish brown; **flowers** square to rhombic, 1.4–2 mm long, 1.4–1.8 mm wide, the sides straight; 5–9 flowers visible in principal spiral, 4–6 in alternate spiral; tepals matte, minutely papillate; lateral tepals 1.1–1.2 mm wide, the inner margins rounded, the outer margins 2-sided; pistils emergent, glossy; stamens exserted; anthers pink-orange, 0.4–0.5 mm long, 0.5 mm wide; thecae oblong-ellipsoid, slightly divaricate; pollen pale orange fading to white. **INFRUCTESCENCE** erect; **spathe** persisting; **spadix** 8–10 cm long, 1.3–1.7 cm diam., with berries scattered throughout; **berries** (immature) green, emergent ca. 1/2 way, obovoid, shortly beaked at apex on drying, ca. 6.5 mm long, ca. 4 mm diam.; pericarp with raphide cells; **seeds** 2 per berry, oblong-obovoid, flattened, beaked at apex, 4–4.5 mm long, 2.5–2.7 mm wide, 1.5–1.8 mm thick, with a gelatinous appendage at one end.

Anthurium penningtonii ranges on both slopes of the Cordillera Central in Ecuador at 300–2,500 m in *Premontane moist forest*,

Premontane wet forest, *Lower montane moist forest* and *Lower montane wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Condor, trail from camp #1 to camp #2 towards crest of Cordillera del Condor, ca. 10–15 km S/SE of Shuar village, Warints, Premontane wet forest, 03°14'S, 78°16'W, 1200–1800 m, 13 Dec. 2002, *John L. Clark 6978* (MO, QCNE, US). **Zamora-Chinchi:** Vicinity of Ecu-Corrientes copper mine development, valley of Río Waiwaime, 4.3 km above gate, 03°34'51"S, 78°25'53"W, 1298 m, 7 Apr. 2006, *Thomas B. Croat 96762* (MO, QCNE, S); Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from the military outpost to Condor Mirador military outpost, 7.1 km S of junction in road to Tandaime, San Marcos and Ecu-Corriente copper mine headquarters, 03°36'42"S, 78°28'02"W, 1128 m, 12 Apr. 2006, *Thomas B. Croat 96949* (MO, QCNE); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritza, 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Mark Menke 89526* (MO, QCNE); Along road between Zumbi on Río Zamora and summit of Cordillera del Cóndor beyond Paquinta 10.1 km beyond Río Nangaritza Bridge, 29.1 km E. of Zumbi, 03°56'13"S, 78°37'27"W, 16 July 2004, *Thomas B. Croat 91206A* (MO, QCNE); Along road from Namirez to Nambija, along mining road, 10.0 km S of Namirez and Río Zamora, vicinity of Nambija, along road to mine headquarters ca. 5 km long,

just south of Nambija, 04°03'44"S, 78°47'29"W, 1779 m, 23 July 2004, *Thomas B. Croat 92051* (MO, QCNE); Cordillera de Nanguipa, along road to Cerro Colorado, about 6 km south of Nambija, 20 km southeast of Zamora, cloud forest on slopes, 04°05'51"S, 78°47'43"W, 1930 m, 19 Feb. 2002, *Tom Delinks 1385* (QCNE); Parroquia Zurmi, Comunidad Centro Shaime (along Río Nangaritzza), forest 2–4 km NW of Centro Shaime, 04°04'S, 78°54'W, 1000 m, 15 Dec. 2001, *John L. Clark 6532* (MO, QCA, QCNE, US); Cordillera del Cóndor region, Parroquia Zurmi; vicinity Las Orquideas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritzza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, *Thomas B. Croat 97136* (MO, QCNE).

Anthurium polyschistum R.E.Schult. & Idrobo, *Bot. Mus. Leaflet* 18(6): 310–311, pl. 60. 1959. Type: Colombia. Amazonas: Trapecio amazonico, Amazon River watershed, Loretoyacu River, 03°49'00"S, 70°26'00"W, 100 m, Mar. 1946, *Schultes 7179* (holotype: US). **Figures 121 & 122.**

The species is a member of sect. *Schizoplacium* and is characterized by its size as one of the smallest species in the section, creeping habit, terrestrial or a low epiphyte, sometimes scandent, or hemiepiphyte habitat, long internodes, cataphylls remaining intact or decomposing into persistent fibers, (9)11–15-sect blades, the segments radiating from a genicular nexus,

not pedately arranged, the segments linear-lanceolate, sessile or shortly petiolulate, membranaceous, margins straight to undulate on blades, primary lateral veins obscure above, weakly raised and concolorous below, collective veins sunken and concolorous above, raised and concolorous below, an erect to erect-spreading inflorescence, a spreading to reflexed-spreading to becoming reflexed, green, lanceolate spathe, a green-glaucous, slender spadix, and berries plum to magenta, and sweet.

Slender creeping plant, terrestrial or a low epiphyte, sometimes scandent, or hemiepiphyte; **stems** smooth, green, 5–7 mm thick; **internodes** 6–10 cm long, dark green, semiglossy to weakly glossy; **cataphylls** triangular, 3–4 cm long, remaining intact or decomposing into persistent fibers. LEAVES with **petioles** 6–22 cm long, subterete to terete, lightly channeled above, obscurely 1-ribbed, medium green, semiglossy; **blades** thin, (9)11–15-sect, the segments radiating from a genicular nexus, not pedately arranged, the segments linear-lanceolate, 8–15 cm long, 5–15 mm broad, attenuate at the base, sessile or shortly petiolulate, acuminate at the apex, membranaceous, paler below, the veins inconspicuous except for the midrib, in some specimens the segment margins crispate, margins straight to undulate; **upper surface** dark green and matte to weakly glossy above; **lower surface** slightly paler and matte to weakly glossy below; **midrib** narrowly raised and concolorous above and below; **primary lateral veins** obscure



Figure 121. *Anthurium polyschistum* R.E.Schult. & Idrobo (not collected). Live plant showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and infructescence with magenta berries.



Figure 122. *Anthurium polyschistum* R.E.Schult. & Idrobo (not collected). Close-up view of inflorescence with green spathe and green spadix.

above, weakly raised and concolorous below; **collective veins** sunken and concolorous above, raised and concolorous below. INFLORESCENCE erect to erect-spreading; **peduncle** terete, 8–28 cm long, in mature plants somewhat longer than the petiole, green; **spathe** lanceolate, spreading to reflexed-spreading to becoming reflexed, 6.0–10 cm long, green; **spadix** slender, 6–14 cm long, 3–6 mm diam., green-glaucous; tepals brownish post-anthesis. INFRUCTESCENCE in fruit to 18 cm long, 2 cm thick; **tepals** remaining deep

green; **berries** plum to magenta, obovoid, sweet.

Anthurium polyschistum ranges from Costa Rica and Colombia (Amazonas, Caquetá) to Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Sucumbíos), Peru (Loreto), Brazil (Acre) and Bolivia (Beni), at 100–1200 m. The species has a wide distribution, possibly found also in Panama and in other Departments, States, Provinces, and Regions of the countries listed above.



Figure 123. *Anthurium pseudoclavigerum* Croat (Croat et al. 105844). Live plant showing stem, petioles and leaf blades, adaxial and abaxial surfaces.

Specimen seen: ECUADOR. **Morona-Santiago:** Region de la Cordillera del Cóndor, Cuenca del Río Coangos, Comunidad Shuar de Kuankus, sendero que conduce hacia la Cueva de los Tayos, bosque maduro intervenido, Bosque Húmedo Premontano, 03°02'59"S, 78°12'32"W, 850 m, 20 June 2005, *Carlos Morales 1314* (MO, QCNE).

***Anthurium pseudoclavigerum* Croat, sp. nov.** Type: Ecuador. Sucumbios: Along Cepe Ferry road (E of Lago Agrio) 8.8 km S of Río Aguatico on

road to Coca (San Francisco de Orellana), 00°5'N 76°50'W, 280 m, 26 Apr. 1984, *T. B. Croat 58495* (holotype, MO-5893437; iso, AAU, B, CAS, COL, F, K, M, NY, QCA, S, SEL, US, USM). **Figures 123 & 125.**

The species is a member of sect. *Dactylophyllum*, characterized by its hemiepiphytic appressed-climbing habit, short internodes, persistent semi-intact cataphylls, prominently angulate-winged petioles, pedately compound leaf blades with 5–7 weakly sinuately lobed leaflets as



Figure 124. *Anthurium pseudoclavigerum* Croat (Croat *et al.* 105844). Close-up view of inflorescence with green spathe and light brown spadix.



Figure 125. *Anthurium pseudoclavigerum* Croat (Croat *et al.* 105844). Close-up view of infructescence with dark violet spathe and dark red spadix.

well as by the long-pedunculate inflorescence, mostly green very elongate, often coiled spathe, very long slender and pendant spadix and red berries.

Hemiepiphytic appressed climber to 2–4 m; epiphytic creeper at 2.5 m; **internodes** short; 1.5–3.8 cm diam. **cataphylls** 10–15.5 cm long, persisting semi-intact at upper nodes, dark brown, eventually reddish brown fibrous; **petioles** (16)38–80 cm long, sharply (4)5–6 ribbed-winged circumferentially, slightly sulcate adaxially with erect margins, 3-ribbed abaxially, medium green, semiglossy, the ribs becoming undulate on geniculum; **blades** palmately compound with 5–7 segments, these essentially contiguous at base or distinctly separated along the rachis; leaflets symmetrical, subcoriaceous, to thinly coriaceous, dark green and semiglossy above, paler below, weakly or slightly bicolorous; **medial leaflet** elliptic-oblongate to elliptic, (18)41–71 cm long, (5)9.5–25.2 cm wide, 2.0–4 times longer than wide, abruptly acuminate at apex (acumen 1.5–3 cm long), acute at base, margins broadly rounded; lateral leaflets weakly sinuate and usually weakly eared on outer margins; **midrib** narrowly rounded to narrowly raised and slightly paler above, acute to sharply acute and slightly paler below; **primary lateral veins** weakly quilted-sunken and concolorous, weakly raised in slight valleys (on stronger veins) or merely weakly sunken above, narrowly-raised and paler below; tertiary veins weakly raised and darker than surface below. **INFLORESCENCE** spreading-pendent to

pendent, sometimes erect-spreading, purplish in early fruit or mature fruit or white; **peduncle** (15)30–41(58) cm long, acutely 1-ribbed, light green, tinged reddish or purplish; **spathe** linear-lanceolate, reflexed, dark purple to green, tinged brownish to reddish violet, sometimes, weakly glossy green inside, greenish purple with darker red veins, closely and finely ribbed outside, often coiled, (15)35–51 cm long, (0.7)1.5–2.5 cm wide **spadix** matte, reddish-violet, dark red, green, bluish green, sea green, light brown, purple-brown, slender, glaucous, (30) 41–70 cm long, 5 mm diam. at base, less than 2 mm diam. near tip; flowers 5–6 per spiral, 2.7–2.8 mm wide, 2.2–2.5 mm wide, and long, sub-4-lobed; stamens held at surface of tepals; anthers 0.3 mm long, 0.7 mm wide, thecae widely divaricate; pollen white. **INFRACTESCENCE** pendent, to 62 cm long, ca. 2 cm diam.; **berries** shining red or rounded at apex, 5–6 mm diam.

Common indigenous names: (Huaorani): "omegueguno", "kuentube", "komanrube", "kimipankai", "honcatome"; (Shuar): "iwianch-nuka".

Anthurium pseudoclavigerum is endemic to the Amazon basin, ranging from southern Colombia (Caquetá, Putumayo) to Ecuador (Sucumbios, Orellana, Napo, Pastaza, Morona-Santiago, Zamora-Chinchipec) and Peru (Loreto, Huanuco & San Martín) at 220–590(1500) m.

Anthurium pseudoclavigerum is a close relative of *A. clavigerum* Poepp., differing from that species by its prominently winged-ribbed petioles, weakly sinuate leaflet margins as well as by the much longer and more slender spathe and spadix.

Paratypes. COLOMBIA. **Caquetá:** 370–390 m, 2–3 km around San Jose del Fragua, 10 Mar. 1981, *Bernal & Tellez* 469 (COL). **Putumayo:** 305 m, 15 km NW of Puerto Asis, *King & Guevara* 6230 (NY, US); El Whiskey, 13 km S of Umbria, vic. Finca "Santa Maria", 300 m, *Plowman* 2067 (GH); Río San Miguel, 290 m, Quebrada de la Hormiga, 15 Dec. 1940, *Cuatrecasas* 11082 (COL, US); 230 m, Puerto Ospina, 14 Nov. 1940, *Cuatrecasas* 10586 (COL); Río San Miguel, Comisaría del Putumayo, 290 m, 15 Dec. 1940, *Cuatrecasas* 11088 (COL); Río Putumayo, 230 m, Puerto Ospina, *Cuatrecasas* 10568 (US); Mocoa, 1800–2400 f, Mocoa & vic., 16 Mar. 1953, *Schultes & Cabrera* 19080 (COL, A, GH); Puerto Asis, Putumayo River, between Puerto Asis and San Pedro, 26 July 1957, *Barclay* 4752 (MO, COL). ECUADOR. **Davis** 868. **Guayas:** Naranjal, 350–400 m, Reserva Ecológica Manglares-Churute, Bosque muy seco Tropical y Bosque Seco Premontano. cerca a Cumbre del Cerro Cimalon Pequeño entrando por el Pentagono, bosque primario. Transecto de 50 x 2 m x 5 (0.05 ha), 02°27'S, 79°40'W, 8 Aug. 1992, *Cerón et al.* 19907. **Morona-Santiago:** Cordillera del Cóndor, 267 m, Cánton Tiwintza, Centro shuar Kaputna, terraza aluvial del Río Santiago, 03°00'30"S, 77°52'08"W, 5 July 2003, *Tsuink & Grupo Shuar de Conservación*

58 (MO, QCNE); Río Kankaim, El Centro Shuar Kankaim (Cangaimine), 20 km WNW of Taisha, 02°20'S, 77°41'W, 500 m, 14 Sep. 1985, *Shiki RBAE103* (MO, NY). **Napo:** Orellana Canton, along oil exp. road to Yuca and Taracoa de la Esperanza, beyond Taracoa, 22.5 km E of jct. with main Coca to Río Tiguino rd. S of Coca, 00°35'S, 76°42'W, 350 m, 29 Feb. 1992, *Croat* 72557 (AAU, B, KYO, L, MEXU, MO, QCNE, SEL, TEX, US); San Pablo de las Secoyas, WSW of Shushufindi, 00°15'S, 76°21'W, 300 m, 6 Aug. 1980, *Brandbyge et al.* 32524 (AAU, MO); Tena, island in river, *Asplund* 10295 (S); Coca-Lago Agrio, Canon de los Monos, N of Coca, *Lugo* 2978 (GB, MO); Finca del Sr. Morales, 15 km on rd. to Yucas, 300 m, *Jaramillo & Coello* 2172 (AAU, QCNE); Lago Agrio-Proyecto San Miguel, Lago Agrio-El Conejo Rd., 300 m, 19 Nov. 1980, *Harling & Andersson* 16652 (GB); 300 m, 6 Aug. 1980, *Brandbyge et al.* 32524 (AAU); 19 Aug. 1981, *Brandbyge et al.* 33755 (AAU); 24 Aug. 1981, *Brandbyge et al.* 36029 (AAU); 36041 (AAU, MO); 25 Aug. 1981, *Brandbyge et al.* 36078 (AAU); 36086 (AAU); Añangu, rain forest on well drained hilly ground in the Parque Nacional Yasuní, collections in the area of the SEF project, 00°31'S, 76°23'W, 260–350 m, 30 May - 21 June 1982, *Ollgaard et al.* 38960 (AAU, MO); *Ollgaard et al.* 38987 (AAU); 27 Feb. 1983–8 Mar. 1983, *Lawesson et al.* 39343 (AAU); 2 km E of Yasuní Scientific Field Station between road and Río Tiputini, 00°40'S, 76°23'W, 220 m, 24–25 July 1995, *Balslev* 6150 (AAU); Yasuní Scientific Research Station, Río Tiputini ca. 6 km upstream from station, 00°40'S, 76°23'W, 210 m, 10

Aug. 1995, *Balslev & Hall 6253* (AAU); Yasuní National Park, near Estación Científica Yasuní, 00°40'S, 76°23'W, 200–250 m, 13 Aug. 1998, *Leimbeck 27* (MO); 200–250 m, *Leimbeck 40* (MO); Yasuní National Park, SE of Estación Científica Yasuní, near rd. from NPF to ECY, km 8 (transect 1), 00°40'S, 76°23'W, 220–240 m, 20 Apr. 1999, *Leimbeck 190* (MO); Lagunas de Cuyabeno, NE part of first lake, 00°01'S, 76°11'W, 300 m, 24 Aug. 1981, *Brandbyge et al. 36041* (AAU); Reserva Faunística Cuyabeno near Pto. Bolívar at confluence of Río Tarapui and Río Cuyabeno, 00°05'S, 76°10'W, 19 Jan. 1984, *H. Balslev 4803* (NY); Tena-Puyo, 61.5 km N of Puyo, 500 m, 22 Dec. 1979, *Croat 49653* (F, MO, QCA); SE of Francisco de Orelleno (Coco)-El Auca, 14.6 km past bridge over Río Napo, 00°37'S, 76°40'W, 450 m, 5 Oct. 1980, *Croat 50375* (MO, QCA); Lago Agrio-Río San Miguel, 3 km N of Lago Agrio, 00°5'N, 76°50'W, 450 m, 3 Oct. 1980, *Croat 50304* (MO, QCA); Tena-Puyo, 5.5 km S of bridge over Río Napo, 01°05'S, 77°47'W, 510 m, 2 May 1984, *Croat 58908* (MO, QCNE); Reserva Florística "El Chuncho" Payamino, 5 km al NW de Coca, Estación experimental INIAP-Napo, 00°30'S, 77°01'W, 250 m, 7 Oct. 1987, *Cerón 2402* (MO, QCNE); Estación Experimental INIAP-Payamino, 5 km al N de Coca Reserva Florística El Chuncho, 00°25'S, 77°00'W, 250 m, 10–15 Sep. 1986, *Neill et al. 7311* (MO); Cantón Orellana, sector Huashito, 20 km al N de Coca, propiedad de Palmoriente, 00°20'S, 77°05'W, 250 m, 3–21 Nov. 1989, *Espinoza 105* (MO, QCNE); Reserva de Producción Faunística Cuyabeno, N of Laguna Grande,

Hectare Plot no. 1, 00°S, 76°12'W, 265 m, 11 Apr. - 10 July 1988, *76116* (AAU); *Nielsen 76436* (AAU); *76444* (AAU); *Nielsen 76608* (AAU); *Nielsen 76472* (AAU); *Nielsen 76589* (AAU); *Poulsen 79338* (AAU); 11 Apr. - 10 June, 1988, *Poulsen 80560* (AAU); vic. of Lago Agrio, km 3, San Miguel-Lago Agrio, 350 m, July 1982, *Besse 1627* (SEL); confluence of Quiwado and Tiwaeno Rivers, 13 Apr. 1981, *Davis et al. 931* (F, SEL); Auca Oil Field, 60 km S of Coca, 300 m, Jan. 1979, *Besse et al. 1055* (SEL); Parque Nacional Napo-Galeras, Cordillera Galeras, 00°42'S, 77°36'W, 1500 m, 23 Oct. 2006, *S. Trogisch, S. Moritz & J. Homeier 143* (QCA, QCNE, GOET, MO); along road to Mushullacta 1–5 km S of Main Narupa-Coca Rd, vic. Parque Nacional Napo-Galeras, 00°42'S, 77°36'W, 1500 m, 20 Apr. 2003, *Croat et al. 87865* (MO, QCNE); Río Napo, a few kilometers below Itaya, in indigenous garden, 00°28'S, 76°33'W, 200 m, 20 Aug. 1982, *Balslev & Santos 2890* (MO); Jatun Sacha, Reserva Biológica Jatun Sacha, 8 km de Puerto Misahuallí, margen derecha del Río Napo, 01°04'S, 77°36'W, 450 m, 4 Sep. 1987, *Cerón & Quinto curso de Biología U.C. 1989* (MO); *Cerón 2093* (MO, QCNE); Cantón Tena, Estación Biológica Jatun Sacha, 8 km al este de Misahuallí, cerca al riachuelo Chinguipino, Parcela Permanente 3, 01°04'S, 77°36'W, 400 m, 20 Jan. 1990, *Cerón et al. 8353* (MO, QCNE); 6 May 1990, *W. Palacios, A. Alvarez & E. Freire 4950* (MO, QCNE); 01°04'S, 77°37'W, 415 m, *S. Trogisch, S. Moritz & J. Homeier 301* (QCNE, GOET, MO); Sumaco, Canton Loreto, Huaticocha, carretera Hollín-Loreto, 20 km al W de Loreto, 00°45'S, 77°28'W, 575

m, 10 Jan. 1989, *Hurtado et al.* 1393 (MO); Yasuní, Anango, 00°30'S, 76°25'W, 14 July 1982, *Luteyn et al.* 8684 (NY); 12 July 1982, *Luteyn* 8664 (MO, NY); Yasuní NP, Anangu, along Río Anangu (black water) near jct. with Río Napo, 00°31'S, 76°23'W, 270 m, 17 June 1982, *Luteyn et al.* 8552 (MO, NY); PN Yasuní, Pozo Amo 2, Trochas de Amosur, 00°52'S, 76°05'W, 230 m, 9–13 Jan. 1988, *Cerón & Coello* 3196 (MO, NY, US); Orellana, carretera y oleoducto de Maxus, Km 40, 00°39'S, 76°26'W, 250 m, 18 May 1994, *Aulestia* 2277 (L, MO, QCNE); Yasuní NP, Estacion Científica Yasuní, at Tiputini and surroundings, 250 m, 19 Apr. 1996, *Kjaer-Pedersen* 2056 (AAU, MO); 00°40'S, 76°23'W, 11 Aug. 1998, *Leimbeck* 17 (AAU, QCA); Aguarico Cantón, Yasuní National Park, Tiputini Biodiversity Station, 00°38'S, 76°10'W, 215 m, 25 June 1998, *D. Neill, H. Abua & F. Enqueri* 11187 (MO); Estación Científica Yasuní, Río Tiputini, NW of confluence of Río Tivacuno, E of Carretera Repsol-YPF, km 7 on road to Pozo Tivacuno, 00°38'S, 76°30'W, 200–300 m, 28 Jan. 2004, *Verónica Sandoya et al.* 002 (MO); *Verónica Sandoya et al.* 003 (MO); *Verónica Sandoya et al.* 082 (MO); SE of Estacion Científica Yasuní, 00°40'S, 076°23'W, 240–250 m, 11 Apr. 1999, *Leimbeck* 160 (AAU, MO); Aguarico, Reserva Etnica Huaorani, Carretera y oleoducto de Maxus, Km 108, 00°59'S, 76°12'W, 245 m, 11 Jan. 1995, *Aulestia et al.* 3 (MO, QCNE); Reserva Etnica Huaorani, Carretera y oleoducto de Maxus en construcción, Km 60–61, S. of Río Tivacuno, 00°51'S, 76°26'W, 250 m, 21–25 Oct. 1993, *Aulestia & Andi* 876 (MO, QCNE); *Aulestia & Gonti* 1767 (MO,

QCNE); *Aulestia & Gonti* 2068 (MO, QCNE); 11 Jan. 1995, *Aulestia et al.* 3018 (MO, NY, QCNE); Archidona, Sumaco, Bosque Protector de la Comunidad de Mushullacta. 00°49'39"S, 77°33'47"W, 1200 m, 25 Feb. 2003, *Altamirano* 141 (MO, QCNE); La Joya de los Sachas, Comunidad Indillama, Río Indillama, Carretera Maxus, Km 5–6, 00°25'S, 76°36'W, 250 m, 14–28 Jan. 1994, *Grijalva et al.* 446 (MO, QCNE); Maxus road and pipeline construction project, Km 10, 00°29'S, 76°34'W, 250 m, 29 June 1994, *Pitman* 450 (MO, QCNE, SEL); Carretera y oleoducto de Maxus, Km 40, Parcela permanente 10, de 1 hectare, 00°39'S, 76°26'W, 250 m, 18 May 1994, *Aulestia* 2277 (MO, QCNE); Tena, Construcción de Carretera Campococha-Chontapunta, Sendero hacia Río Rodríguez-Camino Huaorani, 00°55'S, 77°25'W, 300–650 m, 29 Aug. 1997, *Nuñez & Tapuy* 704 (MO, QCNE); Jatun Sacha Biological Station, 01°04'S, 77°36'W, 400 m, 9 Mar. 1985, *Neill* 6035 (MO, QCNE); Sendero 1 y 3, 01°04'S, 77°36'W, 380 m, 9 Aug. 1992, *Rueda et al.* 1063 (MO, QCNE); 6–8 km airline SE of Puerto Misahualli, 01°04'S, 77°37'W, 400–450 m, 30 July 1990, *Webster & McColm* 28463 (DAV, MO); Along Río Piatua beginning at Botanical Garden on Campus of Universidad Amazonia (CIPCA) and moving up river, 01°14'37"S, 77°53'21"W, 570 m, 10 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich, T. K. Croat & R. Qualls* 105526 (MO, QCNE). **Orellana:** Río Yasuní, ca. 12 km upstream from entrance into Río Napo, ca. 4 km upstream from the Río Yasuní-Río Napo jct., 00°57'S, 75°25'W, 200 m, 25 Aug. 1982,

Balslev & Alarcon 2939 (MO); Yasuní NP, Tiputini Biodiversity Station, 00°38'S, 76°09'W, 200 m, 6 Jan. 2002, *Köster et al. 671* (BONN, MO, QCA); Reserva Étnica Huaorani, Comunidad Dikapare, a 16 km al E de la vía Auca, 120 km al sur del Coca, Río Rumiñacu, Proyecto Etnobotánico del Herbario Nacional, co-financiado por PetroEcuador, 00°59'06"S, 76°50'55"W, 375 m, 22 Jan. 2004, *Naranjo & Freire 671* (MO, QCNE); Reserva Étnica Huaorani, Comunidad Timpoka, Bloque 16 petrolero de Pepsol, km. 3 via SPF; Río Tiputini, 00°40'17"S, 76°22'23"W, 240 m, 9 Apr. 2005, *Diego Naranjo & B. Freire 607* (MO, UB); Comunidad Tobeta, a 170 km al sur del Coca, vía Puerto Pindo 2, Bloque 14 (ENCAN), Proyecto Etnobotánico del Herbario Nacional, co-financiado por PetroEcuador, 00°39'45"S, 76°40'00"W, 300 m, 25 June 2004, *Naranjo & Freire 502* (QCNE); Comunidad Shuar Kunkuk, 165 km al sur del Coca por la vía Auca, 4 km al W de la carretera, Río Quememparo, 00°57'S, 77°55'W, 300 m, 10 Feb. 2004, *Herrera & Guerrero 157* (QCNE); Parque Nacional Yasuní, Centro Científica Yasuní, Trail 10, Botanico Trail, 00°40'34"S, 76°23'52"W, 225 m, 25 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich & M. Rees 105844* (MO, QCNE); Vicinity of San José Payamino, Estación Científica Timburi Cocha, along banks of Río Payamino, 00°28'29"S, 77°17'05"W, 310–330 m, 11 Feb. 2015, *Thomas B. Croat, Geneviève Ferry & David Scherberich 106124* (MO, QCNE). **Pastaza:** Río Curaray, costado sur, alrededores de Laguna Garzayacu, 250 m, 01°29'S, 76°39'W, 20–26 Aug. 1985, *Palacios*

& Neill 663 (MO); Lorocachi, 01°38'S, 75°58'W, 200 m, 27 May 1980, *Brandbyge et al. 31212* (AAU); 24 May, 1980, *Brandbyge & Asanza 30820* (AAU); Centro-Oriente, Tonampari Poblacion Waorani, 400–500 m, 14 Aug. 1980, *Jaramillo & Coello 3499* (AAU, QCNE); Curaray, 01°22'S, 76°58'W, 250 m, 18 Mar. 1980, *Holm-Nielsen et al. 21938* (AAU); 250 m, *Holm-Nielsen et al. 22243* (AAU); Lorocachi, 01°38'S, 75°58'W, 200 m, 27 May 1980, *Jaramillo et al. 31189* (AAU); 200 m, 27 May 1980, *Brandbyge & Asanza 31212* (AAU); Lorocachi, Río Curaray, al sur este del campamento military, 01°38'S, 75°58'W, 200 m, 27 May 1980, *Jaramillo et al. 31315* (AAU); Río Bobonaza, Cachitama-Río Bufe, 02°20'S, 76°40'W, 300 m, 19 July 1980, *Ollgaard et al. 34733* (AAU); *Brandbyge et al. 31315* (AAU); Pozo petrolero "Garza" de TENNECO, 35 km (aprox.) al noreste de Montalvo, 01°49'S, 76°42'W, 260 m, 2–12 July 1989, *Zak & Espinoza 4709* (MO, QCNE); 1–12 July, 1989, *4766* (MO); 320 m, 26–31 Jan., *Hurtado & Neill 1460* (MO, QCNE); 26–31 Jan., 1989, *1498* (MO); Río Curaray, costado sur, alrededores de la Laguna Garzayacu, 01°29'S, 76°39'W, 250 m, 20–26 Aug. 1985, *Neill & Palacios 6702* (MO); Río Curaray, costado sur, boca del Río Querano, 01°30'S, 76°32'W, 230 m, 29–31 Aug. 1985, *Neill & Palacios 6763* (B, MO); Vía Auca, 110 km al sur de Coca, a 10 km del Río Tigüino, Sector Cristal, 01°15'S, 76°55'W, 320 m, 7 Jan. 1989, *Palacios et al. 3404* (MO); UNOCAL petroleum well site "Masarami", 01°27'S, 76°54'W, 390 m, 28 Apr. 1990, *Beck 1053* (QCNE); Pozo Petrolero "Corrientes" de UNOCAL, 01°43'S, 76°49'W, 300 m, 1–31 Aug. 1990,

Gudiño 589 (MO, QCNE); Pozo petrolero "Masaramu" de UNOCAL, 40 km al nor-nororiente de Montalvo, 01°44'S, 76°52'W, 400 m, 1–16 May 1990, *E. Gudiño 275* (MO, QCNE); Pozo petrolero "Namoyacu" de UNOCAL. 30 km al sur del pueblo de Curaray, 01°40'S, 76°57'W, 290 m, 13–30 Nov. 1990, *S. Espinoza & Tiro Coba 568* (CR, MO, QCNE); Villano, Pandanuque, Encima de colina al sur del pozo petrolero Villano 2 de ARCO. 01°28'S, 77°27'W, 550 m, 30 Aug. 1997, *Alvarez et al. 2393* (MO, QCNE); Valle de la Muerte, Curaray, 01°25'S, 76°52'W, 240 m, 22 Mar. 1980, *Holm-Nielsen et al. 22489* (AAU, MO); Vicinity of Puyo, along road from main Puyo-Macas Hwy. to Taculin, 15.5 km of main highway, 0.7 km beyond bridge over Río Taculin on road destined for Chunchupamba, 01°29'37"S, 77°49'18"W, 677 m, 4 Feb. 2015, *Thomas B. Croat, Geneviève Ferry & David Scherberich 106020* (MO, QCNE). **Sucumbios:** Reserva Cuyabeno, Chiritza, 00°05'S, 76°30'W, 230 m, 13 Nov. 1991, *Palacios et al. 8852* (CM, F, GB, K, MO, QCNE); Reserva de Produccion Faunistica Cuyabeno, 7 km N of Laguna Grande, hectare plot no. 1, 00°S, 76°12'W, 265 m, 11 Apr.-10 June 1988, *Poulsen 79338* (AAU, MO); Reserva Faunistica Cuyabeno, Laguna Grande and surroundings, including Río Cuyabeno from Pto. Bolívar to above Laguna Cañangueno, 00°00'S, 76°10'W, 265 m, 11 Mar.-13 May 1990, *Balslev et al. 97029* (AAU); *97276* (AAU); Reserva Faunistica Cuyabeno, just N of Laguna Grande, 00°01'N, 76°11'W, 265 m, 19 Mar. 1988, *Balslev 69000* (AAU); Río Cuyabeno, Puerto Montufar - Río

Cuyabeno, near Puerto Montufar, 00°06'S, 76°01'W, 230 m, 17 Feb. 1980, *Holm-Nielsen et al. 21248* (AAU); Lagunas de Cuyabeno, 00°01'S, 76°11'W, 300 m, 24 Aug. 1981, *Brandbyge et al. 36029* (AAU); *36086* (AAU); *36078* (AAU, MO); Laguna Grande de Cuyabeno, along trail eastwards from Laguna Grande de Cuyabeno, 00°S, 76°12'W, 25 Jan. 1984, *Laegaard 51218* (AAU, QCNE); Reserva de Produccion Faunistica Cuyabeno, Reserva de Producción Faunística Cuyabeno, N of Laguna Grande, 00°S, 76°12'W, 265 m, 11 Apr.-10 July 1988, *Nielsen 76023* (MO); *76444* (MO); *76574* (MO); N of Laguna Grande, 00°01'N, 76°11'W, 16 Mar. 1989, *Balslev et al. 84419* (AAU, MO); near Pto. Bolívar at confluence with Río Tarapui and Río Cuyabeno, 00°05'S, 76°10'W, 300 m, 19 Jan. 1984, *Balslev 4803* (AAU, NY); Río Cuyabeno, 1.5 km upstream from Puerto Bolívar on the right margin, 00°06'S, 76°10'W, 300 m, 19 Aug. 1981, *Brandbyge et al. 33755* (AAU); Gonzalo Pizarro, N bank of Río Aguarico, 3 km NW of Lumbaqui, proposed route of OCP petroleum pipeline, 00°04'10"N, 77°18'30"W, 600 m, 29 Dec. 2001, *Neill & Narváez 13561* (MO, QAP, QCNE); Lumbaqui, Derecho de Ví OCP, 00°04'16"N, 77°18'00"W, 675 m, 29 May 2002, *C. Morales et al. 870* (MO, QCNE); Lago Agrio (Nueva Loja)-Coca (Pto. Francisco de Orllana), 26 km S of Lago Agrio, 4.6 km S of El Emo, then 2.8 km W of main Lago Agrio-Coca Rd, along farm rd., 00°05'S, 76°54'W, 355 m, 29 Feb. 1992, *Croat 72510* (MO, QCNE); Along road from Lumbaqui to Lago Agrio, 0.8 km E of middle of Río Aguarico bridge, forest south

of road along trail to banks of Río Aguarico, disturbed primary forest, 00°03'06"N, 77°17'56"W, 458 m, 4 Sep. 2015, *Thomas B. Croat 106541* (MO, QCNE); Along road from Puerto Carmen del Putumayo to Tarapoa, 14.3 km SW of El Carmen, 11.6 km NE of Palma Roja, 32.8 km NE of Tipisea junction, 00°05'21"N, 75°58'33"W, 233 m, 7 Sep. 2015, *Thomas B. Croat 106603* (MO, QCNE). **Zamora-Chinchipe:** Nangaritza, Cordillera del Condor, Valle del Río Nangaritza, Míazi, Sendero al Hito de Míazi, al este del campamento military, 04°18'S, 78°40'W, 1000–1100 m, 11 Dec. 1990, *Palacios & Neill 6763* (MO, QCNE). PERU. **Loreto:** Río Corrientes, Teniente Lopez, Campamento de Occidental Petroleum, km 11.2 del carretera Sur de Shiviayacu, ca. 1.5 km N del Campamento Lopez, ca. 3 km E del río, y unos 35 km Sur de la frontera con Ecuador, 30–40 m de altura, solve colinas muy accidentadas de arcilla profunda, y bordes de quebradas, 230–305 m, 16 June 1993, *Beltran & Foster 607* (MO); Alto Amazonas, Andoas, 02°55'S, 76°25'W, 180 m, 26 Mar. 1982, *R. Vásquez et al. 3117* (MO); Andoas, 02°55'S, 76°25'W, 180 m, 3 Nov. 1983, *Vásquez & Jaramillo 4552* (MO, USM); Río Pastaza, near Ecuador border, 02°48'S, 76°28'W, 210 m, 15 Aug. 1980, *Gentry et al. 29710* (MO); Campamento forestal, 16 km de la frontera NW 38 km del Río Convetes, 208 m, 11 Apr. 1979, *Aronson & Rodrigues 841* (MO); 843 (CAS, MG, MO, OOM, SAR); Alto Amazonas, Andoas, 02°55'S, 76°25'W, 180 m, 9 Sep. 1983, *R. Vásquez 4436* (MO). **Huanuco:** Leoncio Prado, Rupa Rupa, al este de Tingo Maria, ca. at

Cerro Quemado, 700–800 m, 13 Sep. 1978, *Schunke-Vigo 10600* (MO); Washintsa - Río Huasaga, 120 m, 28 Nov., 1982, *W. Lewis & R. Vásquez 4082* (MO). **San Martín:** Mariscal Caceres, Tocache Nuevo, Río de la Plata, 08°10'S, 76°25'W, 650 m, 1 Nov. 1980, *Croat 51003* (MO, QCA).

Cultivated plants. Ecuador. vic. Coca (San Francisco Orellana), cult. Atlanta Botanical Garden, ABG 93–1470, vouchered 13 Dec. 1996, as *Croat 79441* (MO, QCNE).

Anthurium sagittatum (Sims) G. Don in *R. Sweet, Hort. Brit.*, ed. 3: 633. 1839. — *Pothos sagittatus* Sims, *Bot. Mag.* 38: t. 1584. 1813. Type: *Pothos sagittatus* *Bot. Mag.* 38: t. 1584. **Figures 126 & 128.**

Anthurium aeranthe Baker, *Refug. Bot.* 4: t. 278. 1871. Type: The plate t. 278 serves as the type.

Anthurium alienatum Schott, *Prodr. Syst. Aroid* 507. 1860. Type: Peru. Lechler (K).

Anthurium amazonicum Engl., *Das Pflanzenreich* 4, 23B: 194. 1905. Type: Brazil. Acre: Río Jurua Miry, June 1901; *Ule 5599* (holotype? B).

Anthurium cordato-sagittatum Schott, *Oesterreichische Botanische Zeitschrift* 9: 100. 1859. Type: (not seen).



Figure 126. *Anthurium sagittatum* (Sims) G. Don (Croat et al. 105641). Live plant showing short stem, petioles and inflorescences.



Figure 127. *Anthurium sagittatum* (Sims) G. Don (*Croat et al. 105641*). Close-up view of leaf blade, adaxial surface.



Figure 128. *Anthurium sagittatum* (Sims) G. Don (Croat et al. 105641). Close-up view of inflorescence with spathe tinged pink and spadix whitish.

Anthurium polyrrhizum K. Koch & Augustin, *Index Seminum* [Berlin] 1855(App.): 7. 1855. Type (not seen).

Anthurium terrestre Engl. *Das Pflanzenreich* IV. 23B (Heft 23): 196. 1905. Type: Peru. Aug. 1902, Ule 6308 (holotype?, B).

Anthurium rubrinervium (Link) G. Don in R. Sweet, *Hort Brit.* Ed. 3: 633. 1839. — *Pothos rubrinervia* Link *Hort. Brit.* (ed. 3): 633. 1839. Type: French

Guiana. 1819–21, Poiteau s.n. (holotype?, G).

The species is a member of sect. *Cardiolonchium* and is characterized by its prominently ribbed petioles usually tinged violet-purple, its ovate-cordate blades prominently lobed at the base, and its inflorescences with the spathe olive-green to yellowish-green and the spadix pale green to greenish white.

Terrestrial; **stems** erect, moderately short, 20–30 cm long; **internodes** short,

(1)1.8–2.5 cm diam, brownish, matte, cylindrical, at least sometimes with no obvious petiolar scar indentations; **cataphylls** 5.5–11 cm long, bluntly 1-ribbed, persisting intact at upper nodes, as reddish fibers lower down, splitting at base; **petioles** 18–75 cm long, to 1 cm diam. at base, subterete to weakly D-shaped, usually 4–5-sided or 4–5 winged, the ribs usually prominent, acutely flattened adaxially, 3-ribbed abaxially, usually tinged violet-purple, weakly glossy, geniculum to 2.5 cm; **blades** ovate-triangular-cordate to ovate-cordate, (18)40–67 cm long, (10)20–37 cm wide, 1.3–1.8 times longer than broad, prominently lobed at base, gradually acuminate at apex, subcoriaceous, dark green, semiglossy to matte-subvelvety above, moderately paler and matte below, drying green to olive-green to brown on both surfaces; **anterior lobe** (20)30–43 cm long, **posterior lobe** 13–20 cm long, **sinus** hippocrepiform to parabolic, 10–15 cm deep; **midrib** bluntly acute, concolorous above, acutely ribbed and paler below; **primary lateral veins** 5–8 pairs arising at an acute angle and then spreading at an angle of 35–45(50)°, bluntly acute and concolorous above, paler and acute below; **basal veins** 6–7 pairs, 1–2 free to base; **posterior rib** naked for up to 3.5 cm; **collective veins** arising from one of the primary lateral veins or the uppermost basal to 4 mm from the margins; **tertiary veins** in part raised and concolorous below. **INFLORESCENCE** erect-spreading; **peduncle** slender, (10)20–41 cm long; **spathe** linear to lanceolate, spreading, fully expanded and reflexed at anthesis, 7–15 cm

long, 1–8 cm wide, olive-green to yellowish-green, sometimes tinged pink, persisting intact in infructescence; **spadix** stipitate to 1 cm, cylindroid-tapered, 7–19 cm long, 0.6–1 cm diam., pale green to greenish white in flower becoming darker in fruit, semiglossy; **flowers** 2–3.1 mm long, 1.9–2.3 mm wide, 5–7 visible per spiral; tepals minutely papillate, lateral tepals 1.2–1.5 mm wide, outer margin broadly 2-sided to obtusely 3-sided, inner margin broadly rounded; **pollen** orange to pale yellow; **berries** early-emergent, glossy, dark purple to reddish-brown, at least sometimes 1-seeded.

Anthurium sagittatum ranges throughout the Amazon basin from the Guianas and Brazil (Acre, Amapá, Amazonas), through southern Colombia (Amazonas, Antioquia, Caquetá, Nariño, Putumayo), Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Sucumbíos, Zamora-Chinchipe), Peru (Amazonas, Cusco, Huanuco, Loreto, Pasco, Puno, San Martín, Ucayali), and Venezuela at 20–1700 m in *Tropical moist forest* and *Premontane wet forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Condor, Río Nangaritza, centro Shuar Shaim', 04°18'54"S, 78°40'06"W, 900 m, 31 Jan. 1997, *V. Van den Eynden et al* 925 (MO); Zumbi - Cordillera del Cóndor, Río Zamora 7.7 km S of Yanzaza, 6.8 km E of Paquisha at Río Nangaritza, 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Marck Menke* 89555 (MO, PMA, QCNE).

Nangaritza, Parroquia Guayzim, Campamento Militar Miazí, al sur del río Nangaritza, Transectos de 50 x 2 m (0.1 Ha.), 04°16'S, 78°42'W, 1060–1100 m, 21 Oct. 1991, *Carlos E. Cerón, Marcel Chango, Valdano Tapur & Gerardo Aymard 16901* (MO); Shaimi, Alto Nangaritza, 04°18'00"S, 78°43'00"W, 950 m, 6 Nov. 2004, *F.A. Werner 1340* (MO); Cordillera del Cóndor region, Parroquia Zurmi, vicinity Las Orquideas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, *Thomas B. Croat 97159* (MO, QCNE); Cordillera del Cóndor, parroquia Zurmi, vicinity of Las Orquideas, Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritza., 04°15'01"S, 78°39'33"W, 1128–1250 m, 18 Apr. 2006, *Thomas B. Croat 97178* (MO, QCNE); Cordillera del Cóndor region, parroquia Zurmi, vicinity of Las Orquideas, Cabañas Yancuam, 6 km N of Las Orquideas, 12.1 km S of Zurmi, 19.6 km S of Guayzimi, along steep stream, 04°31'54"S, 78°33'48"W, 869 m, 19 Apr. 2006, *Thomas B. Croat 97272* (MO, QCNE). El Pangui, Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from the military outpost to Condor Mirador military outpost, 7.1 km S of junction in road to Tandaime, San Marcos and Ecuacoriente copper mine headquarters, 03°36'42"S, 78°28'02"W, 1128 m, 12 Apr. 2006, *Thomas B. Croat 96960* (MO, QCNE).

Anthurium scandens (Aubl.) Engl., *Fl. Bras.* 3: 78. 1878. — *Dracontium scandens*

Aubl., *Hist. Pl. Guiana Franc.* 2: 836. 1775. Type: French Guiana. Drawing by Plumier in *Amer. Nascentium Icon.* tab. 74. 1703. (BM, P.). **Figure 129.**

Pothos violacea Swartz, *Prodr.* 32. 1788. Type: Jamaica, *Swartz s.n.* (not seen).

Dracontium repens Descourt., *Fl. Antill.* 7: i. 499. 1829. Type: (Plate 499 serves as the type.)

Anthurium violaceum (Swartz) Schott, *Melet.* 22. 1832. Type: *Swartz s.n.* (not seen)

Anthurium violaceum forma latifolia Kunth, *Enum. Pl.* 3: 68. 1841. Type: (not seen)

Anthurium violaceum forma angustifolia Kunth, *Enum. Pl.* 3: 68. 1841. Type: (not seen)

Anthurium leucocarpum Schott, *Oesterr. Bot. Wochenbl.* 7: 53. 1857. Type: Mexico. *Schiede* (Photos of Schott Aroid Drawing #279, NYGB Neg. #N.S. 3804 and Schott Aroid Drawing #282, NYBG Neg. #N.S. 3805).

Anthurium dolosum Schott, *Oesterr. Bot. Z.* 8: 179. 1858. Type: Guatemala. Near San Pedro and San Lucia, date?, *Wendland 273* (GOET, lecto; K, isolecto).



Figure 129. *Anthurium scandens* (Aubl.) Engl. (Cornejo 4643; MO-5031472). Herbarium specimen showing stem rooting at nodes, short petioles, leaf blades, adaxial and abaxial surfaces, and inflorescences.



Figure 130. *Anthurium soukupii* Croat (Croat 92272). Live plant showing short petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.



Figure 131. *Anthurium soukupii* Croat (Croat 92272). Close-up view of inflorescence with green spathe and purple spadix with green pistils.

Anthurium rigidulum Schott, *Oesterr. Bot. Z.* 8: 180. 1858. Type: Costa Rica. San José, *Hoffmann 508* (Photo of Schott Aroid Drawing #270, NYBG Neg. #N.S. 3807).

Anthurium virgosum Schott, *Oesterr. Bot. Z.* 9: 100. 1859. Type: Brazil. Rio de Janeiro, *Riedel* (isotype, K).

The species is a member of sect. *Tetraspermium* and is characterized by its small size, epiphytic creeper habit, ovate-elliptic blades with the lower surface conspicuously brown punctate, and its small inflorescences with the spathe pale green and the spadix yellow-green.

Epiphytic creeper; **stems** usually less than 1 m long; **roots** numerous along stem, ca. 3 mm diam., gray-green; **cataphylls** 3–6 cm long, drying brown, weathering to reticulate fibers and persisting around stem. **LEAVES** spreading; **petioles** sharply sulcate, rounded abaxially, 2–8.5 cm long, 2–3 mm diam.; geniculum 2–3 mm long, nearly obscure; **blades** ovate-elliptic to lanceolate-elliptic, moderately thick, (3.5)6–13 cm long, (1.5)2–5 cm wide, short-acuminate at apex, acute to rounded at base; **upper surface** semiglossy, **lower surface** conspicuously brown punctate; **midrib** acutely raised above, diminished and sunken in apical half of blade, convexly raised below; **primary lateral veins** 3–10 per side (sometimes more), departing midrib at 35–40° angle, weakly sunken above, ± obscure above and below; **collective veins** arising

from the base, extending straight to apex, 3–5 mm from margin. **INFLORESCENCE** erect to pendent, shorter than leaves; **peduncle** 1.5–6.5 cm long, 1–1.3 mm diam., equaling or longer than petioles; **spathe** ovate to narrowly ovate, 8–16 mm long, ca. 4 mm wide, reflexed at anthesis, abruptly acuminate at apex, pale green; **spadix** 1.3–2 cm long, 2–3 mm diam. midway, yellow-green, sometimes becoming lavender; **flowers** rhombic, 2–4 mm in both directions, the sides straight to sigmoid; 2–3 flowers visible in either spiral; tepals semiglossy, lateral tepals ca. 1.2 mm wide, the inner margin weakly concave to ± straight; pistil greenish-white, scarcely emergent; stigma brush-like, exserted, ca. 0.2 mm long; stamens emerging in a prompt and complete sequence from the base, held at edge of tepals and inclined over pistil; anthers white; thecae ovate, somewhat divaricate; pollen white. **INFRUCTESCENCE** spreading; **spathe** persisting; **spadix** 2.5–3.5 cm long, to 7 mm diam.; **berries** usually pale violet to almost white, sometimes purple, obovoid, rounded at apex, 5–8 mm wide; seeds 1–2 per locule, pale yellow, ovoid, ca. 2 mm long, 1 mm wide.

Anthurium scandens is known from southern Mexico and the West Indies to southern Brazil, ranging from sea level to 2,700 m. This is the most widespread aroid in the New World and, doubtless, the most ecologically diverse as well, occurring in *Tropical moist forest*, *Premontane wet forest*, *Tropical wet forest*, *Premontane rain forest*, and *Lower montane rain forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, cerca a la cresta de la Cordillera, 1 km al oeste del destacamento militar Cóndor Mirador, cuenca alta del río Tundayme, bosque montano, 03°37'53"S, 78°24'07"W, 1750 m, 16 Dec. 2000, *Wagner Ramírez, David A. Neill, Marco Cerna & Grupo Post-Grado MO-QCNE 83* (MO); *Wagner Ramírez, David A. Neill, Marco Cerna & Grupo Post-Grado MO-QCNE 88* (MO); Parroquia Guayzimi, camino al Hito de Pachicutza desde el Campamento Militar, Bosque muy Húmedo Premontano, Transectos de 50 x 2 m x 10 (0.1 Ha.), 04°07'S, 78°37'W, 1050–1100 m, 19 Oct. 1991, *Carlos E. Cerón, Marcelo Chango & Valdano Tapur 16816* (MO).

Anthurium soukupii Croat, *Ann. Missouri Bot. Gard.* 78: 730. 1991. Type: Peru. Cusco: Urubamba, Machupicchu, 0.5 km N of the union of Río Sayacmarca and Río Aobamba, 13°09'48"S, 72°32'44"W, 2370 m, 13 Oct. 1982, *Bernie Peyton & S. Tilney Peyton 1486* (holotype: MO). **Figures 130 & 131.**

The species is a member of sect. *Multinervia* and is characterized by its elongate stem, subtriangular petiole, oblanceolateelliptic blades with more than 20 primary lateral veins and a collective vein arising from near the base, and by its slightly tapered, purple spadix with 8–11 flowers per spiral.

Terrestrial; **stem** elongate, to 50 cm long, 1.5–2.5 cm diam.; **roots** moderately numerous, dense, white, smooth, thick, more or less elongate; **cataphylls** lanceolate, probably subcoriaceous, to 11 cm long, acute at apex, drying yellowish-tan, persisting as fine linear fibers. LEAVES spreading; **petioles** 6.5–11 cm long, ca. 5–7 mm diam., triangular, flattened adaxially with the margins moderately to sharply raised, sides weakly convex, obtusely rounded to acutely angular abaxially; geniculum not at all or only slightly thicker than petiole when dried, 0.7–1 cm long; **blades** coriaceous, broadly to narrowly oblanceolateelliptic, acute at apex, acute to obtuse at base, (22.5)28–63 cm long, (3.8)4.7–10.7 cm wide, broadest above the middle, the margins straight to weakly undulate; **upper surface** semiglossy, medium green, paler below; both surfaces drying matte, occasionally semiglossy below, green to yellowish; **midrib** convex to roundraised above, sharply acute below; **primary lateral veins** numerous, to more than 20 per side, departing midrib at 50–65° angle, more or less straight, obscure to raised and darker than surface above, flat to weakly raised below; **interprimary veins** numerous, almost as conspicuous as primary lateral veins on both surfaces; **tertiary veins** not visible on either surface; **collective veins** arising from near the base, sometimes in the upper third of the blade, equally as prominent as primary lateral veins on both surfaces when dried, 3–12 mm from margin. INFLORESCENCES erect to spreading; **peduncle** 22–40 cm long, 2–4 mm diam., 2.6–4.2 times as long as petiole,

apparently ribbed abaxially; **spathe** reflexed, subcoriaceous, green, lanceolate, 4.5–8 cm long, 0.7–1.4 cm wide, broadest near the base, acuminate at apex, acute at base; **spadix** dark purple, weakly tapered, stipitate to sessile, ca. 3.5–6 cm long, ca. 4–5 mm diam. near base; stipe to 1 cm long in front, to 3 mm long in back; **flowers** more or less square, 3.1–4.3 mm in both directions, the sides straight to smoothly sigmoid; 5–6 flowers visible in principal spiral, 6–7 in alternate spiral; lateral tepals 2.3–3 mm wide, the inner margins straight, slightly turned up against the pistil, the outer margins 2sided; pistils drying blackened, emergent well above the tepals, green; stigma linear, 0.5–0.6 mm long; anthers pinkish, ca. 0.8 mm long, 1 mm wide; thecae ovoid, slightly divaricate. INFRUCTESCENCE with **spathe** absent; **spadix** 3–13.5 cm long, 0.8–1 cm diam.; **berries** globose, rounded at apex, 3.2–4 mm long, 3.7–4.5 mm diam.; pericarp thickened, with numerous pale raphide cells; mesocarp translucent, gelatinous; seeds 2 per berry, reddish brown, ovoid, flattened, dried 3–3.5 mm long, 2.3–2.4 mm diam., 1.1–1.3 mm thick, enveloped by gelatinous, sticky, amber substance.

Anthurium soukupii ranges from La Paz in Bolivia to ZamoraChinchipe in Ecuador, at 1100–2,400 m in *Subtropical lower montane moist forest*, *Lower montane wet forest*, *Subtropical montane wet forest* and *High montane wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Along road into Cordillera del

Condor departing from Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via Numbaima into Cordillera del Condor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91020* (MO, QCNE). **Zamora-Chinchipe:** Faldas de la Cordillera del Cóndor, sendero desde Pachichutza hacia "el Hito", bosque primario, Bosque muy húmedo Premontano, 04°07'S, 78°34'W, 1300–1400 m, 5 Dec. 1990, *Walter A. Palacios & David A. Neill 6555* (MO, QCNE). PERU. **Amazonas:** Cordillera del Cóndor, Puesto de Vigilancia Alfonso Ugarte (PV 3), cabeceras del Río Comainas, tributario al oeste del Río Cenepa, quebrada abajo del campamento, 03°55'S, 78°25'W, 100–1100 m, 20 July 1994, *Hamilton Beltrán & Robin B. Foster 1074* (MO).

Anthurium toasae Croat, **sp. nov.** Type: Ecuador. Zamora-Chinchipe: Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritzza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, G. Walbert & Tuntiak Katan 91214* (holotype: MO-5864989–90; isotypes: AAU!, B!, CAS!, COL!, F!, GB!, HUA!, K!, M!, MEXU!, NY!, PMA!, QCNE!, SI!, SEL!, US!, USM!, VALLE!). **Figures 132–134.**



Figure 132. *Anthurium toasae* Croat (Croat 96700). Live plant showing leaf blades, adaxial surface.

The species is a member of sect. *Belolonchium* and is characterized by its obpyriform, strongly constricted blades prominently lobed at base, and its inflorescences with a pinkish peduncle, a green, sometimes yellowish blade and a spadix green or sometimes pale yellow-orange at anthesis, becoming red in early fruit.

Terrestrial on steep banks or sometimes epiphytic; **internodes** short,

1.5–4 cm diam.; **cataphylls** 10.8–12.8 cm long, persisting semi-intact at apex, in red-brown net-like reticulum with fragments of epidermis; **petioles** 35.2–70.4 cm long, 3–5 mm diam., medium green, pinkish at base, weakly glossy, obtusely flattened adaxially and narrowly and obtusely sulcate, drying yellowish brown to brown; geniculum 1.8–2.3 cm long, drying slightly darker than petiole; **blades** obpyriform, strongly constricted, 25.2–45.2 cm long, 17.6–36.8 cm wide (averaging 37 X 29 cm, 1.15–1.46



Figure 133. *Anthurium toasae* Croat (Croat 96700). Close-up view of inflorescence with green spathe hooding spadix, and green spadix.



Figure 134. *Anthurium toasae* Croat (Croat 96700). Close-up view of infructescence with orange-yellow berries.

times longer than broad, (averaging 1.30), broadest at the middle of the posterior lobes, 0.6–0.8 times as long as petioles (averaging 0.7), abruptly acuminate at apex (acumen to 3.4 cm), prominently lobed at base, subcoriaceous, moderately bicolorous, dark green, and semiglossy above, moderately paler and glossy below, drying dark brownish-green and weakly glossy above, medium brown and semiglossy below; **anterior lobe** 20–36.9 cm long with acute concave margins in lower half of lobe; **posterior lobes** 8.9–21 cm long, 5.3–13.2 cm wide (averaging 15.6 cm x 9.8 cm), directed outward; **midrib** narrowly raised at base becoming acute by middle, more or less concolorous to paler above, bluntly acute and paler, sometimes 3-ridged below; **primary lateral veins** 8–9 pairs, arising at a 45–50° angle, sunken and concolorous above, the larger narrowly raised in valleys above, narrowly raised to acute and slightly paler below, drying concolorous above and below; **tertiary veins** flattened, not etched above, weakly raised to slightly raised below in part in below; **collective veins** arising 4th pair basal veins, 3–5 mm from margin; **basal veins** 6–7 pairs, 1st pair fused to base to 1 cm, 3rd pair fused 3–5.2 cm (sometimes free to the base), 4th pair fused 4–7.2 cm; **posterior rib** gradually curved, naked 3.1–6.7 cm; **sinus** parabolic (sometimes with a decurrent petiole) to hippocrepiform, 4.5–12.3 cm deep, 8.1–12 cm wide. INFLORESCENCE erect-spreading with **peduncle** pinkish, 25.5–59.7 cm long averaging 39.4 cm, drying narrowly and obtusely sulcate, yellowish brown to brown; **spathe** 9–13.5 cm long, 2–4 cm wide,

ovate-narrow elliptic, adult spathe green or sometimes yellowish, sometimes tinged pink, straight with peduncle, hooding spadix, glossy outside, semiglossy inside; **spadix** weakly glossy, green or sometimes pale yellow-orange at anthesis, red in early fruit with tepals violet-purple; **flowers** 5–7 visible per spiral, 2–2.7 mm long, 1.8–2.4 mm wide; tepals 1.3–1.4 mm wide, inner margin rounded, outer margin 2-sided; the pistils somewhat emergent, faintly violet-purple, semiglossy toward apex where no stamens are emergent, matte toward base; stamens displayed closely round the stigma at apex of tepals; anthers 0.5 mm long, 0.4 mm wide; thecae weakly divaricate; pollen white. INFRUDESCENCE bright red, 13 cm long, to 2.0 cm diam.; **berries** obovoid, pale orange-yellow to pale orange, 4–5 mm long, 3–3.5 mm diam., pale-yellow at anthesis; **seeds** 1–2, creamy-colored, elliptical, 2.5 mm wide x 2.0 mm wide.

Anthurium toasae is known only from Ecuador in Morona-Santiago and Zamora-Chinchipe at 792–2500 m, mostly at 1000–1350 m, in *Premontane moist forest* to *Premontane wet forest* life zones.

In the Lucid *Anthurium* key, *Anthurium toasae* maps to *A. jamboense* Croat which also occurs primarily in the Cordillera del Cóndor region, but the latter differs by its blades drying grayish brown above, yellowish red below and by its spadix light green at anthesis, red in early fruit.

Two collections (*Croat 96895A* from the Río Waiwaime and *Croat 97071* from the Río Chuchumbleza) may also be *A. toasae* but differ in having cataphylls that do not persist as fibers but are rather mushy and semi-persistent. In addition, the lower blade surfaces are moderately smooth, lacking the rather prominulous tertiary venation of most *A. toasae* specimens.

Croat 72698, a collection from the Zamora-Loja highway at the Río Zamora bridge at 1610 m is similar to *A. toasae* but differs in drying darker brown and by having the collective veins arising from the lowermost basal veins.

The species is named in honor of Ecuadorian botanist Germán Toasa who made the first collection of the species in Morona-Santiago.

Paratypes: ECUADOR. **Morona-Santiago:** Along road between Limón and Gualaquiza, 31.5 km S of Plan de Milagro (jct. with Limón-Gualaceo Rd.), 25.3 km S of Indanza, 5.4 km S of San Juan Bosco, 24.7 km N of Tucumbatza, 03°08'18"S, 78°33'18"W, 2500 m, 23 May 2003. *Thomas B. Croat & Mark Menke 89314* (MO, QCNE). **Zamora-Chinchi:** Along road from Namirez on Río Zamora and Nambija, 17.9 km E of Río Zamora, 04°03'57"S, 78°47'36"W, 1790 m, 19 July 2004, *Thomas B. Croat 91526* (CAS, COL. CR, F, M, MO, PMA, PSO, QCNE, SEL, VALLE); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza) and Cordillera del

Cóndor, 6.8 km E of Paquisha at Río Nangaritza, 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Mark Menke 89530* (AAU, B, CAS, COL, F, GB, H, HUA, K, M, MO, MEXU, NY, PMA, QCNE, S, SEL, US, USM, VALLE).

Anthurium triphyllum Brongn. ex Schott, *Prodr. Syst. Aroid.* 548. 1860. Type: Bolivia. La Paz: Yungas, 1000–2000 m, *d'Orbigny 412* (holotype: P; photo, SEL). **Figures 135–137.**

Anthurium neblina G.S. Bunting, *Acta Bot. Venez.* 10(1–4): 273. 1975. Type: Venezuela. Terr. Fed. Amazonas, Cerro de la Neblina, Río Yatua, Camp 4, 1250, m, *B. Maguire, J. Wurdack & G. Bunting 36933* (holotype, NY).

Anthurium pastazae Sodiro, *Revista Chilena Hist. Nat.* 9: 278. 1905. Type: Ecuador. Pastaza, *L. Sodiro s.n.* (holotype, B, photo F, US).

The species is a member of sect. *Dactylophyllum* and is characterized by its trisect blades with all segments attenuated at the base, by a peduncle approximately half as long as the petiole and by a creamy white to green spadix. The medial and lateral lobes are ovate-elliptic and broadest at the middle. The medial lobes are characterized by 7–10 primary veins that depart the midrib at a 45° angle and a collective vein that arises in bottom third of lobe and runs along margin 1–4 mm from the margin. The

lateral lobes are more or less equilateral and are characterized by primary lateral veins that initially depart midrib at 90° angle, then sweep more and more upward until the final primary vein is nearly parallel to midrib.

Epiphytic (occasionally hemiepiphytic) or terrestrial; **stems** to 1 m long, 1.5–3 cm diam.; **internodes** elongate to 10 cm long, 0.6–4 cm diam., medium to dark green, matte to semiglossy; **cataphylls** 18–30 cm long, 6–10 mm diam., soft, pale to dark green, coriaceous, marcescent, matte-subvelvety, unribbed or sharply 1-ribbed, mostly deciduous, only pale fibers persisting semi-intact at nodes or as few, pale, fine fibers at base; **LEAVES** with **petioles** 27–83 cm long (averaging 53 cm), finely ribbed, subterete to terete, obtusely and narrowly sulcate, slightly thicker than broad, medium to dark green, purplish violet tinged, matte to weakly glossy to semiglossy, at times weakly flattened adaxially, faintly ribbed abaxially, obscurely sulcate on geniculum; geniculum pale green, very swollen; **blades** trisect with medial lobes slightly longer and wider than lateral lobes, 15–56 cm long, 15–65.9 cm wide (averaging 35.8 x 42 cm), approximately 0.85 times as long as wide, 0.5–1.0 times longer than petiole but averaging 0.7 times as long as petiole, subcoriaceous, dark green and semiglossy to glossy (occasionally matte) above, moderately paler, weakly to moderately bicolorous and semiglossy below; **medial lobes** ovate-elliptic, acute to cuspidate at apex, acute at base, broadest at the middle, 15–56 cm long, 5.2–23.5 cm wide (averaging 36 x 13 cm); **lateral lobes**

ovate-elliptic falcate, ranging from bluntly acute to occasionally cuspidate at apex, acute at base, broadest at the middle, nearly equal, 16–46 cm long, 5.2–19 cm wide (averaging 32 x 11 cm); **midrib** weakly sunken and concolorous above, raised convexly and darker below; **primary lateral veins** 7–10 per side, on medial lobe departing midrib at approx. 45° angle, weakly sunken and concolorous above, bluntly raised and darker below, on lateral lobes first 2–3 veins extending to margin, remaining veins extend to collective vein; interprimary veins etched and concolorous above, weakly raised below; **tertiary veins** partly conspicuous above, weakly raised below; **collective veins** arising in lower third of lobe, extending along margin at inset of 1–4 mm. **INFLORESCENCE** erect; **peduncle** 8.5–41 cm long (averaging 23.9 cm), half as long as petiole, terete, medium green (sometimes purplish violet), matte to mattte-subglistening, weakly sulcate adaxially toward apex; **spathe** cylindroid, 4.7–17.5 cm long (averaging 11.4 cm), 0.7–4 cm wide (averaging 2.0 cm), reflexed-spreading and twisted, incurled along margins, light to medium green, turning brownish in fruit, brittle, matte to weakly glossy on both surfaces; **spadix** 4.5–26.5 cm long (averaging 14.4 cm), 0.4–2 cm diam. (averaging 1 cm), white, greenish-white, pale yellow-green, pale to dark green, dark gray-green or olive-green, matte to semiglossy, sometimes yellow-green to green toward apex and creamy white toward. **INFRUCTESCENCE** erect; **tepals** brown and semiglossy; stamens prominently exerted at anthesis, whitish; pollen pale



Figure 135. *Anthurium triphyllum* Brongn. ex Schott (Croat *et al.* 86532). Live plant showing leaf blades, adaxial surface.

yellow; **pistils** green, weakly emergent, soon emerging, **fruits** medium green, immature, early protruding, acute at apex.

Anthurium triphyllum ranges from Ecuador (Morona-Santiago, Napo, Pastaza, Tungurahua, Zamora-Chinchipe) to Peru (Amazonas, Cajamarca, Cusco, Huanuco, Loreto, Madre de Dios, Pasco, San Martín) and Bolivia (Cochabamba, La Paz), and is also found in southern Venezuela (Amazonas) at 150–3100 m in *Tropical moist forest*, *Premontane moist forest*, *Premontane wet forest* and *Lower montane moist forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Región de la Cordillera del Cóndor, Parroquia San Carlos, Warints, comunidad Shuar, al campamento de la expedición, 03°10'06"S, 78°15'29"W, 800–1000 m, 11 Dec. 2011, *Tuntiak Katan, John L. Clark, Wilson Quizhpe & Elsa R. Toapanta* 77 (MO, QCNE); Gualaquiza, Cordillera del Cóndor, Cuangos, 20 km east of Gualaquiza, near disputed Peru-Ecuador border, 03°29'S, 78°14'W, 1500–1600 m, 17 July 1993, *A.H. Gentry* 80024 (MO, QCNE); Cordillera del Cóndor, Valle del Río Quimi, Orillas del Río Quimi, 03°30'24"S,



Figure 136. *Anthurium triphyllum* Brongn. ex Schott (Croat *et al.* 86532). Live plant showing petioles and leaf blades, abaxial surface.



Figure 137. *Anthurium triphyllum* Brongn. ex Schott (Croat et al. 86532). Close-up view of inflorescences with light green spathe and white spadix.

78°25'35"W, 1090 m, 13 Dec 2000, *Cuascota & Post-Grado MO-QCNE 286* (QCNE, MO); Limon Indanza, Cordillera del Cóndor, Trail from Shuar village, Warints, towards crest of Cordillera del Cóndor, ca. 10–15 km S/SE of Warints, 03°13'S, 78°15'W, 830–1200 m, 17 Dec 2002, *John L. Clark 7072* (MO, QCNE, US). **Zamora-Chinchipe:** Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from the military outpost to Condor Mirador military outpost, 7.1 km S of junction in road to Tandaime, San Marcos and Ecuacoriente

copper mine headquarters, 03°36'42"S, 78°28'02"W, 1128 m, 12 Apr. 2006, *Thomas B. Croat 96961* (MO, QCNE); Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan 91199* (MO, QCNE); Río Nangaritza, Destacamento Militar de Miasi, 04°20'S, 78°40'W, 950 m, 22 Oct 1991, *J. Jaramillo 14320* (NY); Cordillera del Cóndor, Campamento Pachicutza along Río

Nangaritza, lower part of trail to El Hito, 04°07'S, 78°37'W, 900–1200 m, 22 Feb 1994, *van der Werff & E. Freire 13346*; Río Nangaritza, trail from Shaime to Mariposa, Río Nangaritza, 920 m, 21 Nov 1996, *Van den Eynden et al. 846* (MO); Río Nangaritza, centro Shuar Shayme, 04°19'05"S, 78°40'08"W, 930 m, 12 Apr 1996, *Van den Eynden et al. 668* (MO); Los Encuentros-El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, *Croat & Menke 89484* (MO, Q); Along road from Quime Ferry crossing into Cordillera del Cóndor, 22 km above Río Zamora, in a southward direction, along creek at old military camouflage sheds, 03°37'46"S, 78°26'17"W, 1489 m, 14 July 2004, *Croat et al. 91060* (MO, QCNE); Along road from near Paquisha S to Las Orchídeas and end of road on Río Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, vic. of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 91297 (GB, MO, QCNE); Región de la Cordillera del Cóndor. Cuenca alta del Río Nangaritza. Comunidad Shuar de Miazzi, río abajo de la confluencia del Río Chumbiriatza y el Río Nangaritza. Bosque Muy Húmedo Premontano, *Croat et al. 91297* (GB, MO); Namiera-Nambija, along mining road, 10 km S of Namirez and Río Zamora, vic. of Nambija, along road to mine headquarters ca. 5 km long, just S of Nambija, 04°03'44"S, 78°47'29"W, 1779 m, 23 Jul 2004, *Croat 92055* (COL, CR, CUVC, F, K,

MEXU, MO, NY, PMA, QCNE, S, US, USM); Vic. of mining camp at Río Tundaime, along road to military base El Cóndor, 03°37'31"S, 78°26'26"W, 1000 m, 5 Nov 2004, *van der Werff et al. 19344* (MO); Nangaritza, Parroquia, Zurmi, Comunidad Centro Shaime (along Río Nangaritza), forest 2–4 km NW of Centro Shaime, 04°04'S, 78°54'W, 1000 m, 15 Dec 2001, *Clark & Terry 6534* (MO, QCNE, QCA, US); Shaimi, Alto Nangariza, 950 m, 6 Nov 2004, *Werner 1339* (MO); Cordillera del Cóndor, Shaime, Frente a destacamento Militar, Río Nangaritza, 04°18'S, 78°43'W, 930 m, 27 Oct 1991, *Palacios et al. 8719* (MO); Pachicutza, trail to Hito, 04°07'S, 78°37'W, 900 m, 18 Oct 1991, *Palacios et al. 8253* (MO); Río Nangaritza, Pachicutza, 04°07'S, 78°37'W, 900 m, 03 Dec 1990, *Palacios & Neill 6467* (MO); *Palacios & Neill 6494* (MO); Miazzi, along Río Nangaritza, 04°18'S, 78°40'W, 850 m, 29 Jul 1993, *A.H. Gentry 80663* (MO); Zamora, Cordillera de Nanguipa, along road to Cerro Colorado, ca. 6 km S of Nambija, 20 km SE of Zamora, 04°05'51"S, 78°47'43"W, 1930 m, 19 Feb 2002, *Delinks 1369* (MO, QCNE); *Delinks 1390* (MO, QCNE); Palanda, Región de la Cordillera del Cóndor, sector sur. Parroquia San Francisco de Vergel, Playones, Río Vergel, 04°43'01"S, 78°57'47"W, 1800–2100 m, 13 Mar 2005, *Quizhpe et al. 1027* (LOJA, MO); Cordillera del Cóndor region, Parroquia Zurmi; vicinity Las Orquideas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, *Thomas B. Croat 97147* (MO, QCNE); Along



Figure 138. *Anthurium truncicola* Engl. (Croat 101043). Live plant showing leaf blade, adaxial surface.

Río Nangaritza, between Las Orquídeas and Miasi, 04°17'53"S, 78°39'00"W, 872 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98779* (K, MO, NY, QCNE); Vicinity of Las Orquídeas, in forest across from Cabañas Yankuam, 04°15'05"S, 78°39'29"W, 870–890 m, 15 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98609* (COL, HUA, MO, , QCNE, UB); Región de la Cordillera del Cóndor, Cuenca alta del Río Nangaritza, Comunidad Shuar de Miasi, río abajo de la confluencia del Río Chumbiriatza y el Río Nangaritza, Bosque Muy Húmedo Premontano, 04°16'54"S, 78°37'56"W, 900 m, 17 July 2003, *Wilson Quizhpe, F. Santín, O. Jadán & R. Chuinda 669* (MO, QCNE). PERU. **Amazonas.** Cóndorcanqui, Cordillera del Cóndor, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), Cabeceras del Río Comainas, tributario W of Río Cenepa, Cuchillo atrás del campamento, 03°53'35"S, 78°25'30"W, 1200 m, 15 July 1994, *Beltrán & Foster 805* (MO, USM); Río Cenepa, Cordillera del Cóndor, Puesto de Vigilancia Alfonso Ugarte (PV 3), cabeceras del Río Comainas, tributario W of Río Cenepe, 03°55'S, 78°25'W, 1000–1100 m, 20 July 1994, *Beltrán & Foster 1103* (MO).

Anthurium truncicola Engl., *Bot. Jahrb. Syst.* 25: 452. 1898. Type: Ecuador. Pichincha: forests of Nanegal and Mindo, L. Sodiro 44 (holotype, B). **Figure 138.**

Anthurium marginatum Sodiro, *Anales Univ. Centr. Ecuador* 20: 97. 1905. Type: Ecuador. Pichincha: Nanegal, Sodiro.

s.n. (QPLS, lectotype, designated by Carlsen & Croat, 2007)

Anthurium platyglossum Sodiro, *Anales Univ. Centr. Ecuador* 15: 18. 1901. Type: Ecuador. Napo: Cuyuja-Baeza, L. Sodiro s.n. (Holotype: QPLS).

The species is a member of sect. *Semaephyllum* and is characterized by its generally sprawling habit, coriaceous 3lobed blades, and the inflorescence equaling or longer than the petioles with the spathe and spadix green.

Appressed climber or terrestrial and somewhat scandent; **stems** to 1 m or more; **internodes** (1–5)7–30 cm long; **cataphylls** promptly deciduous. LEAVES with **petioles** 30–70 cm long, 4–6 mm diam., dark green, sheathed 9–11 cm long; geniculum 2–2.5 cm long, darker than the remainder; **blades** trilobed, 35–40 cm long, to 38 cm or more wide at the basal lobes, coriaceous, dark green and glossy above, drying blackened, paler and semiglossy below, drying grayish black, **medial lobe** ovateelliptic, 8–11.5 cm wide, acute to acuminate at apex, broadly confluent with the lateral lobes; **lateral lobes** ovate to oblongelliptic 2/3 to 3/4 as long as medial lobe, 21–28 cm long, 7–9 cm wide, acute to acuminate to narrowly rounded at apex, markedly inequilateral tapered to a bluntly rounded apex, mostly more or less elliptic, rarely oblong, usually several times longer than wide, rarely as little as 1.4 times longer than wide; **midrib** concolorous and weakly raised above, darker than surface and

more prominently raised beneath; **primary lateral veins** 11–15 pairs in medial lobe, arising at a 30° angle; **basal veins** 4–5 pairs, the 1st free to the base, the 2nd coalesced 1–2 cm, the 3rd & 4th coalesced 2.5–7 cm; **collective veins** arising from the 1st pair of basal veins. INFLORESCENCE spreading; **peduncle** 25–80 cm long, 5–10 mm diam., terete, circumferentially striate, equal to or one-fourth longer than the petioles; **spathe** linearlanceolate, 13–28 cm long, 2–3 cm wide, subcoriaceous, green, inserted at 30° angle, acute at apex, the margins meeting at base at an acute angle, decurrent; **spadix** 10–23 cm long, 3–8 mm diam., stipitate 7–15 mm, green; **flowers** quadrangular, 3 mm diam., 9 visible per spiral; tepals 2 mm wide, the inner margins convex; stamens to 1.9 mm long, not exerted; anthers cream.

Anthurium truncicola ranges from Colombia (Caquetá, Cauca, Putumayo) to Peru (Amazonas, Cajamarca, Huanuco, Junin, Loreto, Pasco, San Martín) at 180–2200 m in a *Lower montane wet forest* or *Premontane wet forest* life zone. In Ecuador it is one of the relatively few species that occur on both sides of the Andes.

The species is highly variable throughout its range, especially in the degree of lobing of the blades. Generally, the lateral lobes are somewhat falcate and directed toward the apex. The lobes may be slender and narrowly pointed to about equally wide throughout most of their length.

Palacios et al. 6478 & 8195 from the Cordillera del Cóndor (Zamora-Chinchipe: Nangaritza Cantón at Pachicutza on the Río Nangaritza) have scarcely any development of lateral lobes, sometimes represented by a bulging out of the blade margin about one-third the distance up from the base, sometimes with a short lobe about 5 cm long, and may represent a different variety of this species.

Specimens seen: ECUADOR. **Morona-Santiago:** Cerro Winchinkian, the north-easternmost spur of the Cordillera del Cóndor, along Ecuador-Peru border, 3 km south of Río Santiago, 03°05'24"S, 77°57'10"W - 03°05'24"S, 77°57'10"W, 1100 m, 18 Aug. 2002, *David A. Neill & et al.* 14039 (MO, QCNE); Summit of Cerro Winchinkian, the north-easternmost spur of the Cordillera del Cóndor, along Ecuador-Peru border, 4 km south of Río Santiago, 03°05'28"S, 77°56'54"W - 03°05'28"S, 77°56'54"W, 1400 m, 19 Aug. 2002, *David A. Neill & et al.* 14062 (MO, QCNE); Cordillera del Cóndor, densely forested ridge on sandstone substrate, south of Río Warints, east of main ridge of Cordillera del Cóndor, 03°13'54"S, 78°15'10"W - 03°13'54"S, 78°15'10"W, 1190 m, 13 Dec. 2002, *David A. Neill & et al.* 14127 (MO, QCNE); Los Encuentros, on limit to prov. Zamora, at Río Zamora, primary rain forest, 03°45'21"S, 78°38'48"W, 840 m, 26 Sep. 1967, *Benkt Sparre* 19020 (MO, S). **Zamora-Chinchipe:** Cordillera del Cóndor region, vicinity of Ecu-Corriente copper mine development, valley of Río Waiwaime, along road to mine site, 8.2 km from mine

headquarters 5.2 km from locked gate, 03°34'51"S, 78°25'53"W, 1298 m, 9 Apr. 2006, *Thomas B. Croat 96807* (MO, PMA, QCNE); Along road from Tundaime to Condor Mirador, 19.4 km from main junction in road near military post, 03°38'00"S, 78°26'08"W, 1479 m, 20 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98903* (MO, QCNE); Cordillera del Cóndor, near Cóndor Mirador military post, on Ecuador-Peru border, 03°38'20"S, 78°23'29"W, 1760 m, 8 Sep. 2003, *David A. Neill, Eric F. Rodríguez Rodríguez, Wilson Quizhpe & Jürgen Homeier 14510* (MO, QCNE); Río Nangaritza. Pachicutza, Bosque muy húmedo Premontano, 04°07'S, 78°37'W, 900 m, 3 Dec. 1990, *Walter A. Palacios & David A. Neill 6478* (MO); Río Nangaritza, Pachicutza, camino al hito de Pachicutza, 04°07'S, 78°37'W, 900–1000 m, 18 Oct. 1991, *Walter A. Palacios & et al. 8195* (CM, MO); Along road from Namirez on Río Zamora and Nambija, 17.9 km E of Río Zamora, 04°03'57"S, 78°47'36"W, 1970 m, 19 July 2004, *Thomas B. Croat 91527* (GB, MO); Cordillera de Nanguip., along road to Cerro Colorado, about 6 km south of Nambija, 20 km southeast of Zamora., cloud forest on slopes, 04°05'51"S, 78°47'43"W, 1930 m, 19 Feb. 2002, *Tom Delinks 1363* (MO, QCNE); *Tom Delinks 1392* (MO, QCNE); *Tom Delinks 1399* (MO, QCNE); Región de la Cordillera del Cóndor, sector sur. Parroquia San Francisco de Vergel, Playones, Cuenca alta del Río Vergel, Bosque muy húmedo montano bajo, 04°43'01"S, 78°57'47"W, 1880–2200 m, 17 Mar. 2005, *Wilson Quizhpe, Byron Medina, C. Aguirre & M. Prado 1141* (LOJA, MO).

PERU. **Amazonas:** Cordillera del Cóndor, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), Cabeceras del Río Comainas, tributario al oeste del Río Cenepa, valle abajo del campamento, 03°55'00"S, 78°25'24"W, 1000–1100 m, 19 July 1994, *Hamilton Beltrán & Robin B. Foster 1101* (F, USM); Cordillera del Condor, Puesto de Vigilancia Alfonso Ugarte (PV 3), cabeceras del Río Comainas, tributario al oeste del Río Cenepa, valle abajo del campamento, borde de quebrada con roca enormes, y adentro bosque intacto, muy húmedo, en la base de las pendientes, 03°55'S, 78°25'W, 1000–1100 m, *Hamilton Beltrán & Robin B. Foster 1122* (MO).

Anthurium uleanum Engl., *Pflanzenr.* IV. 23B(Heft 21): 74. 1905.

Anthurium uleanum var. **uleanum**. Type: Brazil. Amazonas: Río Jurua Mirim ("Miry"), Aug. 1901, *Ule 5731* (HT: B; IT: G, MG). **Figures 139 & 140.**

Anthurium tenuispadix Engl., *Pflanzenr.* IV. 23B(Heft 21): 73. 1905. Type: Brazil. Amazonas: Río Jurua Mirim ("Miry"), Aug. 1931, E. *Ule 5597* (holotype, B; iso, G, MG).

Anthurium tessmannii K. Krause, *Notizbl. Bot. Gart. Berlin-Dahlem* 9:260. 1925. Type: Peru. Loreto: Prov. Requena, Cumaria, Río Ucayali, 225 m, G. *Tessmann 3351* (holotype, B).



Figure 139. *Anthurium uleanum* Engl. var. *uleanum* (Croat 62498). Live plant showing base of plant, petioles, leaf blades, adaxial and abaxial surface, and inflorescence.



Figure 140. *Anthurium uleanum* Engl. var. *uleanum* (Croat 62498). Close-up view of inflorescence with pale green spathe and white spadix.



Figure 141. *Anthurium valenzuelae* Croat (Camp 1308; MO-2745950). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescences.

The species is a member of sect. *Pachyneurium* and is characterized by its long-petiolate, brown-drying leaves, long peduncle, spreading green spathe and slender, mostly pale purple, glaucous spadix.

Epiphytic; **stem** to 15 cm long, ca. 2.5 cm diam.; **roots** dense, green to whitish, smooth to velutinous, 2–5 mm diam.; **cataphylls** lanceolate, straight to curved, subcoriaceous, 2–11.5 cm long, acute to acuminate at apex, drying reddish brown, persisting semi-intact, weathering to reticulate fibers, apex sometimes remaining semi-intact. **LEAVES** erect-spreading; **petioles** (3)10–36 cm long, 2–10 mm diam., D-shaped, sulcate adaxially with medial rib and acute margins, rounded or 2–7-ribbed abaxially; sheath 2.5–6 cm long; geniculum shaped like petiole, paler and thicker, 0.3–2 cm long; **blades** subcoriaceous, oblong-elliptic to oblong-oblancheolate to obovate, acute to acuminate at apex (the acumen flat), attenuate to acute at base, rarely truncate or subcordate, 20–65 cm long, 5.5–24 cm wide, broadest at or above the middle, the margins broadly undulate; **upper surface** semiglossy, medium green, drying gray to greenish brown, **lower surface** matte to semiglossy, slightly paler, drying greenish to gray-green to brown; **midrib** acutely raised above, acutely to obtusely or convexly raised below; **primary lateral** veins 5–11 pairs, departing midrib at 30–85° angle, straight to arcuate to the margin, acutely raised; **tertiary veins** prominulous, raised on both surfaces on drying; **collective veins** arising from near the apex or absent, rarely from below the

middle, sunken above, prominulous below, 4–8 mm from margin. **INFLORESCENCES** erect to spreading or spreading-pendent, usually shorter than leaves; **peduncle** 14–38 cm long, 3–6 mm diam., rarely less on drying, 0.5–3.7(6) times as long as petioles, terete, firm, flexible; **spathe** spreading to reflexed, rarely erect, subcoriaceous, matte abaxially, medium to pale green, sometimes tinged with red at margins, lanceolate to oblong-lanceolate, 3.5–14 cm long, 0.6–2.7 cm wide, broadest near the base, inserted at 30–50° angle on peduncle, acute to acuminate at apex (the acumen in-rolled), acute to obtuse (sometimes decurrent 5–17 mm) at base; **stipe** 3–7 mm long in front, 2–5 mm long in back; **spadix** usually pale reddish to purplish, sometimes white to pale green, usually appearing glaucous, cylindroid to slightly tapered, curved, erect, (3)5–15 cm long, 3–5 mm diam. midway, 2–3 mm diam. near apex; **flowers** rhombic to 4-lobed, scarcely distinguishable, margins obscure, 1.8–2.5 mm long, 1.7–2.5 mm wide, the sides straight to jaggedly sigmoid; 6–10 flowers visible in principal spiral, 6–8 in alternate spiral; tepals matte, weakly papillate, pale olive; lateral tepals (0.5)2–2.2 mm wide, the inner margins broadly rounded to straight, the outer margins 2–3-sided; pistils weakly raised, not emergent, white to pale pinkish; stigma ellipsoid, 0.3 mm long; stamens emerging promptly in a regular sequence from the base, held well above the tepals then retracting to the tepal level, the laterals preceding the alternates by ca. 4–5 spirals, the 3rd stamen preceding the 4th by ca. 2 spirals; anthers white to pinkish,

0.4 mm long, 0.4–0.5 mm wide, inclined over and obscuring the pistil; thecae oblong, divaricate or not; pollen pale yellow, drying white. INFRUCTESCENCES pendent; **spadix** to 25 cm long, 1 cm diam.; **berries** reddish violet, 5 mm long, 2–4 mm diam.; **seeds** 1–2 per berry, 2.2–2.5 mm long, 0.8–0.9 mm thick, 1.2–1.3 mm wide.

Anthurium uleanum is endemic to the upper Amazon basin, ranging from Ecuador and southern Colombia (Meta, Amazonas, and Vaupes), to Peru (Loreto, Huanuco, Amazonas, and Ucayali), and western Brazil (Acre and Amazonas). It occurs below 550 m in *Tropical moist forest*, *Premontane wet forest*, and *Subtropical wet forest* life zones.

Specimen seen: PERU. **Amazonas**: Cordillera del Cóndor, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), cabeceras del Río Comainas, tributario al oeste del Río Cenepa, subiendo cuchillo al oeste del campamento, 03°54'30"S, 78°25'40"W, 1200–1400 m, 25 July 1994, *Hamilton Beltrán & Robin B. Foster* 1235 (F, USM).

Anthurium valenzuelae Croat, *Aroideana* 35: 76. 2012. Type; Peru. Cusco: Calca, Quebrada Yantile, camino a Lacco, in primary moist forest, 12°38'51"S, 72°15'13"W. 2425 m, 23 Feb. 2004, *L. Valenzuela, E. Suclli, I. Huamantupa, A. Carazas* 2866 (holotype: MO; isotype: NY!, US!, K!). **Figure 141.**

The species is a member sect. *Xialophyllum* and is characterized by its long, reddish-brown-drying, strap-like blades, and its inflorescences with the spathe green or reddish and the spadix red to violet.

Epiphytic vine to 1.5 m tall; **internodes** longer than wide, 1–3 cm long, 0.4–0.8 cm diam.; **cataphylls** persisting as fibers with apex acute, 2–8 cm long, drying reddish brown. LEAVES 27.3 cm long with **petioles** terete, 3.5–23 cm long (average 7.3 cm), diam 0.2–0.3 cm diam., weakly sheathed, shallowly and broadly sulcate; geniculum 0.5–1 cm long, drying darker than petiole; **blades** green, lanceolate to linear-lanceolate, acuminate at apex, obtuse at base, with straight margins 9–35 cm long (average 20.8 cm), 1.2–6 cm wide (average 2.8 cm), 3.5–12.5 times longer than broad (average 7.8), 1.3–7 times longer than petiole (average 3.1), drying medium to dark reddish brown, semi-glossy above and below, glandular punctations are lacking on both surfaces but many specimens have white pustules on the lower surface; **midrib** red, drying sunken above, prominently raised, bluntly acute below; **primary lateral veins** 11–21 pairs (average 14), arising at 45–60° angle, drying finely raised, slightly rounded, more conspicuous on lower surface; **collective veins** arising from the base and running 2–3 mm from margin, conspicuous on both surfaces; **tertiary veins** conspicuous below, less conspicuous above. INFLORESCENCE erect; **peduncle** terete, 5–33 cm long (average 17), **stipe** 0.2–2(3,8) cm long; **spathe** green or reddish, spreading, lanceolate, 3–7 cm long,

0.3–1.2 cm wide, acuminate at apex, drying dark brown; **spadix** erect, red to violet, 2.4–15 cm long (average 7.3 cm), 0.3–0.5 cm wide, cylindroid, tapered, drying dark brown, 3–5 **flowers** visible per spiral, 1.8–3.4 mm long, 1.5–2.4 mm wide, tepals outer margins 2-sided, inner margin broadly rounded. lateral tepals 0.8–1.8 mm wide.

Anthurium valenzuelae ranges from Ecuador (Morona-Santiago and Zamora-Chinchipe to Peru (Cajamarca, Cusco, Pasco) at 900–2800 m in a *Premontane wet forest* life zone.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera de Huaracayo, east of Cordillera del Cóndor and Río Coangos, forest on sandstone ridge, east of Shuar village of Tinkimints, 03°15'44"S, 78°12'01"W, 1380 m, 25 Mar. 2001, *David A. Neill & José M. Manzanares 13202* (MO, QCNE); Cordillera del Cóndor, wet cloud forest on sandstone ridge, south of Río Warints, east of main crest of Cordillera del Cóndor, 03°14'03"S, 78°17'10"W, 1950 m, 14 Dec. 2002, *David A. Neill & et al. 14134* (MO, QCNE). **Zamora-Chinchipe:** Shaimi, SE de Campamento Militar, Márgen derecha de Río Nangaritza, bosque primario sobre pendientes 45%, rocas calizas aflorando, 04°18'S, 78°43'W, 930 m, 27 Oct. 2001, *Walter A. Palacios, I. Vargas & Efraín Freire 8765* (MO); Campamento Shaime, along Río Nangaritza, forest on calcareous rock, 04°20'S, 78°40'W, 900 m, 14 Feb. 1994, *H. van der Werff, Bruce Gray, Efraín Freire & Milton Tirado 12991* (MO); Shaime, sendero hacia el Hito, Bosque intervenido,

suelo franco-limoso, 04°22'S, 78°42'W, 900–1200 m, 27 Oct. 1991, *Jaime L. Jaramillo 14448* (QCA).

Anthurium variegatum Sodiro, *Anales Univ. Centr. Ecuador* 15(108): 13. 1901. Type: Ecuador. Napo: Papallacta-Cuyujua,, *L. Sodiro s.n.* (holotype, QPLS; iso, B[†]) (photo: F), Q). **Figures 142 & 143.**

The species is a member of sect. *Belolonchium* and is characterized by its short internodes, persistent, semi-intact cataphylls, narrowly triangular-sagittate blades and especially by its purple spathe with greenish lines and the usually purplish spadix with prominently exerted stamens.

Terrestrial or epiphytic; **internodes** short, 1.5–3.5 cm diam.; **cataphylls** 5–12 cm long, persisting semi-intact, red-brown. LEAVES subcoriaceous; **petioles** obtusely flattened adaxially, weakly and obtusely sulcate, weakly glossy, medium green, often tinged maroon or violet-purple, 24–74 cm long, 2–8 mm diam.; **blades** sagittate, oblong-triangular, usually widest at the base, long-acuminate at apex, 16–54 cm long, 4.5–27 cm wide, averaging 37 x 15 cm, 1.8–4.7 times longer than wide, 0.6–1.0 times as long as petioles, subcoriaceous, dark green and matte-subvelvety above, paler and matte or semiglossy below; **midrib** narrowly raised and concolorous above, narrowly raised and slightly paler below; **primary lateral veins** 9–14 pairs, rising at a 50–70° angle and then curving upwards, deeply



Figure 142. *Anthurium variegatum* Sodiro (Croat 100921). Live plant showing leaf blade, adaxial surface.



Figure 143. *Anthurium variegatum* Sodiro (Croat 100921). Close-up view of inflorescence showing spathe dark purple with pink veins, and purple-violet spadix.

quilted-sunken and concolorous above, narrowly raised and concolorous below; **tertiary veins** in part weakly sunken above, weakly raised below; **collective veins** arising from 1st–3rd pair of basal veins, 2–4 mm from margin; **basal veins** 4–5(6), 1st pair free to base, the remainder coalesced to various degrees and regularly branching from the posterior rib; **posterior rib** thick, broadly curved, naked 1–4 cm; **sinus** semi-circular to hippocrepiform or spatulate.

INFLORESCENCES erect-spreading; **peduncle** 12–55 cm long, 2–4 mm diam., sometimes dark-violet purple; **spathe** ovate, acuminate at apex, often hooding, 7–21 cm long, 1.8–4.7 cm wide, 1.2–4.5 times shorter than peduncles, usually dark violet-purple or purple with green, yellow or pink veins; **spadix** stipitate 7–22 mm, white, greenish white, yellow-green, red or most often purple-violet, 4.5–18 cm long, 6–16 mm diam., **stamens** white, strongly exserted.



Figure 144. *Anthurium versicolor* Sodiro (Croat 87255). Live plant showing leaf blades, adaxial surface, and inflorescence with green spathe and green spadix.

INFRUTESCENCES erect; **fruits** green with persisting style.

Anthurium variegatum ranges from Ecuador (Loja, Morona-Santiago, Napo, Pastaza, Sucumbíos, Tungurahua, Zamora-Chinchipe) to Peru (Amazonas, Cajamarca, Pasco), at 500–2600 m elevation in *Montane moist forest*, *Montane wet forest*, *Premontane wet forest*, *Lower montane wet forest*, *Premontane rain forest* and *Lower montane rain forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Condor Mirador, provisional old botanical garden near road, along old ill-defined trail to summit, on right side below current landslide blocking road, 03°38'12"S, 78°25'49"W, 1400 m, 23 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 99116* (MO, QCNE).

Anthurium versicolor Sodiro, *Anales Univ. Centr.* Ecuador 15(108): 13. 1901. Type: ECUADOR. Napo: Rio Masfa, between Cuyuja and Baeza, *L. Sodiro s.n.* (QPLS, lecto, designated in Croat & Rodríguez, *Aroideana* 18: 142–147. 1995). **Figure 144.**

The species is a member of section *Cardiolonchium* and is characterized by its lax roots, cataphylls persisting semi-intact as long pale fibers, ovate-cordate to ovate-sagittate moderately bicolorous blade with a variable sinus (parabolic, spatulate, hippocrepiform, or narrowly to broadly obovate), 5–6 basal veins, the first two (sometimes third) free to base, naked

posterior ribs, (6–)9–15 primary lateral veins, and collective veins arising from the 2nd–6th pair of basal veins, as well as a short-pedunculate inflorescence with a stipitate cylindroid or tapered spadix.

Epiphytic or hemiepiphytic appressed climber, sometimes terrestrial; **internodes** longer than broad or broader than or about as broad as long, 4–11 cm long, 0.7–2 cm diam., drying pale to medium grayish brown; **roots** lax; **cataphylls** 12–19.5 cm long, 0.7–1.5 cm wide, drying pale brownish gray to brown, persisting semi-intact with separated fibers at upper nodes, persisting as long pale fibers at lower nodes, eventually deciduous. **LEAVES** supervolute; **petioles** shorter than leaf blade or about as long as leaf blade, 27–86 cm long, drying 0.5–1 cm diam., subterete to terete or C to D-shaped or broader than thick, sulcate or convex adaxially, rounded abaxially, acutely raised, winged or obtusely raised, drying brownish gray to dark brown; geniculum (0.6)1.6–2.5(3.6) cm long, drying slightly darker than the petiole; **blades** ovate-cordate to ovate-sagittate, (26)47–68.5 cm long, (17.2)28–48 cm wide, broadest 2.5–7.5 cm above petiolar plexus, 1.27–1.89 times longer than broad, 0.67–0.96(1.02) times as long as petioles, gradually or abruptly acuminate at apex, prominently lobed at base, moderately bicolorous, matte or matte-subvelvety or semiglossy to glossy above, matte or semiglossy to glossy below, drying yellowish, greenish to olive-green or brownish above, drying to greenish to olive-green or brownish below; **anterior lobe** (20.1)36.5–52.5 cm long, broadly convex along

margins; **posterior lobes** (8.2)14.6–22 cm long, (6.5)11.5–20 cm wide, sometimes overlapping when flattened; **sinus** parabolic, spathulate, hippocrepiform, or closed (narrowly to broadly obovate), (5.9)9–17.8 cm deep, 2–6.5 cm wide; **midrib** drying bluntly acute to narrowly raised and concolorous above, narrowly convex to narrowly rounded and paler than surface below; **primary lateral veins** (6–)9–15 pairs, departing at a 40–55° angle from the midrib, drying bluntly acute above and slightly darker than surface above, narrowly rounded and paler than surface below; **basal veins** 5–6 pairs, the 1st and 2nd pairs free to base, the 3rd pair sometimes free to base, otherwise fused 0.4–1.5 cm, the 4th pair rarely free to base, otherwise fused 0.9–3.5 cm, the 5th pair fused (1.8)3.2–6 cm; **posterior ribs** 1.4–6 cm long, curved, naked along their entire length; **collective veins** arising from the (2nd)3rd–6th pair of basal veins, moderately loop-connected, 3–7 mm from the margin; **upper surface** minutely and sparsely granular, without pale lineations; **lower surface** minutely and sparsely granular and short pale-lineate, sometimes sparsely punctate with moderately dark round punctations. **INFLORESCENCE** usually short-pedunculate; **peduncle** (5.3–)8.5–38 cm long, drying 0.3–0.6 cm diam., drying brownish gray to pale brown; **spathe** spreading or reflexed, 11.7–15.5 cm long, 1.1–2.1 cm wide, linear to lanceolate or oblong, green to greenish, drying pale gray-brown to brown; **spadix** stipitate 2–9(16) mm, 6.2–16.4(24.2) cm long, (0.5–)1–3 cm diam., cylindroid or tapered, green, white to

cream or yellow to yellowish, drying pale to medium brown; **flowers** 5–8 visible per principal spiral 7–10 visible per alternate spiral, 1.8–2.3 mm long, 1.1–1.8 mm wide; tepals minutely granular; lateral tepals 0.9–1.2 mm wide, inner margins broadly convex, outer margins 2-sided or 3-sided. **INFRUDESCENCE** greenish white to olive-green, 1–2 per locule.

Anthurium versicolor ranges from Colombia and Ecuador (on both sides of the Andes) to Peru and Bolivia at 400–3100 m in *Premontane rain forest*, *Premontane wet forest*, *Lower montane wet forest*, and *Montane wet forest* life zones.

Croat *et al.* 91212 may belong to this species but differs by having short internodes, many persistent cataphyll fibers, leaf blades with overlapping posterior lobes, and the upper blade surface with the primary lateral veins less narrowly raised. Possibly it will prove to be a new species and needs to be recollected.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor, Centro Shuar Warints, Ladera y cumbre del Cerro Chankinianain, bosque con dosel de 30 m en laderas, 03°13'45"S, 78°14'30"W, 1496 m, 13 Oct. 2002, *Abel Wisum* 50 (MO, QCNE). **Zamora-Chinchi:** Cordillera del Cóndor region, vicinity of Rio Zamora and village of Quime, along road from the military outpost to Condor Mirador military outpost, 7.1 km S of junction in road to Tandaime, San Marcos and Ecuacoriente

copper mine headquarters, 03°36'42"S, 78°28'02"W, 1128 m, 12 Apr. 2006, *Thomas B. Croat 96963* (MO, QCNE); Vicinity of Ecuacorrientes copper mine concession, vicinity of mine site, along trail above parking area near end of road, 03°34'54"S, 78°26'06"W, 1330–1360 m, 21 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98969* (MO, QCNE); Vicinity of Tandaime, above the junction to Condor Mirador, military reservation above Tandaime village, sandstone plateau of Cordillera del Condor, 03°35'54"S, 78°29'14"W, 1420 m, 20 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98858* (MO, , QCNE, UB); Along road from Tandaime to Condor Mirador, 18.4 km beyond the turnoff near the military check point near Tandaime, 03°38'12"S, 78°25'49"W, 1570 m, 20 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98869* (MO, QCNE); Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91178* (AAU, MO, S); Between San Carlos and Nambija on mining road E off of main San Carlos-Nambija road beginning 6 km S of San Carlos, 0.9 km up road toward mining operation at end of road (2.4 km from road), 04°02'18"S, 78°47'52"W, 1465 m, 23 July 2004, *Thomas B. Croat 91998* (MO, QCNE); Along road from Namirez to Nambija, along mining road, 10.0 km S of Namirez and Río Zamora, vicinity of Nambija, along road to mine headquarters ca. 5 km long, just south of Nambija,

04°03'44"S, 78°47'29"W, 1779 m, 23 July 2004, *Thomas B. Croat 92061* (MO, QCNE); Along road from Zamora to Romerillos along Río Jambué, 13.3 km E of Río Bombuscaro Bridge in Zamora, 0.3 km E of Pituca, 04°08'03"S, 78°56'37"W, 1068 m, 21 July 2004, *Thomas B. Croat 91707* (MO, QCNE); Along road from near Paquisha, south to Las Orchídeas, and end of road at Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 47.0 km S of Intersection near Paquisha, 2.6 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 875 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91304* (MO, QCNE); Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91247* (AU, MO, QCNE); Vicinity of Las Orquídeas, on Río Nangaritza, along steep slopes on trail to waterfall opposite Cabañas Yankuam, 04°14'56"S, 78°39'36"W, 870–900 m, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98731* (MO, QCNE); Cordillera del Cóndor region, parroquia Zurmi, vicinity of Las Orquídeas, Cabañas Yancuam, ca. 3 km S of Las Orquídeas, along stream just S of Cabañas Yancuam, on steep rocky slopes, 04°15'01"S, 78°39'33"W, 1130 m, 19 Apr. 2006, *Thomas B. Croat 97254* (MO, QCNE); Miazí, margen derecha Río Nangaritza, bosque primario, rocas calizas afloran, dosel del bosque 30 m,

suelos entisoles, 04°16'S, 78°42'W, 930 m, 26 Oct. 1991, *Walter A. Palacios, I. Vargas & M. Ruiz* 8608 (MO); Parroquia: Zurmi, Comunidad Centro Shaime (along Río Nangaritza), forest 2–4 km NW of Centro Shaime, 04°18'06"S, 78°41'02"W, 1000 m, 15 Dec. 2001, *John L. Clark* 6528 (MO, QCA, QCNE, US); Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan* 91212 (MO, QCNE).

Anthurium waiwaimense Croat, *sp. nov.*

Type: Ecuador. Zamora-Chinchipe: Cordillera del Condor, vicinity of Ecuacorrientes copper mine concession, vicinity of mine site, along trail above parking area near end of road, 03°34'54"S, 78°26'06"W, 1330–1360 m, 21 Sep 2007, *T.B. Croat & G. Ferry* 98982 (holotype, MO-6060867–869; iso, B, COL, K, QCNE, S, SEL, US, USM).

Figures 145–147.

The species is a member of sect. *Belolonchium* and is characterized by its epiphytic habit, short, thick internodes, terete petioles, narrowly ovate-triangular-sagittate blades with the anterior lobe prominently constricted, with the posterior lobes prominently directed inward and with the collective veins arising from one of the upper primary lateral veins. In addition, it

has a green ovate spathe and a dark violet-purple spadix.

Epiphyte; **roots** gray to 8 mm diam., 2 m long; **internodes** short, 3–4 cm diam.; **cataphylls** 16.6–20.3 cm long, persisting in a dense network of brownish fibers with patches of dark red-brown epidermis; **petioles** 53.8–76.2 cm long, 6–8 mm diam., terete, lacking any sulcus, medium green finely pale-speckled, drying smooth and brown; geniculum 2–2.5 cm long, 8–9 mm diam., drying darker than petioles; **blades** narrowly ovate-triangular-sagittate, 27.5–59.5 cm long, 14.8–33 cm wide (averaging 47 X 26), 1.66–1.93 (averaging 1.80) times longer than broad, broadest at petiole attachment, 0.7–0.9 (averaging 0.8) times long as petioles, abruptly acuminate at apex, prominently lobbed at base, subcoriaceous, semiglossy to glossy, moderately bicolorous, drying slightly grayish brown and weakly glossy above, yellowish brown and semiglossy below; **anterior lobe** to 25–43.8 cm long, prominently constricted, the distal margin slightly rounded; **posterior lobes** 7.9–19.6 cm long, 4.4–10.7 cm wide, directed prominently inward; **midrib** narrowly rounded and paler above and below, drying concolorous above and darker below; **primary lateral veins** 15 pairs, arising 50–60° angle, drying convex, concolorous above and weakly narrowly rounded, concolorous below; **tertiary veins** flat, distinct, darker below; **collective veins** arising from 4th primary lateral veins (from 1st basal vein in pre-adult material), 3–4 mm from margin; **basal veins** 8 pairs, narrowly rounded and paler above and below, 1st pair



Figure 145. *Anthurium waiwaimense* Croat (Croat & Ferry 98982; MO-6060867, sheet 1). Herbarium specimen showing fibrous cataphyll, petiole, leaf blade, abaxial and inflorescence.



Figure 146. *Anthurium waiwaimense* Croat (Croat & Ferry 98982). Live plant showing leaf blade, adaxial surface.



Figure 147. *Anthurium waiwaimense* Croat (Croat & Ferry 98982). Close-up view of inflorescence with light green spathe and dark violet-purple spadix.

fused to 1.8 cm, 3rd pair fused to 5.6 cm, 6th pair fused to 11.5 cm; **posterior rib** gradually curved, naked 11.2 cm; **sinus** hippocrepiform, 8.1–16.9 cm deep, 4.4–14.4 cm wide. INFLORESCENCE erect-spreading with **peduncle** 29.5–59.7 cm long drying smooth and reddish brown; **spathe** 18 cm long, 7.6 cm wide, ovate, long-acuminate, light to medium green, semiglossy, veins darker green, drying yellowish brown; **spadix** stipitate 1.5 cm,

gradually tapered, 12.6–22.8 cm long, 9–12 mm diam. midway, 7 mm diam. 1 cm from apex, dark violet-purple, matte, drying dark reddish brown; **flowers** 10 visible per spiral, drying 1.9–2 mm long, 2–2.1 mm wide; tepals minutely pustular on drying; lateral tepals 1.3–1.4 mm wide, the outer margins 3-sided, inner margin broadly rounded; stamens not exerted.

Anthurium waiwaimense is known only from the type locality in the Cordillera del Cóndor in SE Ecuador near the border of Peru at 1330–1360 m in an area of *Premontane wet forest* life zone.

The species keys out to *A. dolichophyllum* Sodiro, *A. miniatum* Sodiro, *A. plurisulcatum* Sodiro and *A. schunkei* K. Kr. in the Lucid *Anthurium* key. *Anthurium plurisulcatum* differs in having larger blades (80–90 cm long) which are not markedly constricted on the anterior lobe, posterior lobes that are directed outward at about a 45° angle (rather than directed inward in *A. waiwaimense*) and with the collective veins arising from one of the upper pair of basal veins (rather than from one of the upper primary lateral veins for *A. waiwaimense*) as well as 25–30 pairs of primary lateral veins (versus 7–8 pairs for *A. waiwaimense*).

Anthurium miniatum differs in having the blades broadest above the petiolar attachment (rather than below the attachment in *A. waiwaimense*), collective veins arising from one of the uppermost basal veins as well as by its purple spathe and a spadix stipitate to 3 cm long.

Anthurium plurisulcatum from Pichincha Province (Pauma) differs in having a deeply sulcate petioles, blades with the posterior rib only 3–4 cm long, collective veins which arise from one of the upper basal veins and up to 16 primary lateral veins.

Anthurium macbridei K. Kr. from Junin Department in Peru differs in having sulcate petioles, 8–10 primary lateral veins and a narrower spathe. *A. macbridei* also differs in that the blade is narrowly ovate and not constricted, drying papyraceous and the collection veins arise from the 3rd pair of basal veins.

The species is named after the Río Waiwaime near which the type specimen was collected.

***Anthurium walhertii* Croat, sp. nov.** Type: Ecuador. Zamora-Chinchipec: Cordillera del Cóndor region, vic. of Ecua-Corriente copper mine development, valley of Río Waiwaime, along road to mine site, 9.5 km from mine headquarters, 6.5 km S of locked gate, 03°35'07"S, 78°26'05"W, 1280–1530 m, 10 Apr. 2006, T.B. Croat 96889 (holotype, MO-4778196–97; iso, CAS!, COL!, K!, NY!, QCNE!, S!, US!). **Figures 148 & 149.**

The species is a member of sect. *Calomystrium* and is characterized by its terrestrial habit, short internodes, intact cataphylls, terete petioles, ovate-cordate-sagittate, short-acuminate dark brown-drying blades with a spatulate to hippocrepiform sinus, 5–6 pairs of basal veins, 1–2 pairs free to the base, with the upper surface short-pale lineate and lower surface both dark punctate and pustular as



Figure 148. *Anthurium walhertii* Croat (Croat et al. 91045; MO-5864265, sheet 1) Herbarium specimen showing leaf blade, adaxial and abaxial surfaces.



Figure 149. *Anthurium walhertii* Croat (Croat et al. 91045; MO-5864266, sheet 2) Herbarium specimen showing stem, petiole and inflorescence.

well as by its spreading, recurled, whitish spathe and pinkish-magenta spadix.

Terrestrial on steep slopes; **internodes** short near apex to 3 cm long lower down, 1.9–2.5 cm diam, covered by old persisting cataphylls; **cataphylls** 13–18 cm long, 2 cm wide midway, persisting intact, brown, drying dark reddish brown, densely pustular. LEAVES suberect; **petioles** 30–80 cm long, 4.5–6 mm diam., midway, terete, medium green, weakly glossy, drying sulcate, brown to reddish brown, weakly glossy; geniculum 2 cm drying dark reddish brown, weakly darker than petiole; **blades** broadly ovate-cordate, 24.5–36 cm long, 21.5–29 cm wide, 1.1–1.5 times longer than wide, 0.68–0.86 times longer than petiole, widest at 4–5 cm above petiolar plexus, prominently lobed at the base, weakly acuminate at apex, subcoriaceous, medium to dark green and semiglossy above, moderately paler and glossy below, drying grayish brown, matte above, yellowish red brown, drying, semiglossy below; **anterior lobe** 18–29 cm long, margins broadly rounded but weakly concave near the apex; **posterior lobes** 6–13 cm long, 10–12.5 cm wide, oriented downward, weakly inward; **sinus** 7 cm long, 3.2 cm wide, spatulate to hippocrepiform; **midrib** narrowly rounded, narrowly rounded and moderately paler below, drying reddish brown below; **primary lateral veins** 5–8 pairs arising at 40–50° angle, narrowly rounded, drying reddish brown becoming grayish brown near margin, sparsely pale lineate, semiglossy above, narrowly triangular, acute, with prominent

medial rib, drying reddish brown, semiglossy below; **basal veins** 5–6 pairs, 1–2 pairs free to the base, 3rd and 4th pair fused 1 cm, 4th and 5th pair fused 2 cm; **posterior rib** broadly curved, naked first 1.5 cm; **tertiary veins** inconspicuous and concolorous above, conspicuous and concolorous below; **collective veins** arising from 2nd pair of basal veins, 1–2 mm from margin, somewhat irregular; **upper surface** densely and minutely granular, grayish-speckled, short pale lineate, pustular especially along margins and at the apex, drying dark grayish brown, weakly semiglossy; **lower surface** reddish punctate, sparsely pustular, finely granular. INFLORESCENCE erect; **peduncle** 17–39 cm long, 3.5–5 mm diam. midway, dark green, matte, drying sulcate, dark reddish brown, semiglossy; **spathe** reflexed-spreading, recurled, 10–15 cm long, 3–5.3 cm wide near base, white, pale whitish green or medium green and semiglossy inside, medium green and glossy outside, drying dark reddish brown becoming orange-brown near apex, semiglossy; **spadix** 11–18 cm long, 1.2–1.7 cm diam. near base, 8–11 mm diam. 1 cm from apex, medium pink magenta; **flowers** 7–9 visible per spiral, 1.7–1.9 mm long, 1.5–2 mm wide; tepals brownish, smooth, 1.2–1.4 mm wide, inner margin broadly rounded, outer margin 2-sided; pistils reddish, weakly protruding; stamens not emerged; anthers about as broad as long.

Anthurium walhertii is endemic to Ecuador, found so far only in the Cordillera del Condór region in Zamora-Chinchipe

province at 1280–1800 m in a *Premontane wet forest* life zone.

In the *Anthurium* Lucid key, *A. walbertii* tracks to *A. cadolleanum* Sodiro, *A. formosum* Schott, *A. obtusilobum* Schott and *A. radiatum* Sodiro, but all four species differ by their more elongated and more rectangular blades widest close to the petiolar plexus, rather than being more rounded and widest near the middle in the case of *A. walbertii*.

The species epithet *walbertii* is named for Greg Walbert, one of those collecting this new species.

Paratypes: ECUADOR: **Zamora-Chinchipe:** Cordillera del Cóndor, along Peruvian border, 1 km S of military outpost Cóndor Mirador, 03°37'26"S, 78°23'35"W, 1800 m, 15 Dec. 2000, *Cuascota et al.* 339 (MO, QCNE); Along road from Quime Ferry Crossing, on road leading to summit of Cordillera del Condor, 23.2 km above the crossing at Río Zamora on road leading to summit, 03°38'00"S, 78°26'03"W, 1552m, 14 July 2004, *Thomas B. Croat, Lynn Hannon, Greg Walbert, Tuntiak Katan Jua* 91045 (MO, QCNE).

***Anthurium walterlewisianum* Croat, sp. nov.** Type: Ecuador. Zamora-Chinchipe: Vicinity of Ecuacorrientes copper mine development, valley of Río Waiwaime, 5.3 km above locked gate on road to mine, 8.3 km S of mine

headquarters, 1310 m, 00°34'40"S, 78°26'01"W, 7 Apr 2006, *T.B. Croat, C. Davidson & S. Christoph* 96734A (holotype, MO-5963955–56; iso, K, QCNE, S, US). **Figures 150–152.**

The species is a member of sect. *Calomystrium* and is characterized by its epiphytic habit, short internodes, persisting intact cataphylls, terete petioles, narrowly ovate-sagittate brown-drying blades with the collective veins arising from one of the lower pair of basal veins and a narrowly hippocrepiform sinus as well as by the reflexed green spathe and short-tapered dark violet-purple spadix.

Epiphytic; **internodes** short, 2.5–4 cm diam.; **cataphylls** persisting intact at upper nodes, red-brown; **petioles** terete, medium green, weakly glossy, markings not obvious, 77–100 cm long, 9–10 mm diam.; **blades** ovate-lanceolate-sagittate, 63 cm long, 27.5 wide, subcoriaceous, dark green and matte above, moderately paler and glossy to semiglossy, glandular-punctate below; **midrib** narrowly rounded and paler to slightly paler above, bluntly acute toward apex above, acute to acute but with 2 marginal ribs and much paler below; **primary lateral veins** narrowly rounded to round-raised below, these slightly paler in weak valleys in the lower ½ of the blade, merely sunken toward apex above, bluntly acute and moderately paler below. **INFLORESCENCE** erect; **peduncle** 30 cm long, terete, 7–8 mm diam., medium green & weakly glossy; **spathe** pale green, reflexed to erect-spreading, 17.5 cm long,



Figure 150. *Anthurium walterlewisianum* Croat (Croat et al. 96734A). Herbarium specimen showing petiole, leaf blade, adaxial and abaxial surfaces, and inflorescence.



Figure 151. *Anthurium walterlewisianum* Croat (Croat et al. 96734A). Live plant showing leaf blade, adaxial surface.



Figure 152. *Anthurium walterlewisianum* Croat (Croat et al. 96734A). Close-up view of inflorescence with light green spathe and rosy-pink spadix.



Figure 153. *Anthurium warintense* Croat (Neill *et al.* 14140; MO-5771751. Herbarium specimen showing petiole and leaf blade, abaxial surface.

5.6 cm wide, whitish & weakly glossy inside, glossy & medium green outside; **spadix** rosy pink becoming dark violet-purple, matte, 19.5 cm long, 1.1–1.4 cm diam., at base, 1.0–1.5 cm diam. midway, 6–7 mm diam at 1 cm from tip; **flowers** 11–12 visible per spiral, 1.5 mm long, mm wide; lateral tepals ? mm wide, inner margin broadly rounded to straight, outer margin 2-sided; stamens held at level of tepals; anthers white, 0.4 mm long, 0.7 mm wide; thecae rounded, markedly divaricate.

Anthurium walterlewisianum is known only from Ecuador at the type locality in Zamora-Chinchi Province of Ecuador, El Pangui Cantón at 1310 m in a *Premontane wet forest* life zone.

In the Lucid *Anthurium* key, the species keys out to *A. effusipathum* Croat which differs in having a white and typically much broader spathe and a white spadix. That species also frequently has glandular punctations on the upper surface and lacks the conspicuous pustules on the upper surface that are found on *A. walterlewisianum*.

Another species from the same region is *A. wainwaimense* Croat. That species differs in markedly concave anterior lobes rather than being more or less rounded on the anterior lobe.

The species is named in honor of Dr. Walter H. Lewis of the Missouri Botanical Garden and Washington University. Walter, formerly the Director of the Herbarium at

the Missouri Botanical Garden, was largely responsible for my career, having hired me straight out of graduate school to work on the Flora of Barro Colorado Island. Lewis arrived at the Garden when it was in one of its lowest ebbs and quickly helped to elevate the Garden into the position it holds today as one of the foremost research institutes. He re-established the Flora of Panama Project, established a very successful field station in Panama, initiated an inter-institutional collaboration with local universities, started a long-standing floristic seminar for students and staff then became one of the principal forces in the field of ethnobotany with a book entitled *Medical Botany, Plants Affecting Human Health*, currently in 2nd Edition which was co-written with his wife, Memory Elvin-Lewis. Patterned after a text in internal medicine, it was the first of its kind to represent plants known to be harmful, useful or psychoactive and how some originally known in traditional medicine became pharmaceutical discoveries. Another major contribution to ethnobotany has been his extensive work in recording the medical plants of Amazonian Peru and his collaborative efforts with Peruvian and other scientists to identify their bioreactive components. Conducted in the context of evolving policies and laws to protect traditional knowledge, his efforts led to these aspects being incorporated into the *Sui generis* laws of Peru and being lauded by WHO. Also recognized as the leading authority of North American wild roses. Volume 9 of the Flora of North America was dedicated to him.



Figure 154. *Anthurium weberbaueri* Engl. (Croat 96636). Live plant showing leaf blades, adaxial and abaxial surfaces.



Figure 155. *Anthurium weberbaueri* Engl. (not collected). Close-up view of inflorescence with green spathe and brown spadix, and infructescence with fruits green turning dark reddish purple.

Anthurium warintsense Croat, *Aroideana* 31: 82–83. 2008. Type: ECUADOR. Morona-Santiago: Cordillera del Cóndor, wet cloud forest on sandstone ridge, S of Rio Warints, E of main crest of Cordillera del Cóndor, 03°14'03S, 78°17'10"W, 1950 m, 14 Dec. 2002, D. Neill & Shuar conservation interns, 14140 (holotype, : QCNE; isotype: MO). **Figure 153.**

The species is a member of sect. *Dactylophyllum* and is characterized by its leaves with a trisect blade with the medial lobe slightly narrower and slightly longer than the lateral lobes, and by its inflorescences with a green spathe and a cream-colored spadix.

Epiphytic. LEAVES trisect with **petioles** 34.5 cm long, 2–4 mm diam., becoming narrower towards blade, concolorous, terete; **blades** trisect with medial lobe slightly narrower and slightly longer than lateral lobes, 22.5 cm long, 19.5 cm wide, 1.2 times longer than wide, 0.7 times as long as petiole, matte below; **medial segment** lanceolate, acuminate at apex with short shoot-projection of midvein, obtuse at base, 22.5 cm long, 5 cm wide; **lateral segments** lanceolate, falcate, weakly acuminate at apex, obtuse at base, more or less equal in length (21.5 cm long) more or less equal in width, 5.5–6 cm wide; **midrib** acutely raised below; **primary lateral veins** 7–8 pairs, acutely raised below, extending to margin at approximately a 30–45° angle; **collective veins** arising from first primary lateral vein and extending to apex, 2

mm from margin, as prominent as primary lateral veins, raised below; **tertiary veins** numerous, in part raised and concolorous. INFLORESCENCE with **spathe** pale green, 5 cm long, 1 cm wide; **spadix** cream-colored, 6 cm long, 5 mm diam.

Anthurium warintsense is endemic to the Cordillera del Cóndor in Morona-Santiago Province of Ecuador in wet cloud forest on a sandstone ridge at 1,950 m in a *Premontane wet forest* life zone.

Anthurium weberbaueri Engl., *Pflanzenr.* IV. 23B(Heft 21): 81. 1905. Type: Peru: Sandia, 2100–2300 m, Mar 1902, A. Weberbauer 543 (holotype: B). **Figures 154 & 155.**

The species is a member of sect. *Digitinervium* and is characterized by its leaves with reddish-brown-drying ovate-triangular, subcordate blades widest near the base and with strong basal veins running toward the top of the blade, and by its long-pedunculate inflorescences with a green spathe and a dark purple spadix.

Terrestrial or epiphytic; **stems** to 1 m long; **internodes** 2.5–8 cm long, 1–4 cm diam.; **cataphylls** 7 cm long, persisting as brown fibers. LEAVES with **petioles** 17–47 cm long, terete, narrowly and obscurely flattened adaxially, sometimes sharply sulcate on the geniculum, medium green, weakly glossy; geniculum 1–1.5 cm long; **blades** ovate-triangular-subcordate, sometimes ovate-elliptic, 19–37 cm long,

9.5–21 cm wide, 1.6–2.3 times longer than wide, 0.8–1.2 times as long as petiole, widest near the base, subcordate (sometimes rounded) at the base, rounded at apex, moderately coriaceous, dark green and semiglossy above, paler and weakly glossy below, drying reddish-brown and semiglossy on both surface; **midrib** narrowly rounded and paler above, moderately paler or reddish and acute below; **primary lateral veins** 6–8 pairs, etched-sunken and concolorous above, narrowly rounded and darker below, weakly visible on dried specimens; **basal veins** 1–2 pairs, the upper pair running all the way to the top of the blade and the lower pair meeting the margin halfway, acutely raised below, much stronger than primary lateral veins. INFLORESCENCE erect; **peduncle** 27–63 cm long, **spathe** erect-spreading to spreading, ovate-lanceolate, 3.5–10 cm long, 1–3 cm wide at the base, tapering towards tip, coriaceous, green; **spadix** 4.5–14 cm long, 0.8–1.5 cm diam., medium green when immature, brown or dark purple and weakly glossy at maturity. INFRUCTESCENCE pendent; mature **fruits** dark violet-purple, 8 mm long, 6 mm wide ovoid, prominently beaked, **seeds** greenish-white with a gelatinous sticky appendage on either end.

Anthurium weberbaueri ranges from southeastern Ecuador (Morona-Santiago, Zamora-Chinchipe to Peru (Amazonas, Cajamarca, Cusco, Huánuco, Pasco, Ucayali) and Bolivia (La Paz) at 660–2800 m (primarily above 2000 m) in a *Premontane wet forest* life zone.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Condor, vicinity of Ecu-Corrientes copper mine region, valley of Río Waiwaime, 5.9 km above gate near copper mine camp near Río Quimi, along trail to summit above parking, 03°34'54"S, 78°26'06"W, 1331 m, 5 Apr. 2006, *Thomas B. Croat 96636* (MO, PMA, QCNE, US); Cordillera del Cóndor, upper watershed of Río Wawaime (tributary of Río Quimi), ridge above site of proposed EcuCorriente open-pit copper mine, 03°34'56"S, 78°26'20"W, 1440 m, 6 Dec. 2005, *David A. Neill & Wilson Quizhpe 14996* (MO, QCNE). PERU. **Amazonas:** Cordillera del Cóndor, cabeceras del Río Comainas, cuchillo abajo del Cerro Machinaza, 03°54'S, 78°26'W, 1800 m, 3 Aug. 1994, *Hamilton Beltrán & Robin B. Foster 1581* (F, USM).

***Anthurium yankuamense* Croat, sp. nov.**

Type: Ecuador. Zamora-Chinchipe: Nangaritza, vicinity of Las Orquídeas, near Cabañas Yankuam, along new trail to Summit of Los Tepuis Conservation Area, just above road from Las Orquídeas to new ferry, 04°14'55"S, 78°39'36"W, 870 m, 18 Sep. 2007, *T.B. Croat & G. Ferry 98833* (holotype, MO-6057838–40; iso, B, K, QCNE, US, USM). **Figure 156.**

The species is a member of sect. *Belolonchium* and is characterized by its epiphytic habitat, short, thick internodes, persistent red-brown cataphyll fibers, subterete petioles, brown-drying blades with



Figure 156. *Anthurium yankuamense* Croat (Croat & Ferry 98833; MO-6057839, sheet 1). Herbarium specimen showing petiole, leaf blade, abaxial surface, and inflorescence.

a broad more or less arcuate sinus, 13 pairs of basal veins, broadly concave anterior lobe margins as well as by the medium green lanceolate spathe and the narrowly long-tapered greenish yellow spadix. In addition, the collective veins arise from the 8th pair of basal veins.

Epiphytic at 2.5 m; **stem** to 60 cm long; **internodes** short, 12.5–13.5 cm diam., drying 2.2 cm diam.; **cataphylls** 25–26 cm long, medium green, fibers red-brown, persisting in dense fibrous network; **petioles** 83–109 cm long, subterete 8–9 mm diam., medium green, weakly glossy, faintly short pale-lineate, drying 79–109 cm long, 4–6 mm diam., obtusely and broadly sulcate and reddish brown; geniculum 3–3.5 cm, 1.3 cm diam. midway, drying 2–2.1 cm long, slightly paler than petioles; **blades** broadly ovate-sagittate, 88–94 cm long, 64–68 cm wide, drying 69.7–94 cm long, 56–68 cm wide (averaging 83 x 62), 1.33 times longer than broad, broadest at petiole attachment, 0.9–1.1 times long as petioles, gradually acuminate at apex, broadly lobed at base, subcoriaceous, dark green and weakly glossy above, slightly paler and weakly glossy below, drying brownish to dark brown above and brownish below, epunctate; **anterior lobe** 66–70 cm long, drying 62–70 cm long, broadly concave along margin, the distal margin rounded; **posterior lobes** 31.5–36 cm long, 24.5–27 cm wide, drying 29.5–31.7 cm long, 14.7–22.1 cm wide, directed toward base but turned up prominently at 45° angle to midrib; **midrib** narrowly rounded and paler above, acute and paler below, drying paler

above and concolorous below; **primary lateral veins** 10–12 pairs, arising 50–60° angle, narrowly raised in deep valleys and slightly paler above, bluntly acute and paler below, drying paler above and concolorous below; **tertiary veins** in part weakly sunken and concolorous above, moderately raised and darker below, drying concolorous above and below; **collective veins** arising from 7th or 8th pair basal veins, 0.3–0.5 cm from margin; **basal veins** 11–12 pairs, 1st free to base, 8th (9th) and higher order fused 11–13 cm; **posterior rib** very gradually curved, naked 11–13 cm; **sinus** broadly hippocrepiform, 6.2–17.5 cm deep, 19.9–27.5 cm wide. INFLORESCENCE solitary with **peduncle** 48 cm long, 7 mm diam., medium green, semiglossy, drying acutely sulcate and yellowish brown; **spathe** 23 cm long, medium green and semiglossy outside, medium green and glossy inside, drying 19.2 cm long, 1.8 cm wide, lanceolate, subcoriaceous, dark reddish brown; **spadix** 18 cm long, 9 mm diam. midway, 6 mm diam. 1 cm from apex, weak tapered, greenish yellow tinged faintly violet-purple, drying 14.5 cm long, 6 mm wide, brown; **flowers** 6 visible per spiral, drying 1.5–1.6 mm long and 1.4–1.5 mm wide; tepals minutely granular drying; lateral tepals 1.2 mm wide, the outer margins 3-sided, inner margin rounded.

Anthurium yankuamense is endemic to Ecuador, known only from the type locality in Zamora-Chinchi Province in the Nangaritza river valley at 870 m in a *Premontane wet forest* live zone.

In the Lucid *Anthurium* key, *A. yankuamense* maps to *A. dolichophyllum* Sodiro and *A. jimenezae* Croat. *A. dolichophyllum* differs by its less broadly open sinus with the posterior lobes projecting inward while *A. jimenezae* has a similar posterior lobes and sinus but differs by its much narrower anterior lobe. Also, both species are from the Pacific slopes of the Andes while *A. yankuamense* is found in the Amazon Basin.

The species is named for the type locality at Cabañas Yankuam in Zamora-Chinchipe Province.

Caladium Vent., *Descr. Pl. Nov.* 30. 1801. Lectotype: MO-02102122, designated by Hubbard & Rehder, Bot. Mus. Leaflet. 1: 3 (1932).

Herbs, tuberous or rarely rhizomatous, less than 1 m tall. Leaves few, appearing before or with the inflorescence; petioles somewhat spongy, usually longer than the blade, more or less terete, sheathed in the lower part; blades usually thin, ovate to sagittate, usually peltate; primary lateral veins few, joining into two or more

collective veins running around the margin of the blade; minor veins reticulate; surfaces often variegated with white, gray or red. Inflorescences 1–2 per axil; peduncle elongate; spathe strongly constricted, the tube globose to fusiform, usually greenish, sometimes white, sometimes glaucous within, the blade boat-shaped at anthesis, usually white to cream, deciduous; spadix shorter than the spathe, pistillate portion short, usually greenish, staminate portion rotting away after anthesis, sterile at base, constricted above sterile portion, the staminate portion clavate; flowers unisexual, naked; pistillate flowers truncate, ovary sub-2–3 locular; locules many-ovulate; ovules superimposed in two rows per locule; style short; stigma subhemispheric. Berries subcylindric, many-seeded. Seeds ovoid, longitudinally grooved, with endosperm.

Tropical America; West Indies (Puerto Rico & Lesser Antilles); Costa Rica to Panama and in South America to N. Argentina, Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Surinam & Venezuela; 12 species published, 17 expected.

Key to *Caladium* species

1. Blades with the posterior lobes fused only part of their length, distinctly divergent at the tip, typically only a single inflorescence per axil *Caladium bicolor* (Aiton) Vent.
1. Blades with the posterior lobes fused throughout most of their length, usually 2–3 inflorescences per axil *Caladium steudnerifolium* Engl.



Figure 157. *Caladium bicolor* (Aiton) Vent. (Guadeloupe, not collected; photo: X. Delannay). Live plants showing white-maculate leaf blades, adaxial surface.

Caladium bicolor (Aiton) Vent., *Mag. Encycl.* 4(16): 464–471. 1800. *Arum bicolor* Aiton, *Hort. Kew* 3: 316. 1789. Type: Cult. at Kew, introduced to England in 1773 by Messrs. Kennedy and Lee from material cultivated in Madeira; Type: not seen. **Figures 157–159.**

The species is characterized by its tuberous habit, ovate-cordate blades

whitish-spotted in wild specimens, and by its inflorescences with the spathe tube green and glaucous, the spathe blade white on both surfaces, and the spadix with the pistillate portion pale yellow green and the sterile staminate portion creamy yellow. Many different brightly colored forms have been developed for ornamental use.

Tuberous terrestrial herb; tubers to 6 cm diam., depressed globose. LEAVES with



Figure 158. *Caladium bicolor* (Aiton) Vent. (Lingán 680). Live plant showing tuber and inflorescence.

petioles terete, spongy, 26–54 cm long, 6–8 mm diam. midway, semiglossy, pale green, heavily tinged dark purple with solid purple bands extending to near apex, sheathed 15–20 cm; **blades** ovate-cordate, peltate, 23–38 cm long, 10–20 cm wide, 1.5–2.4 times longer than wide, 0.45–0.9 times as long as petiole, thin, dark green and matte-subvelvety above, whitish spotted, matte and paler below, whitish spotted, weakly glaucous; **major veins** obtusely sunken and concolorous to slightly paler above; **midrib** round-raised and moderately paler

with faint striations; **primary lateral veins** thickly convex with a pale striation down both margins below; **tertiary veins** in part weakly raised below. **INFLORESCENCE** erect, one per axil; **peduncle** 18–27 cm long, medium green, obtusely flattened on one side; **spathe** 7–11 cm long; tube 3–4 cm long, 1–1.3 cm diam., glaucous, medium green and glaucous outside, pale green and semiglossy inside; blade white, matte on both surfaces, 4.5 cm wide at anthesis, concave, 3 cm deep; **spadix** 7–10 cm long; pistillate portion 1 cm long in



Figure 159. *Caladium bicolor* (Aiton) Vent. (*Lingán 680*). Close-up view of dissected inflorescence showing spathe tube green inside and outside and spadix with creamy white pistillate portion and white sterile and fertile staminate portions.

back, 1.8 cm long in front, creamy white or pale yellow-green, sometimes faintly pinkish; staminate portion 6.7 cm long, sterile portion 1.8 cm long, 8 mm diam. at base, 6 mm diam. at apex, white or creamy yellow; staminate fertile portion 5.2 cm long, 9 mm diam., 6 mm diam. 1 cm from apex, white.

Caladium bicolor ranges from Panama to Bolivia and eastward to the Atlantic coast of Brazil and is widely cultivated around the world as an ornamental.

Specimen seen: PERU. **Amazonas:** Cordillera del Cóndor, cabeceras del Río Comainas, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), cerca del campamento, 1200 m, 5 Aug. 1994, *Hamilton Beltrán & Robin B. Foster* 1277 (F, USM).

Caladium steudnerifolium Engl., *Bot. Jahrb. Syst.* 6: 284. 1885. Type: Colombia. Valle del Cauca: bei Cordova, Suretto vis Juntas am Fluss Dagua, 300 m, Sep. 1904, *F.C. Lehmann* 1904 (B); epitype, *F.C. Lehmann* 758 (B). Designated by Croat et al, 2019. **Figures 160–163.**

The species is characterized by having ovate-elliptic peltate matte-subvelvety leaf blades which are glaucous on the lower surface as well as by having usually 2–3 inflorescences per axil.

Terrestrial; **rhizome** subterranean, moderately elongated, 10–18 cm long,

internodes short, (1.5)2–3.5(5) cm diam., sparsely rooted, light grayish brown, pale orange inside; **cataphylls** persisting intact, brown; sap yellowish, viscid. LEAVES with **petioles** 24–103 cm long, 6–10 mm diam., terete, weakly glossy to semiglossy, moderately firm to spongy, dark green to medium yellow-green, tinged heavily purple in lower half to throughout much its length, short pale-lineate, sometimes spotted whitish, sometimes tinged purple, with dark purple stripe most of the length of petiole; **blades** ovate, peltate 6.1–18 cm, 23–54 cm long, 1.16–2.4 times longer than wide, 0.33 as long as to 1.25 times longer than petioles (averaging 0.7 times as long as petioles), thinly coriaceous, dark green and matte to matte-subvelvety above, plain or mottled, with whitish maculations midway to margin along full length of blade, much paler, matte, grayish bluish green, matte below, drying moderately bicolorous, grayish green, semiglossy to matte; **anterior lobe** 17–39.7 cm long; **posterior lobes** fused throughout most of their length; **sinus** lacking or to 6 cm deep, averaging 2.5 cm deep, 0.6–0.18 the total length of anterior lobe; **major veins** sunken to flat and concolorous above, convex and concolorous below; **midrib** sometimes round-raised below; **primary lateral veins** 3–5 pairs, arising at 30–55° angle; **tertiary veins** prominulous, flat and darker below. INFLORESCENCES erect, long-pedunculate, usually 2–3 per axil; **peduncles** 23–41 cm long, 12.4–40 cm wide, pale to medium green, semiglossy, weakly speckled; **spathe** 7–11.5 cm long; spathe tube broadly ellipsoid, 2–2.3 cm



Figure 160. *Caladium stenderifolium* Engl. (Croat *et al.* 87985). Live plant showing petioles, white-maculate leaf blade, adaxial surface, and inflorescence.



Figure 161. *Caladium steudnerifolium* Engl. (Croat 97098). View of non-maculate leaf blade, adaxial surface.

diam. at anthesis, roomy inside, pale to medium green on both surfaces, matte outside, glossy to weakly glossy inside; spathe blade green becoming white outside, glaucous inside, flattening to 4–4.5 cm wide, finally deciduous; **spadix** 6.5–8.3 cm long; staminate portion white, 4.5–6.5 cm long, 6–9 mm diam., 5–7 mm diam. at constricted part; pistillate portion 2.5–3.5 cm long, green to cream in bud, becoming pale yellowish, semiglossy.

Caladium steudnerifolium ranges from Colombia (Caquetá, Cauca, Valle), Ecuador (Azuay, Morona-Santiago, Napo, Orellana, Pastaza, Sucumbios, Zamora-Chinchipe); Peru (Loreto, Pasco) and Bolivia (Cochabamba) at 40–1662 m (mostly 200–1000 m) in *Tropical wet forest*, *Tropical wet forest transition zone* to *Pluvial forest*, *Premontane wet forest* and *Premontane rain forest* life zones.

Caladium steudnerifolium had been erroneously synonymized with *Caladium*



Figure 162. *Caladium steudnerifolium* Engl. (Croat 97098). View of leaf blade, abaxial surface.

bicolor (Ait.) Vent. which has also been found in the region of the Cordillera del Condor, but that species differs by having more broadly ovate, proportionately shorter blades with the posterior lobes only partially fused, and by having typically only a single inflorescence per axil.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor, Cantón Tiwintza, Cerro Kampa Naint, Centro Shuar Kaputna, Bosque intervenido,

03°01'30"S, 77°55'01"W, 280 m, 3 July 2003, *Abel Wisum 80* (MO, QCNE); **Zamora-Chinchipe:** In the vicinity of the mining camp at the Río Tundaime, pastures along Río Quimi with small patches of disturbed forest, 03°31'10"S, 78°25'53"W, 900–1000 m, 3 Nov. 2004, *H. van der Werff, Bruce Gray, Juan C. Ronquillo & Wilson Quizhpe 19241* (MO, RSA); Vicinity of Ecu-Corrientes copper mine development, valley of Río Waiwaime, along road to mine site at end of road, along trail down from parking spot,



Figure 163. *Caladium steudnerifolium* Engl. (Croat *et al.* 87985). Close-up of peduncle and inflorescence with spathe tube light green outside.

03°34'44"S, 78°26'08"W, 1312 m, 4 Apr. 2006, *Thomas B. Croat 96592* (MO, QCNE); Along road between Los Encuentros and El Sarsa, 10.7 km E from Los Encuentros, beyond bridge over Río Zamora, 03°46'40"S, 78°38'28"W, 1066 m, 14 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98587* (F, K, MO, NY, , QCNE, US); Along road from Quime Ferry Crossing into Cordillera del Condor, 22 km above Río Zamora, in a southward direction, along creek at old military camouflage shed, 03°37'46"S, 78°26'17"W, 1489 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Greg Walbert & Tuntiak Katan 91071* (MO, QCNE); Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Greg Walbert & Tuntiak Katan 91168* (MO, QCNE); Nangaritza, Cordillera del Cóndor region, vicinity of Las Orquideas forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1140 m, 16 Apr. 2006, *Thomas B. Croat 97098* (MO, QCNE).

Chlorospatha Engl., *Gartenflora* 27: 97. 1878. TYPE: *Chlorospatha kolbii* Engl.

Caladiopsis Engl., *Bot. Jahrb. Syst.* 37: 140. 1905. TYPE: *Caladiopsis lehmannii*

Engl.

Terrestrial or hemiepiphytic; growth sympodial, polyphyllous; new growth sylleptic, caulescent, stems elongate, erect or decumbent and epigaeous; cataphylls intact, semi-intact or \pm fibrous; sap milky or transparent, rarely pink; bulbils absent or produced randomly along its length, solitary, rarely in clusters; internodes \pm cylindrical, 0.5–8 x 0.5–4 cm, usually as long as or slightly longer than wide, usually glabrous; roots adventitious along the length of stem, usually white to greenish; cataphylls marcescent and persistent or quickly to ultimately deciduous, entirely obtusely or acutely 1- to 2-ribbed abaxially or in part only at or toward apex, thin but firm, glabrous, rarely puberulent. LEAVES with spiral phyllotaxy, long-petiolate; sympodial leaf a fully expanded foliage leaf; **petioles** lacking a geniculum, 10–125 cm, as long as or longer than blades, spongy to moderately firm, sheathed basally, $(1/10-)^{1/4-3/4}$ of or nearly entire length ($^{1/3-2/3}$ in ca. 70% of taxa); sheath decurrent or free-ending at apex, occasionally with one side decurrent and the opposite side free-ending, the sides convolute or erect to erect-spreading with margins erect or in-rolled, rarely broadly spreading and appearing winged; free portion 3–10 mm diam. midway, entirely or in part terete, subterete or D- or U-shaped with margins acute and occasionally raised, or obtuse, rarely with acute lateral ribs becoming alate toward the apex, entirely or in part sulcate or not, with or without a low medial keel; **blades** with supervolute vernation, 9.5–62 cm, entire and oblong, ovate or ovate-elliptic, rounded or acute at the base and occasionally inequilateral, or

simple and cordate, sagittate, subsagittate, hastate or subhastate and weakly to prominently or not at all constricted in area of petiole attachment, or variously divided and trifid or pedatifid, auriculate or not, or compound and trisect or pedatisect, membranaceous to coriaceous, glabrous, weakly to conspicuously bicolorous, maculate in some species; upper surface smooth and flat, wrinkled or quilted, or corrugate, bullate, sub-bullate or rugose, velvety to glossy; lower surface \pm smooth, reticulate or rarely areolate, glossy to matte-subvelvety; venation colocasioid, occasionally reticulate; midrib and major veins usually flat and featureless on upper surface, rarely etched or etched-sunken, glabrous, rarely sparsely puberulent; midrib concolorous on upper surface, occasionally paler than surface; primary lateral veins pinnate, in 2 to 11 pairs, concolorous on upper surface, occasionally paler than surface, conspicuous on lower surface, \pm straight, arcuate or irregularly ascending, loop-connected into submarginal collective vein; submarginal veins 2 to 4; **basal veins** coalesced into weak or prominent posterior rib, in pairs or branching off and acroscopic or basisopic; posterior rib (when present) well-developed, naked along the sinus or not; interprimary veins occasionally present (in some species); minor veins structurally indistinct and entirely or in part flat, weakly to moderately sunken, etched, etched-sunken or narrowly or obtusely sunken, glabrous, usually concolorous on upper surface, entirely glabrous or entirely or in part \pm puberulent, granular-puberulent or granulose on lower surface, concolorous,

weakly paler or weakly to moderately darker than surface; secondary veins weakly to prominently raised or in part prominulous on lower surface; tertiary veins \pm raised, prominulous or flat and visibly distinct on lower surface; reticulate veins \pm raised or prominulous, or flat and visibly distinct or obscure on lower surface. **INFLORESCENCES** terminal (appearing axillary), erect to erect-spreading, emitting sweet fragrance at anthesis, rarely odorless (*C. plowmanii*), 2 to 8(to 10) per sympodium, emerging successively at or near apex of petiole sheath or from a subtending sympodial cataphyll near the base; sympodial cataphylls marcescent, ultimately deciduous, 1 to 2-ribbed, glabrous, rarely puberulent; peduncle usually longer than spathe; **spathe** surrounding spadix, weakly or not at all constricted between tube and blade, narrow, elongate, 3–20 cm, usually less than 1 cm diam., 10–20(–25) times longer than wide, narrowly \pm cylindrical, ovoid or ellipsoid; spathe tube \pm cylindrical, ellipsoid or ovoid, occluding pistillate and most or all of sterile staminate portions of spadix, decurrent onto peduncle at base, matte to glossy; spathe blade \pm erect or weakly to prominently cucullate, matte to glossy, white, cream, whitish, yellow, red, maroon or purple, or \pm green and purple-tinged or not, erect after anthesis, rarely spreading or reflexed, ultimately deciduous after anther dehiscence; **spadix** monoecious, slender, 2.2–16.5 cm x 2–8 mm, contained within and slightly to conspicuously shorter than spathe, sessile or stipitate, entirely or in part adnate to spathe at base, usually $\frac{1}{2}$ or more of length of

pistillate portion, occasionally also entirely or in part along length of sterile staminate portion, occasionally only along stipe, divided into pistillate portion at base and fertile male portion at apex, separated by sterile male portion; fertile male portion white, cream, yellow, bright orange, pink, red, green, dark purple, brown, yellowish or greenish, the color frequently different from that of pistillate and sterile portions, cylindrical, tapering, ellipsoid or clavate; sterile male portion white, cream, pink, green, yellow, yellow-orange, bright orange, dark purple, maroon or purplish; pistillate portion white, cream, yellow, green, orange, red, pink, maroon, rose-colored, yellowish, greenish or purplish, \pm cylindrical or weakly broadest midway, 1 to 6 flowers across axis; stamens fused into synandria, with connectives thickened; thecae dehiscing by

terminal pores or longitudinal slits; synandria densely arranged usually subprismatic \pm truncate at apex; pollen extruded in strands; **stigma** brush-like, sessile, or apparently so, or weakly to prominently elevated on style, capitate, \pm cylindrical, obconical or disc-like, occasionally weakly lobed, truncate or broadly depressed medially at apex; berries exposed by re-opening spathe, depressed-globose; seeds white, cream-colored or pale green, 3 to 25 per berry, ovoid to ellipsoid; endosperm copious; chromosomes: $2n = 26$.

Costa Rica and Panama in Central America; Colombia and Ecuador in South America; 69 taxa (68 species, 1 variety), 0–3000 m elevation.

Key to *Chlorospatha* species

1. Leaf blades with all venation glabrous on lower surface.
 2. Synandria truncate at apex, with the lobes not thickened; leaves with blades narrowly ovate with the base acute, rounded or cordulate *Chlorospatha portillae* Croat & L.Hannon
 2. Synandria broadly concave medially, with the lobes \pm prominently thickened; leaves with blades narrowly ovate-elliptic, with the base subcordate to subsagittate *Chlorospatha longipoda* (K.Krause) Madison
1. Leaf blades with all or most venation \pm crispy-puberulent to granular-puberulent on lower surface *Chlorospatha pubescens* Croat & L.Hannon



Figure 164. *Chlorospatha longipoda* (K. Krause) Madison (Croat 87303). Live plant showing leaf blades, adaxial surface.



Figure 165. *Chlorospatha longipoda* (K. Krause) Madison (Croat 87303). Live plant showing petioles and inflorescence.

Chlorospatha longipoda (K.Krause)

Madison, *Selbyana* 5(3–4): 353–354.

1981. *Caladium longipodum* K.Krause,

Notizbl. Bot. Gart. Berlin-Dahlem 15:

43. 1940. Type: Ecuador. Pastaza: Río

Topo, 1200 m, 4 July 1938, H.

Schultze-Rhonhof 2591 (holotype, : B).

Figures 164 & 165.

Chlorospatha madisonii J.Haager &

J.Jeník, *Preslia, Praha*, 56: 165–167.

1984. Type: Ecuador. Napo: Río

Borja, vic. San Francisco de Borja, 15

km NNE of Baeza, near Baeza–Lago

Agrio rd., ca. 1200 m, 00°25'N,

77°50'W (est.), December 1981, J.

Haager & J. Jeník s.n. (holotype, PR).

The species is characterized by its usually narrowly ovate-elliptic leaf blades that are subcordate to subsagittate at the base, with the posterior lobes short and usually rounded at the apex, and the inner margins decurrent onto the petiole. The upper surface is broadly quilted, frequently velvety, and the lower surface is matte and conspicuously reticulate. The species is also characterized by the presence of a sympodial cataphyll, its matte, medium to dark green petiole, sheathed $\frac{1}{3}$ – $\frac{1}{2}$ of its length, short peduncle (4–10 cm long) and small inflorescence, 4–8 cm long, with the spadix adnate to the spathe ca. $\frac{1}{2}$ of the length of the pistillate portion.

Terrestrial or occasionally hemiepiphytic herb, to 40 cm tall, usually in small colonies; **stem** fleshy, decumbent, 20–

40 cm long, erect to 15 cm at apex, remnants of old cataphylls and leaf bases persisting \pm intact to semi-intact along its length; sap milky or transparent; **internodes** usually short, (0.5–)1–2(–4–6) cm x 6–13 mm, matte to weakly glossy (rarely semi-glossy), dark green, occasionally weakly purplish, rarely pale brownish green, drying medium greenish brown; **cataphylls** 6–15 cm long, inequilateral, acuminate or obtuse with acumen (rarely apiculum) at apex, acutely or obtusely 1–2-ribbed abaxially, pale to medium green, rarely purple-mottled in transverse bands, drying matte, medium to medium-dark reddish brown. LEAVES 3–5, erect to erect-spreading; **petioles** (10–)13.5–29 cm long, glabrous, matte, medium to dark green, occasionally purple-mottled in narrow transverse bands in basal $\frac{2}{3}$ drying matte to weakly glossy, dark brown or greenish brown, sheathed 8–14 cm, $\frac{1}{3}$ – $\frac{1}{2}$ of total length (rarely $\frac{1}{4}$); sheath in-rolled or erect with margins in-rolled, decurrent or free ending at apex; free portion 2–3 mm diam. midway, terete, or terete midway and subterete toward apex, obscurely sulcate, bluntly V-sulcate to bluntly and narrowly sulcate or entirely sharply C-shaped and deeply narrowly sulcate, rarely sparsely and weakly granular-puberulent; **blades** narrowly ovate or ovate-elliptic, subcordate to subsagittate at base, (10–)15.5–21.5 x (3.5–)5–13 cm, 1.6–2 times longer than wide, usually broadest across anterior lobe, 1.1–2 times wider across anterior lobe than at base (measured tip to tip across posterior lobes), occasionally as broad as or weakly wider at base on drying, weakly or not at all

constricted in area of petiole attachment, thin to thinly coriaceous, prominently bicolorous, rarely moderately so; **upper surface** broadly quilted, matte, matte-subvelvety, velvety or semi-glossy, medium to dark green, drying matte to weakly glossy, medium to dark green or brownish to yellow-brown; **lower surface** reticulate, narrowly colliculate along all venation, matte, drying weakly glossy, moderately paler; **anterior lobe** (8.8–)14–18 x (3.5–)5–10(–13) cm, 1.4–2.3 times longer than wide, (3–)3.5–10(–11.6) times longer than posterior lobes, weakly to moderately acuminate to bluntly acute or apiculate at apex, broadest below middle; **posterior lobes** directed toward the base, occasionally weakly outward, 1.5–4(–6) x 1.5–4(–5) cm, usually as long as wide, rarely 1.2 times longer than wide, broadly to occasionally narrowly rounded at apex, broadest at base, occasionally markedly inequilateral, the inner side narrower, weakly rounded to acute at base and decurrent onto petiole; outer side 5–6 times wider than inner side midway; **midrib and major venation** occasionally in part weakly granular-puberulent on lower surface, matte, concolorous or weakly to moderately darker than surface; **midrib** deeply sunken on upper surface, convex or moderately to narrowly round-raised on lower surface, matte, drying raised, moderately darker than surface; **basal veins** 1–3 pairs, coalesced into a prominent posterior rib, or with 3–4 branching off, 2–3 acroscopic, 2–3 basiscopic, with 1st and 2nd or also the 3rd fused, forming a short posterior rib 5–10 mm long; **primary lateral veins** 4–6 pairs,

arising at 17–45° angle, most acutely toward apex, \pm arcuate, quilted-sunken on upper surface, convex to narrowly round-raised on lower surface, drying weakly raised, darker than surface; **secondary veins** in part weakly sunken on upper surface, raised on lower surface, occasionally in part sparsely granular-puberulent, darker than surface, drying raised, weakly to moderately darker than surface; **tertiary veins** bluntly to acutely raised or prominulous on lower surface, darker than surface, drying entirely or in part weakly darker than surface; reticulate veins weakly raised or prominulous on lower surface, concolorous to weakly darker than surface, drying entirely prominulous or weakly raised, or in part weakly raised and otherwise prominulous, weakly darker than surface; **collective veins** 2–3(4), the innermost arising from one of lowermost lateral veins on inner side of posterior lobe, moderately scalloped, 3–9 mm from margin. INFLORESCENCES erect, 1–6 per axil, emitting a weak fruity fragrance at anthesis; **sympodium** held within a sympodial cataphyll; **sympodial cataphyll** 6.5–8.5 x 1–2 cm, acuminate at apex, 1-ribbed abaxially, medium green, occasionally weakly purple-speckled (Croat & L. Hannon 86941); **peduncle** terete, 4–10 cm x 1–2 mm (to 13 cm long in fruit), weakly glossy, pale to pale-medium green, occasionally purple-tinged, drying ca. 1 mm diam., dark brown; **spathe** weakly cucullate, 4–8 cm long (1–3.5 cm longer than spadix), oblanceolate, briefly acuminate or cuspidate at apex, opening narrowly most of its length at anthesis, with margins directed forward; spathe tube matte

to weakly glossy, entirely pale to dark green or weakly to heavily purple-tinged on outer surface, weakly glossy to semi-glossy, green on inner surface, 1–2.5 cm long, drying 3–5 mm diam., matte, dark brown; spathe blade weakly glossy, entirely pale to dark green or dark purple, or weakly to strongly purple-tinged to purple-mottled on outer surface, weakly glossy to semi-glossy or matte, pale to dark green on inner surface, 2.5–6 cm long, 1.2–2 cm wide (flattened), drying matte, dark brown to purplish, occasionally moderately paler than tube, marcescent, erect after anthesis; **spadix** erect, occasionally curving forward at anthesis, (3.3–)4.3–5.3 cm long, sessile, \pm cylindrical, adnate to spathe 6–8 mm at base, ca. $\frac{1}{2}$ of the length of pistillate portion; pistillate portion whitish, pale yellow or pale green to yellow-green, (0.7–)1–1.8 cm x 2–3.5 mm, broadest midway; fertile staminate portion white or whitish to whitish green or pale yellow, 2–3 cm x 2–3 mm, bluntly acute at apex, \pm cylindrical, drying yellow to yellow-tan; sterile staminate portion whitish (rarely violet-red), 4–8 x ca. 2 mm, weakly narrower than pistillate and fertile staminate portions; **pistils** weakly coherent, 2–3 across the axis (viewed from above), ca. 1 mm long, rarely in whorls instead of spirals (one inflorescence of *Croat et al.* 86561); ovaries whitish, cream or pale green, 1.2–2 mm diam., \pm cylindrical to obtusely obconical, usually broadly depressed medially, 2–3-locular, with pseudoaxile placentation, the placentae fused at base, or rarely 1-locular with basal placentation and vestigial septa present (*Croat et al.* 86607); ovules 8–12 per locule, anatropous, biseriate

or occasionally 1-seriate; funicle shorter than ovule; style 1.2–1.3 mm diam., as broad as ovary apex, occasionally obscurely attenuate medially, the margin obscure or distinct, not coherent with those of adjacent styles; red chromoplasts present; stigma white to cream, sessile, occasionally obscurely elevated on style, 0.2–0.3 mm diam., obpyramidal or cylindrical; synandria ca. 1 mm long, 1.3–1.5 x 1.1–1.2 mm diam. and \pm elongated in direction of axis, occasionally highly bilaterally symmetrical, coherent, weakly or prominently deeply (2)3–4(5)-lobed (occasionally almost to center), broadly concave medially, with lobes thickened, occasionally subrounded, the margins sinuate-undulate and interlocking with those of adjacent flowers, (2)3–4(5)-androus, the thecae each with a terminal pore; sterile flowers occasionally purple-tinged in basal 2 whorls, rarely violet-red, less than 1 mm long, 1.3–2 x 1–1.3 mm diam. and \pm elongated in direction of axis, coherent, truncate, subprismatic to irregularly prismatic, in 3–5 whorls. **INFRACTESCENCE** pendent, entirely green or occasionally purple-tinged, (2.5–)3–4 cm x (6–)7–10 mm, drying matte to weakly glossy, dark brown; **berries** cream-colored or pale green and weakly violet-tinged apically, 4–5 mm diam., drying yellowish brown; **seeds** 7–8 per berry, 1.2–2 x 0.8–1 mm, obtusely 3-sided, rounded at base, acute at apex, finely costate, drying cream-colored.

Chlorospatha longipoda is widespread on the eastern slopes of the Andes in Ecuador, at (265–)470–1700 m elevation, occurring in

Morona-Santiago, Napo, Pastaza, Sucumbíos, Tungurahua and Zamora-Chinchipe Provinces. The species probably occurs also in Chimborazo Province. As is true of other wide-ranging species from the eastern slopes, *C. longipoda* occurs in a wide variety of life zones: *Tropical wet forest*, *Premontane wet forest*, *Lower montane wet forest*, *Premontane rain forest*, *Premontane moist forest* and *Montane moist forest*.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, along road from near Paquisha, south to Las Orchídeas, and end of road at Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 47.0 km S of intersection near Paquisha, 2.6 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 875 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91356* (MO, QCNE); Cordillera del Cóndor, parroquia Zurmi, vicinity of Las Orquídeas, Cabañas Yancuam, ca. 3 km S of Las Orquídeas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1128–1250 m, 18 Apr. 2004, *Thomas B. Croat 97204* (MO, QCNE).

Chlorospatha portillae Croat & L.P.Hannon, *Ann. Missouri Bot. Gard.* 101: 226–229. 2015. Type: Ecuador. Zamora-Chinchipe: Along El Panguí–Zamora rd., vic. San Roque, 2 km S of San Roque, 10 km S of El Panguí, ca. 900 m, 03°42'11"S, 78°35'59"W, 7 Sep. 2002, *T.B. Croat 87201* (holotype: MO!; isotype: AAU!, B!, CAS!, F!, GH!, HUA!,

INB!, K!, M!, MEXU!, NY!, QCA!, QCN!, S!, SEL!, UB!, U!, VEN!). **Figures 166 & 167.**

The species is characterized by its glossy, dark green, narrowly ovate leaf blades that are acute, rounded or cordulate at the base, and by its ten inflorescences per sympodium with small, purplish spathes.

Terrestrial herb to 50 cm tall; **stem** decumbent, with remnants of old cataphylls persisting \pm intact to semi-intact and \pm fibrous along its length, occasionally with few bulbils produced; bulbils ovoid, solitary, ca. 9 x 4 mm; sap milky; **internodes** 3–8(–10) mm x 1–2.7 cm, semi-glossy, gray-green, drying matte to weakly glossy, dark brown; **cataphylls** 14–16.5 cm long, \pm acuminate or obtuse with acumen at apex, 1-ribbed abaxially, pale-medium green, weakly darker maroon-speckled, dark maroon at apex and on abaxial rib, drying weakly glossy to semi-glossy, dark reddish brown, weakly fibrous. **LEAVES** 2–4, erect-spreading; **petioles** 20.5–42(–53) cm long, glabrous, semi-glossy, dark green, or weakly to prominently maroon-tinged, or entirely dark maroon, drying matte, dark reddish brown, sheathed 5–12 cm, ca. $\frac{1}{4}$ of total length; sheath decurrent at apex; free portion 2–5(–9) mm diam. midway, terete or sharply flattened adaxially in apical 3–4 cm, with margins acutely raised and an obtuse medial rib; **blades** narrowly ovate, 20–34.5 x 6–20 cm, (1.3–)2.5–3.3 times longer than wide, acuminate at apex, broadest at or below middle, acute to rounded at base and frequently weakly inequilateral, occasionally



Figure 166. *Chlorospatha portillae* Croat & L. Hannon (Croat 87201). Live plant showing petioles and leaf blades, adaxial surface.



Figure 167. *Chlorospatha portillae* Croat & L.P. Hannon (*Croat 87201*). View of plant base showing petioles and inflorescences.



Figure 168. *Chlorospatha pubescens* Croat & L.P. Hannon (*Croat et al.* 88000). Live plant showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.



Figure 169. *Chlorospatha pubescens* Croat & L.P. Hannon (*Croat et al.* 88000). Close-up view of leaf blade, abaxial surface.



Figure 170. *Chlorospatha pubescens* Croat & L.P. Hannon (*Croat et al.* 88000). Close-up view of inflorescence with green spathe tube.

cordulate, decurrent onto petiole, thinly coriaceous, moderately bicolorous, \pm symmetrical or weakly to moderately inequilateral, with one side to 2.5 cm wider than opposite side; **upper surface** quilted, semi-glossy to glossy, dark green, drying weakly glossy, dark brownish green; **lower surface** glossy, drying semi-glossy to glossy, weakly to moderately paler; **midrib and major veins** deeply sunken and concolorous on upper surface, narrowly raised on lower surface, concolorous or weakly to prominently maroon-tinged, drying \pm flattened, much darker than surface; **primary lateral veins** 5–6 pairs, arising at 25–40° angle, \pm straight to weakly arcuate; **minor veins** mostly flattened on lower surface, weakly darker than surface, drying concolorous to weakly darker than surface; **secondary veins** drying weakly prominulous on lower surface; **tertiary and reticulate veins** flat, visible on lower surface, frequently darker than surface, drying in part visible; **collective veins** 3–4, the innermost arising from base, loop-connected with all preceding lateral veins, moderately scalloped, 5–13 mm from margin. INFLORESCENCES erect, to 10 per axil, the sympodium held within a sympodial cataphyll; sympodial cataphyll 7.4–12 x ca. 1.5 cm, acuminate at apex, 1-ribbed abaxially; **peduncle** 9–17.5 cm x ca. 1 mm, prominently thicker than broad, prominently purple-tinged or weakly to prominently dark purple-mottled, drying matte, blackish brown; **spathe** erect, 3–5.4 cm long, acuminate at apex; tube medium green and purple-tinged on outer surface, pale green on inner surface, 1.2–2.8 cm x 3–

4.5 mm, drying matte, dark brown on outer surface, weakly paler on inner surface; blade medium green and prominently purple-tinged on outer surface, pale green on inner surface, 1.6–2.6 cm x 2.5–4 mm, 7–10 mm wide (flattened), drying matte, dark brown on outer surface, weakly paler on inner surface, marcescent, erect after anthesis; **spadix** erect, 2.3–3.5(–5) cm long, sessile, adnate to spathe 0.7–1.8 cm at base, $\frac{1}{2}$ – $\frac{3}{4}$ of the length of pistillate portion; pistillate portion white, 1–2.4 cm x 2.2–3 mm, broadest near apex, drying dark brown; fertile staminate portion white, 1.1–2 cm x 2–3 mm, ellipsoid, narrowly rounded at apex, drying medium yellow-brown; sterile staminate portion white, 3–4 x 1–1.5 mm, cylindrical, drying pale-medium yellow-brown; **pistils** densely arranged, ca. 3–4 across the axis (viewed from above), 1.5–2 mm long; ovaries ovoid to \pm cylindrical, ca. 1.5 x 1 mm, 2-locular, with axile placentation; ovules 8–10 per locule, hemianatropous, biseriate; funicles shorter than ovules; style Type 2 (**Figure 1B**), 0.3–0.5 x ca. 0.8 mm, comprising ca. $\frac{1}{4}$ of the length of pistil, as broad as ovary apex, the margins obscure and weakly or not at all coherent with those of adjacent styles; stigma ca. 0.2 mm diam., capitate, weakly elevated on narrowed portion of style, drying dark brown; synandria ca. 1 x ca. 1 mm, coherent, truncate, 2–3-lobed, 2–3-androus; sterile flowers ca. 0.5 x ca. 0.8 mm, coherent, truncate, subprismatic to prismatic, in 3 whorls.

Chlorospatha portillae is known from the eastern slopes of the Andes in Zamora-

Chinchipe Province, Ecuador, at 875–1465 m in a *Premontane wet forest* life zone.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Los Encuentros–El Sarsa rd., Km 14.7, 1455 m, 03°48'40"S, 78°36'28"W, 15 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiake Katan 91089* (MO, QCNE); Along rd. from near Paquisha, S to Las Orquídeas, and end of rd. at Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 47 km S of intersection near Paquisha, 2.6 km N of Las Orquídeas, 875 m, 04°12'48"S, 78°38'41"W, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiake Katan 91343* (MO, QCNE); between San Carlos and Nambija, on mining rd. E off of main San Carlos–Nambija rd. beginning 6 km S of San Carlos, 0.9 km up rd. toward mining operation at end of rd. (2.4 km from rd., 1465 m, 04°02'18"S, 78°47'52"W, 23 July 2004, *Thomas B. Croat 91999* (MO, QCNE); Vicinity of Las Orquídeas; near Cabañas Yankuam; along Río Nangaritza, S of camp, old trail along river and on steep slopes of forest W of River, 04°15'06"S, 78°39'29"W, 877 m, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98667* (MO, QCNE).

Chlorospatha pubescens Croat & L.P.Hannon, *Ann. Missouri Bot. Gard.* 101(1): 229–233. 2015. Type: Ecuador. Napo: Along Archidona–San Vicente Para rd., 15.8 km E of Archidona, 5.7 km E of Santo Domingo, 10 km E of San Pablo, 797 m, 00°57'24"S, 77°43'49"W, 23

Apr. 2003, *T.B. Croat, L.P. Hannon & N. Altamirano 88000* (holotype: MO; isotypes: B!, COL!, K!, NY!, QCNE!, S!, US!). **Figures 168–170.**

Chlorospatha pubescens is characterized by its usually prominently hastate leaf blades that are velvety, dark green and usually broadly quilted on the upper surface and much paler and conspicuously reticulate on the lower surface, with all venation more or less raised and crispy-puberulent to granular-puberulent, and by its small pale green inflorescences.

Terrestrial herb less than 50 cm tall, in small colonies; **stem** decumbent, erect 10–15 cm at apex, with remnants of old cataphylls persisting \pm intact along its length, occasionally producing bulbils along its length; bulbils solitary, green, 2–3 x 2–3 mm; **internodes** 0.8–2 x 1–1.5 cm, weakly glossy to semi-glossy, dark green or yellow-green, drying 7–10 mm diam., matte to weakly glossy, medium to dark brown or green; **cataphylls** 7–13 cm long, cuspidate at apex, entirely acutely or bluntly 1–2-ribbed or in part only toward apex, matte to weakly glossy, medium green, drying matte to weakly glossy, medium to dark brown. LEAVES (2–)6–8, erect, erect-spreading, spreading to reflexed-spreading; **petioles** (13–)16–29(–32) cm long, minutely obtusely many-ribbed abaxially, usually crispy-puberulent along ribs, matte, medium to dark green, drying matte, (medium) dark brown or greenish, sheathed 5–10(–14) cm, 1/10–1/4(¹/₃–¹/₂) of its length; sheath with sides \pm erect, decurrent at apex, or with one

side wider and prominently free-ending, glossy and paler on inner surface; free portion 5–7 mm diam. midway (drying 2–5 mm diam.), obtusely D-shaped, the margins acute toward apex; **blades** hastate or subhastate, occasionally sagittate, (12.5–)15–21.5(–27) x (10–)12.5–19.5 cm, 1.1–1.4 times longer than wide, weakly acuminate to apiculate at apex, rarely bluntly acute, broadest at base (rarely broadest across anterior lobe), 1.5–1.9(–2.3) times broader at base than across anterior lobe (measured tip to tip across posterior lobes), thin to thinly coriaceous, conspicuously bicolorous (rarely moderately bicolorous), the margins broadly undulate, rarely crispate-undulate; **upper surface** broadly quilted, rarely flat, velvety, dark green, drying matte or velvety-matte, dark green (rarely dark yellow-brown); **lower surface** reticulate, matte, narrowly colliculate along all venation, drying weakly glossy to semi-glossy, moderately to prominently paler (rarely weakly paler); **anterior lobe** (8.5–)10.5–18(–19.5) x (5.5–)7.5–12.5(–15.5) cm, (1.3)1.4–1.6(–1.9) times longer than wide, (1.5–)1.7–2.2(–2.5–2.7) times longer than posterior lobes, broadest near base, weakly or not at all constricted at base, rarely moderately to prominently constricted, \pm symmetrical; **posterior lobes** directed outward, 5–10(–11.5) x (3–)3.5–6.5 cm, (1.2–)1.4–2.3(–2.5) times longer than wide, bluntly acute to narrowly rounded at apex, broadest midway or near base; **all orders of venation** usually \pm crispy-puberulent to prominently granular-puberulent on lower surface, most densely so toward base of midrib, major veins and entire length of posterior rib;

midrib deeply sunken on upper surface, occasionally entirely sparsely crispy-puberulent or in part only in basal $\frac{1}{2}$, concolorous or weakly paler than surface and yellow-green, drying concolorous or weakly to moderately paler, round-raised or occasionally obtusely angular on lower surface, minutely many-ribbed, weakly paler to weakly darker than surface, drying weakly raised to \pm flattened, concolorous or weakly darker than surface; **basal veins** 1–2(3) pairs, coalesced into prominent posterior rib, the 1st free to the base, or with 3–6 branching off, the 1st free to the base, 1–2 acroscopic, 2–3 basisopic, coalesced into weak posterior rib 3–4 cm long; **posterior rib** naked 3–8 mm per side (rarely not naked), round-raised with an acute medial rib on lower surface, finely many-ribbed, frequently \pm scurfy-pubescent, drying raised, darker than surface; **primary lateral veins** 3–4 pairs, arising at 15–45(–70) $^{\circ}$ angle, most acutely toward apex, straight or moderately arcuate, deeply quilted-sunken (rarely etched-sunken) on upper surface, occasionally entirely sparsely crispy-puberulent or in part in basal $\frac{1}{4}$ – $\frac{1}{2}$, drying concolorous, or in part concolorous and otherwise weakly to moderately paler in basal $\frac{1}{2}$, round-raised on lower surface; **secondary veins** in part weakly sunken or obtusely sunken on upper surface, convex to narrowly raised on lower surface, concolorous to weakly darker than surface, drying raised or narrowly raised, concolorous to weakly darker than surface; **tertiary veins** usually obscure on upper surface, rarely obtusely sunken, entirely raised on lower surface, or in part raised and

otherwise prominulous, concolorous to weakly darker than surface, drying entirely raised or in part raised and otherwise prominulous, weakly darker than surface; reticulate veins usually obscure on upper surface, rarely obtusely sunken, entirely prominulous on lower surface, or mostly prominulous and otherwise visibly distinct and flat, weakly darker than surface, drying entirely or in part prominulous and otherwise flat, weakly darker than surface; **collective veins** 2–4, the innermost arising from one of lowermost lateral veins on inner side of posterior lobe, occasionally from apex of posterior rib, loop-connected with all preceding lateral veins, weakly to moderately scalloped, 4–10(–16) mm from margin. INFLORESCENCES erect, (1–)3–6 per axil, emitting a weak, sweet fragrance at anthesis; sympodium held within a sympodial cataphyll; sympodial cataphyll 5–8 cm long, pale-medium green, usually weakly crispy-puberulent or granular-puberulent along longitudinal veins (rarely glabrous), drying matte to weakly glossy, medium brown; **peduncle** (3.5–)4.5–7(–8.5) cm x 1–1.5 mm, terete, or cylindroid and wider than thick, to 2.5 mm wide and 1.5 mm thick, matte, pale to medium-dark, sparsely crispy-puberulent or granular-puberulent in longitudinal rows, drying matte to weakly glossy, medium to dark brown or greenish brown; **spathe** erect, frequently weakly cucullate, 4.3–7(7.1) cm long, usually entirely greenish cream, pale green or medium-pale green on both surfaces, rarely \pm deeply purple-tinged on outer surface, most prominently so on tube, oblanceolate, cuspidate at apex, opening

narrowly or broadly most of its length at anthesis, the margins directed forward or weakly outward; tube weakly glossy (semi-glossy) on outer surface, \pm narrowly, sparsely crispy-puberulent or granular-puberulent at base (rarely entirely glabrous), weakly glossy (glossy) on inner surface, (1–)1.5–1.9 cm x 3–6 mm, weakly thicker than broad, drying 2–4 mm diam., matte to weakly glossy, medium to dark brown or greenish on outer surface, paler on inner surface; blade erect to erect-spreading, matte (semi-glossy) on outer surface, matte (glossy) on inner surface, (2.5–)3.2–5.2(–5.5) cm long, 1.2–1.8 cm wide (flattened), obtusely 1-ribbed with most venation prominulous on outer surface, drying matte (rarely weakly glossy), medium to dark brown on both surfaces, usually weakly to moderately paler than tube, marcescent, usually erect after anthesis, rarely spreading; **spadix** erect, curving forward at anthesis, 3.3–4.3(–4.6) cm long, usually weakly stipitate ca. 1 mm at base (stipe and axis pale green), occasionally sessile, \pm cylindrical, adnate to spathe 2–3(–5) mm at base, along stipe and narrowly onto pistillate portion 2–3 mm, $\frac{1}{4}$ or less of the length of pistillate portion; pistillate portion cream or pale yellow-green, 0.8–1.7 cm x 1.5–3 mm, broadest midway; fertile staminate portion white, cream or creamy yellow, 1.2–2.3(–2.5) cm x 2–3 mm, bluntly acute to narrowly rounded at apex, broadest at base, \pm cylindrical to weakly tapering; sterile staminate portion cream or rarely white and weakly purple-tinged or minutely purple-speckled, 3–8(–10) x 2–2.5 mm, \pm cylindrical or weakly broadest at apex or

base, occasionally naked at base to 1 mm; **pistils** weakly coherent to \pm laxly arranged (most conspicuously so toward base), 2–4 across the axis (viewed from above), 1–1.3 mm long; ovaries cream, 1–1.5 mm diam., \pm cylindrical to obtusely obconical, frequently broadly depressed medially, 2-locular, with axile or subaxile placentation, 5–8(–10) ovules per locule, or rarely 1-locular with subaxile placentation and ca. 12 ovules; ovules hemianatropous, biseriate; funicles shorter than ovule; style (0.8–)1–1.2 mm diam., weakly narrower than to as broad as ovary apex, with red chromoplasts, the margins distinct, not coherent with those of adjacent styles; stigma white, 0.2–0.3 mm diam., sessile, \pm capitate or cylindrical, rarely broadest and truncate at apex; synandria ca. 1 mm long, (1.3–)1.8–2 x (0.8–)1.3–1.5 mm diam. and \pm elongated in direction of axis, occasionally highly bilaterally symmetrical, sometimes subrounded, prominently and deeply (2)3–4(5)-lobed, occasionally almost to middle (rarely (2)3-lobed, on one inflorescence), broadly concave medially, with lobes prominently thickened, the margins sinuate-undulate and interlocking with those of adjacent flowers, coherent, (2)3–4(5)-androus, the thecae each with a terminal pore; pollen cream-colored, in tetrahedral tetrads, with exine reticulate; sterile flowers, 0.7–1 mm long, 1.5–2 x (0.5–)1–1.2 mm diam. and \pm elongated in direction of axis, less so in basal whorl, coherent, truncate, subprismatic to irregularly subprismatic, in 3–5(6) whorls.

Chlorospatha pubescens occurs on the eastern slopes of the Andes in Ecuador

(Morona-Santiago, Napo, Pastaza, Sucumbíos, Zamora-Chinche) at 400–1551 m in *Tropical wet forest*, *Premontane wet forest*, *Premontane rain forest* and rarely in *Premontane moist forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinche:** vic. El Panguí, Quime crossing Río Zamora, 861 m, 03°32'28"S, 78°26'40"W, Mar. 1996, *Thomas B. Croat 81351* (MO, QCNE); along rd. from Quime Ferry crossing into Cordillera de Cóndor, 22 km SW of Río Zamora, and Quime crossing, 1489 m, 03°37'46"S, 78°26'17"W, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91068* (MO, QCNE); along rd. between Zumbi on Río Zamora and summit of Cordillera del Cóndor, 27.3 km E of Zumbi, 8.6 km E of Río Nangaritza bridge, 1259 m, 03°56'17"S, 78°37'45"W, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91228A* (MO, QCNE); *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91229* (MO, QCNE).

Dieffenbachia Schott, *Wiener Z. Kunst* 3: 820.1829. TYPE: *Dieffenbachia seguine* (Jacq.) Schott.

Seguinum Raf., *Fl. Tellur.* 3: 66. 1836 [1837]. TYPE: *Seguinum maculatum* Raf. [*Dieffenbachia seguine* (Jacq.) Schott].

Maguirea A.D. Hawkes, *Bull. Torrey Bot. Club* 75: 635.1948. TYPE:

Maguirea spathicarpoides A.D. Hawkes 5
[*Dieffenbachia paludicola* N. E. Br.].

Terrestrial; caudices thick, often elongate and prostrate, rooting at the lower nodes, the older portions of the stem trailing across the surface of the ground, often for considerable distances; sap often milky and frequently with varying concentrations of oxalic acid, with conspicuous annular leaf scars. *Petioles* elongate, amplexicaul, sheathed to the middle or sometimes to the apex; sheath unequal and often free-ending at apex; leaves clustered in a tight whorl at the stem apex; *blades* ovate to oblong-ovate, elliptic, oblanceolate, or obovate, acuminate at apex, acute to obtuse to rounded at base, typically subcoriaceous, sometimes variegated throughout or in areas along the midrib with paler colors; midrib raised on both surfaces; primary lateral veins pinnate, usually sunken above, raised below, much more prominent than the minor veins, all lateral veins extending to the margins without forming a single collective vein but with several primary lateral veins often forming a series of short, discontinuous collective veins; interprimary lateral veins sometimes present; minor veins distinct to obscure, usually not markedly raised, sometimes connected by transverse tertiary veins. INFLORESCENCES shorter than the leaves, 1 to several per axil; bracts short and usually inconspicuous; peduncle usually somewhat flattened and angular with one edge narrowed; *spathe* oblong, persistent, convolute at base, often somewhat constricted about midway, opening usually

only above the middle, usually green on outside, somewhat paler within; *spadix* slightly shorter than the spathe, divided into pistillate and staminate portions, each with naked unisexual flowers; the pistillate portion basal, about as long as the staminate portion, fused to the spathe, remotely many-flowered (typically 20 to 80 rarely to 160); staminate portion clavate, white, free from the spathe, densely many-flowered, often separated from the pistillate portion by a naked interval. Staminate flowers consisting of 4 stamens united into a 4- to 5-sulcate, truncate synandrium; anthers lateral, contiguous, the common connective thick, fleshy; the thecae obovoid to oblong-elliptic, dehiscing by short, apical, pore-like slits; pollen extruded in strands, inaperturate, ellipsoid or oblong or nearly spherical, large, averaging more than 75µm, exine psilate to obscurely verruculate and/or sparingly punctate-foveolate to densely foveolate; pistillate flowers moderately dispersed but often in weak rows with 1 to 5(6) pistils per spiral, and surrounded by 4 or 5 claviform white staminodia, these longer than the ovary usually 2–5 mm, usually spreading, sometimes fused briefly at the base; ovaries 2- or 3-carpellate, sometimes 1-carpellate, sessile, depressed globose to depressed ovoid, 2- or 3-lobate; ovules 1 per locule, pale green, semiglossy, erect, anatropous; placenta axile to basal; stylar region inconspicuous; stigma large, hemispheric or 2- or 3-lobate, about as broad as the ovary, yellow to orange in color. INFRUCTESCENCE with fruiting spathe often turning yellow, orange, or red,



Figure 171. *Dieffenbachia cannifolia* Engl. (Croat & Menke 89552). Life plant showing leaf blades, adaxial surface, and inflorescence.

breaking up longitudinally in fruit to expose the colorful berries; fruits baccate, globose or 2- or 3- lobed, 1- or 2(3)-seeded; seeds globose or ovoid, the testa thick, smooth, green to blackish green; embryo large; endosperm lacking. Chromosomes $2n = 54, 68$. Tropical and subtropical America; Mexico to West Indies (with questionable presence in the Dominican Republic and the lesser Antilles) and in South America to Argentina. With 58 published species and 140 estimated.

Dieffenbachia cannifolia Engl., *Pflanzenr.* IV 23Dc(Heft 64): 40, f. 18. 1915. Type: Peru. Loreto: Leticia, June 1902, E. Ule 6183 (holotype: B!; isotype: L!). **Figures 171 & 172.**

The species is characterized by its milky latex with acrid onion or skunk odor, its petioles sharply and broadly sulcate sheathed to near the apex or throughout and with sheath free-ending at apex, its large elliptic to obovate and slightly inequilateral blades, its 12–14 pairs of primary lateral veins arcing upwards near the edge of the



Figure 172. *Dieffenbachia cannifolia* Engl. (Croat & Menke 89552). Close-up view of inflorescence.

blade, its 1–6 inflorescence per axil with green spathe and white spadix, and its closely packed, green or yellow-green berries becoming orange or red at maturity.

Terrestrial plant, **stems** erect, 0.5–2 m tall; milky latex caustic to bare skin, with acrid onion or skunk odor; **internodes** cylindrical, 1.5–4 cm long, 2–4 cm diam, dark green to dark yellow-green or faintly orange-brown, moderately smooth but minutely and irregularly fissured, glossy, sometimes warty. **LEAVES** erect, crowded towards the apex; **petioles** sharply and broadly sulcate, 5.5–18 cm long, sheathed to near the apex or throughout, drying medium yellow-green to yellowish brown, with the abaxial surface somewhat ribbed, sparsely pale short-lineate, the upper margins thin but smooth; sheath free-ending at apex, sometimes extending over base of blade; **blades** elliptic to ovate-elliptic to obovate or obovate-elliptic, (20)35–45(55) cm long, (8)10–15(24) wide, averaging 35 x 15 cm, 1.3–3.4 times longer than wide, 2.1–5.1 times longer than petioles, usually broadest above the middle, acute to abruptly and shortly acuminate or rounded and cuspidate at apex, acute to somewhat rounded at base, slightly inequilateral, one side 1.8–2.5 cm wider, subcoriaceous, dark green and glossy, semiglossy or matte above, paler and matte below, drying dark brown to grayish yellow-brown or dark gray-green above, grayish green to yellowish green below; **midrib** concolorous, broadly sulcate at base, flat-raised above, bluntly and broadly angular and moderately paler below, 8–15 mm wide

near the base and tapering towards the apex, drying flat, faintly striate, darker than or lighter than surface above, almost flat, moderately coarsely ribbed and moderately paler than the surface below; **primary lateral veins** 12–14 pairs, arising at 45–60° angle from the midrib and arcing upwards near the edge of the leaf, becoming indistinct from minor veins near the edge, concolorous and quilted-sunken above, prominently raised, drying paler than surface below; minor veins thin, moderately densely spaced, moderately distinct. **INFLORESCENCES** 1–6 per axil, erect; **peduncle** 5–10 cm long, drying 3–5 mm diam., erect, medium to dark green, finely striate; **spathe** 13–23 cm long, pale green or green; tube remaining closed, 5–10 cm long, 1.3–2.2 cm wide; blade oblong and narrowly cuspidate-acuminate at apex, 8–13 cm long, up to 4 cm wide when open; **spadix** white, 10–19 cm long, the stipe 1 cm long with pistillate portion 3–6.5 cm long; staminate portion 4.5–9.5 cm long; sterile staminate portion (1.5)1.8–2.9 cm long; **pistillate flowers** 2 mm diam., surrounded by 4–5 staminodia, these 1–1.5 mm long; sterile portion 1.5 cm long; staminate portion 4.5 cm long; synandria 1.5 mm diam.; ovaries depressed on drying; **male flowers** with synandria 1.5 mm diam. **INFRUCTESCENCE** erect, drying yellowish brown, (8–)13–17.5 cm long; **spathe** tube to 6 cm long, 1.5–3 cm wide on drying, finely striate, orange or red at maturity, **berries** closely packed, green or yellow-green becoming orange or red at maturity.

Dieffenbachia cannifolia ranges from Colombia (Amazonas, Putumayo) to Ecuador (Morona-Santiago, Napo, Pastaza, Sucumbios, Zamora-Chinchipe) and Peru (Amazonas, Loreto, Pasco, San Martín), and to Brazil (Acre, Amazonas) at 100–1500 m elevation in *Premontane moist forest*, *Tropical moist forest*, *Tropical wet forest*, *Premontane wet forest* and *Premontane rain forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Limón Indanza, Cordillera del Condor, Cuenca del Río Coangos, Comunidad Shuar de Kuankus, Sendero que conduce hacia la comunidad Yunkumas, Informante: José Saant, 03°02'36"S, 78°13'03"W, 850 m, 14 June 2005, *Carlos Morales & M. Tupiza* 1214 (MO, QCNE).

Zamora-Chinchipe: Cordillera del Condor, along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritzza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn Hannon, Greg Walbert & Tuntiak Katan Jua* 91253 (AAU, B, CAS, GB, MO, MEXU, QCNE, S, SEL); Nangaritzza, Río Nangaritzza, upper valley, 3 km east of Miazi, near disputed Peru-Ecuador border, 04°18'S, 78°40'W, 1000 m, 11 Dec. 1990, *David Neill & W. Palacios* 9682 (MO); Cordillera del Cóndor, parroquia Zurmi, Cabañas Yancuam, ca. 3 km S of Las Orquídeas, slopes W of Río Nangaritzza, 04°15'01"S, 78°39'33"W, 1128–1250 m, 18 Apr. 2006, *Thomas B. Croat* 97199 (MO, QCNE); Cordillera del Cóndor region, parroquia Zurmi, Cabañas Yancuam,

6 km N of Las Orquídeas, 12.1 km S of Zurmi, 19.6 km S of Guayzimi, along steep stream, 04°31'54"S, 78°33'48"W, 869 m, 19 Apr. 2006, *Thomas B. Croat* 97275 (MO, QCNE); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritzza, 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Mark Menke* 89523 (MO, QCNE); *Thomas B. Croat & Mark Menke* 89552 (MO, QCNE).

Dracontium L., *Sp. Pl.* 967, 1753. TYPE: *Dracontium polyphyllum* L. (lectotype, designated by Britton & Wilson (*Scientific Survey of Puerto Rico and the Virgin Islands*, 5(1): 7, 1923)).

Eutereia Raf., *Fl. Tellur.* 4: 12. 1836 [1838]. TYPE: *Eutereia nigricans* Raf. [nom. superfl. pro *Dracontium polyphyllum* L.]

Echidnium Schott, *Oesterr. Bot. Wochenbl.* 7: 62. 1857. TYPE: *Echidnium schomburgkii* Schott. [nom. superfl. pro *Dracontium dubium* Kunth].

Ophione Schott, *Oesterr. Bot. Wochenbl.* 7: 101. 1857. TYPE: *Ophione purdieana* Schott [= *Dracontium purdieanum* (Schott) Engl.].

Chersydrium Schott, *Oesterr. Bot. Z.* 15: 72. 1865. TYPE: *Chersydrium jararaca* Schott. [nom superfl. pro *Dracontium asperum* K. Koch].

Godwinia Seem., *J. Bot.* 7: 314, t. 96, 97. 1869. TYPE: *Godwinia gigas* Seem. [= *Dracontium gigas* (Seem.) Engl.

Terrestrial, tuberous, hypogeous perennial herbs, 1--5 m tall, with 1 leaf (rarely 2) and with 1 (or rarely 2) inflorescences; *tuber* \pm hemispheric, 2--20 cm diam., 2--10 cm thick; flat above, with a few to many tubercles among many roots; convex below, smooth or strongly wrinkled, without tubercles and roots; tubercles elongate, ovoid to ellipsoid or cylindrical; *cataphylls* partially covering the petiole base. *Leaves* arising terminally from tuber apical bud, tripartite; *petioles* 1--5 m long, 2--8 cm diam. at base, 1--3.5 cm diam. at apex, light to dark or brownish green, sometimes tinged brown near the base, mottled and streaked with whitish or pale green areas forming a reptilian pattern; armament varying from a smooth surface to having heavy protuberances, especially in lower 1/2 sometimes with horizontal elongate irregular projections, sometimes with spiny projections to 2 mm long; *blades* with 3 major divisions, each 0.5--1.5 cm long, papyraceous to thinly coriaceous; upper surface green, glossy or semiglossy, rarely matte; lower surface semiglossy or matte; sometimes with fenestrations along rachises or major veins; middle division sub-dichotomously divided into 3 sections; lateral divisions sub-dichotomously divided

into 2 sections; each section may comprise a single leaf segment or be subdivided into 2 or 3 smaller subsections accordingly; *midrib* and major veins convex and light green on upper surface and conspicuously round-raised and paler on lower surface; secondary veins \pm parallel and arching apically, forming 2 collecting veins along the margins, with the innermost the strongest; terminal segments 8--20 \times 3--7 cm, lanceolate to irregular, free or confluent at base, often strongly decurrent downward along rachises, apically acuminate or caudate gradually into 1, 2, or rarely 3 apices; smaller leaflets oblanceolate or \pm triangular, 1--15 \times 1--6.5 cm, caudate, acute or rounded at apex, free at base, or decurrent downward partly covering the rachises, or confluent completely at base with rachises completely covered by leaf tissue; irregular or often pinnately arranged on the rachises. *Inflorescence* usually solitary; bracteoles 3 to 5; *peduncle* often shorter than petiole, rarely exceeding petiole, 0.5--6 cm diam.; *spathe* marcescent, degrading on developed infructescence, narrowly ovate to naviculiform, convolute at base, open above, often hooded to broadly open; margins not overlapping or overlapping at the base and forming a tube, to broadly overlapping with only a small apical opening; \pm acuminate at apex, erect to slightly arching, violet-purple, often tinged green or greenish insided, reddish purple to maroon, glossy to semiglossy inside, often with a whitish translucent area 0.5--10 cm high around the base of the spadix, periodically emitting at anthesis a foul scent like decomposing vegetables or meat; *spadix*

at anthesis greenish to purple, cylindric, sessile or stipitate with a stipe 0.5–2.5 cm long; spadix of infructescence 4–25 × 4–10 cm, often 4 to 15 times longer and 4 to 8 times wider than at anthesis. Flowers perfect, perigoniate, and spirally arranged on spadix, opening basipetally; tepals 4 to 6(8), green to purple, completely covering anthers before anthesis. Stamens (4)5 to 17(19); anthers yellow, open apically, turning red-brown; filaments often slightly dilated, subcompressed and abruptly contracted at the apex into the connective; anthers exceeding connective, linear-elliptic, yellow, turning reddish brown, dehiscing apically by a vertical slit with rounded aperture at anthesis; pollen emerging in strands; ovary of 2 to 5(7) locules each with 1 ovule; style 2–5 mm long above tepals at anthesis, pale green to dark purple, persistent in fruit or not; stigmas 2- or 3-, sometimes 4-lobed, covered with a clear sticky liquid at anthesis. *Berries* green when young, maturing to reddish, purplish, purplish red, purple-brown or orange, darkened apically, somewhat depressed around style when persistent or rounded; *seeds* 1 to 7 per berry, variable in shape from round to reniform to triangular to elongate, 0.5–1.0 cm long, 0.4–1.2 cm wide, smooth or decorated dorsally with warty projections, usually with 1 to 3 dorsal ridges, these continuous or interrupted, thin or thick. Chromosome number: $2n = 26$ on all species counted to date.

Dracontium spruceanum (Schott)
G.H.Zhu. *Novon* 6(3): 308. 1996. —
Echidnium spruceanum Schott. *Oesterr.*

Bot. Z. 8(11): 350. 1858. Type: Brazil. Amazonas: São Gabriel, May 1852, R. *Spruce* 2406 (holotype: K!).
Figures 173 & 174.

The species is characterized by its large tubers, large solitary leaves to 2.7 m tall with a tall erect petiole arising from the tuber and with compound blades divided several times into multiple segments, and by its large inflorescences with a purplish-violet spathe 15–32 cm long and a short purple spadix 3–4 cm long.

Terrestrial; **tuber** about 12 cm under surface of soil, 8–10 cm diam., 6 cm thick, flattened on bottom, rounded on top with 2–9 tubercles, each 1.0–1.5 cm diam., brownish; **roots** borne near the apex. **LEAVES** 1.2–2.7 m tall; **petioles** armed with prickles at base, to 125 cm long, 2.6 cm diam. at base, 1.4 cm diam. midway, 1 cm diam. at apex, dark olive-green with irregular transverse raised lines and with irregular spots of pale yellow-green, increasingly spotted toward apex; **blades** compound, segments thin, yellow-green and weakly glossy above, slightly paler and matte below, drying medium green above, paler green below; middle division twice trichotomously branched, 50–65 cm long, 50–60 cm wide, with terminal subdivision consisting of three sections, with each basal subdivision consisting of many segments; lateral divisions twice dichotomously branched, 47–60 cm long, 45–55 cm wide, with terminal subdivision consisting of two sections, with basal subdivision consisting of many segments; basal segments free



Figure 173. *Dracontium spruceanum* (Schott) G.H. Zhu (Croat 50533). Live plant showing leaf blades, adaxial surface.

from each other; with lateral segment 58 cm wide, spreading at 90° angle; petiolule narrowly ridged on one side, rachis spiny, almost throughout, yellow-green with darker olive-green variations; **major veins** weakly etched-sunken above; **midrib** narrowly round-raised and paler below; **primary lateral veins** prominently raised below;. INFLORESCENCE erect; **peduncle** erect, 30–113 cm long, 1–1.4 cm diam., pinkish with purplish elongated lines toward apex; **spathe** 15–32 cm long, 3.5–11 cm wide, purplish-violet outside, paler toward base, almost black inside within

except purplish-violet near base; **spadix** stipitate 1–2 cm, 3–4 cm long, 7–14 mm diam., purple with prominent exerted pistils. INFRUDESCENCE with **spathe** withered, dark brown; **spadix** 10 cm long, 3.3 cm diam. with berries, 1.6 cm diam. without berries; **berries** green, irregularly bumpy, becoming pale orange, 11 mm long, 6–7 mm diam., sunken with persistent style at apex; **seeds** dark yellow-brown, 7 mm long, 4 x 5 mm wide, with 3 weak irregular rows of low projections.



Figure 174. *Dracontium spruceanum* (Schott) G.H. Zhu (Peru, not collected; photo: W. Staeckresize). Close-up view of inflorescence showing spathe blackish inside and small purple spadix.

Dracontium spruceanum ranges from Costa Rica and Panama to Colombia (on both sides of the Andes), Venezuela, Suriname, Brazil (Acre, Amazonas), Ecuador (throughout the Amazon Basin) and Peru (Amazonas, Huánuco, Loreto, Madre de Dios, Pasco, San Martín) at 0–1450 m in multiple life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Región de la Cordillera del Cóndor, Centro Shuar Kaputna, al lado sur del Río Santiago, suelo aluvial, en planicie del río, con piedras, 03°01'23"S, 77°55'22"W, 300 m, 11 Oct. 2003, *Camilo Kajekai & Grupo Shuar 86* (MO, QCNE); Cordillera del Cóndor, trail from Comunidad Warints to camp #1 towards crest of Cordillera del Cóndor, Premontane wet forest, 03°13'58"S, 78°15'11"W, 830–1200 m, 11 Dec. 2002, *John L. Clark 6943* (MO, QCNE, US). **Zamora-Chinchipe:** Around mining camp at the Río Tundaime, roadside trees and disturbed lower montane forest, 03°31'41"S, 78°25'33"W, 800 m, 31 Oct. 2004, *H. van der Werff, Bruce Gray, Juan C. Ronquillo & Wilson Quizhpe 19097* (MO); Pachicutza, camino al Hito, bosque primario sobre terreno plano, suelos aluviales, 04°07'S, 78°37'W, 900 m, 18 Oct. 1991, *Walter A. Palacios, Gerardo Aymard & Efraín Freire 8309* (MO); Cordillera del Cóndor region, Parroquia Zurmi, vicinity Las Orquídeas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquídeas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, *Thomas B. Croat 97134* (MO, QCNE); Along Río Nangaritza, between Las Orquídeas and

Miasi, 04°17'53"S, 78°39'00"W, 872 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98780* (MO, QCNE). PERU. **Amazonas:** Cordillera del Cóndor, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), cabeceras del Río Comainas, tributario al oeste del Río Cenepa, valle abajo del campamento, 03°55'00"S, 78°25'24"W, 1000–1100 m, 19 July 1994, *Hamilton Beltrán & Robin B. Foster 1111* (F, USM).

Monstera Adanson, *Fam. P.* 2: 470. 1763. Type: *M. adansonii* Schott (*Dracontium pertusum*)

Tornelia Guttierrez ex Schott, *Gen. Aroid.* T. 74. 1858.

Serangium W. Wood ex R. A. Salisbury, *Gen. Pl. Fragm.* 5. 1866

Hemiepiphytic appressed climbing herbs; stems typically tightly appressed with roots on one side of stem. Leaves distichous; juvenile plants initially terrestrial with scototropic growth and long internodes, leaves erect-spreading and widely scattered on stem, becoming hemiepiphytic and phototropic on climbing, sometimes with short petioles and shingled leaf blades (Sect. *Marcgraviopsis*). Adult plants typically with short internodes and long-petiolate leaves; internodes often pale-speckled. Petioles usually heavily sheathed, geniculate at apex; sheath persisting or deciduous. LEAVES many, usually scattered on stem. Blades entire, oblique, oblong to ovate-elliptic, often conspicuously fenestrate

(**perforations** often in 1 to several rows), more rarely deeply pinnatifid; midrib deeply sunken above, narrowly raised and usually paler below; primary lateral veins pinnate, running into marginal veins, often forming a submarginal collective vein; secondary laterals often parallel-pinnate, sometimes reticulated; higher order venation reticulate; surfaces glabrous. **INFLORESCENCE** one-several per axil; peduncle shorter than petiole, typically somewhat flattened; spathe ovate or oblong-ovate, cuspidate at apex, usually somewhat convolute at base, typically coriaceous and white, sometimes reddish within, opening soon after anthesis, typically promptly deciduous; spadix sessile, subcylindroid, somewhat shorter than spathe and not protruding; flowers bisexual, naked, the lowermost spirals of flowers usually sterile and often producing resin; stamens 4, free, filaments flattened, connective slender, thecae oblong-ellipsoid, dehiscing by longitudinal slits; pollen zonate, hamburger-shaped, 42–52 µm diam.;

exine foveolate to subreticulate or psilate; apertural exine verrucate or regulate; sterile flowers with 4 conical staminodia, pistillode 2-locular; ovules 2 per locule, prismatic, lacking ovules; pistils prismatic, obovoid to ellipsoid; ovary 2-locular; ovules 2/locule, anatropous, funicle short; placentation axile at base of septum; style broader than ovary, thickened, truncate to shortly attenuate; stigma oblong-elliptic to linear or round. **INFRUCTION** with berries 1–3-seeded, often shedding stylar region at maturity, mesocarp pulpy; seeds obooid to ellipsoid, compressed, testa smooth, embryo large, endosperm absent; chromosomes $2n = 60$ (24, 48, 56, 58, 70).

Central Mexico to the West Indies, throughout Central American and in South America throughout the Amazon basin and to southern Brazil but not Uruguay, Paraguay, Chile; 42 species described with about 100 estimated.

Key to *Monstera* species

1. Blades deeply pinnatifid with the lobes divided almost to the midrib.
 2. Blades drying dark brown or blackish above, medium brown or grayish-green below *Monstera pinnatifida* Schott
 2. Blades drying gray to gray-green to yellow-brown above, pale to medium yellow-brown below *Monstera aureopinnata* Croat
1. Blades not deeply pinnatifid, ovate-elliptic with 2–10 perforations.

3. Petioles minutely light green speckled-lineate; blades distinctly inequilateral, with one side truncate to subcordate and the other cuneate to acute at the base; primary lateral veins at least on one side arising at an angle of more than 60°, drying medium brownish-green above
Monstera adansonii subsp. *laniata* (Schott) Mayo & I.M.Andrade
3. Petioles densely pale to dark-green-speckled; blades not distinctly inequilateral, similar on both sides, drying dark brown above
Monstera lechleriana Schott

Monstera adansonii Schott subsp. ***laniata*** (Schott) Mayo & I.M.Andrade, *Feddes Repert.* 124(1): 24. 2014 ['2013']. — *Tornelia laniata* Schott, *Oesterr. Bot. Wochenbl.* 8: 179. 1858. — *Monstera pertusa* (L.) deVriese var. *laniata* (Schott) Engl., in *Mart., Fl. Bras.* 3: 113. 1878. — *Monstera adansonii* var. *laniata* (Schott) Madison, *Contrib. Gray Herb.* 207: 38. 1977. Type: Costa Rica. Candelaria, date?, A.S. Ørsted 15795 (holotype, C!). **Figures 175 & 176.**

The subspecies is characterized by its ovate-elliptic, usually perforate medium-brownish-green-drying blades, usually less than twice as long as broad, unequal at the base with one side truncate to subcordate and the other side cuneate to acute, by primary lateral veins at least on one side arising at an angle of more than 60° and with a peduncle that equals or exceeds the spadix.

Appressed-climbing hemiepiphyte, to 1–5 m high. JUVENILE plants terrestrial; blades usually elliptic, entire or fenestrate.

ADULT stems with **internodes** short, 1.2–2.2(–6) cm long, (1)2–4(6–) cm diam., dark to medium green, white-speckled to slightly speckled-lineate, semi-glossy, slightly flattened, sharply sulcate with erect margins on free portions, smooth, not warty or weakly warty; stems and petioles slightly roughened with small pale warts. LEAVES with **petioles** 40–59 cm long, sharply D-shaped on free portion, sheathed to near apex, densely and minutely light green speckled-lineate (minutely so near apex of petioles), matte; sheath margins involute below middle, erect near apex, turning brown to black and sometimes deciduous; geniculum U-shaped obtusely to acutely sulcate, upper margins sharply angled; **blades** erect-spreading, more or less rosulate, distichous on stem; **ovate–elliptic**, 35–59 cm long, 23–30 cm wide, 1.3–1.8 times longer than wide, often inequilateral, acuminate at apex, unequal at the base with one side truncate to subcordate and the other side cuneate to acute, virtually concolorous to moderately bicolorous, medium green, semiglossy to weakly glossy above, weakly glossy below, perforate or




Figure 175. *Monstera adansonii* subsp. *laniata* (Schott) Mayo & I.M. Andrade (*María Stapf 662*). Live plant showing petioles, leaf blades, adaxial surface, and inflorescences.



Figure 176. *Monstera adansonii* subsp. *laniata* (Schott) Mayo & I.M. Andrade (*María Stapf* 662). Close-up view of young infructescence.



Figure 177. *Monstera aureopinnata* Croat (Campos & Nuñez 4639; MO-4971512). Herbarium specimen showing petiole, leaf blade, adaxial and abaxial surfaces, and inflorescence.

with few pinnations (via tearing?) with the margins usually entire, sometimes lacinate, with fenestrations absent to numerous, subcoriaceous, drying medium brownish-green above, lighter brownish-green below; **midrib** broadly sunken and yellowish green above, narrowly rounded and paler below; **primary lateral veins** 10–20 pairs, at least on one side arising at an angle of more than 60°, 5–26 mm apart, obtusely quilted-sunken above, prominently convex and much paler than surface, usually whitish below; **interprimary veins** darker than surface; **tertiary veins** obscurely raised and darker below. INFLORESCENCE 1 per axil sweet artificial banana fragrance; **peduncle** erect, laterally compressed, (12–)14–20 cm long, 1.4–1.6 cm diam. at apex, minutely flecked, **spathe** (10)15–20 cm long, 3.1–4.7 cm wide at anthesis (10–15 cm when flattened), almost as broad as long at anthesis, acuminate, cream to white or pale yellow, marcescent and deciduous; **spadix** 8–16 cm long, 1.4–2.5 cm diam., (4.6)7–9.2 times longer than wide, light grayish green to cream to white or pale yellow, sometimes with a sour aroma, matte; **pistils** prismatic, truncate at apex 5  4 mm; stigma oblong-linear; stigma lobes uniform, with moist clear substance at base of spadix, and on lower spathe. INFRUCTESCENCE 14–16(–22) cm long, 2.5–3 cm diam., green to creamy yellow; berries pale yellow-green; seeds green.

Monstera adansonii subsp. *laniata* ranges from Nicaragua to Panama and along the Pacific slope of South America and adjacent lowlands in Colombia and Ecuador, and

also to Venezuela, the Guianas, and south to Brazil (Amapá and Pará) at sea level to 1250 m in *Tropical moist forest*, *Tropical wet forest* and *Premontane wet forest* life zones.

Madison recognized *M. adansonii* as having three varieties, with the typical variety being restricted to the West Indies, var. *laniata* ranging from Nicaragua to Panama and along the Pacific slope and adjacent lowlands in Colombia and Ecuador, and also to Venezuela, the Guianas, and south to Brazil (Amapá and Pará), and var. *klotzschiana* being restricted to South America, ranging throughout much of the Amazon basin from southern Venezuela and the Guianas south to Paraná State in Brazil to Amazonian Peru and Bolivia. Those varieties were subsequently changed to subspecies by Mayo & I.M. Andrade.

Specimen seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, parroquia Zurmi, vicinity of Las Orquideas, Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritzza, 04°15'01"S, 78°39'33"W, 1128–1250 m, 18 Apr. 2006, *Thomas B. Croat* 97230 (MO, QCNE).

Monstera aureopinnata Croat, *Rodriguésia* 56(88): 92. 2005. Type: Perú. Cajamarca: San Ignacio, Huarango, Nuevo Mundo-Pisaguas, secondary forest, 05°10'00"S, 78°32'00"W, 13 Nov. 1997, *J. Campos & S. Nuñez 4639* (holotype: MO!; isotypes: FI, K!, US!, USM!). **Figure 177.**

The species is characterized by its yellowish brown-drying, pinnately-lobed leaf blades which are lobed to the base with the basal portions of the lobes prominently decurrent in both directions on the rachis. Also characteristic are the acute pistils and the orange to red berries.

Appressed-climbing hemiepiphytic; **internodes** shorter than broad on adult plants, to 2–2.5 cm diam., longer than broad and to 3 cm long on preadult plants, epidermis drying yellow-brown, semiglossy, conspicuously longitudinally folded-ridged and transversely fissured. LEAVES erect-spreading with **petioles** thicker than broad, 29–44 cm long, drying finely ribbed, 6–8 mm thick on free portion, sulcate adaxially, greenish gray, grayish brown to dark yellow-brown, sheathed 13–26 cm, 0.36–0.78% its length; sheath persistent intact; geniculum 2.5 cm long, drying darker than the petiole; **blades** pinnately lobed, usually unevenly with an unequal number of pinnae or pinnae of much different widths, 44–58 × 19–26(40) cm, (1.4)2–2.6 times longer than wide, 1.3–1.9 times longer than petioles, drying gray to gray-green to yellow-brown above, usually pale to medium yellow-brown below, less frequently dark yellow-brown

below; pinnae 3–6 pairs, 1–7.1 cm wide, the middle of the lobe 1.2 times wider than the constricted portion, broadly decurrent at base both up and down the rachis, the broadest portion of the pinnae always the very base (as measured from the 2 decurrent sides) this being up to twice the width of the broadest part of any portion distally; the lowermost pinnae sometimes bifurcated to near the base; **primary lateral veins** 1–4 per pinnae, drying concolorous to slightly paler and weakly sunken above, narrowly raised and paler below; **upper surface** weakly and minutely granular, with major veins drying slightly paler, flat or weakly sunken; **lower surface** drying with minor veins, mostly closely parallel, with occasional oblique interconnectivity (especially toward margins), raphide cells clearly visible as raised lines between the minor veins with occasional short white linear cellular inclusions visible, weakly granular on high magnification. INFLORESCENCES arising in clusters of up to 3; **peduncles** 7.5–9 cm long, drying 5–7 mm wide, dark to light yellow-brown, matte, finely striate; **spathe** 12–22 cm long, 1.4–2 times longer than spadix, drying yellow-brown to dark reddish brown; **spadix** yellow-orange (post-anthesis) 9.5–15 cm long; **pistils** ca. 3 mm long, drying with the ovary ca. 1 mm wide, the style 1.5 mm diam., dark brown, minutely papillate-granular, matte, acute with the stigma borne at the apex and slightly wider than the dried style; stigma 0.6 × 0.3 mm, depressed medially with pale brown raised margin; stamens free, ca. 2 mm long on drying, the thecae 1.2 mm long, oblong, closely parallel,

the filament flattened. INFRUCTESCENCE to 21×3 cm on drying; **berries** obovoid, red to orange, acutely pointed, to 8×4 –5 mm.

Monstera aureopinnata is known from northeastern Peru, Brazil and Ecuador at 130–1550 m in *Tropical wet forest* and *Premontane wet forest* life zones.

Specimens seen: ECUADOR. Miasi, sendero hacia el Hito, bosque primario, suelo humifero, $04^{\circ}18'S$, $78^{\circ}40'W$, 900–1200 m, 21 Oct. 1991, Jaime L. Jaramillo 14268 (MO, QCA); Región de la Cordillera del Cóndor, cuenca alta del Río Nangaritzza, Comunidad Shuar de Shaime, por la confluencia del Río Numpatakaima y el Río Nangaritzza, $04^{\circ}18'42''S$, $78^{\circ}39'12''W$, 900 m, 26 July 2003, Wilson Quizhpe 665 (MO, QCNE); Cordillera del Cóndor region, Parroquia Zurmi, vicinity Las Orquideas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritzza, $04^{\circ}15'01''S$, $78^{\circ}39'33''W$, 1130–1250 m, 17 Apr. 2006, Thomas B. Croat 97142 (COL, K, MO, QCNE, S, US).

Monstera lechleriana Schott, *Prodr. Syst. Aroid.* 366. 1860. Type: Peru. Gavan, Aug. 1854, *W. Lechler* 267a (holotype: K!). **Figure 178.**

The species is characterized by its short internodes, leaves with the petiole densely pale to dark-green-speckled and the dark-brown-drying ovate-elliptic blades with 2–10 perforations 0.7–8.4 cm long, 0.5–2.2

cm wide, and by its erect inflorescences 1–3 per axil with the spathe creamy-white and the spadix creamy-white to greenish white.

Appressed-climbing hemiepiphyte at 3–5 m high; JUVENILE PLANTS terrestrial; internodes dark green, semiglossy 3–5 mm long, 2–4 mm diam.; petioles sheathed nearly throughout; sheath erect-incurled; geniculum sharply sulcate; blades subcoriaceous, weakly glossy; major veins sunken above, narrowly raised below. ADULT PLANTS with **stem** to ca. 1 m long; **internodes** short, 2–5 cm long, 2–6 cm diam., medium-dark green, smooth, densely pale-speckled, and matte to semiglossy. LEAVES with **petioles** medium to dark green, densely pale to dark-green-speckled, (13)16–30 cm averaging 22.5 cm long, sheathed mostly throughout to within 1.2–3.2 cm to apex; geniculum 2.1 cm thick, 1.3 cm wide, slightly to acutely sulcate-winged, sheath dark green, densely pale-speckled, the margins incurled; **blades** ovate-elliptic, 47–75 cm long, 31–49 cm wide, averaging 63×39 cm, 1–1.9 times longer than wide, 0.5–1.4 times as long as petioles, rounded or obtuse at the base, subcoriaceous to moderately coriaceous, semiglossy to glossy, weakly bicolorous with 2–10 perforations 0.7–8.4 cm long, 0.5–2.2 cm wide; drying dark brown above, medium greenish-brown below; **midrib** yellowish green to dark green, broadly sunken, concave and concolorous above, moderately paler and weakly glossy, drying the same color as surface, thicker than broad and narrowly rounded to bluntly angular with medium pale rib below; **primary lateral**

veins 13–20 pairs, obtusely quilted-sunken and concolorous above, convex, narrowly round-ridged, whitish and pleated-raised below; interprimary veins present; **major veins** drying lighter than surface; **minor veins** moderately obscure, drying darker than surface; **tertiary veins** inconspicuous. INFLORESCENCES erect, 1–3 per axil, pale green; **peduncle** 13–30 cm long, 1.3–2.5 x 1.7–2.9 cm diam., whitish at base, medium green at apex, matte; **spathe** 17 cm long, 6.5 cm wide when open, coriaceous, creamy-white, persisting after anthesis and brown, narrowly pointed, about twice as long as spadix, drying dark brown to black; **spadix** creamy-white to greenish white 9.5–22 cm long, 2.5–6.5 cm diam.; **pistils** initially pale bluish green, matte, finally pale yellow-green, matte, the apical portion deciduous to expose white fleshy mesocarp with seeds; **seeds** black, enveloped in sweet mesocarp which soon is acrid.

Monstera lechleriana ranges from Colombia, (Caquetá, Putumayo, Vichada), Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Pichincha, Sucumbios, Zamora-Chinchipe), to Peru (Amazonas Bagua, Cusco, Huanuco, Junin, Loreto, Madre de Dios, Pasco, San Martin, Ucayali) and Bolivia (Beni, Cochabamba, La Paz, Pando, Santa Cruz) and Brazil (Amazonas) at 100–1650 m, in *Premontane wet forest*, *Tropical moist forest* and *Tropical wet forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, Río Nangaritza, cerca del Destacamento Militar de Miasi, 20 Oct. 1991, *Jaime L. Jaramillo*

14093 (NY); Cordillera del Cóndor, Cantón El Pangui, Parroquia Tundayme, Valle del Río Quimi, Bosque muy húmedo premontano, 03°33'07"S, 78°26'59"W, 970 m, 6 Oct. 2006, *Carlos Morales & Diego Reyes 1906* (MO, QCNE); Cordillera del Cóndor region, vicinity of Ecuacoriente copper mine development, Río Waiwaime drainage, along road to mine site, 7.2 km S of mine headquarters, 4.2 km S of locked gate, 03°34'41"S, 78°25'38"W, 1174 m, 9 Apr. 2006, *Thomas B. Croat 96799* (MO, QCNE); Vicinity of Ecuacorrientes copper mine concession, vicinity of mine site, along trail above parking area near end of road, 03°34'54"S, 78°26'06"W, 1330–1360 m, 21 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98983* (MO, QCNE); Cordillera del Condor, vicinity of Ecuacorrientes copper mine development, valley of Río Waiwaime, 8.1 km S of mine headquarters on road to mine site, 03°35'51"S, 78°25'57"W, 1291 m, 7 Apr. 2006, *Thomas B. Croat 76749* (MO, QCNE); Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from the military outpost to Condor Mirador military outpost, 7.1 km S of junction in road to Tandaime, San Marcos and Ecuacoriente copper mine headquarters, 03°36'42"S, 78°28'02"W, 1128 m, 12 Apr. 2006, *Thomas B. Croat 96953* (MO, QCNE); Along road from Namirez (22.3 km S of Yanzaza) to Nambija, 3 km above San Carlos, 03°46'44"S, 78°38'30"W, 762 m, 28 May 2003, *Thomas B. Croat & Mark Menke 89590* (MO, QCNE); *Thomas B. Croat & Mark Menke 89592* (MO, QCNE); Along road from Zamora to Romerillos along Río



Figure 178. *Monstera lechleriana* Schott (Peru, not collected; photo: Charles Porter). Live plant showing appressed stem, petioles, leaf blades, adaxial and abaxial surface, and inflorescences.



Figure 179. *Monstera pinnatipartita* Schott (Palacios et al. 8688; MO-4266103). Herbarium specimen showing leaf blade, adaxial and abaxial surfaces, and inflorescence.



Figure 180. *Monstera pinnatipartita* Schott (Croat et al. 82540). Live plant showing leaf blade, adaxial surface.

Jambué, 13.3 km E of Río Bombuscaro Bridge in Zamora, 0.3 km E of Pituca, 04°08'03"S, 78°56'37"W, 1068 m, 21 July 2004, *Thomas B. Croat* 91827 (AAU, GB, MO, QCNE); Along road from Zamora to Romerillos, 13.3 km E of bridge over Río Bombuscaro at Zamora, 0.4 km N of Pituca along river, 04°08'02"S, 78°56'31"W, 975 m, 30 May 2003, *Thomas B. Croat & Mark Menke* 89792 (M, QCNE); Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan* 91252 (AAU, GB, MO, QCNE, S, SEL); Cordillera del Cóndor region, Parroquia Zurmi; vicinity Las Orquídeas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquídeas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, *Thomas B. Croat* 97140 (MO, QCNE); Shaimi, SE de Campamento Militar, margen derecha de Río Nangaritza, 04°18'S, 78°43'W, 930 m, 27 Oct. 1991, *Walter A. Palacios, I. Vargas & Efraín Freire* 8768 (CM, MO); Región de la Cordillera del Condor, Parroquia Surmi, Sector Hito el "Empalme", Comunidad Yawi, Bosque primario premontano, suelos arcillosos de color amarillento, 04°28'16"S, 78°39'09"W, 1200 m, 8 June 2005, *Wilson Quizhpe, V. Granda, D. Veintimilla, H. Salas & P. Wampash* 1226 (LOJA, MO); Between mining camp and the valle del Río Quimi, 03°31'41"S, 78°25'33"W, 800 m, 1 Nov.

2004, *H. van der Werff, Bruce Gray, Juan C. Ronquillo & Wilson Quizhpe* 19149 (MO); Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan* 91303 (MO, QCNE); Along road from near Paquisha, south to Las Orchídeas, and end of road on Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 38.5 km S, 11.1 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 878 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan* 91358 (MO, QCNE); *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan* 91359 (MO, QCNE); *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan* 91394 (MO, QCNE); Miasi, sendero hacia el Hito, bosque primario, suelo húmedo, 04°18'S, 78°40'W, 900–1200 m, 21 Oct. 1991, *Jaime L. Jaramillo* 14233 (NY, QCA).

Monstera pinnatipartita Schott, *Oesterr. Bot. Wochenbl.* 7: 197. 1857. Type: Venezuela. Distrito Federal: Caracas, *Reichenbach s.n.* (HT: W?, presumed lost). Neotype: Venezuela. Zulia: Distrito Perijá, ca. 13 airline km NE of intersection of the Maracaibo-La Fría Hwy. (Hwy. 6) and the Río Aricuaisá (near intersection of LAGOVEN picas 80–2 and 19, 09°26'N, 72°29'W, 40 m, 20 June

1980, *G. Davidse, A. C. González & R. A. León 18286* (neotype: MO). Designated by Croat & Cedeño, in prep. **Figures 179 & 180.**

[*Monstera dilacerata* (Koch & Sello) Koch sensu Madison (1977), non Koch, pro parte.]

The species is characterized by its petioles nearly as long as the blade, the deeply pinnatifid blades with the lobes divided almost to the midrib and somewhat constricted toward the base of the pinnae as well as by the peduncle which is longer than the flowering spadix.

Appressed-climbing hemiepiphyte, flowering at 1.5–10 m. JUVENILE plants usually terrestrial with scandent stems, internodes elongate; blades almost rounded, entire and lacking perforations becoming appressed ADULT stems elliptic to more or less terete in cross-section, 1.5–2.5(–3.3) cm diam., pale yellowish green, almost matte; **internodes** 1–1.5(–3) cm long, light green and smooth, sometimes covered entirely with petiole bases; roots numerous and short. LEAVES distichous borne clustered at the apex of the stem; peduncles, petioles and cataphylls heavily speckled with whitish flecks; **petiole** 40–60 cm long, thicker than broad, matte, pale yellowish green, paler on abaxial surface, base of petiole white with green spots, usually sheathed throughout most of its length but on the largest leaves up to 7 cm from the apex; sheath involute, dark green, faintly striate along the margins,

persistent, the inner surface glossy; free portion of petiole and geniculum U-shaped to narrowly C-shaped, broadly sulcate above, the margins acute; geniculum 3–5 cm long, 5–7 mm wide, thicker than broad; **blade** pinnatifid never perforate, ovate in outline, acute at apex, obtuse to truncate at the base, 30–65 cm long, 16–30 cm wide, (1.2)1.7–2.1 times longer than wide, thinly coriaceous to moderately coriaceous, sometimes waxy, semiglossy and dark to medium green above, paler green to yellow-green below, sometimes matte on both surfaces, concolorous or weakly moderately bicolorous, drying dark brown or blackish above, medium brown or grayish-green below; pinnae 4–12 per side, divided almost to the base, 1–3 (–6) cm wide, often initially fused near the tips of the pinnae; **midrib** obtusely sunken and concolorous to paler above, much paler than the surface, whitish, narrow-rounded below; **primary lateral veins** 7–14 pairs, arising at a 35–50° angle, sunken and concolorous above, convex and whitish to cream-colored below; minor veins fine and parallel, scarcely visible or darker and distinct. INFLORESCENCES erect, 1–5 per axil; **peduncle** 12–21 cm long, 1–1.5 cm diam., somewhat flattened to terete, semiglossy, medium green, minutely flecked whitish; **spathe** 14–20 cm long, 6–10 cm wide when flattened, greenish yellow turning cream-yellow or cream-colored or white with faint greenish tinge, weakly glaucous, deciduous, acutely pointed; **spadix** 15–21 cm long, 2–2.5 cm diam. at anthesis, more slender toward the base, (4.4)5.5–9.1 times longer than wide, pale green; **pistils** hexagonal, 2.5–2.7 mm wide;

style drying 2.5–3 mm diam., margins irregular, often quadrangular, dark brown, very contorted, matte, deeply caviform; stigma linear, prominently raised but usually overtopped by elevated margins, 1.2–1.4 mm long, 0.4 mm wide, light brown with a deep dark slit. INFRUCTESCENCE with **spadix** 4–5 cm diam., cream to greenish yellow to white; **berries** 1.4–1.6 cm long; **seeds** 8 mm long, 4 x 6 mm diam., cream-colored to greenish white to grayish white, becoming brown, concave at apex.

Monstera pinnatipartita ranges from Guatemala and Belize throughout Central America to Panama and Colombia (Magdalena, Bolívar, Huila, Valle, Risaralda, Nariño, Meta and Caquetá), northern Venezuela, Ecuador (Esmeraldas, Los Rios, Guayas, Manabí, Napo, Orellana, Pastaza, Pichincha, Sucumbíos, Zamora-Chinchipe) and Peru (Loreto, Ucayali, San Martín, Huánuco) ranging from sea level to 600 m, rarely to 1000 m.

Specimen seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, Shaime. Frente a destacamento Militar, margen derecha del Río Nangaritzza, bosque primario, 04°18'S, 78°43'W, 930 m, 21 Oct. 1991, *Walter A. Palacios, I. Vargas & Efraín Freire 8688* (MO, QCNE).

Philodendron ('Philodendrum') Schott, *Wien. Zeitschr. Kunst, Lit., Theater und Mode* 3:780. 1829. LECTOTYPE: *P. grandifolium* (Jacq.) Schott, *Arum grandifolium* Jacq.

Telipodus Rafinesque, *Fl. Tell.* 3:66. 1836 [1837]. Type species: *Philodendron grandifolium* (Jacq.) Schott

Thaumatophyllum Schott, *Bonplandia* 7: 31. 1859. Type species: *P. spruceanum* Schott *Elopium* Schott, *Oesterr. Bot. Zeitschr.* 15:34. 1865. Type species: *Philodendron*

surinamense (Miq.) Engl.

Boursia [Hoffmannsegg, *Verz. Pfl.* 42. 1824, nom. nud.] Post & O. Kuntze, *Lexicon Gen.*

Phanerog. 62. 1903. Type species: *Caladium boursia* Reichenbach

Appressed hemiepiphytic climbers or vines with aerial roots, less frequently terrestrial with creeping rhizomatous or deeply rooted stems, rarely short-stemmed true epiphytes, rarely somewhat arborescent in Central America; sometimes with flagelliform shoots; sap usually taniniferous, drying dark, rarely with latex, drying white; stems of monophyllous sympodia with elongated hypopodial internodes; internodes densely rooted at nodes, often much longer than broad or about as long as broad, sometimes broader than long at anthesis, sometimes flattened on one side, often coarsely pale-streaked just below the node, usually green and semiglossy, but often turning gray-green to brownish or reddish-brown in age; juvenile plants usually terrestrial or epiphytic and scandent, the

petioles conspicuously sheathed and subtended by inconspicuous intravaginal squamulae; cataphylls (prophylls) of mature stems unribbed or variously ribbed, caducous, marcescent and deciduous or persistent and membranaceous to moderately coriaceous, remaining intact or more commonly decomposing to net-like fibrous remains. Leaves usually long-petiolate; petioles usually with ligulate sheath in juvenile plants, adult plants usually sheathed only at base (except *P. sect. Pteromischum*), variously shaped in cross-section, firm or spongy, usually smooth, frequently densely pale, short-lineate or pale-striate throughout, sometimes warty or covered with scale-like processes, rarely geniculate apically; blades simple and entire, ovate, cordate, hastate, sagittate, oblong to elliptic or variously divided, trifid, trisect, palmatisect, pinnatifid or bipinnatifid; midrib raised or sunken above, raised below; primary lateral veins pinnate, usually conspicuous, spreading to the margins and running into an antemarginal collective vein; the lowermost primary lateral veins (basal veins) often coalesced on cordate blades, the posterior rib (coalesced basal veins) naked with the sinus or not; interprimary veins sometimes present; secondary lateral and higher order veins transversely reticulate between the secondary veins, sometimes all veins slender with no distinct primary lateral veins; minor veins conspicuous or obscure, usually fine and closely parallel; cross-veins (minute veins extending transversely between the minor veins) sometimes visible; secretory ducts sometimes appearing like veins, linear, short to long, obscured to very

distinct on lower surface. Inflorescences 1-several per axil, much shorter than the petioles; peduncles shorter or longer than the spathe; spathe erect, usually coriaceous, entirely persistent, often with large superficial resin canals on inner surface which exude resin, opening widely at anthesis (usually about one day), then reclosing and persisting in fruit, deciduous only on ripening of fruit, frequently colorful, often bicolorous on outside, typically somewhat constricted between tube and blade, convolute at base, tube cylindric to inflated, often red to violet-purple within; blade usually opening widely, becoming more or less boat-shaped at anthesis, usually white within, sometimes tinged reddish; spadix sessile to stipitate, divided into pistillate and staminate portions, each with unisexual flowers; pistillate zone usually greenish, basal, obliquely fused at its base to the spathe, free above, usually much shorter than the staminate portion, and separated from it by a sterile zone of staminodial flowers; intermediate sterile zone cylindric to ellipsoid, much shorter than staminate zone in Central America, usually thicker than staminate zone; staminate zone clavate, white, usually somewhat constricted above the sterile staminate zone; flowers unisexual, naked, closely aggregated in several spirals; staminate flowers 2–6 (usually 4–5) androus, stamens free, adjacent, lacking stomial groove, prismatic to obpyramidal; anthers tetrasporangiate, with microsporangia embedded in the abaxial surface of the anther, columnar in shape, elliptic, ovate to rhombic in cross-section, sessile to

subsessile, connective thick, apically truncate, usually irregularly 4–5-sided, overtopping thecae; thecae oblong or elliptic, emarginate at the base, dehiscing apically by short, ragged lateral pore, endothecial thickenings lacking; pollen extruded in strands or mixed with resin secretion or exuded in amorphous masses, inaperturate, ellipsoid or oblong or occasionally elongate, medium sized (mean 40 microns, range 28–54 microns), mostly perfectly psillate, sometimes minutely verruculate, scabrate or fossulate to clearly punctate, subfossulate, subfoveolate or subverrucate; sterile staminate flowers naked, usually prismatic, truncate and usually more irregular than fertile flowers and lacking thecae; pistillate flowers with gynoeceium syncarpous, ovoid, subcylindric, cylindric or obovoid, 3–9 (14) locular in Central America (2-locular in *P.* sect. *Philopsammos* and to 47-locular in *P.* subg. *Meconostigma* in South America); locules equal the number of carpels; ovules 1 to several to numerous (to ca 30) per locule, usually hemiorthotropous, rarely hemianatropous, ascending on moderately long or sometimes short funicles;

placentation axile, sub-basal or basal; stylar region as broad as or sometimes slightly narrower than ovary; style short, unlobed, with or without boss (see definition under Style type-D), funnel or annulus; central style dome usually lacking; stigma sessile, hemispherical to lobulate. Berries subcylindroid to obovoid, exposed by the re-opening of the spathe, white, whitish-translucent, red or orange; seeds few to many per berry, oblong to ellipsoid or ovoid-oblong, testa rather thick, striate-costate, rarely sarcotestate; embryo axile, straight, elongate, endosperm copious; chromosomes: $2n = 30, 32, 34, 36, (26, 48)$.

Tropical and subtropical America; Central Mexico to Argentina; West Indies (occurs in all countries of Central and South America except Chile and Uruguay: Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Greater Antilles, Guatemala, Guayana, Honduras, Lesser Antilles, Mexico, Nicaragua, Panama, Paraguay, Peru, Surinam, Trinidad, Uruguay and Venezuela; 487 published species, 1000 estimated.

Key to *Philodendron* species

1. Petioles extensively sheathed, the sheath more than 40% (and usually more than half) the total petiole length *Philodendron* subgenus *Pteromischum*
2. Blades elliptic to lanceolate, markedly inequilateral, 2–3.7 times longer than wide, drying reddish-brown *Philodendron alliodorum* Croat & Grayum
2. Blades ovate to ovate-elliptic, not markedly inequilateral, 1.6–2.3 times longer than wide, drying gray or gray-brown.

3. Petioles with sheath narrow, in-turned; inflorescences with long peduncles, 21–23 cm long *Philodendron pedunculum* Croat & Grayum
3. Petioles with sheath broadly winged, splayed widely at apex, the wing to 3.4 cm wide when flattened; inflorescences with shorter peduncles, 10–16 cm long *Philodendron palaciosii* Croat & Grayum
1. Petioles with rudimentary sheath, usually much less than 40% the petiole length *Philodendron* subgenus *Philodendron*
4. Leaves with deeply 3-lobed blades.
 5. Inflorescences small; spathe 4–6.5 cm long, red, maroon or purplish outside *Philodendron micranthum* Poepp. ex Schott
 5. Inflorescences larger, spathe 10–21 cm long, green outside.
 6. Blades usually with both short-pale-lineations and dense granulations on the upper surface; inflorescences 1–3 per axil; spathe reddish with prominent resin canals inside *Philodendron barrosoanum* G.S.Bunting
 6. Blades without short-pale-lineations or dense granulations on the upper surface; inflorescences up to 6 per axil; spathe tube dark violet-purple inside tube, tinged purplish on the lower part of blade, resin canals not present *Philodendron paloraense* Croat
4. Leaves with blades ovate, lanceolate, oblanceolate, cordate or sagittate, never deeply 3-lobed.
 7. Blades ovate, lanceolate or oblanceolate, sometimes subcordate or cordulate at the base, never deeply cordate or sagittate.
 8. Blades cordate, 1.25–1.55 times longer than wide, truncate to subcordate at the base; inflorescences large; spathe 16–23 cm long, often spreading back at apex; spadix with the apex protruding forward at anthesis *Philodendron attenuatum* Croat
 8. Blades lanceolate or oblanceolate, sometimes cordulate at the base, at least twice as long as wide.
 9. Laticifers conspicuous on the lower blade surface.
 10. Blades ovate-elliptic to oblong-elliptic, 2.5–3.5 times longer than wide, rounded or subcordate at the base, widest in lower half; primary lateral veins 8–9 pairs; inflorescences moderately large, in clusters of up to 14 *Philodendron ruizii* Schott

10. Blades oblanceolate, 3–9 times longer than wide, attenuate or subcordate at the base, widest in upper half; primary lateral veins 24–29 pairs; inflorescences 1–6 per axil *Philodendron acutifolium* K.Krause
9. Laticifers absent or not conspicuous.
11. Blades oblanceolate, widest in upper half and narrowing towards the base, attenuate or cordulate at junction with petiole.
12. Blades strongly cordulate, with posterior lobes *Philodendron parvilobum* Croat
12. Blades attenuate or only weakly cordulate at the base.
13. Primary lateral veins 6–9 pairs, widely spaced, with interprimary veins present.
14. Blades 2.5–3.8 times longer than wide; primary lateral veins quilted and weakly sunken above, convex-pleated below *Philodendron heterophyllum* Poepp.
14. Blades 4.1–5.9 times longer than wide; primary lateral veins not quilted, sunken to weakly sunken above, weakly raised below *Philodendron herthae* K.Krause
13. Primary lateral veins 16–23 pairs, closely spaced *Philodendron campii* Croat
11. Blades ovate-lanceolate, lanceolate or elliptic, in lower half, rounded, truncate or cuneate at the base.
15. Primary lateral veins 8–20 pairs; blades ovate-triangular to broadly ovate, sometimes truncate or subcordate; cross-veins connecting minor veins prominent on drying *Philodendron asplundii* Croat & M.L. Soares
15. Primary lateral veins 6–10 pairs; blades oblong-ovate or ovate-elliptic.
16. Blades ovate-elliptic, rounded or subcordate at the base; inflorescences small, whitish, with peduncle 2–7.5 cm long and spadix to 10 cm long *Philodendron heleniae* subsp. *amazonense* Croat
16. Blades oblong-ovate, sometimes with small posterior lobes less than 2 cm long; inflorescences larger, green, with peduncle 10–26 cm long and spadix to 17.5 cm long *Philodendron pulchrum* G.M.Barroso
7. Blades ovate-cordate or ovate-sagittate.

17. Blades with cataphylls, petioles, peduncles and/or spathe tubes often sparsely or densely scaly.
18. Plants with at least petioles consistently densely scaly.
19. Cataphylls, petioles, peduncles and spathe tube purplish violet to brownish and densely scaly; primary lateral veins conspicuously branched near blade margin *Philodendron verrucosum* L.Mathieu ex Schott
19. Petioles green and scaly; primary lateral veins not branching *Philodendron nangaritense* Croat
18. Plants with petioles either smooth or sparsely to densely scaly, especially near apex; cataphylls and spathe tube purple and often densely scaly; primary lateral veins not conspicuously branched near blade margin *Philodendron pseudoverrucosum* Croat
17. Blades with petioles always smooth, not scaly.
20. Laticifers prominent on the lower surface (darker than the surface).
21. Blades with 8–13 pairs of closely spaced, heavily branching primary lateral veins with interprimary veins prominent; blade drying dark brown above, usually slightly paler and yellow-brown below *Philodendron schmidtiae* Croat & Cerón
21. Blades with 5–6 pairs of widely spaced primary lateral veins, without interprimary veins visible; blades drying black .. *Philodendron atratum* Croat
20. Laticifers absent on the lower surface (or at least not visible).
22. Blades triangular-sagittate, widest near the petiolar plexus.
23. Stems warty; petioles with broadly flaring ruffled-winged margins; blades sometimes subcordate; spathe heavily tinged maroon or purple on tube *Philodendron ernestii* Engl.
23. Stems not warty, petioles without broadly flaring ruffled-winged margins.
24. Petioles sheathed in the lower 1/4; plant drying dark reddish-brown *Philodendron cuangosense* Croat
24. Petioles not sheathed or only inconspicuously at base; plants drying medium greenish-brown or reddish-brown *Philodendron deflexum* Poepp. ex Schott
22. Blades ovate-cordate, widest near the middle.

25. Blades 1.7–2 times longer than wide, weakly lobed at the base *Philodendron huaynacapacense* Croat
25. Blades 1–1.8 times longer than wide, deeply lobed at the base.
26. Petioles with prominent undulate wings; posterior rib naked 2.7–3.2 cm; inflorescences reddish *Philodendron mamei* André
26. Petioles without prominent undulate wings.
27. Blades moderately short-pale-lineate and densely areolate on magnification, drying dark green above; spathe dark green *Philodendron colombianum* R.E.Schult.
27. Blades not short-pale-lineate and densely areolate, drying dark blackish brown above; spathe white becoming pale green *Philodendron kroemeri* Croat

Philodendron acutifolium K. Krause, *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 620. 1932. Type: Peru. Junín: Puerto Bermudez, at 375m, July 1929, *E.P Killip & A.C. Smith n. 26578* (holotypes: US; isotype: NY). **Figures 181 & 182.**

The species is a member of subgen. *Philodendron*, section *Macrobellium*, subsect. *Glossophyllum*, series *Glossophyllum* and is characterized by its short internodes, leaves forming a rosette near the apex of the stem, the deeply sulcate petioles, by the narrowly ovate-oblong blades with many primary lateral veins and have conspicuous laticifers visible on the lower surfaces as well as by the long-pedunculate inflorescences with a green spathe which is violet-purple in the lower portion of the tube inside.

Usually hemiepiphytic or epiphytic, sometimes terrestrial; sap clear, colorless; **stems** to 60 cm long; **internodes** short, ca 1.0–4.0 cm long, 1.8–5(–6) cm diam., medium green, semiglossy, becoming dark green matte; **cataphylls** mostly deciduous, 50–60 cm long, purple to medium green promptly turning light brown, narrowly and sharply 2-ribbed (rarely 1 ribbed) (ribs ca. 4–5 mm high) and concave, broader than thick toward apex and more or less knife-edged, light brown at upper nodes, reddish at base, persisting as fibers, sometimes persisting as a rotting mass, semiglossy. LEAVES clustered near apex of stems; **petioles** 12–37 cm long, C-shaped to deeply and obtusely triangular, subterete to terete at base, with thick broad rounded lateral margins or thick marginal ribs, moderately spongy to moderately firm, medium to dark green, densely darker green-lineate (these becoming diffused and blotchy adaxially), sometimes densely dark green-speckled,



Figure 181. *Philodendron acutifolium* K. Krause (Croat *et al.* 103857). Live plant showing petioles and leaf blades, adaxial and abaxial surfaces.

thicker than base of blade, sulcate at blade base becoming obtusely flattened to broadly rounded adaxially at sheath, rounded abaxially, weakly glossy to matte; **blades** narrowly ovate-oblong to oblanceolate, 56–60 cm long, 5.5–32 cm wide, 2.75–9.0 times longer than wide, usually acute at base, sometimes rounded, rarely cordulate, subcoriaceous, dark green and weakly glossy to glossy above, somewhat paler and matte to weakly glossy or glossy below; **midrib** broadly sulcate to flat-raised at base soon weakly to broadly sulcate toward apex, moderately paler above, thicker, narrowly-

rounded to obtusely triangular and slightly paler and spongy below; **primary lateral veins** 24–29 pairs, weakly sunken to quilted-sunken and concolorous above, narrowly convex and slightly paler to concolorous, matte below; **minor veins** moderately distinct to inconspicuous, slightly darker below; **lower blade surface** with laticifers conspicuous. **INFLORESCENCES** 1–6 per axil; **peduncle** terete, 5–16 cm long, 1–3 cm diam., at least sometimes markedly flattened, 9 x 14 mm wide, medium to pale green, tinged dark purple post-anthesis, weakly demarcated at apex with faint



Figure 182. *Philodendron acutifolium* K. Krause (Croat *et al.* 103857). Close-up view of inflorescence with green spathe.

reddish ring, weakly glossy to semiglossy; **spathe** 11–16 cm long, 1.4–2.8 cm diam., to 3.5 cm diam. at anthesis, pale green to medium green on both surfaces, sometimes whitish on blade, tinged purplish on open edge, semiglossy outside, sometimes weakly reddish on exterior of tube, dark violet-purple inside in lower $\frac{1}{2}$ to $\frac{2}{3}$ of tube, sometimes weakly suffused onto lower 2 cm of spathe blade (blade otherwise greenish white within), with conspicuous resin canals inside of tube, sparser on inside of blade but at least sometimes extending to the apex of blade; **spadix** 7–14 cm long; pistillate

portion pale green, to 2.6 cm long, 11 x 13 mm thick; staminate portion to 9 cm long, the sterile staminate portion to 6–7 mm long, 13 x 15 mm wide; 2 cm long; **pistils** pale yellowish white to pale green, 6-locular; ovules 1 per locule, 0.6 mm long; **INFRUDESCENCE** 7–7.5 cm. long, 2.4–2.7 cm diam.; **berries** pale orange.

Philodendron acutifolium ranges from Colombia (Amazonas) to Ecuador (Sucumbios, Napo, Pastaza, Morona-Santiago, Zamora-Chinchipe), and Peru (Loreto, Amazonas, Cajamarca, San Martín,



Figure 183. *Philodendron alliodorum* Croat & Grayum (Croat & Silverstone-Sopkin 98030). Live plant showing stem, petioles and leaf blades, adaxial surface.

Cusco) in the Amazon basin at 240–2000 m, mostly at 1000–1500m. in *Premontane moist forest*, *Tropical moist forest*, *Premontane wet forest*, *Premontane rain forest*, *Lower montane moist forest* and *Lower montane wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor, Cuenca del Río Coangos, Centro Shuar Maikuants, Cerro Kunkuk Naint, 03°06'02"S, 78°15'48"W, 1030 m, 18 Mar. 2006, *Abel*

Wisum 397 (MO, QCNE); Cordillera del Condor, Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via Numbaima into Cordillera del Condor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Croat et al.* 91021 (MO, QCNE); Limón: Indanza, Cordillera del Condor, Parroquia Santa Susana, Kuankus, Comunidad Shuar, NE of trail to Cerro Chuank Naint, 03°02'36"S, 78°13'03"W, 800



Figure 184. *Philodendron alliodorum* Croat & Grayum (*Croat et al.* 83864). Close-up view of petiole and leaf blade, adaxial surface.

m, 15 June 2005, *Tuntiak Katan & Carlos Morales* 280 (QCNE, MO). **Zamora-Chinchipe.** Cordillera del Condor: El Condor: Cordillera del Condor, Nov 1990, *Croat* 75372 (MO, QCNE); Los Encuentros - El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, *Croat & Menke* 89499 (MO, QCNE); Namirez (22.3 km S of Yanzaza) - Nambija, 8.1 Km S of San Carlos, 04°03'37"S, 78°47'25"W, 1524 m, 28 May 2003, *Croat & Menke* 89628 (MO, QCNE); Los Encuentros - El Sarsa, 03°48'40"S, 78°36'28"W, 1455 m, 15 July

2004, *Croat et al.* 91125 (GB, MO, QCNE); Nangaritza, Cordillera del Condor, Shaimi, SE de Campamento Militar, Márgen derecha de Río Nangaritza, 04°18'S, 78°43'W, 930 m, 27 Oct 1991, *Palacios et al.* 8769 (MO, QCNE); Vicinity of Tandaime, above the junction to Condor Mirador, military reservation above Tandaime village, sandstone plateau of Cordillera del Condor, 03°35'54"S, 78°29'14"W, 1420 m, 20 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 98857 (MO, QCNE); Along road from Tandaime to Condo Mirador, 18.4 km beyond the turnoff near the military check

point near Tundaime, 03°38'12"S, 78°25'49"W, 1570 m, 20 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98891* (MO, QCNE); Cordillera del Cóndor region, parroquia Zurmi; vicinity of Las Orquideas, Cabañas Yancuam, ca. 3 km S of Las Orquideas, along stream just S of Cabañas Yancuam, on steep rocky slopes, 04°15'01"S, 78°39'33"W, 1130 m, 19 Apr. 2006, *Thomas B. Croat 97236* (MO, QCNE).

Philodendron alliodorum Croat & Grayum, *Phytologia* 73: 30. 1992. Type: Costa Rica. San Jose: Western part of Montañas Jamaica, ca. 3 km NE of Bijagual de Turrubares, Carara Reserve, 09°46'N, 84°33'W, 500–600 m, 7 Aug. 1985, *M. H. Grayum, R. H. Warner, J. C. French & P. J. Sleeper 5857* (holotype: MO; isotypes: BM!, CR!, NY!, US!). **Figures 183 & 184.**

The species is a member of subsp. *Pteromischum* and is distinguished by its relatively short, fully sheathed petioles, involute petiole sheath with the margins brittle and scarious, and usually rather narrow (2.0–3.5 times longer than wide), markedly inequilateral leaf-blades with 10–14 primary lateral veins pairs. This is a species more easily recognized on herbarium sheets than in life, because the leaf blades generally dry with a distinctive brownish or reddish-brown color.

Shrubby, much-branched, rigidly clambering plants, ascending to at least 10 m on tree trunks, stems with prominent

petiole scars, fertile branches divergent; **internodes** (0.4–)2.1–12.6 cm long, 0.3–0.8(1.1) cm diam., dark green to gray-green becoming brown, semiglossy or glossy to matte, drying stramineous to café-au-lait or mid-brown, costate, the epidermis slightly to moderately brittle and flaky; **nodal roots** occasionally seen on juvenile (and presumably appressed) shoots, to ca. 1.5 mm diam., sometimes bearing spiny galls. LEAVES with **petioles** 5.6–13.6 cm long, 30–45% as long as blade, extensively sheathed, the sheath involute with the edges brownish, dry and cracking, the free portion prolonged apically by 1.5–2.5(5.0) mm (often beyond the lamina base), unsheathed portion of petiole obsolete or to 0.3(0.5) cm long; **blades** thinly coriaceous to subcoriaceous, narrowly to broadly elliptical to lanceolate or oblanceolate (broadest near the middle to slightly above), gradually to abruptly long-acuminate (rarely short-acuminate) apically (the acumen 0.6–2.4 cm long), narrowly to broadly cuneate or (more rarely) truncate to rounded or subpandurate basally (often cordulate at the petiole apex), markedly inequilateral, 13.4–32.2 cm long, 3.2–14.0 cm wide, 2.0–3.7 times as long as wide, semiglossy to glossy on both sides, virtually concolorous to weakly or moderately bicolored (young blades reddish); **midrib** sunken above, convex below; **primary lateral veins** 10–14 pairs, (0.2)1.0–3.4 cm apart, weakly sunken above, weakly convex below; **minor veins** weakly visible, slightly darker below. INFLORESCENCES solitary, very rarely paired; **cataphylls** absent; **peduncle** (0.6)1.1–3.5 cm long (to 4.4+ cm in fruit),

subterete, pale short-lineate; **spathe** at anthesis 6.8–15.0 cm long, 1.4–3.6(4.1) cm wide, externally green and often whitish lineolate below, paler (greenish white to cream) distally, often with pale whitish spots, internally uniformly whitish, abscising in fruit, acumen of spathe obsolete to, more commonly, 1.1–2.3 cm long; **spadix** 5.9–12.3 cm long, the fertile male portion 0.6–1.2 cm wide, cream-colored; sterile male zone 0.7–1.2 cm long; female portion of spadix 1.1–4.3 cm long (to 8.3+ cm in fruit), 0.50–1.25 cm wide (to 2.1+ cm in fruit), pale green or yellowish, fertile male flowers 0.8–1.7 mm long, 0.6–2.0 mm wide, irregularly polygonal, sterile male flowers 1.2–2.3 mm long, 0.7–1.7 mm wide, cuboidal to clavate, female flowers 1.3–2.1 mm long, 0.5–0.9 mm wide, the stylar canals 4–5. **INFRUCTESCENCES** with ripe **fruits** very pale yellowish orange (ochroleucous), emitting a pronounced garlicky odor at night.

Philodendron alliodorum ranges from northeastern Nicaragua to easternmost Panama, thence to Colombia (Antioquia, Chocó, Nariño, Risaralda, Valle del Cauca) and Ecuador on both sides of the Cordillera (Carchi, El Oro, Esmeraldas, Los Ríos, Morona-Santiago, Napo, Orellana, Pastaza, Pichincha, Tungurahua, Zamora-Chinchipe) at 0–2010 m in *Tropical wet forest*, *Premontane wet forest*, and *Premontane rain forest* life zones, extending more sparingly into *Tropical and Premontane moist forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, along

road from near Paquisha, south to Las Orchídeas, and end of road at Río Nangaritzza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 47.0 km S of Intersection near Paquisha, 2.6 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 875 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntia Katan 91347* (GB, MO, QCNE); *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntia Katan 91350* (MO, QCNE); Vicinity of Las Orquídeas, in forest across from Cabañas Yancuam, 04°15'05"S, 78°39'29"W, 870–890 m, 15 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98623* (MO, QCNE); Along Río Nangaritzza, between Las Orquídeas and Miasi, 04°18'00"S, 78°39'10"W, 864 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98831* (MO, QCNE, UB); Cordillera del Cóndor region, vicinity of Las Orquídeas forest near Cabañas Yancuam, ca. 3 km S of Las Orquídeas, slopes W of Río Nangaritzza, 04°15'01"S, 78°39'33"W, 1130–1140 m, 16 Apr. 2006, *Thomas B. Croat 97109* (MO, QCNE); Cordillera del Cóndor, parroquia Zurmi; vicinity of Las Orquídeas, Cabañas Yancuam, ca. 3 km S of Las Orquídeas, slopes W of Río Nangaritzza, 04°15'01"S, 78°39'33"W, 1128–1250 m, *Thomas B. Croat 97198* (MO, QCNE).

Philodendron asplundii Croat & M.L.Soaes, *Novon* 11: 381. 2001. Type: Ecuador. Napo: Vicinity of Baeza, on steep slopes above town of Baeza and the road between Baeza and Lago Agrio (Nuevo Loja), virgin forest at edge of pastures; 2500 m, 19



Figure 185. *Philodendron asplundii* Croat & M.L. Soares (Croat 97138). Live plant showing appressed stem, petioles and leaf blades, adaxial surface.



Figure 186. *Philodendron asplundii* Croat & M.L. Soares (*Croat et al.* 105799). View of stem, petioles and inflorescences.

Dec. 1979, T.B. Croat 49444 (holotype: MO; isotypes: COL!, FI!, INPA!, K!, M!, NY!, QCA!, QCNE!, US!). **Figures 185–186.**

The species is a member of subgenus *Philodendron* section *Philodendron* and is highly variable in blade shape but can be distinguished by the prominent cross-veins visible even on fresh veins but especially noticeable on drying and by the sharply D-shaped to sharply 2-ribbed cataphylls which persist as fine fibers and fragments of epidermis.

Appressed-climbing hemi-epiphyte to 1–3 meters above ground, rarely terrestrial; **stems** up to 1 m long; **internodes** short, (2)4–8 cm long, (0.6)3–5.0 cm diam.; **cataphylls** 21–44 cm. long, faintly to sharply 2-ribbed to sharply D-shaped, green or green tinged weakly with red or purple, drying brown with distinct striations, persisting intact to semi-intact and dilacerating into a net of fine fibers with mucilage (with thin patches of epidermis), the epidermis brown to rusty-brown. **LEAVES** with **petioles** terete to obtusely flattened adaxially, 17–60(100) cm.

long (avg. 35.7 cm.), 0.54–1.69 times longer than blade (avg. 1.08 times longer), 0.6–1.2 cm diam. midway, firm, semiglossy, grey-green to medium and dark green, sometimes dark green with darker green lines; geniculum 1.3–3 cm long, sometimes slightly darker, scurfy, slightly broader than petioles; sheath short or almost absent, up to 3.0 cm long; **blades** lanceolate (probably pre-adult), narrowly ovate-triangular to broadly ovate, sometimes truncate or subcordate, 17–68 cm. long, 7.6–36 cm wide, 1.2–3.9 times longer than wide, acuminate at apex, subcoriaceous to coriaceous, weakly glossy to glossy, dark green and matte, slightly bicolorous above, much paler and semiglossy below, drying grayish green to dark brown or yellow-brown above, dark yellow-brown to grayish green below; **midrib** flat, slightly paler, concolorous, and broadly convex on the upper surface, raised and paler on the lower surface; **primary lateral veins** 8–20 pairs, arising at sharp angle then spreading at 45°–60° angle from midrib, gently curving toward apex, sunken above, impressed above, raised and darker than surface below; **minor veins** obscure above, distinct or rarely indistinct on lower surface; cross-veins distinct on drying; basal veins 2–5 on each side, 1st pair free to base, 2nd & 3rd pairs often coalesced 1–2 cm; **posterior rib** (when present) short and straight, never naked along sinus; **sinus** (when present) parabolic to arcuate or subhippocrepiform; **upper surface** smooth, frequently short-pale-lineate, sometimes sparsely granular; **lower surface** weakly pale punctate-granular, sometimes pale-short-lineate.

INFLORESCENCES up to 8 per axil; **peduncle** (4.5)8–15.5 cm. long, 7–10 mm (drying 3–8 mm) diam., terete to weakly flattened, conspicuously striate, erect to somewhat spreading with the spathe sometimes turned upward from the peduncle, green with paler streaks, white at base tinged with red; **spathe** 8–14(17) cm. long, tapering to apex, tube 3–5.3 cm long, 2–3.6 cm in diam., green to pale green with white streaks, the blade white to yellowish-white, sometimes bent backwards about midway at anthesis, paler green on the inner surface of the blade, whitish to pale green or light red on the inner surface of the tube with translucent resin canals, these eventually with pale yellow resin in lower 2/3 of tube; **spadix** 7.513 cm long, female portion 1.9–2.2 cm. long, 1.2–1.4 cm diam., greenish-white to white or pale yellow-green; male portion creamy-white to white, 3.5–8.5 cm long, 1.0 cm. diam. 1 cm. above base, 0.7 cm. diam. 1 cm. below tip; sterile male portion ca. 1 cm. long, 1.4–1.6 cm in diam; sterile male flowers 1.75 mm long, 1.75 mm in diam., fertile male flowers 1.5–2.4 mm long, 1.3–1.5 mm in diam., narrowed toward base, stamens 3–5 per flower; **pistils** 1.5–3 mm long, 1–2 mm in diam., 4–6 locular, dark tan on drying; style 0.6–0.8 mm long, 1.25 mm in diam.; stigma depressed-globular 1–1.2 mm high; style irregularly circular in outline with a central indentation and usually 4–6 indentations in a circle around a central pore (these corresponding to the usual number of locules), drying to appear as a shield like covering, ca 2 mm. diam., which extends slightly beyond the margin of the ovary;

locules 4–7 per ovary, 2.1 mm. long; **ovules** hemianatropous, ca 25 per locule, 0.4–0.5 mm. long; placentation axial, bisseriate; funicle 0.3–0.4 mm. long. **INFRUCTESCENCE** with **berries** yellowish to orangish or greenish-white, seeds 1 mm. long, .5 mm. wide, longitudinal striations (ridges) 8–10, narrowing near chalazal end, tan when dried.

Philodendron asplundii is restricted to the Amazon basin and ranges from southern Venezuela (Amazonas) and French Guiana to Brazil (Acre, Amazonas) Colombia (Putumayo, Amazonas, Caquetá), Ecuador (Sucumbios, Napo, Pastaza, Morona-Santiago, Zamora-Chinchipe), Peru (Amazonas, Loreto, Ucayali, San Martín, Huanuco, Pasco, at 150–2500 m in *Tropical moist forest* and *Premontane wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor región, Valley of Río Coangos, lower valley slopes, east of Shuar village of Tinkimints, forest and cultivated areas, 03°15'25"S, 78°12'50"W, 1000 m, 25 Mar. 2001, *David A. Neill & José M. Manzanares 13218* (MO, QCNE); Along road into Cordillera del Condor departing from Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via Numbaime into Cordillera del Condor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan 91027* (MO, QCNE). **Zamora-Chinchipe:** Vicinity of Ecua-

Corrientes copper mine development, valley of Río Waiwaime, along road to mine site at end of road, along trail down from parking spot, 03°34'44"S, 78°26'08"W, 1312 m, 4 Apr. 2006, *Thomas B. Croat 96594* (MO, QCNE); Along road from Quime Ferry Crossing on road leading to summit of Cordillera del Condor, 23.2 km above the crossing at Río Zamora on road leading to summit, 03°38'00"S, 78°26'03"W, 1552 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan 91038* (MO, QCNE); Along road between Los Encuentros and El Sarsa, 13.7 km S of bridge over Río Zamora at Los Encuentros, 03°48'40"S, 78°36'28"W, 1455 m, 15 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan 91124* (MO, QCNE); Along road from Namirez on Río Zamora and Nambija, 17.9 km E of Río Zamora, 04°03'57"S, 78°47'36"W, 1790 m, 19 July 2004, *Thomas B. Croat 91532* (MO, QCNE); Along road from near Paquisha south to Las Orchídeas, and end of river at Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 37.3 km S of junction, 12.3 km N of Las Orchídeas, 04°08'25"S, 78°38'31"W, 886 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan 91405* (MO, QCNE); Along road from near Paquisha, south to Las Orchídeas, and end of road at Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 47.0 km S of Intersection near Paquisha, 2.6 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 875 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert &*

Tuntiak Katan 91346 (MO, QCNE); Cordillera del Cóndor region, Parroquia Zurmi; vicinity Las Orquideas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, *Thomas B. Croat 97138* (MO, QCNE); Vicinity of Las Orquídeas, near Cabañas Yancuam, along Río Nangaritza, S of camp, old trail along river and on steep slopes of forest W of River, 04°15'06"S, 78°39'29"W, 877 m, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98682* (MO, QCNE); Vicinity of Las Orquídeas, near Cabañas Yancuam, along new trail to Summit of Los Tepuis Conservation Area, just above road from Las Orcheas to new ferry, 04°14'55"S, 78°39'36"W, 870 m, 18 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 88837* (MO, QCNE); Along road between Gualaquiza and Zamora, 5 km S of El Pangui, Premontane wet forest, 04°21'S, 78°50'W, 800 m, 20 Oct. 1980, *Thomas B. Croat 50815* (JBG, MO, QCA).

Philodendron atratum Croat, *Aroideana* 36E(1): 19–24. 2013. Type: Ecuador. Morona-Santiago: Along road between Palora and Llushín, departing main Palora-San Vicente de Tarqui road, 8.7 km NW of Palora, 3.4 km S of Río Amudalo, 2.1 km E on road to Llushín, 922 m, 01°41'46"S, 78°01'21"W, 25 Aug. 2002, *T.B. Croat & L.P. Hannon 86951* (holotype: MO; isotypes: AAU!, B!, CAS!, COL!, F!, GH!, K!, M!, NY!, S!, SEL!, QCNE!, US!, USM!). **Figures 187 & 188.**

The species is a member of subsp. *Philodendron*, section *Macrobium* and is characterized by its thick stems with short internodes, sharply 2-ribbed, marcescent and deciduous cataphylls, obtusely flattened petioles, very large, thick black-drying blades as well as by the 4–5 inflorescences per axil with medium green spathe outside with the tube heavily tinged violet-purple inside.

Terrestrial, epiphyte or hemiepiphyte; **stems** less than 1 m long; **internodes** dark green and semi-glossy, later gray-brown, short, 3–8 cm diam., 1–3 cm length, coarsely short-ribbed at apex; **cataphylls** 18.8–35 cm long, medium green, sharply 2-ribbed, marcescent then deciduous, drying with fragments of dark brown epidermis and pale fibers. LEAVES with **petioles** spongy, subterete, obtusely flattened adaxially, medium green, matte-subvelvety to semi-glossy, dark green-lineate, obtusely ribbed adaxially, 2.2 cm diam. at apex, 2.8 cm diam. midway, drying 59.8–86.9 cm long, 0.9–1.7 cm diam., blackish brown; geniculum 1.5–3.2 cm long, drying slightly paler than petioles; **preadult blades** broadly ovate cordate to sagittate, to 34.3 cm long, 25.5 cm wide, the sinus ca. 3 cm deep, narrowly rounded at the apex; **adult blades** broadly ovate-cordate, 61.1–93.4 cm long, 41–68 cm wide (averaging 76 X 55), 1.30–1.49 (averaging 1.38) times longer than broad, 0.7–1.4 (averaging 1.0) times longer than petioles, abruptly acuminate at apex (acumen to 1.7 cm), broadest above petiole attachment, subcoriaceous, semiglossy, moderately bicolorous, dark green and



Figure 187. *Philodendron atratum* Croat (Croat et al. 105708). Live plant showing epiphytic habit, petioles and leaf blades, abaxial surfaces.

semiglossy to matte-subvelvety above, moderately paler and weakly glossy below, drying dark grayish black and glossy above, paler and semi-glossy below; **anterior lobe** 46.3–72.2 cm long, the margins broadly rounded; **posterior lobes** 19.3–35.2 cm long, 15.8–27.6 cm wide, directed downward and inward; **midrib** broadly convex to flattened and slightly paler above, narrowly rounded, faintly dark-lineate and concolorous below, drying darker above and below; **primary lateral veins** 5–6 per side, arising at a 60° angle near base then 50° angle near apex, weakly and obtusely

sunken, slightly paler above, thickly convex and slightly paler below, drying darker above and below; **minor veins** moderately obscure, arising mostly from midrib but also from the primary lateral veins closer to margins, drying obscure above and distinct below; **laticifers** long and discontinuous, weakly raised, appearing like minor veins; **basal veins** 7(8) pairs, the 1st pair free to the base, 2nd pair fused to 2–2.5 cm, the 3rd and 4th pair fused to 2.4–5 cm; **posterior rib** gradually curved, naked 1.5–2.5 cm; **sinus** spatulate, 13.3–21.9 cm deep, 5.4–16.8 cm wide. **INFLORESCENCE** 4–5 per axil;



Figure 188. *Philodendron atratum* Croat (Croat et al. 105573). Live plant showing leaf blades, adaxial surface, and inflorescences with green spathe.

peduncle 8.7–11.3 cm long, 0.9–1.7 cm diam. midway, pale green, whitish at base, pale-striate, drying black brown; **spathe** medium green, semiglossy, faintly pale short-lineate, open face paler, tinged violet-purple on outside, inner surface white and glossy on blade, heavily tinged violet-purple in tube, drying 14.9–18 cm long, 4.4–6.2 cm wide, reddish black-brown; tube 3.2–4.7 cm diam., constriction 2.5–3.0 cm, blade 2.6–2.9 cm diam.; **spadix** 17 cm long, drying 12.6–16.4 cm long, dark brown; pistillate portion 1.3–2.3 cm long in front, 2.2–3.1 cm long in back, 12 mm diam. at middle;

staminate portion 10.6–11.5 cm long, 1–1.2 cm diam., gradually tapered; sterile staminate portion 5–8 mm long, 1.3–2.0 cm diam. toward apex, to 1.5 cm diam. at constriction; **pistils** 2.5–2.6 mm long, 1.5–1.7 mm diam.; style with margins rounded, slightly narrower than the stigma; **stigma** rounded, 15–1.6 mm diam., 0.1 mm thick, consisting of 5–6 irregular mounds around the periphery with a medial concavity, completely covered with stigmatic papillae; locules 5–6, 1 mm long, 0.2 mm diam; **ovules** ca. 10 or more per locule;



Figure 189. *Philodendron attenuatum* Croat (Croat 96942). Live plant showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescences.



Figure 190. *Philodendron attenuatum* Croat (Croat 96942). Close-up view of leaf blade, adaxial surface.



Figure 191. *Philodendron attenuatum* Croat (Croat 96942). Close-up view of inflorescence with male spadix protruding forward.

placentation axile, 0.1 mm long, the funicle about as long as the ovule.

Anthurium atratum ranges from southern Colombia (Putomayo) to southern Ecuador (Sucumbios, Napo, Pastaza, Morona-Santiago and Zamora-Chinchipe from 280–1524 m in a *Premontane wet forest* life zone.

Specimens seen: ECUADOR. **Morona-Santiago:** Along road into Cordillera del Condor departing from Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via Numbaime into Cordillera del Condor, 24 km SW of Río Zamora., 03°38'11"S, 78°25'49"W, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, G. Walbert & Tuntia Katan 91019* (MO, QCNE). **Zamora-Chinchipe:** Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from military post to Condor Mirador military outpost, ca. 3.5 km S of junction in road to Tandaime, San Marcos and Ecuacorriente copper mine headquarters, 03°36'21"S, 78°28'17"W, 12 April 2006, *Thomas B. Croat 96971* (MO, QCNE); Vicinity of Ecuacorrientes mining company, Valley of Río Quime, trail along Río Waiwaime near its mouth at Río Quime, 03°33'45"S, 78°27'47"W, 23 Sept 2007, *Thomas B. Croat & Geneviève Ferry 99107* (MO, PMA, QCNE); Along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 26 May 2003, *Thomas B. Croat & Mark Menke 89497* (MO, QCNE); Along road from Namirez (22.3

km S of Yanzaza) to Nambija, 8.1 km S of San Carlos, 04°03'37"S, 78°47'25"W, 28 May 2003, *Thomas B. Croat & Mark Menke 89641* (MO, PMA, QCNE); Vicinity of Ecuacorrientes copper mine concession, vicinity of mine site, along trail above parking area near end of road, 03°34'54"S, 78°26'06"W, 1330–1360 m, 21 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98967* (MO, PMA, QCNE, US); Along road from Tandaime to Condo Mirador, 18.4 km beyond the turnoff near the military check point near Tundaime, 03°38'12"S, 78°25'49"W, 1570 m, 20 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98888* (MO, QCNE).

Philodendron attenuatum Croat, *Aroideana* 36E(1): 24–29. 2013. Type: Ecuador. Napo: Vicinity of Archidona, along road to San Pablo, 1.8 km E from main plaza in Archidona, 00°57'S, 77°49'W, 945 m, 21 Apr. 2003, *T.B. Croat, L.P. Hannon & N. Altamirano 87955* (holotype: MO; isotypes: AAU!, B!, CAS!, COL!, F!, GOET!, K!, NY!, QCNE!, S!, SEL!, US!) **Figures 189–191.**

The species is a member of subgen. *Philodendron*, sect. *Macrobellium*, subsect. *Glossophyllum*, ser. *Ovata* characterized by its moderately short internodes, unribbed, more or less marcescent and deciduous cataphylls, subterete, spongy petioles, more or less ovate blades with attenuated bases, inflorescences 2–3 per axil with the spathe green and long-tapered to the apex and often somewhat reflexed with the tube dark

purple-violet inside as well as by a long-tapered staminate portion of the spadix which usually remains exposed outside the spathe after it closes.

Usually hemiepiphytic, sometimes terrestrial, or rupicolous; **stems** to 1 m long, drying light yellow-brown; **internodes** 1–4 cm long, 1–4.5 cm diam., typically about as long as broad, dark green to greenish gray and semiglossy; **cataphylls** 15.5–31 cm long, unribbed, spongy, medium green, pale green-speckled-lineate marcescent and deciduous. **LEAVES** with **petioles** 24.7–65 cm long, spongy, subterete, obtusely and shallowly sulcate toward base, moderately spongy, obtusely flattened adaxially, semiglossy, densely dark green-lineate; **blades** narrowly ovate to ovate, 26.1–49.1 cm long, 14.5–36.6 cm wide, 1.39 (1.24–1.55) times longer than broad, 0.9 (0.7–1.1) times longer than petioles, abruptly acuminate at apex, truncate to subcordate at base with the leaf tissue usually decurrent on the petiole, subcoriaceous, moderately bicolorous, dark green and weakly glossy to semiglossy above, paler and semiglossy below, drying yellow-brown above, yellow-green below; **midrib** broadly convex and slightly paler above, convex and much paler below, drying darker above, moderately paler below; **primary lateral veins** 3–5 pairs, arising at an acute angle then spreading at 50–60° angle, obtusely quilted-sunken and concolorous above, convex to slightly and paler below, drying moderately paler than the surface; **minor veins** moderately obscure to distinct below, minutely granular

on magnification with a paler, vein-like structure loosely coursing in a somewhat undulating pattern between the minor veins; the cross-veins typically clearly visible; **laticifers** if present, not obvious, the lower surface sometimes minutely granular; **posterior lobes** when present rounded; **sinus** arcuate, to 5.6 cm deep. **INFLORESCENCE** 2–3 per axil; **peduncle** medium green, terete, 16–21 cm long, 10–12 mm diam., semiglossy, clearly demarcated at apex, 11.5–18 cm long, drying 4–7 mm diam., dark yellowish green; **spathe** 16–23 cm long, moderately green and semiglossy outside, pale green and glossy inside on blade, dark violet-purple inside on tube (to ca. 3 cm high), not obviously constricted, long-attenuate and often spreading back at apex; tube to 7.7 cm wide when flattened, drying yellowish to reddish brown; **spadix** stipitate 1.5 cm long, drying 15.6–18.6 cm long, medium brown to dark reddish brown; pistillate portion 3.7–7.7 cm long in front, 9 mm diam. at middle, 3.4–7.2 cm long in back, pale green; staminate portion 7.2–13.1 cm long, 6 mm diam., gradually long-tapered, the apex of male spadix protruding forward at anthesis, persisting dark brown post-anthesis; sterile staminate portion 5–7 mm long, 6 mm diam.; **pistils** 2.6–2.8 mm long, 2.6–2.8 mm diam., the style thick with rounded margins, shallowly sunken midway with a weakly raised stigma; **stigma** funnel-shaped, 0.4–0.5 mm diam., covered initially by a thin, very ephemeral mantle 1.4–1.5 mm wide; **locules** 5, 1.4–1.6 mm long; completely filled with a single, thin-walled ovular envelope filled with watery fluid; **ovules**

with basal placentation, solitary, 0.2 mm long, funicles 0.2–0.4 mm long, the base of the funicle covered with a dense layer of glands.

Philodendron attenuatum ranges from Ecuador (Morona-Santiago, Napo, Pastaza, Zamora-Chinchipe) to northern to Central Peru (Amazonas, Cajamarca, Loreto, Pasco, San Martín, Ucayali) at 500–2100 m in *Premontane wet forest*, *Lower montane wet forest* and *Lower montane moist forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Vicinity of Ecuacorrientes copper mine development near Tundaime, banks of Río Waiwaime., 03°33'58"S, 78°26'16"W, 8 Apr. 2006, *Croat 96790* (MO, QCNE); Cordillera del Cóndor region, vicinity of Ecuacorriente copper mine development, valley of Río Waiwaime, along road to mine site, 2.5 km from end of road., 03°34'30"S, 78°37'W, 9 Apr. 2006, *Croat 96826* (MO, QCNE); Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from the military outpost to Condor Mirador military outpost, 7.1 km S of junction in road to Tandaime, San Marcos and Ecuacorriente copper mine headquarters, 03°36'42"S, 78°28'02"W, 12 Apr. 2006, *Croat 96942* (F, HUA, MO); Vicinity of Ecuacorrientes mining company, Valley of Río Quime, trail along Río Waiwaime near its mouth at Río Quime, 03°33'45"S, 78°27'47"W, 23 Sep. 2007, *Croat & Geneviève Ferry 99108* (MO, QCNE); Along road between Los Encuentros and El Sarsa, 4.7 km E of Los Encuentros, 03°46'42"S, 78°38'32"W, 26

May 2003, *Croat & Mark Menke 89444* (MO, Q, QAP, QCA); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritza., 03°54'18"S, 78°35'W, 27 May 2003, *Croat & Mark Menke 89519* (MO, QCNE); Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 16 July 2004, *Croat, Lynn P. Hannon, G. Walbert & Tuntiak Katan 91291* (K, MO, US); Along road from near Paquisha, south to Las Orchídeas, and end of road on Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 38.5 km S, 11.1 km N of Las Orchídeas., 04°12'48"S, 78°38'41"W, 17 July 2004, *Croat, Lynn P. Hannon, G. Walbert & Tuntiak Katan 91400* (AAU, GB, MO); Nangaritza, Cordillera del Cóndor region, parroquia Zurmi; vicinity of Las Orquídeas, Cabañas Yancuam, ca. 3 km S of Las Orquídeas, along stream just S of Cabañas Yancuam, on steep rocky slopes, 04°15'01"S, 78°39'33"W, 19 Apr. 2006, *Croat 97246* (MO, QCNE); Vicinity of Las Orquídeas, near Cabañas Yancuam, along Río Nangaritza, S of camp, old trail along river and on steep slopes of forest W of River, 04°15'06"S, 78°39'29"W, 16 Sep. 2007, *Croat & Geneviève Ferry 98688* (MO, QCNE); Shaime, frente a destacamento Militar Márgen derecha del Río Nangaritza, 04°18'S, 78°43'W, 27 Oct. 1991, *Walter Palacios, I. Vargas & E. Freire 8730* (MO, QCNE); Vicinity of Ecuacorrientes

copper mine region, valley of Río Waiwaime, 5.9 km above gate near Río Quimi, 03°34'54"S, 78°26'06"W - 03°35'02"S, 78°26'09"W, 1331–1426 m, 6 Apr. 2006, *Thomas B. Croat 96690* (MO, QCNE); El Condor, 17 June 1993, *Thomas B. Croat 75374* (MO, QCNE); Along Río Nangaritza, between Las Orquídeas and Miasi, 04°17'53"S, 78°39'00"W, 872 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98778* (MO, QCNE). PERU. **Amazonas:** Prov. Condorcanqui, Cordillera del Cóndor, Puesto de Vigilancia Alfonso Ugare (PV3), headwaters of Río Comainas, tributary W of Río Cenepa, 03°54'S, 78°25'W, 1200–1400 m, 18 July 1994, *Hamilton Beltran & R. Foster 963* (MO).

Philodendron barrosoanum G.S.Bunting, *Ann. Missouri Bot. Gard.* 50: 23.1964. Type: Cultivated in Jardim Botânico do Rio de Janeiro, origin Amazonas, Apr. 1960, *G. M. Baroso s.n.* (designated 60R9), (holotype: MO; isotype: MG). **Figures 192 & 193.**

The species is a member of subsp. *Philodendron* sect. *Macrobolium* subsect. *Bulaoana* and is characterized by its appressed-climbing hemiepiphytic habit, short internodes, sharply 2-ribbed and deciduous cataphylls, terete petioles, deeply 3-lobed and sagittate-hastate blades with usually both short-pale-lineations and dense granulations on the upper surface, as well as by the short-pedunculate inflorescence with the spathe green outside and reddish with prominent canals throughout inside.

Appressed-climbing hemiepiphyte; JUVENILE PLANTS. **petioles** semiglossy, drying light green, 15–20 cm long 0.6–0.8 cm wide; **blades** 18–21 cm long, 12–14 cm wide, only differs from the adult plant in that the sinus is parabolic. ADULT PLANTS. **internodes** short, longer than broad, matte, 6.6–8 cm long, 0.8–2.5 cm diam., dark green and semiglossy, soon light gray-green, becoming light brown in age; **cataphylls** 4.7–22 cm long, medium green, sharply 2-ribbed, deciduous. LEAVES erect-spreading, **petioles** 24–82 cm long, 0.6–1.6 cm wide, moderately spongy, semiglossy, medium green, dark short-lineate-streaked, moderately spongy with heavy short purple lineations toward apex; **blades** deeply 3-lobed, 27.5–65 cm long, 32–72 cm wide (average 40.5 × 44.9 cm), subcoriaceous, semiglossy, slightly bicolorous, dark green and semiglossy above, paler and semiglossy below, drying grayish green and matte to weakly glossy above, yellowish green and weakly glossy below; **medial lobe** 23.7–47 cm long (average 32.8 cm), 11.1–28 cm wide (average 16.9 cm), constricted lower down to a width of 6.5–16.8 cm, abruptly confluent with lateral lobes, the width of the confluent portion of the lateral lobe at its narrowest point 2.8–10 wide, the length of the confluent portion (as measured from the petiole plexus to the maximum incision) 6.2–10.3 cm, this length 0.21–0.30 times as long as the medial lobe, margin convex; **lateral lobes** 16.7–35 cm long (average 23.2 cm), 5–19 cm wide (average 10.5 cm), the lobes directed ca. 100–105° from midrib, slightly inequilateral, the lower side is broader 4.5–6.8 cm wide, the upper side



Figure 192. *Philodendron barrosoanum* G. S. Bunting (Croat & Trujillo 100520). Live plant showing petioles and leaf blades, adaxial surface.



Figure 193. *Philodendron barrosoanum* G. S. Bunting (Croat & Trujillo 100520). View of inflorescence with green spathe.



Figure 194. *Philodendron campii* Croat (Croat *et al.* 105828). Live plant showing short petioles, leaf blades, adaxial surface, and small inflorescence.

2.2–5.6 cm, narrowly rounded at apex, broadly confluent onto medial lobe 2.8–10 cm (average 5.9 cm); major veins drying more or less concolorous above, paler below; **basal veins** 7–9 pairs, 1st free to base, the remainder regularly branching off the posterior rib; **posterior rib** directed more or less straight toward tip of lobe, the naked portion 1.5–3.3 cm long; **midrib** narrowly raised and concolorous above, convex and paler below; **primary lateral veins** inconspicuous above, narrowly raised and slightly paler below; **minor veins** moderately distinct on lower surface;

laticifers present but sparse and moderately obscure; **upper surface** with usually both short-pale-lineations and dense granulations; **lower surface** minutely granular; laticifers apparently lacking; **sinus** spatulate, 6–13 cm deep (average 9 cm), sinus width at narrowest part 1.3–4.5 cm, broadest part 3.2–6 cm. **INFLORESCENCES** 1–3 per axil; **peduncle** 4–9.8 cm long; **spathe** 10.3–21 cm long, 5–7 mm wide, medium green, densely short-pale-lineate outside post-anthesis, reddish with prominent canals throughout inside; **spadix** with pistillate



Figure 195. *Philodendron campii* Croat (Croat *et al.* 105828). Close-up view of leaf blade, adaxial surface.



Figure 196. *Philodendron campii* Croat (Croat et al. 105828). Close-up view of plant base showing petioles and inflorescence.

portion 4.5–5.7 cm long, 1.1–1.6 wide; staminate portion 6–11 long, 1–2.2 wide; sterile staminate portion 1–2 cm long, 1.1–1.4 wide; locules 9–11; **pistils** with ovules 3–5 per locule, axile placentation.

Philodendron barrosoanum occurs in Brazil (Acre, Amazonas, Rondônia), Colombia (Amazonas, Caquetá, Cauca, Huila, Meta, Norte de Santander, Putumayo, Tolima, Valle del Cauca, Vaupés), Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Sucumbíos, Zamora-Chinchipe), French Guiana, Peru (Amazonas, Huánuco, Junín,

Loreto, Pasco, San Martín) and Venezuela (Amazonas, Bolívar) at 70–1150 m in *Tropical moist forest* and *Premontane wet forest* life zones as well as the transition zones from *Premontane wet forest* to *Tropical moist forest* and the transition zones from *Premontane wet forest* to *Tropical wet forest*.

Specimen seen: ECUADOR. **Morona-Santiago:** Región de la Cordillera del Cóndor, Cuenca del Río Coangos, Comunidad Shuar de Kuankus, sendero que conduce hacia el Río Coangos al sur de la comunidad, 03°02'33"S, 78°12'58"W, 620 m,

12 June 2005, *Carlos Morales 1178* (MO, QCNE).

Philodendron campii Croat, *Aroideana* 27: 39–47. 2004. Type: Ecuador. Pastaza: Along rd. between Puyo and Banos, vic. Shell, less than 1 km N of village, disturbed virgin forest in marshy area with standing water, 1°29'39"S, 78°03' 52"W, 1096 m, 15 Aug. 2002, T.B. Croat, L.P. Hannon & P.E. Schmidt 86625 (holotype: MO; isotypes: K, US). **Figures 194–196.**

The species is a member of subgenus *Philodendron*, section *Calostigma*, subsection *Glossophyllum* and is characterized by its usually epiphytic, rosulate habit, short, moderately slender stem and mostly oblanceolate to somewhat oblong-elliptic leaf blades with 16–23 pairs of primary lateral veins, usually 8–10 mm apart and arising at ca. 70° from the midrib. In addition, it has 2–5 inflorescences per axil, with ovate to nearly globular, greenish spathe tubes that are maroon within, and greenish-white blades.

Epiphytic or occasionally terrestrial at higher elevations; **internodes** 2–3 cm long, 1–1.4 cm diam., pale green, drying tan to brownish; sap clear; **leaf scars** moderately conspicuous, 2.1 cm high, 3.7 cm wide; **roots** relatively few per node, descending, drying brown, mostly to ca. 4 cm long, 1–1.5 mm diam.; **cataphylls** subcoriaceous, sharply 2-ribbed, 20–25 cm long, medium green, with hyaline margins, inequilateral at

apex, drying brownish, ultimately becoming fibrous. LEAVES erect to spreading, more or less rosulate; **petioles** 5.5–7.5 cm long, 9–10 mm diam., somewhat C-shaped in cross-section, thickly swollen and moderately spongy, bluntly and shallowly to deeply sulcate, medium green, semi-glossy, sheathed inconspicuously or between 1/3–1/2 their length; **blades** oblong-oblanceolate, 30–50 cm long, 7.5–17 cm wide at widest point, 4–6.7 times longer than wide, 5.4–9.25 times longer than the petioles, widest point at 1/3–1/2 their length, subcoriaceous, semi-glossy, weakly bicolorous, dark green above, slightly paler below, acuminate at apex, acute to attenuate at base; **midrib** flattened near base, convex toward apex above, thicker than broad below; **primary lateral veins** (9–)16–23 per side, arising from the midrib at 60–80° (mostly about 70°), curving upward, somewhat quilted-sunken above, convex and darker than the surface below; interprimary veins conspicuous, darker than surface; **minor veins** clearly visible; cross-veins sometimes weakly visible. INFLORESCENCES 2–5(–9) per axil; **peduncles** 6–11.6 cm long, slightly flattened, ca. 3 × 5 mm diam., 0.9–1.5 times as long as the petioles, weakly glossy, medium green; **spathe** medium green to cream outside, not at all constricted, 4.5–8.2 cm long, averaging about 6 cm, to 2 cm diam. when furled, 3.4–3.7 cm wide when open, weakly cuspidate-acuminate at apex, the blade turning paler toward the margins, finally almost white along the margins; resin canals prominent, extending to within 1.7 cm of apex and 1 cm above the base;

spadix white, 5.9–10.4 cm long; pistillate portion cylindroid, slightly narrowed toward the apex, 1.5–3.72 cm long, 5–8 mm diam. near apex, 6.2–9 mm midway, 6–8.5 mm at base; staminate portion weakly tapered, 2.3–7.5 cm long, 7.4–9 mm diam. at base, 5.4–7.5 mm diam. midway, 4–5.8 mm diam. near the apex; sterile staminate portion 8–10 mm long; **pistils** \pm oblong, 1.6–2.2 mm long, 1.1–2 mm diam.; locules 6(–7), ca. 1 mm long; **ovules** 1–2 per locule, contained within an oblong, transparent, gelatinous envelope, basal ovules 0.5 mm long, the funicle much shorter than the ovule; stigma depressed-globose, 0.4–0.7 mm diam., 0.4 mm thick. INFRUCTESCENCES with **berries** green to brown.

Philodendron campii ranges from Brazil (Amazonas) to southern Colombia (Amazonas, Caquetá, Nariño, Putumayo), through Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Sucumbíos, Zamora-Chinchipe) and into northern Peru (Amazonas, Cusco, Loreto, San Martín) at 130–1750 m in *Tropical moist forest*, *Tropical wet forest* and *Tropical pluvial forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Región de la Cordillera del Cóndor, Parroquia Santa Susana, Kuankus, comunidad Shuar, sendero hacia la tarabita, bosque primario de altura 30 m, 03°02'33"S, 78°12'58"W, 650 m, 14 June 2005, *Tuntiake Katan & Carlos Morales* 273 (MO, QCNE); Cordillera del Cóndor región, Valley of Río Coangos, lower valley slopes, east of Shuar village of Tinkimints, forest and cultivated areas, 03°15'25"S, 78°12'50"W, 1000 m, 25

Mar. 2001, *David A. Neill & José M. Manzanares* 13219 (MO, QCNE). **Zamora-Chinchipe:** Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritzza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan* 91302 (MO, NY, QCNE, S); Along Río Nangaritzza, between Las Orchídeas and Miasi, 04°17'53"S, 78°39'00"W, 872 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 98796 (MO, QCNE).

Philodendron colombianum R.E.Schult., *Bot. Mus. Leaflet* 18:121 1958. Type: Colombia. Vaupés: Río Apaporis, Soratama (above mouth of Río Kananari) and vicinity, 274 m, 26 Mar. 1952, *Richard Evans Schultes & Isidro Cabrera* 16087 (holotypetype, GH). **Figures 196–198.**

The species is characterized by its large dark-green-drying ovate-cordate blades with 5–6 pairs of primary lateral veins, the upper surface moderately pale short-lineate and densely areolate on magnification and the lower surface faintly granular on magnification, and by its inflorescences 1–2 per axil and with a dark green spathe.

Generally terrestrial, sometimes epiphytic; **stems** to 30 cm long; **internodes** short, 1–4 cm long, 1–3 cm diam.; **cataphylls** 10–22 cm long, persisting semi-



Figure 197. *Philodendron colombianum* R. E. Schult. (Croat *et al.* 105605). Live plant showing petioles, leaf blades, adaxial surface, and inflorescence/

intact with pale reddish-brown fragments of epidermis with light yellowish-brown fibers. LEAVES with **petioles** terete, narrowly and shallowly sulcate, 18.5–46 cm long, 0.8–1.4 times longer than blade; **blades** ovate-cordate, 20–50 cm long, 12–30 cm wide (1.1–1.6 times longer than wide), acuminate at apex, subcoriaceous, semiglossy, dark green above, much paler below, drying dark green above, medium yellowish green below; **posterior lobes** rounded, 5–12 cm long; **basal veins** 5–6 pairs, 1st–2nd (3rd) free to the base, some sometimes coalesced up to 1.5 cm; **sinus** narrow or closed to

narrowly triangular, not at all naked; **midrib** obtusely raised and concolorous above, bluntly angular, thicker than broad, and slightly darker below; **primary lateral veins** 5–6 (7) pairs, weakly quilted-sunken and concolorous above, narrowly convex and darker than surface below; **minor veins** moderately distinct, the cross-veins visible on both surfaces, especially on the lower surface on drying; **upper surface** moderately pale short-lineate, densely areolate on magnification; **lower surface** faintly granular on magnification. INFLORESCENCES 1–2 per axil;



Figure 198. *Philodendron colombianum* R. E. Schult. (Croat *et al.* 105588). Close-up view of inflorescence and infructescence.

peduncles 9–13.5 cm long; **spathe** 5.7–7.5 cm long, to 2 cm diam., dark green; **spadix** 6–7.5 cm long; staminate spadix to 3.5–4 cm long; pistillate spadix to 1.7 cm long. **INFRUCTESCENCES** with **spadix** with pistillate portion 3–3.5 cm long, 1.3 cm diam.; **pistils** to 4.5 mm long, 2.4 mm diam.; style ca. 1 mm diam., drying light brown, flattened, sometimes irregularly lobed; stigma with 5–6 pores in a ring around the periphery; ovules with axile placentation, ca. 1 mm long, .015 mm diam., finely ridged with a short swollen area on both ends, funicle short.

Philodendron colombianum ranges from southern Colombia (Caquetá, Vaupes) to Ecuador (Morona–Santiago, Napo, Orellana, Pastaza, Sucumbios, Zamora–Chinchipe) at 100–1200 m. in *Premontane moist forest* and *Premontane wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Región de la Cordillera del Cóndor, Cuenca del Río Coangos, Comunidad Shuar de Kuankus, sendero que conduce hacia la comunidad Yunkumas, bosque maduro. Bosque Húmedo Premontano, suelos arcillosos rojizos,



Figure 199. *Philodendron cuangosense* Croat (Gentry 80040; QCNE-89182). Herbarium specimen showing petiole, leaf blade, abaxial surface, and inflorescence.

03°02'36"S, 78°13'03"W, 850 m, 14 June 2005, *Carlos Morales 1207* (MO, QCNE). **Zamora-Chinchipe:** Along road between Zumbi (on Río Zamora, 7.7 Km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritzza, 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Mark Menke 89522* (MO, QCNE); Parroquia Zurmi, Comunidad Centro Shaime (along Río Nangaritzza), forest 2–4 km NW of Centro Shaime, forest on limestone outcrop, 04°04'S, 78°54'W, 1000 m, 15 Dec. 2001, *John L. Clark 6537* (MO, QCA, QCNE, US); Vicinity of Las Orquídeas, near Cabañas Yankuam, along Río Nangaritzza, S of camp, old trail along river and on steep slopes of forest W of River, 04°15'06"S, 78°39'29"W, 877 m, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98690* (MO, QCNE); Along Río Nangaritzza, between Las Orquídeas and Miasi, on rocky banks of flat-bottomed stream with waterfall, 04°18'09"S, 78°39'11"W, 867 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98766* (MO, QCNE); Río Nangaritzza, Shaime, margen derecho del río, Bosque muy húmedo Premontano, bosque primario, 04°20'S, 78°40'W, 100 m, 8 Dec. 1990, *Walter A. Palacios 6635* (K, MO). PERU. **Amazonas:** Cordillera del Cóndor, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), Cabeceras del Río Comainas, tributario al oeste del Río Cenepa, Valle abajo del campamento, 03°55'00"S, 78°25'24"W, 1000–1100 m, 19 July 1994, *Hamilton Beltrán & Robin B. Foster 1120* (F, USM).

***Philodendron cuangosense* Croat, sp. nov.** Ecuador. Morona-Santiago:

Gualaquiza Cantón, Cordillera del Cóndor, Cuangos, 20 km E of Gualaquiza, near disputed Peru-Ecuador border, cloud forest, transect #1, 03°29'S, 78°14'W, 1510 m, 18 July 1993, *A.H. Gentry 80040* (holotype, QCNE-89182). **Figure 199.**

The species is a member of subgen. *Philodendron*, sect. *Philodendron*, subsect. *Solenosterigma* characterized by its hemiepiphytic habit, elongate prominently ridged-scaly yellow-brown internodes, deciduous cataphylls, moderately long-sheathed subterete petioles, narrowly ovate-triangular-sagittate, dark brown-drying moderately thin blades with parabolic sinus, 5–6 pairs of basal veins, moderately short weakly curved posterior ribs which are naked about half their length, 8–9 pairs of primary lateral veins as well as by the long-pedunculate solitary inflorescence with a weakly constricted spathe.

Hemiepiphytic climber; **internodes** elongated, to 10.5 cm long, to 2.5 cm diam., drying 0.8–1.2 cm diam., deeply and irregularly longitudinal ridges with flaking yellow-brown epidermis; **cataphylls** deciduous. LEAVES with **petioles** 31.5 cm long, 4–6 mm diam., drying dark brown, matte, sheathed to 7.5 cm long; **blades** narrowly ovate-sagittate, acuminate at apex, deeply lobed at base, 33.7 cm long, 20 cm wide, 1.68 times longer than broad, 1.06 times longer than petioles, subcoriaceous, dark green and weakly glossy above, slightly paler and semiglossy below, drying dark

reddish-brown on both surfaces; **anterior lobe** weakly convex to straight on the margins; **posterior lobes** 8.7–9.5 cm long, 7.7–8.5 cm wide; **sinus** parabolic, 5.5 cm long, 5.3 cm wide; **basal veins** 6–7 pairs, 1st & 2nd free to the base, 2nd pair fused 1 cm, 3rd pair fused 1.8–2.5 cm, 4th pairs fused 2.8–3.2 cm **posterior ribs** nearly straight 2.5–2.9 cm long, almost straight, naked 7–10 mm; **midrib** drying convex and concolorous above, narrowly raised and bluntly acute and dark brown below; **primary lateral veins** 8 pairs, arising at 40–60° angle; **minor veins** moderately fine and distinct, weakly raised below; **upper surface** smooth; **lower surface** minutely granular. INFLORESCENCE solitary; **peduncle** 10 cm long, drying 5 mm diam., finely ridged, dark brown; **spathe** 15.8 cm long, 4 cm diam. on tube, 3 cm diam. at constriction, 3.2 cm diam. at middle of blade, drying dark brown throughout; **spadix** 14.5 cm long, staminate spadix 7.3 cm long, 1.4 cm diam. midway; sterile staminate portion, 7 cm long, 1.2 cm diam.; pistillate portion 6.7 cm long, 3.2 cm diam.; **pistils** mm long; ovary (3)4-locular, style 0.9–1.1 mm diam., thin, irregularly rounded; stigma button-shaped, 1.2–1.3 mm diam., thin, sometimes with medial pits exposed; **seeds** 18–23 per locule, 1.4–1.5 mm long, 0.4–1.5 mm diam., dark brownish black, glossy with a brownish nipple at apex; funicle filiform, ½ as long as seeds to somewhat longer than seeds.

Philodendron cuangosense is endemic to the Cordillera del Cóndor at 1510 m along the Ecuador-Peru border in a *Premontane rain forest* life zone.

Philodendron cuangosense has been confused with *P. ernestii* Engl. which differs by having warty stems and prominently undulate-winged petioles.

In the Lucid *Philodendron* key the species tracks to *P. deflexum* Poepp. which differs by it typically short internodes, much larger typically greenish-drying leaves and typically large clusters of inflorescences in each axil; *P. dodsonii* Croat & Grayum, differing by its typically short thick internodes, much larger blades (36–87 cm long x 28–66 cm), cataphylls initially persisting in parchment like mats and blades with the posterior ribs naked to 6 cm; *P. mathewsii* Engl., differing by having much longer oblong-ovate blades with a subcordate base; *P. mexicanum* Liebm., differing by its leaf blades which are concave along the margins and with much narrower posterior lobes which are directed somewhat outward and *P. sagittifolium* Liebm., differing by having typically thicker and shorter internodes.

The species is named for the type locality in Cuangos in the Cordillera del Cóndor in Morona-Santiago Province.

Philodendron deflexum Poepp. ex Schott, *Syn. Aroid.*: 101. 1856. Type: Peru. Bei Pompayacu, *Poeppig 1281* (B, W). Type destroyed, a photo of the original specimen represents the type. Neotype: Peru. Huánuco: Along road from Huánuco to Tingo María, vicinity Km 479, 09°34'S, 76°03'W,



Figure 200. *Philodendron deflexum* Poepp. ex Schott (Croat & Trujillo 98190). Live plant showing epiphytic habit, long adventitious roots, petioles, leaf blades, adaxial surface, and inflorescences.

1200 m, 1 June 1998, *Thomas B. Croat & Mary Sizemore* 81581 (MO; isoneotype USM). **Figures 200–202.**

Philodendron megalophyllum Schott, *Prodr.* 279. 1860. Type: Venezuela. Amazonas: Vicinity of Cerro Neblina, 27 Nov. 1984, *Thomas B. Croat* 59371 (MO!, QCA!).

The species is a member of subgenus *Philodendron* section *Macrobelum* subsection *Macrobelum* and is characterized by its smooth, long-dangling roots; sharply 2-ribbed, deciduous cataphylls; almost terete petioles; large thin ovate-lanceolate blades with conspicuous posterior lobes; and by its slender green long-pedunculate inflorescences that often occur in a group of 5–6 per axil. In young plants, the swollen bases of petioles are unusually soft, and



Figure 201. *Philodendron deflexum* Poepp. ex Schott (Croat & Ferry 102022). Close-up view of leaf blade, adaxial surface.



Figure 202. *Philodendron deflexum* Poepp. ex Schott (Croat & Trujillo 98190). Close-up view of stem, petiole bases and inflorescence.

even in adult plants, the petioles are moderately spongy.

Hemiepiphytic or epiphytic to 30 m and sometimes a terrestrial vine on steep banks; **sap** light brown or orange; **internodes** moderately short, usually twisted into spirals, 2–9 cm long, 1.5–8 cm diam., medium to dark green or gray to gray-brown, matte to weakly glossy becoming light brown and transversely scurfy; **roots**, smooth, gray-green, 1–3 per

node, extending to the ground; **cataphylls** 23–40 cm long, pale to medium green, sometimes pinkish, matte to weakly glossy, densely dark green-short-lineate (sometimes densely reddish lineate), unribbed or 1-ribbed to sharply 2-ribbed or D-shaped, soft, deciduous, (marcescent, persisting semi-intact, becoming brown, eventually only the base persistent), sometimes tinged with maroon toward base. **LEAVES** with **petioles** terete, 2.0–2.7 cm diam. midway and to 4 cm diam. at swollen bases,

conspicuously swollen and fleshy when young, obtusely and weakly flat near apex, medium green, matte to semiglossy, spongy to moderately firm, 44–80 cm long, (usually about as long as blades), finely striate to faintly and minutely short dark-green to dark reddish-lineate (sometimes with a dark purple ring at apex); **blades** ovate-lanceolate, cordate-sagittate, 25–67 cm long, 10–36 cm wide, 1.8–2.4 times longer than wide, prominently cordate at base, cuspidate at apex, subcoriaceous, dark green and semiglossy above, moderately paler and matte to semiglossy below, slightly to moderately bicolorous, drying greenish-brown or reddish-brown; **posterior lobes** moderately rounded, 8.5–27.5 cm long, 6.0–22 cm wide at middle; **sinus** spatulate, sometimes hippocrepiform, 7–28 cm deep, narrowly to broadly rounded at apex; **midrib** flat (or broadly sunken) to broadly convex and paler to slightly paler above, narrowly raised to thickly convex below, paler and weakly glossy below, short dark-lineate below, concolorous; **primary lateral veins** 13–18 pairs, moderately distinct, fine, flat-convex, (weakly sunken to bluntly- or quilted-sunken especially toward apex), slightly paler and concolorous above, narrowly rounded and thickly convex, paler, matte and concolorous below; **minor veins** fine, weakly raised above, mostly flat below, moderately distinct; **basal veins** 6–13, with 1–2 free to base, 3rd and higher order coalesced along a well developed posterior rib, 1.0–5.5 cm from base. **INFLORESCENCES** (1)2–3, up to 6 per axil; **peduncle** 8.5–23 (40) cm long, medium green, faintly striate, up to 3 times

longer than spathe, often of the same green shade; **spathe** 8.5–24 cm long, clearly demarcated from peduncle, glossy to weakly glossy, yellow green to dark green or sometimes maroon outside; yellow green to brownish inside, post-anthesis; tube pale green or shaded maroon or violet-purple inside, tinged weakly onto the whitish blade; inner surface of spathe exuding reddish orange resin droplets in middle area at the base of blade; **spadix** 1–1.5 (2+) cm diam. and protruding beyond spathe ca. 3 cm post-anthesis; stipe sometimes purple; pistillate spadix pale green with pale greenish white flowers; staminate flowers creamy white.

Philodendron deflexum ranges throughout the Amazon basin of Ecuador, Colombia, Peru, Bolivia, and Brazil to southern Venezuela, Guyana, Suriname and French Guiana at 0–2200 m in *Tropical moist forest*, *Premontane moist forest*, *Premontane wet forest* and *Lower montane moist forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Vicinity of Ecu-Corrientes copper mine development, valley of Río Waiwaime, along road to mine site, 4.5 km above gate, 7.5 km E of mine headquarters, 03°34'44"S, 78°25'47"W, 1289 m, 7 Apr. 2006, *Thomas B. Croat* 96789 (MO, QCNE); Cuenca del río Tundayme, Carretera hacia el destacamento Militar Cóndor Mirador, vegetación secundaria y bosque montano al lado de la Carretera, 03°37'14"S, 78°26'36"W, 1500 m, 12 Dec. 2000, *Marco Cerna & et al.* 395 (G, MO, QCNE); Along road between Zumbi on Río Zamora and

summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91177* (MO, PMA, QCNE); Cordillera del Cóndor, along road from Zamora to Romerillos along Río Jambué, 13.3 km E of Río Bombuscaro Bridge in Zamora, 0.3 km E of Pituca, 04°08'03"S, 78°56'37"W, 1068 m, 21 July 2004, *Thomas B. Croat 91785* (MO, QCNE); Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91296* (MO, QCNE); Along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 16 May 2003, *Thomas B. Croat & Mark Menke 89471* (MO, QCNE); Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91210* (MO, QCNE); In the vicinity of the mining camp at the Río Tundaime, pastures along Río Quimi with small patches of disturbed forest, 03°31'10"S, 78°25'53"W, 900–1000 m, 3 Nov. 2004, *H. van der Werff, Bruce Gray, Juan C. Ronquillo & Wilson Quizhpe 19249* (GB, MO, S); In the vicinity

of the mining camp at the Río Tundaime, along road to military base El Condor, montane forest, 03°38'02"S, 78°25'32"W, 1500 m, 6 Nov. 2004, *H. van der Werff, Bruce Gray, Juan C. Ronquillo & Wilson Quizhpe 19382* (MO). PERU. **Amazonas:** Cordillera del Cóndor, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), Cabeceras del Río Comainas, tributario al oeste del Río Cenepa, valle abajo del campamento, 03°55'00"S, 78°25'24"W, 1000–1100 m, 19 July 1994, *Hamilton Beltrán & Robin B. Foster 1102* (F, USM).

***Philodendron ernestii* Engl., Bot. Jahrb. Syst. 37: 126. 1905. Type: Brazil. Acre: Río Juruá, Oct. 1901, Ule 5770, (B). Figures 203–204.**

The species is a member of subgenus *Philodendron* section *Polyspermium* subsection *Platypodium* and is characterized by its appressed-climbing habit, long internodes, petioles with a dark violet-purple ring at apex, ovate-cordate or subcordate blades, and its large inflorescences 1 per axil with the spathe heavily tinged maroon or purple on tube.

Appressed-climbing hemiepiphyte or vine with flowering branches pendent. JUVENILE PLANTS with petioles 9–20 cm long, blades narrowly ovate, to constricted sagitate 13–20 cm long, 6–8 cm wide. ADULT STEMS elongate, usually appressed-climbing; **internodes** elongate 2–20 cm long, 1–3 cm diam., medium green to dark olive-green or brownish or yellow



Figure 203. *Philodendron ernestii* Engl. (Croat & Trujillo 98163). Live plant showing leaf blades, adaxial surface.



Figure 204. *Philodendron ernestii* Engl. (Croat 85052). Close-up view of petioles with ruffled-winged margins and inflorescence with reddish-purple spathe.

green, weakly glossy and weakly to strongly warty, tuberculate; **cataphylls** 17–22 cm long, D shaped to sharply D-shaped, tinged reddish or purple, unribbed or sometimes 1-ribbed, deciduous. **LEAVES** in a rosette; **petioles** 20–65 cm long (avg. 33 cm), blade length to petiole length ratio 0.8 to 2.9. (average 1.4), sharply D-shaped or subtriangular with broadly flaring ruffled-winged margins, (sometimes unwinged), broadly convex medially adaxially, convex, rounded or sharply flattened and paler abaxially with dark violet-purple ring at apex, medium green, darker toward margin,

weakly glossy; epidermis dry and flaky on dried specimens; **blades** ovate-cordate to ovate-subcordate, 16–72 cm long, 6–56 cm wide (averaging 41 x 28 cm), as broad as long or up to 2.5 times longer than broad (averaging 1.6 times longer than wide); subcoriaceous, slightly bicolorous, dark green and semiglossy with gray-green variegations above, slightly paler and glossy below; **anterior lobe** 13–63 cm long (averaging 33 cm), acuminate at apex; **posterior lobes** 2–24 cm long (averaging 13 cm), 1–19 cm wide (averaging 13 x 9 cm); **midrib** obtusely sunken or flat and

concolorous above, acute to bluntly acute, occasionally narrowly rounded, slightly raised and slightly paler below, occasionally purplish or red-edged; **primary lateral veins** 7–9 pairs, often branched, obtusely and narrowly to deeply sunken (sometimes narrowly raised), quilted and concolorous above, prominent and narrowly raised to convex or sharply angular or bluntly acute, paler, concolorous (sometimes purplish) below; **basal veins** 6–9 pairs, 1–3 free, others fused 0.5 to 6 cm, often in groups of 2–5 (usually 2–3) at different points; **minor veins** distinct to obscure, close and fine below; **posterior rib** naked to 5 cm; sometimes branched. INFLORESCENCE 1 (rarely 2) per axil; **peduncle** maroon (3–)6–13 cm long, 8–11 mm diam. midway; **spathe** 8–23 cm long, 2–4.5 cm diam. on tube (1.6 cm when furled), semiglossy, white to dark violet-purple or medium green, heavily tinged maroon or purple on tube, sometimes densely covered with short, raised irregular lines outside, whitish or tinged faintly reddish throughout most of the inner surface to dark purple or magenta within; the spathe blade faintly tinged magenta., often with maroon spots on outside, whitish within; resin canals not obvious; **spadix** 7.5–21 cm long; pistillate portion 4.5 to 9 cm long, 1.5 cm diam. at base, 1.3 cm diam. at apex; staminate portion 8 to 11 cm long, 1.3 to 1.8 diam. midway, 1.1 cm diam. at constriction; bluntly pointed apex; sterile staminate portion 2 cm long, 1 to 1.5 cm diam. at base. INFRUCTESCENCE with **spadix** to 35 cm long, 5 cm wide; pistillate portion 8.5

cm long, 3 cm wide; **berries** cream-colored to creamy orange.

Philodendron ernestii ranges from southern Colombia (Amazonas, Caquetá, Meta, Putumayo) and eastern Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Sucumbíos, Zamora-Chinchipe) to northern Peru (Amazonas, Cusco, Huánuco, Loreto, Madre de Dios, Pasco, Puno, San Martín, Ucayali), to northeastern Bolivia (Beni, Cochabamba, La Paz, Pando) to far western Brazil (Acre, Amazonas, Pará, Roraima) in areas that drain to the Amazon River. It is found at altitudes of 100–1800m, usually below 400 m, in *Tropical moist forest*, *Premontane wet forest*, *Tropical wet forest* and *Lower Montane wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Condor: Along road into Cordillera del Condor departing from Chuchumbeza, then 6.8 km S of Chuchumbeza to Quime ferry on Río Zamora, then SW via Numbaime into Cordillera del Condor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Croat et al.* 91022 (CAS, MO); Gualaquiza, Cordillera del Cóndor, Cuangos, 20 km east of Gualaquiza, near disputed Peru-Ecuador border, 03°29'S, 78°14'W, 1500–1600 m, 17 July 1993, *A.H. Gentry* 80026 (MO, QCNE); Cordillera del Cóndor, Cuangos, 20 km east of Gualaquiza, near disputed Peru-Ecuador border, transect 1, 03°29'S, 78°14'W, 1510 m, 18 July 1993, *A.H. Gentry* 80040 (MO, QCNE). **Zamora-Chinchipe:** Vicinity of Ecua-Corrientes copper mine development,

Río Waiwaime drainage, along road to minesite 3.3 km above gate, 6.3 km E of mine headquarters, 03°34'37"S, 78°25'37"W, 1308 m, 7 Apr. 2006, 03°34'37"S 078°25'37"W, 1308 m, 6 Apr. 2006, *Thomas B. Croat 96724* (MO, QCNE); Cordillera del Cóndor, vertiente occidental, Cuenca del Río Machinaza, Comunidad Machinaza, Bosque muy húmedo pre-montano, 03°37'31"S, 78°31'50"W, 1050 m, 22 Mar. 2006, *Wilson Quisbpe & Fabienne Luisier 2050* (LOJA, MO, QCNE); Vicinity of Las Orquídeas, Cabañas Yankuam, along Río Nangaritza, in secondary vegetation, 04°15'05"S, 78°39'28"W, 860 m, 15 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98648* (MO, QCNE); Cordillera del Cóndor region, vicinity of Las Orquídeas forest near Cabañas Yancuam, ca. 3 km S of Las Orquídeas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1140 m, 16 Sep. 2006, *Thomas B. Croat 97083* (HUA, MO, QCNE); Vicinity of Las Orquídeas, near Cabañas Yankuam, along new trail to Summit of Los Tepuis Conservation Area, just above road from Las Orquídeas to new ferry, 04°14'55"S, 78°39'36"W, 870 m, 18 Sep. 2007, *Thomas B. Croat 98844* (MO, QCNE); Cordillera del Condor, along road from near Paquisha, south to Las Orquídeas, and end of road on Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 38.5 km S, 11.1 km N of Las Orquídeas, 04°12'48"S, 78°38'41"W, 878 m, 17 July 2004, *Croat et al., 91395* (GB, MO).

Philodendron **heleniae** subsp.
amazonense Croat, *Novon* 11: 386.

2001. Type: Ecuador. Napo: Parque Nacional Yasuní, Pozo Petrolero Daimi', 00055'S, 76011'W, 26 May–8 June 1988, *Carlos E. Cerón & Fernando Hurtado 4246* (holotype: MO; isotypes: K!, QCNE!, US!).
Figures 205–207.

The subspecies is a member of *Philodendron* subgenus *Philodendron* sect. *Calostigma* subsect. *Oligocarpidium* and is characterized by its scandent habit, the reddish brown-drying internodes much longer than broad, subterete petioles, narrowly ovate, subcordate, yellow-brown-drying blades and by its clusters of up to 5 small whitish inflorescences. It differs from *P. heleniae* subsp. *heleniae* in having generally fewer inflorescences per axil, usually white rather than reddish spathes, smooth rather than coarsely pustular lower blade surfaces, and the near lack of secretory cells in mature leaves.

Usually hemiepiphytic, rarely terrestrial; vining or appressed-climbing; **stem** appressed-climbing to somewhat scandent; **internodes** smooth, 1–7(10) cm long, 1.0–2.5 cm diam., as broad as long or much longer than broad, flattened on one side with sharp to blunt marginal ridges, matte, gray-green, turning brown, drying reddish brown, the epidermis smooth or irregularly folded and ridged, drying with longitudinal folds, sometimes peeling free upon drying; **cataphylls** 11–16 cm long, sharply 2-ribbed, green, deciduous. LEAVES with **petioles** 8.5–29 cm long, 6–8 mm diam., ± terete to D-shaped, obtusely



Figure 205. *Philodendron heleniae* subsp. *amazonense* Croat (Croat *et al.* 90537). Live plant showing hanging roots and leaf blades, adaxial surface.

flattened and weakly sulcate adaxially, firm, medium green, drying reddish brown; **blades** narrowly ovate to oblong-elliptic, subcoriaceous, strongly bicolorous, acuminate at apex, usually weakly and unequally subcordate, sometimes obtuse, truncate or rounded at base, 34–55 (av. 45.4) cm long, (16)18–25 (av. 19.8) cm wide, 1.8–2.8 times longer than wide (av. 2.3); **upper surface** dark green, semiglossy, drying smooth and yellow-brown to gray-green,

lower surface much paler, weakly glossy to matte, drying yellowish to reddish brown, the secretory canals typically only visible on very young leaves; **sinus** broadly V-shaped to arcuate or lacking, to 1.5 cm deep when present; **midrib** flat to broadly convex, pale green above, bluntly acute and thicker than broad, slightly paler than surface below; **primary lateral veins** 6–10 pairs, departing midrib at a 40–60° angle, weakly sunken above, weakly raised and darker than surface



Figure 206. *Philodendron bekeniae* subsp. *amazonense* Croat (Croat et al. 90537). Close-up view of stem, petioles and inflorescences.

below; **minor veins** weakly visible, arising from the midrib only, the surface smooth below; **basal veins** lacking. INFLORESCENCES 1–5 per axil; **peduncle** 2–7.5 cm long, 4–6 mm diam., green, obtusely flattened on one side; **spathe** greenish or white throughout, whitish on inner surface, semiglossy, cuspidate at apex, sometimes blade white and tube green, 4–10 cm long, up to 5 mm diam.; **spadix** sessile, slightly shorter than

the spathe; pistillate portion pale green to creamy white, extending to 2/3 the length of spadix shortly after anthesis; pistils (5)6–9-locular; locules (1)3–4-ovulate; staminate portion cream to white, cylindrical or clavate.

Philodendron bekeniae ranges from Panama to Ecuador, from 20 to about 1040(-1450) m elevation. *Philodendron bekeniae*



Figure 207. *Philodendron heleniae* subsp. *amazonense* Croat (Croat et al. 90537). Close-up view of infructescence.

subsp. *heleniae* ranges down the Pacific slope of South America.

Philodendron heleniae subsp. *amazonense* is endemic to the Amazon basin ranging from Colombia (Amazonas) to Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Sucumbíos, Zamora-Chinchipe) and Peru (Amazonas, Huánuco, Loreto, Ucayali) at 200–1500 m in *Tropical moist forest*, *Tropical wet forest* and *Premontane wet forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor region, vicinity of Las Orquideas forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritzza, 04°15'01"S, 78°39'33"W, 1130–1140 m, 16 Apr. 2006, *Thomas B. Croat 97084* (MO, QCNE); Vicinity of Las Orquídeas, Cabañas Yankuam, along Río Nangaritzza, in secondary vegetation, 04°15'05"S, 78°39'28"W, 860 m, 15 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98640* (MO, QCNE).

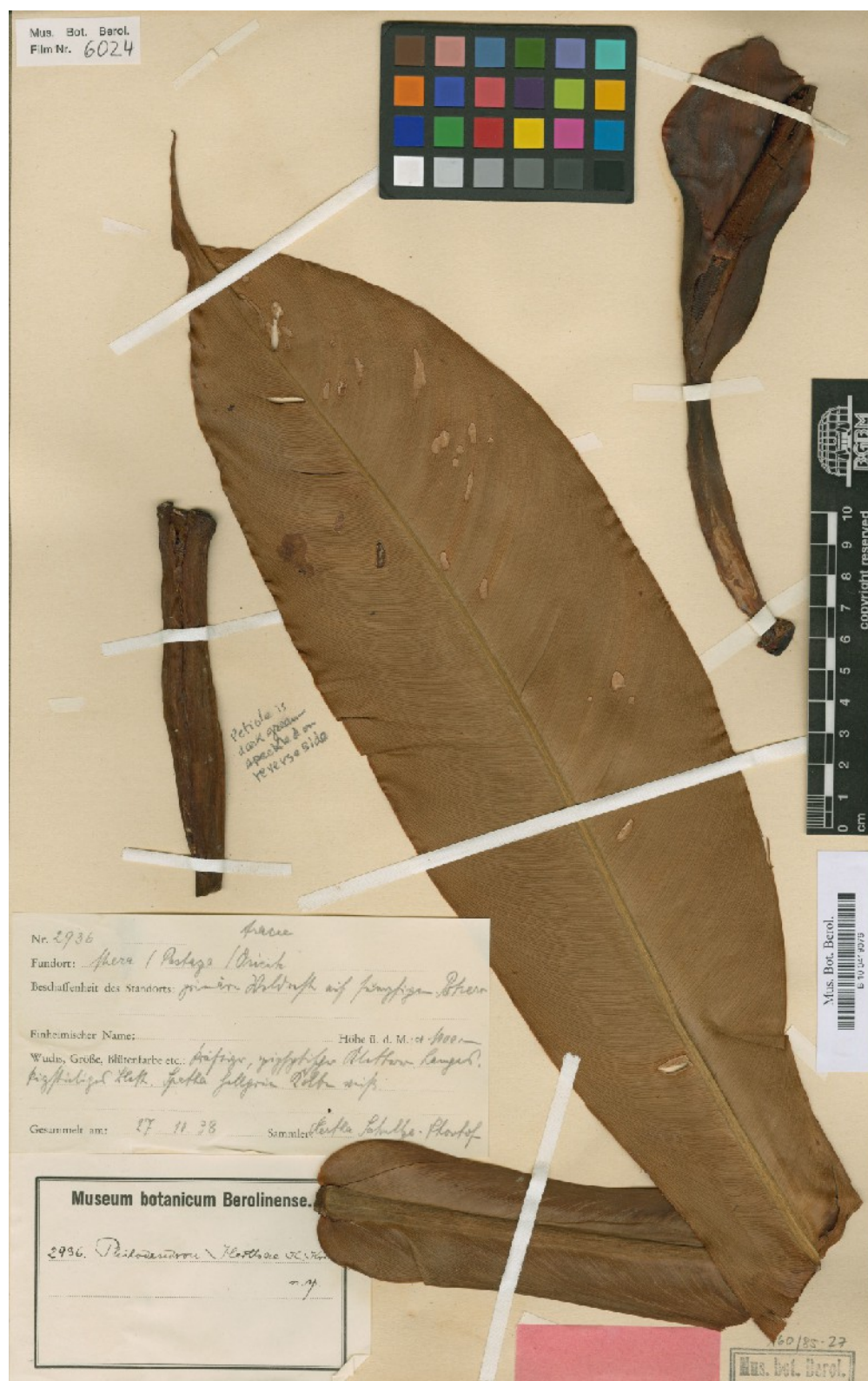


Figure 208. *Philodendron berthae* K. Krause (Schulze-Rhonhoff 2936; B-100419076). Herbarium specimen showing petiole, leaf blade, adaxial and abaxial surfaces, and inflorescence.

Philodendron herthae K. Krause, *Notizbl. Bot. Gart. Berlin-Dahlem* 15:41. 1940. TYPE: Ecuador. Pastaza: Mera, 1100 m, 27 Oct. 1938, *Schulze-Rhonhoff* 2936 (holotype: B). **Figure 208.**

The species is a member of subgenus *Philodendron* and is recognized by its epiphytic habit, narrowly oblanceolate blades that are truncate to weakly cordulate at base and leaves that usually dry reddish brown. The inflorescences may be 1–4 per axil but are not noteworthy and are green.

Appressed hemiepiphytic climber; **internodes** 3–12 cm long, 1–2 cm diam., medium to dark green, weakly glossy, becoming gray- to yellow-brown, smooth to minutely transverse-fissured, broadly flattened on one side with bluntly acute marginal ribs; **cataphylls** medium green to densely dark green-speckled to dark green-lineate, soft, cataphylls acutely 1–2-ribbed or 2-low-ribbed, 16–17.5 cm long, deciduous; **petioles** 4–24 cm long, 4–10 mm diam., obtusely flattened adaxially, somewhat soft, matte, medium to dark green spotted or densely short-dark-lineate, **blades** narrowly oblanceolate, truncate to weakly cordulate at base, narrowly acuminate at apex, subcoriaceous, (16.5) 20–70 cm long, (2.8) 4–20 cm wide, (2.9) 4.1–5.9(6.2) times longer than wide, lower fifth of blade inequilateral by 2–8 mm, sinuses when present 2–7(17) mm deep, moderately bicolorous, dark green and glossy to weakly glossy above and much paler and semiglossy below, drying to an olive or light or darkish reddish-brown above and a yellow- to light

reddish-brown below; **midrib** broadly convex and concolorous to slightly paler and flattened toward middle above, prominently narrow to bluntly rounded and darker below, sparsely short dark-lineate to slightly paler and sparsely green-speckled below; **primary lateral veins** 6–9 pairs, sunken to weakly sunken, obscurely visible and concolorous above, weakly raised below; **minor veins** weakly to moderately distinct. INFLORESCENCE 1–4 per axil; the prophylls extending one-half to nearly the full length of the petiole; **peduncle** 3.5–12 cm long, 4–8 mm diam., medium green, semi-glossy, drying dark brown, densely dark green-speckled, clearly demarcated from spathe; **spathe** 10–17 cm long, 1.5–2.5 cm diam., pale to medium green, glossy to semiglossy outside, pale-green and glossy inside, sparsely short-lineate, with resin canals; **spadix** weakly protruding from spathe post-anthesis.

Philodendron herthae ranges through the eastern slopes of the Andes from Colombia to Ecuador and Peru at 100–1500 m in *Tropical wet forest*, *Premontane wet forest*, sometimes in *Premontane moist forest* and *Premontane rain forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, Pachicutza, 1000–1200 m, 18 Oct. 1991, *Jaime L. Jaramillo* 14039 (NY); Canton Nangaritza, Parroquia Guayzimi, Campamento Militar, Transectos de 50 x 2 m x 5. (0.05 ha.), Bosque húmedo Premontano, 04°21'S, 78°40'W, 1050–1150 m, 24 Oct. 1991, *Carlos E. Cerón, Marcelo*

Chango, Valdano Tapur, Gerardo Aymard & Joaquina Albán C. 17182 (MO).

***Philodendron heterophyllum* Poepp. Nov. Gen. Sp. Pl. 3: 86, pl. 297. 1845.** Cotypes: Peru. In Urwäldern bei Cuchero, *Poeppig 1560* (W); Provinz Maynas Alto, bei der Mission Tocache, *Poeppig 1968* (W), both collections lost by action of World War II, Neotype: Illustration (plate # 297) in Poeppig, *Nov. Gen. Sp. Pl. 3: 86.* serves as the type. **Figures 209–210.**

The species is a member of subgenus *Philodendron* sect. *Macrobelum* and is characterized by its hemiepiphytic appressed-climber habit and its oblanceolate blades with the primary lateral veins quilted and weakly sunken on the upper surface and convex-pleated on the lower surface.

Hemiepiphytic appressed-climber, flowering ca. 2 m off ground; **internodes** dark green turning gray- to brownish-green or brown, 1–13 cm long, 0.5–2 cm diam., obtusely to sharply flattened on one side, semiglossy to glossy, sap clear; **cataphylls** 7–19 cm long, sulcate adaxially, sharply winged, margins slender, broadly flaring, coarsely 1-ribbed or sharply 2-ribbed (ribs raised to ca. 5 mm pale to dark green), semiglossy, densely or finely dark-green-speckled to densely short-lineate, deciduous. LEAVES with **petioles** obtusely flattened, (3) 7–10.5 (34) cm long, 0.3–1.5 cm wide, somewhat spongy, semiglossy, dark green

adaxially, medium green abaxially, broadly and acutely or obtusely sulcate adaxially, slightly broader than thick, short-lineate to densely dark-green-speckled, may have a purple ring at apex, leaf sheath covering one-half to four-fifths the length of the petiole; **blades** oblanceolate, 23–38 (52) cm long, 6.8–15 cm wide, 2.5–3.8 times longer than wide, widest 1/3 the distance from the apex, distinctly tapered in the lower third of the blade, 2–5 cm wide at the mid-point of the tapered area, obtusely attenuate at base, strongly caudate at apex, subcoriaceous, moderately bicolorous, dark green above, semiglossy, sometimes glossy on both surfaces, drying olive-green to dark brown, rarely light brown; **midrib** flat to broadly convex and concolorous above, convex to narrowly rounded and paler below; **primary lateral veins**, 6–7 pairs, quilted, weakly sunken and concolorous above, convex-pleated and concolorous below, interprimary veins moderately distinct to obscure. INFLORESCENCES 1–4(–5) per axil; **peduncle** 5–10.5 cm long, 3–13 mm diam., dark green, semiglossy to moderately glossy; **spathe** 9.2–14.7 cm long, 1.5–2 cm diam. on tube, medium to dark green and semiglossy to glossy outside, slightly paler on blade, inner surface glossy, pale to medium green throughout to with pale yellow streaks and white dots; **spadix** white, weakly protruding from spathe post-anthesis, staminate portion 4.8–8.7 cm long, 5–7 mm wide, sterile staminate portion 4–8 mm long; **flowers** pale green; pistillate part 3–4.5 cm long, 5–8 mm diam.



Figure 209. *Philodendron heterophyllum* Poepp. (Croat 85840). Live plant showing petioles, leaf blades, adaxial surface, and inflorescences.

Philodendron heterophyllum ranges from Colombia (Putumayo) and Ecuador (Morona-Santiago, Napo, Orellana, Sucumbíos, Zamora-Chinchipe), to Peru (Cusco, Huánuco, Junín, Loreto, Madre de Dios, Pasco, San Martín, Ucayali), Brazil (Acre, Rondônia) and Bolivia (Cochabamba, La Paz, Pando, Santa Cruz) at 20 to 1300 m in *Tropical wet forest*, *Tropical moist forest* and *Lower montane moist forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Región de la Cordillera del Cóndor, Cantón Tiwintza, Centro Shuar

Kaputna, al sur del Río Santiago, sendero hacia la cumbre del Cerro Kaputna, bosque húmedo tropical, suelo derivado de roca arenisca y caliza, 03°01'15"S, 77°54'50"W, 400 m, 13 Oct. 2003, *Germán Toasa* 9253 (MO, QCNE). **Zamora-Chinchipe:** Along road to Romerillao Alto from Zamora, 19.1 km E of Río Bombuscaro in Zamora, 6.3 km E of La Pituca, 04°10'04"S, 78°56'10"W, 1203 m, 20 July 2004, *Thomas B. Croat* 91535 (MO, QCNE).

Philodendron huaynacapacense Croat, *Willdenowia* 36: 886. 2006. Holotype:



Figure 210. *Philodendron heterophyllum* Poepp. (Croat 85840). Close-up view of inflorescence with green spathe.

Peru, Huánuco: Leoncio Prado, along road between Tingo Maria airport and Huayna Capac, 10 km west of bridge over Rio Huallaga, 09°14'56"S, 76°02'16"W, 1294 m, 6 June 1998, Thomas B. Croat & Mary Sizemore 81896 (holotype: MO; isotypes: B!, F!, K!, NY!, UB!, USM!, USM!).

Figure 211.

The species is a member of subgenus *Philodendron* sect. *Macrobelum* subsect. *Macrobelum* and is characterized by its ovate-cordate blades that are inequilateral with

one side up to 1.5 cm wider, and its inflorescences with the spadix protruding beyond the end of the spathe at anthesis and with the spathe tube weakly tinged pinkish.

Terrestrial; **internodes** 1–2 cm long, 2–2.5 cm diam., dark green and weakly glossy becoming grey-brown; **cataphylls** 17–19 cm long, sharply 2-ribbed, green, drying dark brown and coriaceous, deciduous. **LEAVES** erect with pendent blades; **petioles** 25–42 cm long (averaging 33.6 cm), dark green and weakly glossy,

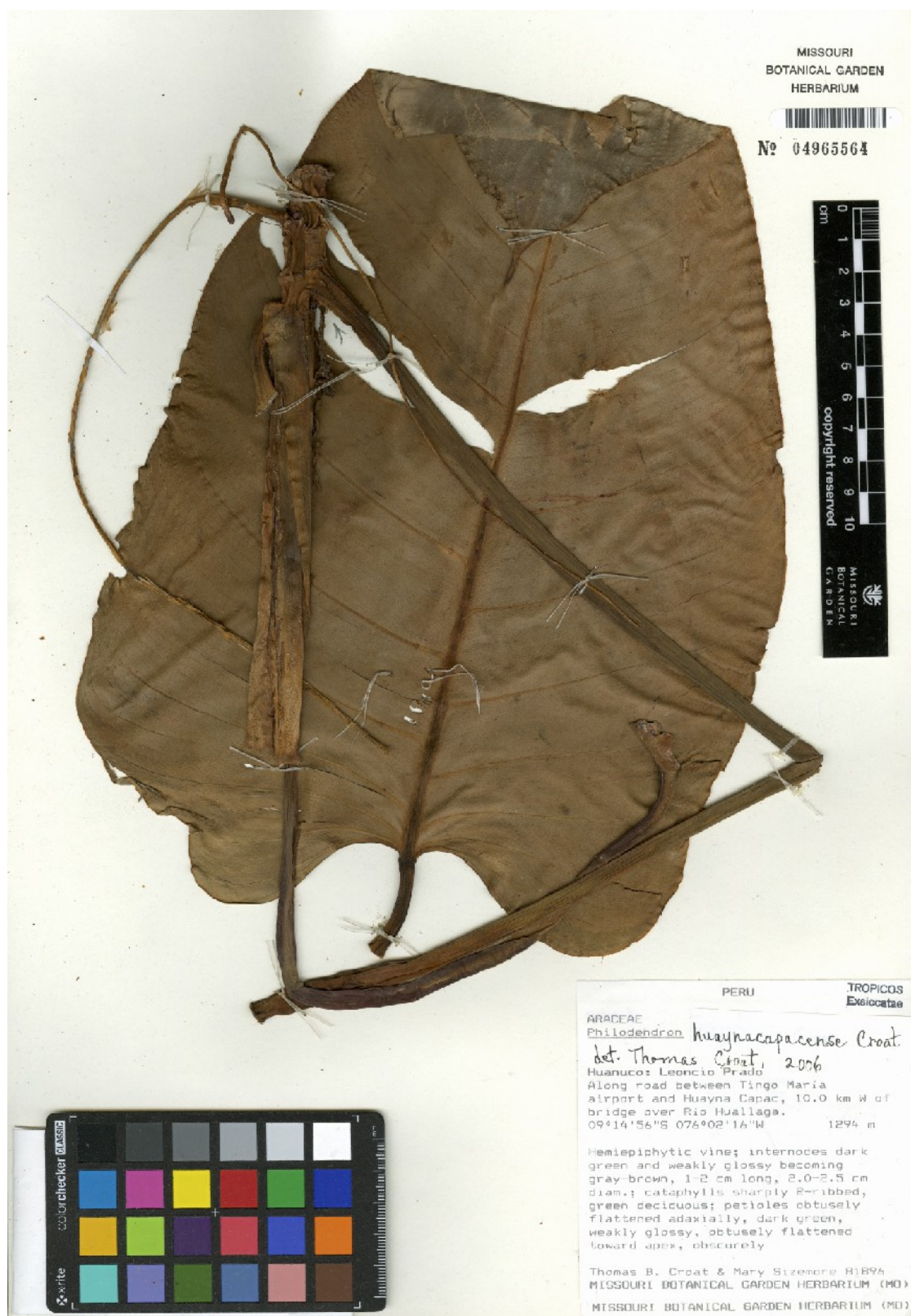


Figure 211. *Philodendron huaynacapacense* Croat (Croat & Sizemore 81896; MO-4965564). Herbarium specimen showing stem, cataphylls, petiole, leaf blade, adaxial and abaxial surfaces and inflorescence.



Figure 212. *Philodendron kroemeri* Croat (Croat *et al.* 103834). Live plant showing stem, cataphylls, petioles, leaf blades, adaxial surface, and inflorescences.

obtusely flattened adaxially; **blades** ovate-cordate, 32–37 cm long (averaging 33.31 cm), 7–21 cm wide (averaging 16.7 cm), 1.7–2 times longer than wide, abruptly long-acuminate at the apex, weakly lobed at base, inequilateral with one side up to 1.5 cm wider, subcoriaceous, dark green and semiglossy above, moderately paler and weakly glossy below, drying weakly brown and matte above, dark yellowish brown and moderately glossy below; **anterior lobe** 29–33.5 cm long (averaging 30.81 cm), margins weakly undulate; **posterior lobes** rounded to broadly rounded, 4–7 cm long (averaging

5.76 cm), 3–6 cm wide (averaging 4.3 cm); **sinus** widely parabolic to arcuate, (0.8–)1.5–4 cm deep (averaging 2.5 cm); **major veins** drying paler than upper surface and darker than lower surface; **midrib** flat and slightly paler above, convex, darker and densely short-red-lineate below; **primary lateral veins** 6–9 pairs, arising at a 50° angle, sunken and concolorous above, maroon and convex below (at least toward base), drying slightly darker or slightly paler than the surface; interprimary veins moderately distinct, conspicuously flat above and below; **basal veins** 4 pairs, all free to the



Figure 213. *Philodendron kroemeri* Croat (Croat *et al.* 103834). Close-up view of inflorescences with white spathe.

base or with the lowermost briefly united for 1–1.5 cm; **posterior ribs** absent or when present naked for up to 1 cm; **minor veins** moderately distinct on fresh leaves but rather inconspicuous on drying, alternating with short-lineate or punctiform secretory ducts. **INFLORESCENCES** (post-anthesis) 2 per axil; **peduncle** green, 2–3 cm long; **spathe** 10 cm long, 1.8 cm in diam. on tube, cuspidate at apex, medium green on tube outside, paler within, tinged faintly pink on tube inside; **spadix** 6.3–11 cm long; pistillate portion 5.6–7.8 cm long, 0.7–1.1 cm diam. midway, 0.6 cm diam. at base, 0.3–0.9 cm diam. at apex; staminate portion 3.2 cm long, drying 0.5–0.6 cm diam., protruding well beyond the end of the spathe after anthesis; **pistils** closely compacted, 5 mm long; style 1.2–1.6 mm wide, irregularly rounded, the surface drying granular, the margins thin, stigma rounded 0.2–0.4 mm in diam., depressed-globose, button-shaped on drying with a weak depression in the middle; ovary 4–5-locular; **juvenile seeds** narrowly ovoid to ovoid-ellipsoid, 1 mm long, finely striate longitudinally, 1–2 per locule, one positioned near the base and one closer to the apex.

Philodendron huaynacapacense ranges from southeastern Ecuador (Zamora-Chinchipe) to Peru (Huánuco, Pasco, San Martín) and Bolivia (Cochabamba, La Paz) at 200–2560 m in a *Premontane wet forest* life zone.

Specimen seen: ECUADOR. **Zamora-Chinchipe:** Vicinity of Ecu-Corrientes

copper mine region, valley of Río Waiwaime, 5.9 km above gate near Río Quimi, 03°34'54"S, 78°26'06"W - 03°35'02"S, 78°26'09"W, 1331–1426 m, 6 Apr. 2006, *Thomas B. Croat 96701* (MO, QCNE).

Philodendron kroemerii Croat, Novon 15(1). 2005. Type: Bolivia. La Paz: Nor Yungas, Serranía Bella Vista, along road between Caranavi and Yucumo, 34.3 km NE of Caranavi, 15°41'30"S, 67°29'37"W, 1567 m, 5 Aug. 2000, *Thomas B. Croat, Amparo Acebey & Thorsten Krömer 84820* (holotypes: MO; isotypes: B!, F!, GOET!, K!, LPB!, NY!, USC!, US!, USM!). **Figures 212–213.**

The species is a member of subspecies *Philodendron* and is characterized by its appressed-climbing habit, short internodes, dark-blackish-brown-drying broadly ovate-cordate blades with the posterior rib scarcely naked, and by its inflorescences 3–7 per axil with a white spathe becoming pale green.

Appressed-climbing hemiepiphyte; **internodes** short, 5–6 cm long, to 3 cm diam, drying dark yellow-brown, narrowly ridged longitudinally; **cataphylls** 22 cm long, sharply 2-low-ribbed, medium green, obscurely darker green-lineate, marcescent and persistent semi-intact at least at the upper nodes, drying light yellowish brown, soon deciduous. **LEAVES** with **petioles** 43 cm long, subterete, medium dark green and

semiglossy, obtusely flattened adaxially, unmarked, drying dark brown to blackened, 8–10 cm diam, matte; **blades** broadly ovate-cordate, 42.5 cm long, 28.5 cm wide, 1.5 times longer than wide, subcoriaceous, dark green and weakly glossy to semiglossy above, slightly paler and semiglossy below, abruptly short-acuminate at apex, deeply lobed at base, drying dark blackish brown above, slightly paler and dark yellow-brown below; **anterior lobe** 32.5 cm long, the margins broadly convex; **posterior lobes** 12.5–14 cm long, 10 cm wide; **midrib** broadly convex and concolorous to slightly paler above, convex to narrowly rounded and slightly paler below, drying slightly darker than surface above, moderately darker and irregularly and finely striate below; **primary lateral veins** 6 pairs, arising at 55° angle near apex, to 65–85° angle in lower half of blade, convex, darker than surface, sometimes drying blackened and much darker than surface; **basal veins** 6–7 pair, the 1st pair and often 2nd pair free or nearly so to base, 3rd and higher order basal veins coalesced 1.5–4 cm; **posterior rib** scarcely naked, mostly to ca. 1 cm, infrequently to 2 cm; **minor veins** moderately indistinct with a few visible, drying close and fine but not markedly visible. INFLORESCENCES 3–7 per axil; **peduncle** (1.5)4–7.7 cm long, 9 mm diam., pale green at base, darker green toward apex, dark brown to blackened on drying; **spathe** white at anthesis, becoming pale green, greenish white and glossy inside, 4.5–5.5 cm long, 6–9 mm diam., abruptly pointed at apex, drying blackened to dark brown; **spadix** 4.8–5.2 cm long; staminate

portion 1.2–4.3 cm long, 6–12 mm diam.; androeceum 1.0–1.7 mm diam., broadly convex at apex, subrounded to irregularly angular, 4–5(6)-sided, the angles broadly rounded; sterile staminate portion not obvious on live material; pistillate portion 3.0 cm long in front, 2.3–2.6 cm long in back, 6.5–7 mm diam. at base, 6.0 mm diam. at apex; **pistils** bottle-shaped, subterete to rhombic in cross-section, the upper 1 mm tapered inward, 1.0–1.7 mm diam.; locules 4–5 per ovary; ovules 1 per locule, 0.6–0.9 mm long, 0.3–0.4 mm diam.; placentation basal; funicle shorter than the length of the ovule; stigma 0.5–0.7 mm diam., 2–3 mm thick.

Philodendron kroemeri ranges from Colombia (Caquetá, Meta, Putumayo, Santander) to Ecuador (Azuay, Morona-Santiago, Napo, Pastaza, Zamora-Chinchipe), Peru (Amazonas, Cajamarca, Cusco, Huánuco, Junín, Pasco, Ucayali) and Bolivia (Cochabamba, La Paz) at (620)891–2400 m in *Premontane moist forest*, *Premontane wet forest* and *Lower montane moist forest* life zones.

Specimen seen: ECUADOR. **Morona-Santiago:** Campamento Achupalla, Cordillera del Cóndor, 15 km east of Gualaquiza, dense tangled forest with few large trees, Transect # 3, 03°27'S, 78°22'W, 2100 m, 23 July 1993, *A.H. Gentry 80390* (MO, QCNE); Along road into Cordillera del Condor departing from Chuchumbeza, then 6.8 km S of Chuchumbeza to Quime ferry on Río Zamora, then SW via Numbaima into Cordillera del Condor, 24

km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntia Katan 91001* (MO, QCNE).

Zamora-Chinchipe: Bosque Protector Cordillera del Cóndor, Cantón El Pangui, parroquia Tundayme, cima de la Cordillera, arriba del valle del Río Quimi, meseta de roca arenisca, con bosque denso y achaparrado o arbustal, 03°35'17"S, 78°26'16"W, 1660 m, 30 Sep. 2006, *Wilson Quiñhpe & Abel Wisum 2384* (MO, QCNE); Along road from Namirez on Río Zamora and Nambija, 17.9 km E of Río Zamora, 04°03'57"S, 78°47'36"W, 1790 m, 19 July 2004, *Thomas B. Croat 91531* (MO, QCNE); Cordillera del Condor, vicinity of Ecuacorrientes copper mine region, valley of Río Waiwaime, 5.9 km above gate near copper mine camp near Río Quimi, along trail to summit above parking, 03°34'54"S, 78°26'06"W, 1331 m, 5 Apr. 2006, *Thomas B. Croat 96657* (MO, QCNE, NY, S); Cordillera del Cóndor, bosque montano sobre roca arenisca, cerca del destacamento militar Cóndor Mirador, en la Frontera Ecuador-Perú, 03°38'29"S, 78°23'14"W, 1800 m, 15 Dec. 2000, *G. Pabon, Jorge Caranqui & Grupo Post-Grado MO-QCNE 347* (MO, QCNE); Cordillera del Cóndor, cresta de la Cordillera, en la frontera Ecuador-Perú, 1 km al sur del destacamento militar Cóndor Mirador, bosque enano sobre roca arenisca, Hito de la Paz 13, 03°37'26"S, 78°23'35"W, 1800 m, 15 Dec. 2000, *M. Cuascota & Grupo Post-Grado MO-QCNE 335* (MO, QCNE); Along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros,

03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89472* (B, MO, QCA); Cordillera de Nanguipa, along road to Cerro Colorado, about 6 km south of Nambija, 20 km southeast of Zamora, cloud forest on slopes, 04°05'51"S, 78°47'43"W, 1930 m, 19 Feb. 2002, *Tom Delinks 1366* (MO, QCNE).

Philodendron mamei André, *Rev. Hort.* 104, f. 21. 1883. Type: *cult. in Berlin and Kew s.n.*, no date, Ecuador (B). Epitype: **Zamora-Chinchipe.** Zamora-Parque Nacional Podocarpus, 3.3 km NW of Zamora, 04°05'31"S, 78°57'30"W, 792 m, 29 May 2003, *Croat & Menke 89650* (holoepitype, MO-5694741; isoeptypes, AAU!, B!, CAS!, COL!, F!, GB!, K!, NY!, M!, P!, QCA!, QCNE!, RSA!, S!, TEX!, UB!, US!, USM!, VEN!). **Figures 214–217.**

The species is a member of subgenus *Philodendron* section *Macrobeium* subsection *Eucardium* and is characterized by its terrestrial habit, prostrate stem with short internodes, undulate-winged more or less erect petioles, ovate-cordate blades nearly as wide as long and with a gray to gray-green mottling above as well as by the reddish inflorescences.

Terrestrial; JUVENILE PLANTS with long internodes and narrowly ovate blades up to 27 cm long; ADULT PLANTS: **stem** repent, short (less than 20 cm long) or up to about 1 m long, covered with old



Figure 214. *Philodendron mamei* André (Croat & Menke 89650). Live plant showing petioles, leaf blade, adaxial surface, and inflorescences.



Figure 215. *Philodendron mamei* André (Cordillera del Cóndor, not collected). Close-up view of leaf blade, adaxial surface.



Figure 216. *Philodendron mamei* André (Cordillera del Cóndor, not collected). Close-up view of petiole with prominently undulate wings.



Figure 217. *Philodendron mamei* André (Croat & Menke 89650). Close-up view of inflorescences with red spathe.

semi-intact cataphyll bases; **internodes** 2–4 cm long, 1–6 cm diam., faintly reddish to medium green, weakly glossy to semiglossy, faintly ridged; **cataphylls** 14–25 cm long, averaging 19.5 cm, semiglossy, sparsely short-pale-streaked, red to reddish brown to dark brown at lower nodes, medium green and faintly and sparsely pale-short-lineate at upper nodes, sharply flattened and winged marginally, sharply 2-ribbed, with ribs low or narrow to sharply D-shaped with weakly erect marginal ribs, marcescent, with parts persisting semi-intact. **LEAVES** with **petioles** (16–)35–65(–106) cm long,

averaging 60 cm long, 1.2 cm wide midway, 0.4–1.5 times longer than the blade, averaging 0.7 times as long as blades, usually obtusely and sharply to weakly flattened near apex, narrowly rounded to broadly convex abaxially winged on lateral margins, the wings usually prominently undulate (especially toward apex), the surface semiglossy to matte, medium to dark olive-green, reddish near base, finely pale-streaked, densely short-lineate-striate or striate to faintly ribbed circumferentially throughout; **blades** ovate-cordate, 17–60.5 cm long, 9.5–56 cm wide, averaging 39 x

30.8 cm, 1–1.8 times, averaging 1.33 times longer than wide, sometimes slightly inequilateral with one side up to 1 cm wider, thinly coriaceous to subcoriaceous, very bicolorous, matte to weakly glossy or semiglossy, pale yellow-green to dark green, sometimes faintly to heavily mottled with gray to gray-green blotches throughout between major veins above, moderately to much paler and weakly glossy to semiglossy below, mottling persisting after drying; **anterior lobe** margins convex, 14.5–41 cm long, averaging 27.9 cm, 16.5–44.3 cm wide, averaging 29.7 cm, **posterior lobes** rounded, directed downward and inward, 4.5–25 cm long, averaging 15.1 cm, 4.8–25 cm wide, averaging 15.1 cm; **sinus** spatulate, 5.5–17 cm deep, averaging 11.2 cm deep; **midrib** sunken to flattened and concolorous, to slightly paler above, narrowly rounded, convex or bluntly angular and slightly darker, more or less matte, sparsely short-pale-lineate below; **primary lateral veins** 6–8 pairs, departing midrib at steep angle then spreading to 40–50° angle, deeply and bluntly quilted-sunken and concolorous, slightly paler above, narrowly rounded to round-raised or convex, matte and slightly darker below; **basal veins** 6–7 pairs, 1st free to base, 2nd to 7th fused into a posterior rib; primary lateral and basal veins regularly branching; **interprimary veins** usually present and conspicuous; **posterior rib** almost straight, naked to 2.7–3.2 cm; **minor veins** fine, moderately distinct and close below. **INFLORESCENCES** 1–2 per axil; **peduncle** green, heavily tinged with violet-purple, coarsely whitish-streaked; **spathe**

erect in flower, the blade red or white outside, pinkish inside; tube dark purple-violet outside, magenta inside. **INFRUDESCENCE** 20.5 cm long, 3.6 cm diam. on tube, dark violet-purple throughout outside; **berries** white.

Philodendron mamei ranges on the eastern slope of the Andes in Ecuador (Morona-Santiago, Napo, Zamora-Chinchipec) and Peru (Amazonas) at 730–1660 m elevation in a *Premontane wet forest* life zone. The species occurs in the understory of primary forest, sometimes occurring along stream banks in full shade and in cutover primary forest with persisting epiphytes.

Specimens seen: ECUADOR. **Zamora-Chinchipec:** Vicinity of Ecuacorrientes mining company, Valley of Río Quime, trail along Río Waiwaime near its mouth at Río Quime, 03°33'45"S, 78°27'47"W, 1000 m, 23 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 99066* (HUA, MO, QCNE); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritza, 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Mark Menke 89554* (MO, QCNE); Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiake Katan 91300* (MO, PMA, QCNE); Cordillera del

Cóndor region, Parroquia Zurmi, vicinity Las Orquideas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, *Thomas B. Croat 97141* (MO, QCNE).

Philodendron micranthum Poepp. ex Schott, *Oesterr. Bot. Wochenbl.* 5: 17. 1855. Type: Peru. *Poeppig. sn.* (isotype, P).. **Figures 218–220.**

The species is a member of subgenus *Philodendron* section *Tritomophyllum* and is characterized by its long internodes, green-drying 3-lobed blades with the lower surface moderately granular between the veins, and by its inflorescences 1–8 per axil with the spathe red, maroon or purplish.

Hemiepiphytic to 4–6 m tall; **internodes** 7–9(15) cm long, 1.4–1.7 cm diam., maroon and smooth, soon conspicuously, transverse-fissured and gray, drying tan to yellow-brown; **cataphylls** 20–23 cm long, sharply 1-ribbed, deciduous. LEAVES with **petioles** 23–56 cm long, 3–5 cm diam., acutely 1-ribbed adaxially, dark green, weakly glossy; **blades** 3-lobed, 29–35 cm long, 37.5–45.5 cm long, 0.6–0.9 times as long as wide, 0.4–0.9 times as long as the petioles, subcoriaceous, dark green and matte above, slightly paler and weakly glossy below, drying green to gray-green to yellowish green, constricted lower down to a width of 1–4 cm, abruptly confluent with lateral lobes, the width of the confluent portion of the lateral lobe at its narrowest

point 1–2.5 cm wide, the length of the confluent portion (as measured from the petiole plexus to the maximum incision) 0.4–0.9 times as long as the medial lobe; **medial lobe** elliptic, 16–30 cm long, 5–10 cm diam., acute to acuminate at apex, cuneate at the base and confluent with the lateral lobes, the constricted zone 1–4 cm wide, confluence width 1–2.5 cm wide; **lateral lobes** hastate-falcate, 13–25 cm long, 5–7 cm diam.; **upper surface** moderately smooth between the veins on magnification; **lower surface** moderately granular between the veins; **midrib** obtusely sunken and slightly paler above, narrowly raised and concolorous below; **primary lateral veins** not obvious on either surface; **minor veins** uniformly distinct. close and moderately prominent with some prominent cross-veins; **basal veins** not apparent; **posterior rib** naked region 0.5–2.2 cm long; **sinus** absent to arcuate; laticifers apparently lacking. INFLORESCENCE erect-spreading, 1–8 per axil; **peduncles** 3–7.5 cm long, 1–2 mm diam., slightly shorter than or slightly longer than the spathe, drying medium to dark brown, **spathe** subcoriaceous, 4–6.5 cm long, 1–1.5 cm wide, drying 8–10 mm diam., red, maroon or purplish, sometimes medium green and tinged purple outside, green to white within, maroon only at base, opening to near the base in the front at anthesis, the spadix sometimes remaining protruded after anthesis, drying reddish brown outside; **spadix** 3–6 cm long; staminate portion narrowly tapered, 2.5–3 cm long, 3 mm diam., drying yellow-brown; pistillate portion pale green, 2–3 cm long, 6–10 mm



Figure 218. *Philodendron micranthum* Poepp. ex Schott (Croat *et al.* 91415). Live plant showing petioles and leaf blades, adaxial surface.

diam.; **pistils** ca. 1 mm long, 0.6 mm diam.; style 1.3–1.5 mm wide, the margins irregularly 5–6-sided, turned somewhat upward, surrounding a depression densely covered with granules and with 5 domes, one for each locule; stigma 3–5 mm diam., rounded with a medial depression, blackened on drying; ovary 1.6 mm long, 5-locular, the outer margins densely granular on drying; ovules 1 per locule, basally attached, 1 mm long, filling the entire locule,

the funicle short, born at one side on the lower end, ca. $\frac{1}{4}$ as long as ovule, bearing glands in its lower half. INFRUCTESCENCE with **berries** green to yellow-red to reddish brown.

Philodendron micranthum ranges from S. Colombia (Amazonas) to E. Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Zamora-Chinipe) to Brazil (Acre, Amazonas) and Peru (Amazonas, Huánuco,



Figure 219. *Philodendron micranthum* Poepp. ex Schott (Croat 85073). Close-up view of leaf blade, abaxial surface.

Loreto, San Martín) at 200–300 m. in *Tropical moist forest* and *Premontane wet forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Along road from near Paquisha south to Las Orquídeas, and end of river at Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 37.3 km S of junction, 12.3 km N of Las Orquídeas, 04°08'25"S, 78°38'31"W, 886 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan* 91415 (MO, QCNE); Río Nangaritza, Pachicutza, 04°07'S, 78°37'W, 900 m, 3 Dec.

1990, *Walter A. Palacios & David A. Neill* 6492 (ENCB, MO, QCA).

***Philodendron nangaritense* Croat, sp. nov.** Type: Ecuador. Zamora-Chinchipe: Cordillera del Cóndor region, vicinity of Las Orquídeas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquídeas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1140 m, 16 Apr. 2006, *T.B. Croat* 97112 (holotype: MO-5971502; isotype: QCNE). **Figures 221–223.**



Figure 220. *Philodendron micranthum* Poepp. ex Schott (Croat *et al.* 105773). Close-up view of inflorescences with spathe reddish purple.

The species is a member of subgenus *Philodendron* and is characterized by its terrestrial habit, long scaly petioles dark violet-purple at apex and by its broadly ovate-cordate blades with rounded posterior lobes, 4 pairs of primary lateral veins and 6 pairs of basal veins.

Terrestrial; creeping on forest floor and climbing up on the tree trunk, loosely attached; **internodes** 3.5–6.0 cm long, 2.7–3.8 cm diam., gray-green, semiglossy, smooth, the inner surface pink in time with purple resin droplets; **cataphylls** 17 cm

long, unribbed, reddish, persisting as brown epidermis and an underlayment of fine pale fibers. LEAVES with **petioles** terete, 59–65 cm long, 7–8 mm diam. midway, thickened at apex, weakly glossy, medium yellow-green, semiglossy densely medium green, scaly, especially toward apex, dark violet-purple at apex; **blades** broadly ovate-cordate, 29–41 cm long, 21–38 cm wide, 1.1–1.4 times longer than wide, 0.5–0.63 times as long as petiole, subcoriaceous, dark green, and moderately glossy above, moderately paler and glossy below; **anterior lobe** 21.5–28 cm long, broadly rounded,



Figure 221. *Philodendron nangaritense* Croat (Croat et al. 91345; MO-6916684). Herbarium specimen showing fibrous cataphylls, petioles and leaf blade, abaxial surface.



Figure 222. *Philodendron nangaritense* Croat (Croat 97112). Live plant showing petioles and leaf blades, adaxial and abaxial surfaces.

short-acuminate; **posterior lobes** 11–14 cm long, 8.5–13 cm wide, curving inward, broadly rounded at apex; **sinus** parabolic or spatulate, 2–2.5 cm wide, 7.5–12 cm deep, sometimes closed at the end; **midrib** broadly convex and paler above, narrowly rounded and slightly darker below; **primary lateral veins** 4 pairs, arising at a 45–50° angle and curving upward, weakly quilted-sunken and concolorous above, bluntly pleated-raised and concolorous below; **basal veins** 6 pairs, the 1st pair free to the base, the 2nd–6th pairs merged at the base for

1–2 cm; **minor veins** moderately obscure. INFLORESCENCE unseen.

Philodendron nangaritense has been found so far only in the Cordillera del Cóndor region of Zamora-Chinchipe province in Ecuador at 875–1140 m in a *Lower montane wet forest* life zone.

Philodendron nangaritense resembles *Philodendron verrucosum* L. Mathieu ex Schott which also has densely scaly petioles, but that species has the blades with the primary lateral veins thick and conspicuously



Figure 223. *Philodendron nangaritense* Croat (Croat 97112). Close-up view of scaly petioles.



Figure 224. *Philodendron palaciosii* Croat & Grayum (Croat 97295). Live plant showing appressed-climbing habit, winged petioles and leaf blades, adaxial and abaxial surfaces.



Figure 225. *Philodendron palaciosii* Croat & Grayum (Croat 96946). Close-up of leaf blades, adaxial surface.

branched near the margin while the primary lateral veins of *P. nangaritense* are thin and unbranched.

Paratype: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, along road from near Paquisha, south to Las Orchídeas, and end of road at Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 47.0 km S of Intersection near Paquisha, 2.6 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 875 m, 17 July

2004, Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntia Katan 91345 (MO, QCNE).

Philodendron palaciosii Croat & Grayum, *Rodriguésia* 56(88): 106–108. 2005. Type: Ecuador. Napo: Tena Canton, Est. Biol. Jatun Sacha, along S bank of Rio Napo, 8 km E of Puerto Misahualii, 01°04'S, 77°36'W, 450 m, 1 Apr. 1992, T.B. Croat 73380 (holotype: MO; isotypes: AAU!, B!,

CAS!, F!, K!, MEXU!, NY!, QCNE!, US!). **Figures 224 & 225.**

The species is a member of subgenus *Pteromischum* and is characterized by its petioles with the sheath broadly winged and splayed widely at apex, and the matte-drying, pale yellow-green ovate-elliptic blades which are ovate and attenuated at the base.

Terrestrial or hemiepiphytic, 0.5–1 m tall or appressed climbing to 3 m; **stem** sometimes decumbent or pendent, 1–1.2 cm diam., **internodes** 1–4 (6) x 0.7–1.5 cm diam., matte, gray-green to olive-green, drying ribbed, weakly striate. **LEAVES** with **petioles** 12–23 cm long, dark green to yellowish brown, matte and finely costate, minutely granular on surface, sheathed to near the middle or up to 1 cm below blade attachment, sheath broadly winged, splayed widely at apex to 3.4 cm wide when flattened, rounded and weakly free-ending at apex, the free portion of petiole sharply and deeply D shaped, 2–3 mm diam.; **blades** subcoriaceous, ovate to ovate-elliptic, 19.5–29 x (7.8)10–13.7 cm, 1.6–2.3 times longer than wide, 1.2–1.6 times longer than petioles, gradually long acuminate at apex, prominently decurrent at base, bicolorous, subvelvety matte, dark green (sometimes almost blackened), drying matte and gray above, paler, matte and yellow-green to gray-green below; **midrib** broadly convex and slightly paler to concolorous, finely costate above, broadly convex and paler, minutely granular below; **primary lateral veins** 13–17 pairs, mostly aggregated

near the base, arising in a sweeping curve (especially those near the base) at an acute angle then spreading at 40–70° angle, minutely undulate and scarcely more prominent than the minor veins on upper surface, weakly raised and paler than surface below, **minor veins** moderately obscure. **INFLORESCENCE** 1 per axil, rarely 2 per axil; **peduncle** 10–16 cm x 3–4 mm, medium green with dark green striations, drying yellowish green, dark brown or pale yellow-brown; **spathe** 11.5–16 x 1.5–1.7 (3) cm, white to creamy white, or greenish yellow, the spathe tube green, the lower 2/3 of the entire inner surface greenish white, lined with intermittent red streaks, drying greenish yellow-brown, pale green within post anthesis with brown resin canals; **spadix** 6–15 cm long, elongating in fruit with the staminate spadix protruding slightly beyond the end of the spathe, creamy white; pistillate portion 2–3.3 cm x 7–9 mm, pale green to pale yellow-green; staminate portion 5–5.5 cm long, the sterile staminate portion 1 cm x 8 mm diam.; pistils 1.8 x 7–9 mm, densely and minutely warty at apex; stigma 0.5–0.6 mm diam., drying dark brown, the style apron to 1 mm wide, pale brown. **INFRUCTESCENCE** orange.

Philodendron palaciosii ranges from Central Ecuador (Morona Santiago, Napo, Orellana, Pastaza, Sucumbíos, Tungurahua, Zamora-Chinchipe) to Peru (Amazonas, San Martín) at 200–1750 m in *Tropical moist forest*, *Tropical wet forest*, *Premontane moist forest* and *Premontane rain forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipec:** Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from the military outpost to Condor Mirador military outpost, 7.1 km S of junction in road to Tandaime, San Marcos and Ecu-Corriente copper mine headquarters, 03°36'42"S, 78°28'02"W, 1128 m, 12 Apr. 2006, *Thomas B. Croat 96946* (MO, QCNE); Along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89487* (MO, QCNE); Along road between Los Encuentros and El Sarsa, 10.7 km E from Los Encuentros, beyond bridge over Río Zamora, 03°46'40"S, 78°38'28"W, 1066 m, 14 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98592* (MO, QCNE); Cordillera del Cóndor, parroquia Zurmi, vicinity of Las Orquideas, Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1128–1250 m, 18 Apr. 2006, *Thomas B. Croat 97197* (MO, QCNE); Cordillera del Cóndor region, parroquia Zurmi, vicinity of Las Orquideas, Cabañas Yancuam, ca. 3 km S of Las Orquideas, along stream just S of Cabañas Yancuam, on steep rocky slopes, 04°15'01"S, 78°39'33"W, 1130 m, 19 Apr. 2006, *Thomas B. Croat 98245* (MO, QCNE).

***Philodendron paloraense* Croat, sp. nov.**

Type: Ecuador. Morona-Santiago: Palora - Llushín, departing main Palora-San Vincente de Tarqui Rd, 8.7 km NW of Palora, 3.4 km S of Río Amundalo, 2.1 km E on rd. to

Llushin, 01°41'46"S, 78°01'21"W, 922 m, 25 Aug 2002, *T.B. Croat & L.P. Hannon 86967* (holotype, MO 5740474; isotypes, CAS!, COL!, K!, MO 86968–69, S, US!). **Figures 226–228.**

The species is a member of subgenus *Philodendron* sect. *Tritomophyllum*, characterized by its epiphytic habit, short internodes, sharply 1-ribbed and promptly deciduous cataphylls, petioles tapering slightly at apex, obtusely flattened adaxially, deeply 3-lobed and falcate blades which often dry blackened with the lateral lobes narrow, elongated (mostly 0.9–2.0 times longer than wide) and directed toward the apex with narrowly rounded tips as well as by its short-pedunculate inflorescence with a medium green spathe dark violet-purple and glossy inside tube, tinged purplish on the lower part of blade with the blade otherwise medium green. Also distinctive is that the species has up to six inflorescences per axil.

Epiphyte; **internodes** short, 2.5–14 cm long (average 7.3 cm), 0.3–3.2 cm diam., (average 1.6 cm), light brown, matte, checked in a reticulate pattern; **cataphylls** (7–)16–26 cm long (average 17.5 cm), promptly deciduous, drying purplish, sharply 1-ribbed. LEAVES with **petioles** 25.3–82 cm long (average 47.2 cm), 0.3–1.5 cm diam. (average 0.82 cm), tapering slightly at apex, obtusely flattened adaxially, dark green, matte, densely purplish, ribbed; **blades** deeply 3-lobed, falcate, moderately coriaceous, attenuated at base, weakly



Figure 226. *Philodendron paloraense* Croat (Croat *et al.* 105809). Live plant showing stem, cataphylls, petioles and leaf blades, abaxial surface.



Figure 227. *Philodendron paloraense* Croat (Croat *et al.* 105809). View of leaf blades, adaxial surface, and inflorescences.

decurrent on petiole to 5 mm, 26.3–70.3 cm long (average 45.3 cm), 21.7–60 cm wide (average 36.5 cm), 0.9–2.0 times longer than wide (average 1.3), 0.7–1.2 times longer than the petiole (average 0.98), greenish gray to gray or brown above, gray to yellow–brown or blackish below; **medial lobe** 26.3–70.3 cm long, 5.9–20.8 cm wide (average 45.3×10.1 cm), broadest in apical 2/3, gradually long-acuminate to acuminate at apex, weakly constricted at base, constricted lower down to a width of 3.0–12 cm, abruptly confluent with lateral lobes, the width of the confluent portion of the lateral lobe at

its narrowest point 2.0–4.2 cm wide, the length of the confluent portion (as measured from the petiole plexus to the maximum incision) 0.6–1.1 times as long as the medial lobe; **lateral lobe** falcate, 17–48 cm long (average 31.6 cm), 3.1–16 cm wide (average 7.4 cm), gradually long to acuminate at apex, weakly constricted at base, marked inequilateral, the lower margin prominently decurrent onto the posterior rib, posterior ribs fused with midribs at base; **sinus** arcuate to lacking; **midrib** flat and concolorous above, much thicker and narrowly rounded and purple below;



Figure 228. *Philodendron paloraense* Croat (Croat *et al.* 105809). Close-up view of inflorescences with green spathe.

primary lateral veins 3 pairs, arising at 25–35° angle, weakly sunken and concolorous above, convex and purple below; **basal veins** 4–6 pairs; **posterior rib** naked 1.5–3 cm; **minor veins** moderately distinct; **upper surface** frequently sparsely pustular; **lower surface** smooth with whitish irregularly shaped blotches and pustules, sometimes blackish granular; laticifers present, mostly short to medium length, usually between each pair of **minor veins**, more prominent on lower surface. INFLORESCENCE up to 6 per axil; **peduncle** medium green, 3–15 cm long (average 10.4 cm), 0.2–1 cm wide

(average 0.7 cm), 2.1–9.8 mm times longer than spathe (average 6.9 mm), weakly glossy, clearly demarcated at apex; **spathe** 12–17.5 cm long (average 14.9 cm), 0.8–3.7 cm wide (average 2.2 cm), erect, coriaceous, medium green and semiglossy to weakly glossy outside, dark violet-purple and glossy inside tube, tinged purplish on the lower part of blade, blade otherwise medium green, obtuse at apex, acute at base with margins overlapping, meeting at 45° angle; **spadix** 12–14.8 cm long, (average 13.9 cm), cylindric, pistillate portion 4–5.5 cm long, (average 4.5 cm), 0.5–1.1 cm wide, (average

0.7 cm), drying brown, staminate portion broader than pistillate portion, 5.9–9.2 cm long, (average 7.7 cm), 0.9–1.5 cm wide, (average 1.2 cm), drying dark brown; sterile staminate portion indistinct, 1.6–2.5 cm long (average 2.1 cm), 0.9–1.4 cm long (average 1.1 cm); **pistils** 2 mm long, 0.9–1.0 mm diam., embedded linear cellular inclusions in the walls of the ovary; style conspicuous, 0.6–0.7 mm diam.; stigma button-shaped, 0.7 mm diam.; locules 5; ovules 1 per locule, basal placentation, 1 mm long, 0.3 mm diam., ovules contained in gelatinous envelopes; funicles shorter than ovules.

Philodendron paloraense ranges from Colombia (Meta, Putumayo) to Ecuador (Morona-Santiago, Pastaza, Zamora-Chinchipe) and Peru (Amazonas, Loreto) at 100–1700 m in *Tropical moist forest* and *Premontane rain forest* life zones.

Philodendron paloraense is most similar to *P. boltonianum* Schott which differs in having more elongated internodes, blades mostly 2.5–3.6 times longer than wide with the lateral lobes mostly broadly rounded at apex, typically longer internodes and 1–4 inflorescences per axil.

Palacios & Neill 6449 is apparently also this species but is unusual in having blades that dry greenish and appears to have only 1 inflorescence per axil.

The species is named for the type locality, Palora, where it was collected.

Paratypes: COLOMBIA. **Meta:** Sierra de la Macarena, Central Mountains North Ridge, dense forest, 1400 m, 27 Dec. 1949, *W.R. Phillipson & Jesús M. Idrobo 1956* (US); Along road to San Luis de Cubarral, 0.5 km W of North-South hwy. between Villavicencio and Granada, 03°45'N, 73°45'W, 550 m, 24 Mar. 1983, *Thomas B. Croat 55540* (MO, QCA). **Putumayo:** Río Gineo, 8 km west of Villagarzon, moist shady forest, 300 m, *Timothy C. Plowman 2050* (F, GH, MO). ECUADOR. *Walter A. Palacios 16254*; Tagged as *van der Werff 9–5-89*, apparently from Ecuador, 1996, *Thomas B. Croat 78293* (MO, QCNE). **Morona-Santiago:** Elias, Tayuza-Mendez, just S of Tayuza, 02°43'S, 78°13'W, 600 m, 26 Sep. 1994, cultivated at Missouri Botanical Garden as *Fisk 10.*, *Thomas B. Croat 77235* (MO, SEL); Cultivated plants from Waimea Arboretum, Cordillera de Cutucu, E of Logrono, originally collected by M.T. Madison, also as *Waimea 77p668*, 1000–2000 m, *Thomas B. Croat 75199* (MO, QCNE). Limón (Gen. Plaza Gutiérrez)—Macas, 6.5 km north of Limón, 02°55'41"S, 78°24'25"W, 1032 m, 12 Aug. 2002, *Thomas B. Croat, Lynn P. Hannon & Petra E. Schmidt 86497* (MO, QCNE); Cantón Macas, Parque Nacional Sangay, sendero a Sardina Yacu, entre el Río Sardina y Volcá, 02°05'S, 78°10'W, 1500–1700 m, 2 Oct. 1996, *Consuelo Montalvo A. & Carlos E. Cerón 20* (QAP); Palora, confluencia del Río Llushin Grande y Chico, 01°39'S, 78°06'W, 1000 m, 17 Sep. 1996, *Carlos E. Cerón, Consuelo Montalvo A. & Miguel Joya 32604* (QAP). **Napo:** Along road between Lago Agrio and Francisco de Orellano (Coco), 4.7 km N of Coco, Tropical moist forest,

00°28'S, 76°58'W, 5 Oct. 1980, *Thomas B. Croat* 50406 (MO, QCA); Cantón Aguarico, Parque Nacional Yasuní, Lagunas de Garza Cocha, Bosque húmedo Tropical, bosque primario cerca a borde del río Garza, suelo parcialmente inundado, 01°01'S, 75°47'W, 200 m, 22 Sep. 1988, *Carlos E. Cerón & Nelson Gallo* 4946 (MO); Reserva Florística "El Chunchu" Payamino, bosque primario, Bosque húmedo tropical, 5 km al NW de Coca, Estación experimental INIAP-Napo, 00°30'S, 77°01'W, 250 m, 7 Oct. 1987, *Carlos E. Cerón* 2408 (B, MO, QAME). **Pastaza:** Along road from Palora to Río Amundalo and San Vicente de Tarqui from Palora, 7.9 km W of Palora, 0.8 km E of Río Amundalo, 01°43'07"S, 78°02'26"W, 940 m, 22 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich & M. Rees* 105809 (MO, QCNE). **Sucumbíos:** Reserva Cuyabeno, Chiritza, Bosque húmedo Tropical, bosque primario sobre suelos rojos de Colinas, 00°05'S, 76°30'W, 230 m, 13 Nov. 1991, *Walter A. Palacios, Galo A. Tipaz, Daniel Rubio, Edgar Gudiño & Milton Aulestia* 8834 (MO, QCNE). **Zamora-Chinchipe:** Ca. 30 km N of Zamora, S of Guadalupe, near the village Conchay at Río Yacu-ambi, W of the village, 03°52'S, 78°52'W, 1000 m, 12 Nov. 2000, *R. Leimbeck, J.E. Madsen, B. Windeballe & C. Rosales* 376 (MO, AAU). Cordillera del Condor, Río Nangaritza, Pachicutza, 04°07'S, 78°37'W, 900 m, 3 Dec. 1990, *Walter A. Palacios & David A. Neill* 6449 (MO); *Walter A. Palacios & David A. Neill* 6788 (MO). PERU. **Amazonas:** Bagua, *Camilo Díaz S. & et al.* 6932 (MO). **Loreto:** Yanamono, Explorama Lodge, tourist camp,

50 miles NE of Dtto. Iquitos, bosque primario, suelos de altura, 03°30'S, 72°50'W, 106 m, *Rodolfo Vásquez & Nestor Jaramillo* 533 (MO).

Philodendron parvilobum Croat, *Willdenowia* 35: 355–357. 2005. Type: Ecuador, Morona-Santiago: Macas-Sucua, 8.1 km S of Río Umbaino, 02°23'09"S, 78°10'01"W, 948 m, 21 Aug. 2002, *T.B. Croat & L.P. Hannon* 86728 (holotype: MO!; isotypes: AAU!, B!, CAS!, F!, GB!, K!, MEXU!, NY!, QCNE!, SEL!, US!). **Figures 229–231.**

The species is a member of subgenus *Philodendron* and is characterized by its sharply 2-ribbed deciduous cataphylls, short petioles, oblanceolate blades cordulate at the base, and its inflorescences with a green spathe and a ivory spadix protruding after anthesis.

Internodes dark green to gray-green, (1–)2–3 cm long, (1.2–)1.7–2 cm diam., becoming yellow-brown and semi-glossy, sharply flattened on one side, occasionally with acute marginal ribs; **cataphylls** green, soft, deciduous, sharply 2-ribbed, 16 cm long, pale green, the ribs to 3–4 mm high, flaring, sometimes with spreading wings. LEAVES with **petioles** spongy, subterete, dark green and semi-glossy, sometimes striate or densely short-lineate, conspicuously constricted and darker at apex where it meets the midrib, obtusely flattened adaxially; **blades** subcoriaceous,



Figure 229. *Philodendron parvilobum* Croat (Croat 96996). Live plant showing petioles, bases of leaf blades, adaxial and abaxial surfaces, and inflorescences with green spathe and protruding spadix.

moderately bicolorous, semi-glossy, oblanceolate, (25–)32–37 x (9–)11.5–18 cm, acuminate to cuspidate at apex, narrowly cordulate at base, **posterior lobes** (3–)4.3–4.5 x 2–4.5 cm midway, **sinus** V-shaped, 3–4 cm deep, 6–7.5 cm wide, narrowly rounded at apex; **midrib** convex and slightly paler above, narrowly rounded and paler to much paler below; **primary lateral veins** 8–9 pairs, departing at 85° angle, then spreading at 60° angle near the margin,

obtusely sunken to weakly quilted and concolorous above, convex and paler below; **minor veins** sparse, weakly visible below. **INFLORESCENCES** 2 or 3(–5) per axil; **peduncle** 11.5–12 cm long, (3.5–)6–8 mm in diam., medium green, semi-glossy; **spathe** 5–13 cm long, semi-glossy, sometimes glossy, medium to dark green, paler green on blade outside, purple-tinged on open edge outside, pale green to whitish inside; spathe tube (0.8–)1.7–2.2 x 2.4–2.6



Figure 230. *Philodendron parvilobum* Croat (Croat 96996). View of petioles, leaf blades, adaxial surface, and inflorescence.



Figure 231. *Philodendron parvilobum* Croat (Croat 96996). View of petioles and leaf blades, abaxial surface.



Figure 232. *Philodendron pedunculum* Croat & Grayum (Croat *et al.* 90622). Live plant showing petioles and leaf blades, adaxial surface.

cm, dark purple-violet to dark maroon in lower 1/2 to 2/3 inside; **spadix** ivory throughout, 4.8–8 cm long; staminate portion 3.3–5.9 cm long, sometimes weakly protruding after anthesis, sterile staminate portion 8–9 mm in diam., middle of fertile staminate portion 9 mm in diam., at 1 cm from tip, 5 mm in diam.; pistillate portion 2.7–4 cm long in front, 3–3.5 cm long in rear, 0.8–0.9 cm in diam. at base, 1.2–1.4 cm in diam. midway, 1–1.2 cm in diam. at apex;

pistillate flowers pale to medium green before anthesis, creamy white after anthesis; **pistils** medium green in early fruit; **immature fruits** pale green.

Philodendron parvilobum ranges from Ecuador (Morona-Santiago, Zamora-Chinchiipe) to Peru (Amazonas, San Martín) and Brazil (Acre) at 300–1350 m in *Premontane wet forest* and *Lower montane moist forest* life zones.



Figure 233. *Philodendron pedunculum* Croat & Grayum (*Croat et al. 90622*). View of petioles, leaf blades, adaxial and abaxial surface, and inflorescence.

Specimens seen: ECUADOR: **Zamora-Chinchipe:** Vicinity of Ecuacorrientes copper mine development, valley of Río Waiwaime, along road to mine site, 4.5 km above gate, 7.5 km E of mine headquarters, 03°34'44"S, 78°25'47"W, 1289 m, 7 Apr. 2006, *Thomas B. Croat 96786* (MO, QCNE); Cordillera del Cóndor region, along road from Tandaime to Valle del Quime, along right bank of Río Quime, 4.2 km from bridge over Río Waiwaime near headquarters of Ecuacorriente copper mine, 03°31'55"S, 78°27'10"W, 1200 m, 13 Apr. 2006, *Thomas B. Croat 96996* (MO, QCNE); Valley of Río Waiwaime, near mouth at Río Quime, 03°33'40"S, 78°27'47"W, 1000 m, 22 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 99011* (MO, PMA, QCNE); Cordillera del Condor, Los Encuentros-El Sarsa, 4.7 km E of Los Encuentros, 03°46'42"S, 78°38'32"W, 822 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89445* (MO, QCNE); *Thomas B. Croat & Mark Menke 89576* (MO, QCNE); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritza, 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Mark Menke 89521* (MO, QCNE); Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntia Katan 91208* (MO, NY, QCNE, US).

Philodendron pedunculum Croat & Grayum, *Willdenowia* 35(2): 356–358. 2005. Type: Ecuador, Morona-Santiago: Patuca-Santiago, Cordillera de Cutucu, 11.4 km E from Patuca turnoff on Macas-Limon rd., 5.1 km E of Patuca, 02°46'30"S, 78°07'W, 944 m, 9 July 2004, *T.B. Croat, L.P. Hannon, G.A. Wahlert & Tuntia Katan 90611* (holotype: MO; isotypes: B!, K!, NY!, QCNE!, US!). **Figures 232 & 233.**

The species is a member of *Philodendron* subgenus *Pteromischum* and is characterized by its terrestrial habit, creeping stem, nearly fully sheathed petioles, ovate-elliptic to broadly ovate, inequilateral blades that dry grayish on the upper surface and yellowish brown below, and especially by the long-pedunculate inflorescence with a green spathe.

Terrestrial, creeping over ground in dense stand; **stem** repent; **internodes** 1–1.5 cm long, 0.8–1(–2) cm in diam., dark green, semiglossy to glossy. LEAVES with **petioles** 16–19 cm long (averaging 17 cm), matte to weakly glossy or semiglossy, dark green and semiglossy, fully sheathed to within 4–6 mm from apex, sheath in-turned, pale green tinged with pink and semiglossy inside free portion; geniculum sharply sulcate; **blades** narrowly ovate to ovate-elliptic, (13.5–)20–22 x (5.5–)10–12.5 cm (averaging 22 x 12.3 cm), 1.8 times longer than wide, abruptly and inequilaterally acuminate at apex, prominently inequilaterally attenuate at base, markedly inequilateral with one side 1–2 cm

wider than opposite side, subcoriaceous, dark green and weakly glossy to matte-subvelvety above, moderately paler and matte below, drying gray to dark gray-brown above, dark yellow-brown to gray or grayish yellow below; **midrib** flat to obtusely sunken and concolorous above, bluntly angular and concolorous below; **primary lateral veins** 5–10 per side, weakly quilted-sunken and concolorous above, bluntly angular and pleated to convex and darker below, drying flat to concolorous above, weakly raised and darker than surface below, departing midrib at an acute angle then sweeping across blade at 35° angle; interprimary veins present between most pairs of primary lateral veins, conspicuous and flat on both surfaces; **minor veins** moderately obscure on drying. **INFLORESCENCE** solitary, erect with **peduncle** (18–)21–23 cm long, 7 mm in diam., pale green, weakly glossy; **spathe** 13.5–16 cm long, (2.5–)3–3.2 cm wide near base, 2 cm wide near apex, 3.3 cm thick on tube, medium to dark green, weakly glossy to semiglossy outside, much paler green and glossy inside; **spadix** 8–10 cm long, 2.2 cm wide at anthesis, drying medium yellow to pale yellowish brown; pistillate portion 3.5 cm long, 1.8 cm in diam.; staminate portion 6 cm long, 7 mm in diam. midway, narrowly tapered to apex; sterile staminate portion 1.3 cm in diam.; **pistils** pale green to pale yellow, 1.4–1.6 mm in diam., drying pale brown; stigma broadly sunken with a thickly raised margin, medium dark yellow-brown, 0.5–0.9 mm in diam.; **berries** pale yellow.

Philodendron pedunculum is endemic to Ecuador, known only from the eastern Andean slopes of Ecuador in Sucumbíos, Napo, Pastaza, Morona-Santiago and Zamora-Chinchipe provinces at 400–945 m in a *Premontane wet forest* life zone.

Specimen seen: ECUADOR. **Zamora-Chinchipe:** Vicinity of Las Orquídeas, Cabañas Yankuam, along Río Nangaritza, in secondary vegetation, 04°15'05"S, 78°39'28"W, 860 m, 15 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98646* (MO, QCNE).

Philodendron pseudoverrucosum Croat, *Aroideana* 36E(1): 52–54. 2013. Type: Ecuador. Tungurahua: Along road from Río Negro on Río Pastaza to Parque Nacional Sangay, 4.9 km south of Río Negro, 4.8 km S of bridge over Río Pastaza, 01°26'46"S, 78°13'33"W, 1520 m, 19 Aug. 2002, *T.B. Croat & L.P. Hannon 86647* (holotype: MO; isotypes: AAU!, B!, CAS!, COL!, CUVCI!, F!, K!, M!, NY!, QCNE!, S!, SEL!, US!, USM!). **Figures 234–236.**

The species is a member of subgenus *Philodendron* and is characterized by its reddish cataphylls densely covered with medium green scales, petioles often sparsely or densely gray-scaly especially near apex, reddish-brown-drying ovate-sagittate blades with short pale lineations on the upper surface and with the major veins densely granular puberulent below, and by its



Figure 234. *Philodendron pseudoverrucosum* Croat (Croat *et al.* 105596). Live plant showing petioles and leaf blades, adaxial surface.

inflorescences 1–2 per axil with a whitish spathe blade and a yellowish-white spadix.

Terrestrial or hemiepiphyte on rocky bank along stream and in deep shade in forest; **stem** creeping; **internodes** 5–10 cm long, 2–5 cm diam., dark green, semiglossy becoming gray-brown, weakly glossy and transversely, minutely ribbed; **cataphylls** 20–35 cm long, reddish purple to reddish brown, densely covered with medium green scales, unribbed, marcescent, persisting at upper nodes as thin intact member, finally deciduous, drying intact with reddish dark

brown epidermis. **LEAVES** with **petioles** 32–93 cm long, 5–10 mm diam., terete, medium green to dark olive-green, matte to weakly glossy, becoming obtusely flattened adaxially towards apex, sometimes sparsely or densely gray-scaly especially near apex, drying reddish medium brown to grayish dark brown; **preadult blades** broadly ovate-sagittate, to 19.7 cm long, 10.5 cm wide, the sinus ca. 2 cm deep, broadly rounded at the apex; **adult blades** ovate-sagittate, 27.3–59 cm long, 21.1–49.6 cm wide (averaging 44 x 35), 1.14–1.54 (averaging 1.27) times longer than broad,



Figure 235. *Philodendron pseudoverrucosum* Croat (Croat et al. 105596). Close-up view of leaf blades, adaxial surface.



Figure 236. *Philodendron pseudoverrucosum* Croat (Croat *et al.* 105596). Close-up view of inflorescence with spathe violet-purple and densely scaly.



Figure 237. *Philodendron pulchrum* G. M. Barroso (Croat *et al* 105760). Live plant showing petioles and leaf blades, adaxial surface.



Figure 238. *Philodendron pulchrum* G. M. Barroso (Croat et al 105760). Close-up view of inflorescence with green spathe.

broadest at petiole attachment, 0.5–1.1 (averaging 0.72) times long as petioles, abruptly acuminate at apex (acumen to 2 cm long), prominently lobed at base, thin to softly coriaceous, dark green and matte-velvety above, sometimes pale green along main veins, paler, purple tinged and matte below, drying reddish medium brown to reddish dark brown and weakly glossy above, medium brown and semiglossy below; **upper surface** smooth with short pale lineations, sometimes absent; **lower surface** glossier; **anterior lobe** 21.4–42.8 cm long, with straight margins, the distal margin rounded; **posterior lobes** 8.8–23 cm long, 7.2–18.9 cm wide, directed downward and inward; **sinus** hippocrepiform, 5.5–17.6 cm deep, 1.9–7.8 cm wide; **midrib** flattened to sunken and paler above, narrowly round-raised and paler to slightly darker, drying flattened and concolorous above and round-raised, densely granular puberulent and darker below; **primary lateral veins** 8(7–9) pair, arising at a 50–60° angle near middle, narrowly sunken and paler to concolorous above, narrowly round-raised and paler to concolorous below, drying narrowly acute and concolorous above, flattened, densely granular-puberulent and darker below; **minor veins** arising mostly from midrib but also from the primary lateral veins closer to margins, distinct, weakly raised and granular below; **cross-veins** distinct on lower surface with bands of violet-purple tinging the areas between primary lateral veins; **laticifers** short and discontinuous on lower surface; **basal veins** 9 (7–9) pairs, the 1st and 2nd pair free to the base, 3rd pair fused to 1–1.5 cm, the 4th and 5th pairs fused to 3.5–5.5 cm,

drying densely granular puberulent below; **posterior rib** gradually curved, naked 1–1.5 cm. INFLORESCENCE 1–2 per axil, **peduncle** 3.3–13.2 cm long; **spathe** tube violet-purple and often densely gray-scaly; blade whitish, paler than tube externally, pale red with darker base and margins internally, post-anthesis inflorescence dark, drying 4.2–26.8 cm long, 1.3–4.8 cm wide, coriaceous, reddish dark brown; **spadix** yellowish-white, drying 7.1–18.6 cm long, dark brown to blackish brown; pistillate portion 1.9–8.2 cm long in front, 3–10 mm diam. at middle, 1–6.5 cm long in back; staminate portion 4.6–10.6 cm long, 3–18 mm diam., gradually tapered; sterile staminate portion 7–17 mm long, 2–8 mm diam.; pistils 5–6 mm long, 2.8–3.3 mm diam. (4)5–6-locular; style 2.2–3 mm wide, the margins rounded, yellow-brown in pickled collections; stigma button-shaped, 0.9–1.0 mm diam., dark brown in pickled collections, with (4)5–6 deep pits around the periphery; ovules with axil placentations, 8–10 per locule, 0.6–0.9 mm long, 0.3 mm diam., with a minute constricted cap on the apex, funicle very short.

Anthurium pseudoverrucosum ranges from eastern Ecuador (Morona-Santiago, Napo, Pastaza, Sucumbíos, Tungurahua, Zamora-Chinchi) to northern Peru (Cajamarca, Pasco) at 780–1960 m in *Premontane wet forest* and *Premontane moist forest* life zones.

Specimen seen: ECUADOR. **Zamora-Chinchi:** Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza), and

Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritzá, 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Mark Menke 89529* (MO, QCNE).

Philodendron pulchrum G.M.Barroso, *Arch Jard Bot Rio de Janeiro* 15: 92. 1957. Type: Brazil. Solimoes. From a cultivated plant at Jardim Botânico do Rio de Janeiro under the number living plant number 6423 vouchered under herbarium number RB 95820 (holotyp: RB). **Figures 237 & 238.**

The species is a member of subgenus *Philodendron* and is characterized by its robust stem, erect rosette of leaves with oblong-ovate blades 2–3 times longer than wide, sometimes with small posterior lobes, these usually less than 2 cm long, and by its moderately long-pedunculate, solitary green inflorescences with a purple-red tube.

Epiphyte or hemiepiphytic climber, sometimes terrestrial, occurring at 0.05–29 m high; sap copious, clear with turpentine scent; **roots** sparse, reddish brown; stems to more than 1 m long; **internodes** short 1 cm long, 2–6 cm diam.; **cataphylls** thick, bluntly 1 or 2-ribbed, medium green, matte, persisting intact at upper nodes, turning brown, marcescent. **LEAVES** semi-erect; **petioles** 23–40 cm long, 8–12 mm diam., terete to sharply C-shaped with adaxial groove, broadly and sharply sulcate near base, more bluntly so near apex, slightly thicker than broad, medium green, matte, densely short-dark-lineate, with fine veins;

blades oblong-ovate, 45–60 cm long and 23–30 cm wide, 2–3 times longer than wide, sometimes with small posterior lobes usually less than 2 cm long, moderately coriaceous, dark green and semiglossy above, somewhat paler and matte below; **midrib** flat and slightly paler above, narrowly rounded and moderately paler, yellow-green below; **primary lateral veins** 6–10 pairs, weakly sunken and concolorous above, convex and slightly paler below, especially in lower 1/2 near midrib; **basal veins** 1–2 pairs, not at all coalesced; **minor veins** moderately obscure, etched above, distinct and flat below; lower surface appearing purplish. **INFLORESCENCE** 1 per axil, erect, green; **peduncle** 10–26 cm long, green finely striate; **spathe** green to pale green with whitish margins and red-purple dots on the back, rarely white outside, greenish white inside in the upper part fading to purple-red in tube inside; **spadix** 11–17.5 cm long; staminate portion 8–4.5 cm long; pistillate portion 3.5–8 cm long, the sterile portion averaging 2 cm long; pistils pale green to white with stigma red, stamens yellow. **INFRUCTESCENCE** white at maturity; **berries** white to orange in fruit, sometimes bright yellow-green to green with small brown spots.

Philodendron pulchrum ranges from Venezuela (Amazonas) to Colombia (Amazonas, Caquetá, Meta, Putumayo, Vaupes, Guania), Brazil (Amazonas), Ecuador (Napo, Pastaza, Morona-Santiago, Zamora-Chinchipe) and Peru (Loreto, Pasco, San Martín) at 65–850(1250) m elevation in *Tropical moist forest, Premontane*

moist forest, Tropical wet forest and Premontane rain forest life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, along road from near Paquisha, south to Las Orchídeas, and end of road on Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 38.5 km S, 11.1 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 878 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntia Katan 91399* (K, MO, PMA, QCNE, US); Cordillera del Cóndor region, parroquia Zurmi, along road between Las Orquideas and Zurmi 7.4 km S of Zurmi, 15.9 km S of Guayzimi, 41.9 km S of main Zumbi Paquisha Road, outcrops of pure white sand, 04°09'21"S, 78°38'32"W, 869 m, 19 Apr. 2006, *Thomas B. Croat 97279* (MO, QCNE).

Philodendron ruizii Schott, *Oesterr. Bot. Wochenbl.* 4: 418. 1854. Type: Peru. 1778–88, *H. Ruiz s.n.* (holotype, B). **Figures 239–241.**

This species is a member of subgenus *Philodendron* section *Baursia* and is characterized by its epiphytic habit, the usually short internodes, short petioles about ½ as long as the blades, its long, narrow blades with conspicuous laticifers visible on the lower blade surface and by the cluster of moderately large inflorescences.

Usually epiphytic, sometimes terrestrial or hemiepiphytic; **internodes**

0.3–20 cm long, young plants with internodes to 15 cm, 2.3–4.8 cm diam., medium yellow to pale green becoming gray to medium green, semi glossy, tinged brown, becoming light brown and matte in age, eventually scurfy with many transverse fissures and wrinkles; stems woody; **cataphylls** 10.5–34 cm long, membranaceous, usually sharply to weakly 2-ribbed, sometimes unribbed or 1-ribbed, medium to pale green, reddish tinged at base, (sometimes reddish throughout in juvenile plants), densely short, dark-lineate, persisting only in the upper nodes turning mushy then deciduous sometimes persisting intact and mushy, dark yellow-brown, finally dark brown with large fragments and fine pale fibers. LEAVES with **petioles** subterete, 13–31 cm long, moderately spongy, obtusely flattened and obtusely sulcate adaxially, medium to dark green with short dark green lineations throughout, weakly glossy to matte, densely, dark-dashed with fine lines; **blades** oblong to narrowly elliptic to oblong-ovate-elliptic, 27–69 cm long, 8.5–39 cm wide, (1.8)2.5–3.5(5.2) times longer than wide, (1.15)1.8–2.1 times longer than petiole, obtuse or rounded at the base, widest near the middle, coriaceous to subcoriaceous, dark green and semi-glossy above, moderately paler and weakly glossy to matte below, drying medium greenish-brown; **midrib** brown, convex to flat and slightly paler above in valley, narrowly rounded and slightly darker below, sometimes slightly paler below with short, darker lineations, with a narrow purple ring at apex; **primary lateral veins** 8–9 pairs, usually conspicuous, U-shaped, becoming



Figure 239. *Philodendron ruizii* Schott (Croat et al. 91099). Life plant showing epiphytic habit, petioles and leaf blades, adaxial surface.



Figure 240. *Philodendron ruizii* Schott (Croat *et al.* 91099). Close-up view of leaf blades, adaxial and abaxial surfaces.



Figure 241. *Philodendron ruizii* Schott (Croat et al. 91099). Close-up view of inflorescences with whitish spathe.

less conspicuous at margin, obtusely to weakly sunken, weakly quilted, concolorous above, convex to slightly darker below, except sometimes faintly pale-striate in lower portion above, thick convex, matte, and unmarked below; **minor veins** not conspicuous; **lower surface** with conspicuous laticifers. INFLORESCENCES short-pedunculate, up to 14 per axil, usually 1–8 per axil, clustered; **peduncle** short 3.5–7 cm long, obtusely flattened on one side, white to medium-yellow-green, finely striate, reddish toward apex, clearly demarcated from spathe; **spathe** 8.5–14.5 cm long, 1.5–3 cm diam., thicker toward apex and bluntly acute at apex, greenish white to white on both sides, weakly glossy outside, slightly paler and glossy inside; resin canals clearly visible; **spadix** 8–14.5 cm long, white to yellow-green; pistillate portion of the spadix medium green, pistils sparse and clearly aligned in rows, 3–4 cm in length and 0.5–1.25 cm diam.; staminate spadix greenish white, tends to be slightly longer than pistillate portion of spadix, 2–4.5 cm in length and 0.5–1.25 cm in diameter, persisting outside of tube and protruding up to 1 cm; INFRUCTESCENCE with young **fruits** pale green.

Philodendron ruizii ranges from Colombia (Caquetá, Putumayo), to Ecuador (Azuay, Loja, Morona-Santiago, Napo, Pastaza, Sucumbíos, Tungurahua, Zamora-Chinchipe), Peru (Amazonas, Cajamarca, Cusco, Huánuco, Junín, Loreto, Pasco, San Martín, Ucayali) and Bolivia (Cochabamba, La Paz.) at 100–2370 m. primarily in

Premontane wet forest and *Montane wet forest* life zones, less frequently in *Montane moist forest*, *Lower montane moist forest*, *Tropical moist forest*, *Lower montane wet forest*, *Premontane rainforest*, and *Subalpine wet forest* life zones.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor region, vicinity of Ecu-Corriente copper mine development, Valley of Rio Waiwaime, along road to mine site, 9.5 km from mine headquarters, 6.5 km S of locked gate, 03°35'07"S, 78°26'05"W - 03°25'25"S, 78°26'19"W, 1280–1530 m, 10 Apr. 2006, *Thomas B. Croat 96903* (MO, QCNE); Cuenca del río Tundayme, carretera hacia el destacamento Militar Cóndor Mirador, vegetación secundaria y bosque montano al lado de la Carretera, 03°37'14"S, 78°26'36"W, 1500 m, 12 Dec. 2000, *Marco Cerna & et al. 402* (MO, QCNE); Cordillera del Cóndor, cresta de la cordillera en la frontera Ecuador - Perú, 1 km al sur del destacamento militar Cóndor Mirador, bosque enano sobre roca arenisca, 03°38'32"S, 78°23'36"W, 2000 m, 15 Dec. 2000, *Wagner Ramírez, David A. Neill, Marco Cerna & Grupo Post-Grado MO-QCNE 68* (MO, QCNE); Along road between Los Encuentros and El Sarsa, 4.7 km E of Los Encuentros, 03°46'42"S, 78°38'32"W, 822 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89570* (MO, QAP, QCNE); Along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89494* (MO, QCNE); Along road between Los Encuentros and El Sarsa, 13.7

km S of bridge over Río Zamora at Los Encuentros, 03°48'40"S, 78°36'28"W, 1455 m, 15 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntia Katan 91099* (MO, QCNE, SEL, US); Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi, 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntia Katan 91207* (F, MO, PMA, QCNE, USM); Río Nangaritza, Pachicutza, Bosque muy húmedo Premontano, bosque secundario y remanentes de bosque primario, 04°07'S, 78°37'W, 900 m, 3 Dec. 1990, *Walter A. Palacios & David A. Neill 6451* (MO); Shaime, sendero hacia el Hito, 04°22'S, 78°42'W, 900–1200 m, 27 Oct. 1991, *Jaime L. Jaramillo 14434* (QCA).

Philodendron schmidtiae Croat & C. E. Cerón, *Aroideana* 36E(1): 60–68. 2013. Type: Ecuador. Pastaza: Puyo Baños, vic. Shell, less than 1 km N of town, 01°29'39"S, 78°03'52"W, 1096, 15 Aug. 2002, *T.B. Croat, L.P. Hannon & P.E. Schmidt 86610*, (holotype: MO; isotypes: CM!, G!, IBE!, JBGPI, KRAM!, L!, LE!, M!, MOL!, QCNE!, SEL!, TEX!, VDB!, WU!, Z!). **Figures 242–244.**

The species is a member of subgen. *Philodendron*, sect. *Philodendron*, ser. *Fibrosa* and is recognized by its mostly short internodes, conspicuous sharply 2-ribbed cataphylls which persist as fibers, more or less D-shaped, heavily striate petioles, its

broadly ovate, closely and heavily veined leaf blades as well as by having up to 3 inflorescences per axil with the spathe greenish outside and tinged burgundy purple throughout inside.

Appressed hemi-epiphyte or terrestrial on steep slope; sap dark purple-brown; **stem** to 1.5 m long; **internodes** short or elongated 4–18 cm long on pre-adult plants, 2.5–8 cm diam., medium green to gray-brown, semiglossy to matte, coarsely streaked at upper nodes and finally brown, close transverse-fissured, usually completely covered with cataphylls with a dense reticulum of fibers; **cataphylls** 20–45 cm long, sharply D-shaped to sharply 2-ribbed or sharply flattened and 2-edged, pale to medium green, sometimes tinged pinkish, semiglossy to almost matte, spongy before becoming fibrous, becoming dark brown, persisting semi-intact as thin reddish brown to brown fragments of epidermis overlapping a fine (manila) pale network of fibers. LEAVES with **petioles** (30) 57–100 cm long, 1.5–2 cm diam., D-shaped to convex or obtusely to sharply flattened adaxially, low-ribbed medially, with lateral margins somewhat raised, more acutely so toward apex, finely pale striate-ribbed throughout with close parallel ridges, pale-lineate, matte to weakly glossy, firm to somewhat spongy, medium to dark green, sometimes tinged violet-purple toward apex, darker violet-purple at apex and onto base of midrib, drying dark yellow-brown, matte to weakly glossy; geniculum indistinct; LEAVES 1–1.6 m long **pre-adult blades** subcordate, to 24.1 cm long, 15.5 cm wide,



Figure 242. *Philodendron schmidtiae* Croat & C. E. Cerón (Croat *et al.* 93512). Live plant showing appressed-climbing habit, cataphylls persisting as a network of fibers, petioles, leaf blades, adaxial surface, and inflorescence.



Figure 243. *Philodendron schmidtiae* Croat & C. E. Cerón (Croat *et al.* 93512). Close-up view of leaf blade, adaxial surface.

abruptly acuminate at apex, the sinus to 3 cm deep; **adult blades** ovate-cordate, 32–94 cm long, 27–82 cm wide, 1.1–1.3 times longer than broad, broadest at petiole attachment, 0.6–1.2 times as long as petioles, abruptly acuminate at apex (acumen to 2 cm), prominently lobed at base, thin to coriaceous, dark green and glossy above, moderately paler and semi-glossy below, drying dark brown above, usually slightly paler and yellow-brown

below; **upper surface** sparsely pustular, short pale-lineate, relatively smooth but matte; **lower surface** equally smooth, moderately densely dark-speckled, minutely pustular, short pale-lineate near veins, sometimes sparsely granular; **anterior lobes** 22–68 cm long, broadly convex on margins; **posterior lobes** 11–34 cm long, 11.5–21.5 cm wide, broadly rounded, turned inward and sometimes overlapping; **major veins** sometimes reddish near the base; **midrib**



Figure 244. *Philodendron schmidtiae* Croat & C. E. Cerón (*Croat et al.* 93512). Close-up view of fibrous remnants of cataphylls surrounding inflorescence with purple spathe tube and white spathe blade.

flat to sunken, and slightly to moderately paler to concolorous above, narrowly rounded, weakly dark-striate and slightly darker to concolorous, sometimes faintly purplish, matte below; **primary lateral veins** 8–13 pairs, arising at 50–60° angle near middle, quilted-sunken and slightly paler above, round-raised, matte and concolorous, sometimes purplish below, heavily branching; **minor veins** arising mostly from midrib but also from the primary lateral veins closer to margins, fine, moderately distinct below, undulating on drying; smaller veins on lower surface distinct, somewhat intermittent; **laticifers** conspicuous, long, wavy and sometimes crossing over minor veins; **cross veins** sometimes conspicuous, sometimes absent; **basal veins** 10–14 pairs; 1st, 2nd, 3rd pair free to the base, 4th and 5th and higher order fused 1–6 cm; **posterior ribs** gradually curved, naked to 7 cm; **sinus** hippocrepiform, 7–32 cm deep, to closed and obovate. INFLORESCENCE 1–3 per axil; **peduncle** 7–12 cm long, 0.5–1.7 cm diam. midway, pale green, coarsely whitish streaked especially near apex, drying light brown, longitudinally ridged; **spathe** 18–23 cm long, 2.0–3.0 cm diam., blade pale green or white outside and weakly glossy pre-anthesis, tube densely pale short-lineate throughout and purple or slightly more greenish than the blade outside; inner surface glossy deeply burgundy-purple throughout; **spadix** 13–16 cm long, 1.5–2 cm diam. midway, 1 cm diam. at 1 cm from apex ; sterile male section only slightly thicker than female part 2 cm long, bluntly pointed at apex; pistillate portion pale

greenish white, 5.5–6.8 cm long in front, 4.0–4.6 cm long in back, 1.7–1.8 cm in diam. midway, 1.4 cm diam. at apex, constricted at 7.5 cm above base, 1.5 cm wide at constriction; ; **pistils** 4–6 mm long, 1.4–2.4 mm diam.; styles style slightly wider than the stigmas, sloping down sharply ; stigma 1.1–1.3 mm diam. 0.2–0.4 mm thick, papillae dense but mostly with an open space midway; ovary 5–6-locular, with the outer walls moderately thick, lacking any obvious cellular inclusions; locules 2.8 mm long, 0.6 mm diam; ovules ca. 18–20 per locule, 0.4–0.9 mm long, with axile placentation, extending from the very base to the very apex of the locule; **immature fruits** greenish white.

Philodendron schmidtiae ranges from Ecuador (Sucumbios, Napo, Pastaza, Morona-Santiago, Zamora-Chinchipe) to Peru (Huanuco, Pasco, Puno, San Martín) at 250–2100 m in *Premontane wet forest* and *Premontane rain forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** San Juan Bosco, Cerro Winchinkian, the north-easternmost spur of the Cordillera del Cóndor, along Ecuador-Peru border, 3 km south of Río Santiago, sedimentary rock substrate (siltstone?), transition from lowland Amazonian forest to cloud forest., 03°05'24"S, 77°57'10"W, 1100 m, 18 Aug. 2002, David Neill & et al. 14045 (MO, QCNE). **Zamora-Chinchipe:** Shaime, colecciones a 1km del destacamento militar, margen derecho del río Nangaritza, 04°18'S, 78°40'W, 25 Oct. 1991, Jaime L. Jaramillo

14411 (QCA); Cordillera del Cóndor region, vicinity of Ecu-Corriente copper mine development, valley of Río Waiwaime, along road to mine site, 2.5 km from end of road., 03°34'30"S, 78°37'W, 1280 m, 9 Apr. 2006, *Thomas B. Croat 96833* (MO, QCNE); Vicinity of Ecu-Corrientes copper mine development, valley of Río Waiwaime, along road to mine site at end of road, along trail down from parking spot., 03°34'44"S, 78°26'08"W, 1312 m, 4 Apr. 2006, *Thomas B. Croat 96593* (MO, QCNE); Vicinity of Ecu-Corrientes copper mine development, valley of Río Waiwaime, 4.3 km above gate, 03°34'51"S, 78°25'53"W, 1298 m, 7 Apr. 2006, *Thomas B. Croat 96764* (MO, QCNE); Along road between Los Encuentros and El Sarsa, 10.7 km E from Los Encuentros, beyond bridge over Río Zamora., 03°46'40"S, 78°38'28"W, 1066 m, 14 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98593* (COL, MO, QCNE, UB); Vicinity of Ecuacorrientes copper mine concession, vicinity of mine site, along trail above parking area near end of road., 03°34'54"S, 78°26'06"W, 1330–1360 m, 21 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98977* (MO, QCNE); Along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros., 03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89496* (CHOCO, MO, Q, QCA, QCNE, USM); Along road from Namirez (22.3 km S of Yanzaza) to Nambija, 8.1 km S of San Carlos, 04°03'37"S, 78°47'25"W, 1524 m, 28 May 2003, *Thomas B. Croat & Mark Menke 89627* (K, MO, QCNE, US); Along road between Zumbi on Río Zamora and summit

of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi., 03°56'13"S, 78°37'27"W, 1352 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91179* (MO, QCNE); Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91298* (MO, QCNE); Nangaritza, Cordillera del Cóndor region, parroquia Zurmi, vicinity of Las Orquídeas, Cabañas Yancuam, ca. 3 km S of Las Orquídeas, along stream just S of Cabañas Yancuam, on steep rocky slopes, 04°15'01"S, 78°39'33"W, 1130 m, 19 April 2006, *Thomas B. Croat 97251* (MO, QCNE); Vicinity of Las Orquídeas, near Cabañas Yancuam, along Río Nangaritza, S of camp, old trail along river and on steep slopes of forest W of River, 04°15'06"S, 78°39'29"W, 877 m, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98684* (CUVC, MO, QCNE); *Thomas B. Croat & Geneviève Ferry 98689* (MO, QCNE); Along Río Nangaritza, between Las Orquídeas and Miasi, 04°17'53"S, 78°39'00"W, 872 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98805* (MO, QCNE); *Thomas B. Croat & Geneviève Ferry 98814* (MO, QCNE).

Philodendron verrucosum L. Mathieu ex Schott, Syn. *Aroid.* 85. 1856. Type: Locality unknown (holotype, W?; lost?); Neotype: Schott ic. 2757–2759



Figure 245. *Philodendron verrucosum* L. Mathieu ex Schott (Croat 96967). Live plant showing leaf blades, adaxial surface, and scaly petioles.

(designated by Croat in Ann. Missouri Bot. Gard. 84: 553. 1997).
Figures 245–247.

Philodendron daguense Linden & André,
Ill. Hort. 18: 192, t. 79. 1871. Type:
Colombia. Valle: Río Dagua, *Wallis*
s.n. (holotype, K).

Philodendron pilatonense Engl., *Bot.*
Jahrb. Syst. 37: 129. 1905. Type:

Ecuador. Pichincha: Río Pilatón, May
1899, *Sodi* *s.n.* (holotype, B;
isotypes, G, MO).

Philodendron discolor K. Krause,
Notizbl. Bot. Gard. Berlin-Dahlem 9:
273. 1925. Type: Peru. Junín: Prov.
Jauja, in the valley of Río
Masamerich (Río Pontachuela)
confluent of Río Pangoa, above
Rasthütte Calabaza, 1500–1600 m,



Figure 246. *Philodendron verrucosum* L. Mathieu ex Schott (not collected). Close-up view of leaf blade, adaxial surface, and scaly petiole.

11E30S, 7 May 1913, *Weberbauer 6663* (holotype, B; isotype, F).

The species is a member of subgenus *Philodendron*, section *Philodendron*, subsection *Achyropodium* and is characterized by its densely scaly or setose stems with trichomes green to greenish white, purplish violet to brownish petioles with the surface densely scaly, broadly ovate-cordate blades 1–1.7 times longer than wide, 6–8 pairs of basal veins with the first 1–2 free to the base and the others coalesced into a posterior rib, 3–6 pairs of primary lateral veins with

conspicuous branches in the upper half, and large inflorescences clustered 1–4 per axil with the spathe densely scaly or setose, the blade medium green, whitish or reddish green outside, white to pinkish inside and the tube reddish green, medium green, or dull purple-violet outside, red or pale reddish inside.

Usually hemiepiphytic, rarely terrestrial or epiphytic; **stem** appressed-climbing, densely scaly or setose, trichomes green to greenish white; pre-adult internodes to 20 cm long, 1–2 cm diam.;



Figure 247. *Philodendron verrucosum* L. Mathieu ex Schott (not collected). Close-up view of leaf blade, abaxial surface, and scaly petiole.

adult **internodes** smooth, scurfy, minutely wrinkled, semiglossy to matte, 3–10 cm long, 2–6 cm diam., about as long as broad or longer than broad, gray to brown, **roots** moderately numerous, mostly short, covered at least on one side with fine root hairs, drying dark brown, semiglossy, faintly appressed-scaly; **cataphylls** 10–30 cm long, unribbed, sometimes bluntly 1-ribbed, green or reddish, densely scaly or setose, persisting as a tangled network of fibers. LEAVES erect-spreading; **petioles** 33–65(90) cm long, 3 cm diam. at base, 1.5 cm diam. at apex, subterete, purplish violet to brownish, surface densely scaly, the scales of two distinct types, short, broad, often lacerate scales interspersed with long acicular scales, the latter erect, or spreading then erect; **blades** broadly ovate-cordate, thinly coriaceous, moderately bicolorous, acuminate to narrow acuminate at apex (the acumen mostly inrolled, 1–2.5 mm long), cordate at base, 28–75 cm long, 19–60 cm wide 1–1.7 times longer than wide, 0.7–1.5 times longer than petiole, broadest below point of petiole attachment, upper surface dark green or bronze-green blackish green on new leaves), velvety to matte, drying dark brown, yellow-green or gray-green, lower surface pale green tinged red-purple between secondary veins (weakly glossy and purple-violet on new leaves), matte, drying yellow-brown to reddish brown; anterior lobe 9.6–51 cm long, 10–59 cm wide, 1.9–3 times longer than posterior lobes; posterior lobes 8–21 cm long, 5–28 cm wide, broadly rounded to obtuse; sinus hippocrepiform to obovate or closed; **midrib** flat to sunken, paler than surface above, convex, matte,

darker than surface below; **basal veins** 6–8 pairs, with (0)1,2 free to base, numbers 3–4 coalesced 1–5 cm; posterior rib not at all naked on small blades or naked for 0.5–6 cm; **primary lateral veins** 3–6(8) pairs, departing midrib at a 50–55° angle, sunken, paler than surface above, round-raised to convex, darker than surface below, conspicuously branched near leaf margin; **minor veins** distinct and darker than surface below, arising from both the midrib and primary lateral veins; cross-veins conspicuous, in part raised below. INFLORESCENCES 1–4 per axil; **peduncles** 5–25 cm long, 1–2 cm diam., medium green to purplish, usually 0.66–1.75 times longer than the spathe; **spathe** densely scaly or setose, 10–22 cm long, 4 cm diam.; spathe blade medium green, whitish or reddish green outside, white to pinkish inside; spathe tube reddish green, medium green, or dull purple-violet outside, red or pale reddish (dark green post-anthesis) inside; **spadix** 14.6 cm long; pistillate portion cylindrical to weakly clavate, 1.8–4.6 cm long, 1 cm diam. at apex, 8 mm wide at base; staminate portion 9.4 cm long; fertile staminate portion cream; **pistils** 2.6–3.3 mm long, 1.4–1.7 mm diam.; ovary 4–5-locular, 1.9–2.5 mm long, 1.4–1.7 mm diam., with axile placentation; locules 1.9–2.5 mm long, 0.5–0.7 mm diam.; ovule sac 1.8–2.2 mm long; ovules 20–24(34) per locule, 2-seriate, contained within translucent, gelatinous ovule sac, 0.1–0.2 mm long, as long as or longer than funicle; funicle to 0.2 mm long, adnate to lower part of partition, style 0.5–0.6 mm long, 1.4–1.7 mm diam., similar to style type B; style apex

more or less flat; stigma more or less lobed, 1.4 mm diam., 0.2–0.3 mm high, covering entire style apex; the androecium truncate, prismatic, oblong, margins more or less 4–6-sided, 0.8–0.9 mm long, 2–2.5 mm diam. at apex; thecae oblong, 0.3–0.4 mm wide, more or less parallel to one another; sterile staminate flowers blunt, irregularly 4–5-sided, sometimes clavate or prismatic, 1.6–1.8 mm long, 1.4–1.7 and 1.9–3.4 mm wide. INFRUCTESCENCE with ripe **berries** white.

Philodendron verrucosum ranges from Costa Rica to Peru at 200 to 1500 (mostly above 500) m elevation, mostly in *Premontane rain forest* and *Tropical lower montane rain forest* but also in *Tropical wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor, Cuangos, 20 km east of Gualaquiza, near disputed Peru-Ecuador border, cloud forest, Transect # 4, 03°29'S, 78°14'W, 1480 m, 18 July 1993, *A.H. Gentry 80126* (MO, QCNE); Along road into Cordillera del Condor departing from Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via Numbaime into Cordillera del Condor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntia Katan 91023* (MO, QCNE). **Zamora-Chinchipe:** Vicinity of Ecu-Corrientes copper mine development, valley of Río Waiwaime, along road to mine site at end of road, along trail down from parking spot, 03°34'44"S,

78°26'08"W, 1312 m, 4 Apr. 2006, *Thomas B. Croat 96595* (MO, QCNE); Cordillera del Cóndor, Cresta de la Cordillera, en la frontera Ecuador-Perú, 1 km al sur del destacamento militar Cóndor Mirador, bosque enano sobre roca arenisca, Hito de la Paz 13, 03°37'26"S, 78°23'35"W, 1800 m, 15 Dec. 2002, *M. Cuascota & Grupo Post-Grado MO-QCNE 332* (MO, QCNE); Along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89470* (MO, QAP, QCA, QCNE); Along road between Los Encuentros and El Sarsa, 13.7 km S of bridge over Río Zamora at Los Encuentros, 03°48'40"S, 78°36'28"W, 1455 m, 15 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntia Katan 91114* (CAS, K, MO, QCNE); *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntia Katan 91118* (MO, PMA, QCNE); Along road from Namirez on Río Zamora and Nambija, 17.9 km E of Río Zamora, 04°03'57"S, 78°47'36"W, 1790 m, 19 July 2004, *Thomas B. Croat 91524* (AAU, GB, MO, QCNE); Cordillera de Nanguipa, along road to Cerro Colorado, about 6 km south of Nambija, 20 km southeast of Zamora, cloud forest on slopes, 04°05'51"S, 78°47'43"W, 1930 m, 19 Feb. 2002, *Tom Delinks 1386* (MO, QCNE); Vicinity of Las Orquídeas, near Cabañas Yankuam, along Río Nangaritz, S of camp, old trail along river and on steep slopes of forest W of River, 04°15'06"S, 78°39'29"W, 877 m, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98686* (MO, QCNE).

Rhodospatha Poeppig in Poeppig & Endlicher, *Nov. Gen. Sp.* 3: 91. 1845. Lectotype: *R. latifolia* Poeppig (see Nicolson in *Taxon* 16: 518. 1967). *Anepsias* Schott, *Atimeta* Schott.

Trichosclereids abundant; evergreen, usually climbing herbs, producing flagelliform shoots; LEAVES many, distichously arranged; petiole geniculate apically, sheath long, persistent to marcescent; blade oblong-elliptic, \pm oblique, always entire; primary lateral veins pinnate, numerous, running into distinct marginal vein, secondary and tertiary laterals parallel-pinnate, higher order venation transverse-reticulate. Inflorescence usually solitary; peduncle shorter to longer than petiole; spathe broadly ovate or oblong-ovate, abruptly cuspidate, yellowish white, cream, purplish or pink within, caducous after anthesis; spadix long-stipitate to sessile, cylindric-conic, basal flowers sometimes sterile or female and scattered. Flowers bisexual, perigone absent; stamens 4, free, filaments linear-oblong, flattened, connective slender, thecae ovoid to

ellipsoid, dehiscing by longitudinal slit; pollen extruded in strands, fully zonate or inaperturate, hamburger-shaped or ellipsoid to oblong, medium-sized (mean 47 μ m, range 34–57 μ m), exine densely to sparsely foveolate and nearly psilate to obscurely fossulate or verrucate; gynoeceum compressed obconic to cylindric, ovary 2-locular, ovules usually numerous per locule, rarely few (*R. venosa*), anatropous to hemianatropous, funicle fairly long, placenta axile, rarely subbasal, stylar region well-developed, broader than ovary, prosmatic, truncate to convex apically, stigma elliptic to linear, usually longitudinal; berry cylindric-prismatic, truncate, many-to few-seeded; seeds rounded-reniform, flattened, testa brittle, very hard, smooth or with verrucose crest, embryo rather large, strongly curved, endosperm present but sparse. $2n=28, 56$.

Tropical American; Mexico and Belize, Honduras, Nicaragua, Costa Rica and Panama to Trinidad, the Guianas, Brazil and Bolivia; 30 published species; estimated 75.

Key to *Rhodospatha* species

1. Petioles with the sheath persisting intact and inrolled; plants drying dark reddish-brown *Rhodospatha latifolia* Poepp.
1. Petioles with the sheath deciduous or persisting as fibers; plants not drying dark reddish-brown.

2. Lower blade surface densely reddish granular-punctate; midrib drying granular, with pale raphide cells visible on magnification; plants drying medium greenish brown to grayish brown above, gray-brown to reddish brown below *Rhodspatha katipas* Croat
2. Lower blade surface not reddish granular-punctate; midrib drying smooth; plants drying dark brown above, medium brown below *Rhodspatha neillii* Croat

Rhodspatha katipas Croat, *Rodriguésia* 56(88): 113–114. 2005. Type: Peru. Amazonas: Río Cenepa, vic. of Huampami, ca. 5 km E of Chávez Valdía, ca. 4°30'S, 78°30'W, 200–250 m, 7 Aug. 1978, *E. Ancuash 1308* (holotype: MO; isotypes: K!, US!, USM!). **Figure 248.**

The species is characterized by appressed-climbing habit, moderately elongate internodes, petioles with deciduous and fibrous sheaths, the bluntly sulcate geniculum, more or less elliptic, slightly inequilateral blades with the base rounded to weakly cordate, the midrib drying granular and with pale raphide cells visible on magnification, and moderately inconspicuous cross veins that are oblique and positioned relatively near the margins.

Appressed-climbing hemiepiphytic, to 2–4 m; **internodes** 1–3 × 1–2 cm, drying yellow-brown, smooth to longitudinally folded, sometimes transversely fissured, those in the upper part of the stem hidden by overlapping leaf bases; **cataphylls** deciduous or more commonly persisting as

a network of fibers and patches of epidermis. LEAVES with **petioles** 22–56 cm long (averaging 38 cm long), drying greenish brown, matte, mostly smooth, sometimes weakly folded, but never prominently ridged, sheathed to the geniculum (rarely ending 2–2.5 cm below the geniculum), sheath deciduous and fibrous, geniculum bluntly sulcate, 2.5–3.5 cm long; **blades** narrowly ovate to elliptic, 26–65 × 16.5–34 cm, broadest at middle or slightly below the middle (averaging 35 × 19 cm) 1.5–2.8 times longer than wide, averaging 1.3–1.7 times longer than wide, 0.89–1.9 times longer than petioles, inequilateral, one side 1–2.6 times wider than the other, mostly rounded and abruptly acuminate sometimes acute and acuminate at apex, moderately inequilateral at base, one or both sides often weakly subcordate, one side often merely rounded, drying greenish brown to grayish brown above, gray-brown to reddish brown below; **midrib** deeply sunken above, thicker than broad, sparsely granular and with pale raphide cells below; **primary lateral veins** 22–40 per side, 4–22 mm apart, mostly to 1 cm or more, closest near the base (to 4–5 mm apart), frequently



Figure 248. *Rhodospatha katipas* Croat (Brandhyge & Asanza 32431; AAU 77/82–321). Herbarium specimen showing leaf blade, abaxial surface, and inflorescence.

arising at an acute angle then spreading at 66°–90° angle, straight to weakly curved to the margin, usually smooth, sometimes granular, sometimes pale with dark short lines in Peruvian populations; interprimary veins 1, usually much smaller than the primary veins, along with the minor veins sometimes drying undulate; **minor veins** 2–4 alternating between the primary and interprimary veins, sometimes sparsely granular; **cross veins** mostly oblique and obscure, mostly near the outer margins, sometimes throughout the surface; **lower surface** densely reddish granular-punctate. INFLORESCENCE erect; **peduncle** 6.5–24 cm long, (averaging 14.5 cm long), 0.6–1.7 times longer than the spadix (averaging about as long as the spadix); **spadix** 11–21.2 cm long (averaging 15 cm long), 10–15 mm diam., to 20 cm in early fruit, broadest at about the middle, tapered somewhat to the base, substantially tapered to the apex, narrowly rounded at apex; **pistils** sometimes regularly 4-sided, sometimes irregularly 5–6 sided, 1.4–2 mm diam., the sides mostly straight, frequently convex, sometimes concave, the surface usually with a finely granular waxy layer, sometimes with fine pale globules of wax or the wax irregularly furrowed, usually faintly purplish brown, sometimes brown; **stigmas** mostly oblong-elliptic, black & glossy, 0.6–0.8 × 0.3–0.5 mm, sunken medially; **stamens** included, anthers 1 mm long, 0.5 mm diam. INFRUCTESCENCE to 3 cm diam., pale red; seeds brown, subdiscoid, 1–1.2 × 0.4–0.5 mm, slightly broader in one dimension with a prominent notch on one end, with a

sharp granular ridge around the outer margins.

Rhodospatha katipas ranges from eastern Colombia (Caquetá, Meta, Putumayo) to Ecuador (Morona-Santiago, Napo, Orellana, Sucumbíos, Zamora-Chinchipec) and Peru (Amazonas, Cusco, Madre de Dios, Pasco, San Martín) at 200–1800 m in *Tropical moist forest* and *Premontane wet forest* life zones.

Rhodospatha katipas is most easily confused with *Rhodospatha mukuntachia* Croat from Peru, Ecuador and Bolivia. That species differs in being terrestrial with short internodes hidden by the overlapping leaf bases, petiole sheaths not extending to the geniculum, the sharply sulcate geniculum, and blades with prominent cross veins extending throughout the surface of the leaves. In addition, the lower midrib of *R. mukuntachia* is densely and softly crustiose-puberulent on drying, rather than sparsely granular, as in *R. katipas*. It differs from *Rhodospatha latifolia* Poepp. which can also occur in the Cordillera del Cóndor area by its petioles with the sheath persisting as a network of fibers (rather than being entire in the case of *R. latifolia*). It also dries a lighter grayish brown color rather than the dark reddish-brown color of *R. latifolia*.

Specimens seen: ECUADOR. **Morona-Santiago:** Los Tayos, partial opening in submontane rain forest, 03°07'S, 78°14'W, 700 m, 24 July 1976, *Rodriguez, Louis, G.C.G. Argent & R.B. Burbidge* 315 (IBE, K, MO).

Zamora-Chinchi: Along road between Zamora and Gualaquiza, 29 km N of Yangzatzza, 04°10'S, 78°50'W, 890 m, 19 Oct. 1980, *Thomas B. Croat 50769* (IBE, MO, QCA); Río Nangaritza, centro Shuar Shaim, bosque primario intervenido, 04°18'54"S, 78°40'06"W, 900 m, 31 Jan. 1997, *Veerle Van den Eyden, Pablo Lozano, Ingrid Lauweers & Omar Cabrera 917* (MO); Nangaritza, Parroquia Guayzimi, Campamento militar Miazí, al sur del río Nangaritza, 04°16'S, 78°42'W, 1060–1100 m, 21 Oct. 1991, *Carlos E. Cerón, Marcelo Chango, Valdano Tapur & Gerardo Aymard 17870* (QAP); Along Río Nangaritza, between Las Orquídeas and Miasí, 04°17'53"S, 78°39'00"W, 872 m, 17 Sep. 2017, *Thomas B. Croat & Geneviève Ferry 98801* (MO, UB); Shaime, en la unión de los Ríos Nangaritza y Numpatakaime, 04°20'S, 78°40'W, 1000 m, 7 Dec. 1990, *Walter A. Palacios 6611* (MO, QCNE), Shaime, frente a destacamento militar, margen derecha del Río Nangaritza, 04°18'S, 78°43'W, 930 m, 27 Oct. 1991, *Walter A. Palacios, I. Vargas & Efraín Freire 8711* (MO, QCNE).

***Rhodospatha latifolia* Poepp., Nov. Gen. Sp. Pl., 3: 91. 1845.** Type: Peru. Huanuco: Cuchero, Monson, *E.F. Poeppig* (W, destroyed). Plate 300 in Poepp., Nov. Gen. Sp. Pl., 3. 1845 (lectotype, designated here). **Figures 249–251.**

The species is characterized by its petiole sheathed almost to apex with sheath more or less intact and inrolled, dark reddish-brown-drying ovate-elliptic blades rounded at the base, and its short-

pedunculate inflorescences with a deciduous spathe and a pinkish spadix.

Hemiepiphytic or epiphytic; **internodes** 1–7 cm long, 1–2.7 cm diam., dark green and semiglossy, soon gray, smooth but eventually closely and weakly transversed-fissured lower down. LEAVES with **petioles** 30–67 cm long, weakly glossy, dark green, sheathed almost to apex with sheath more or less intact and inrolled; geniculum and free portion broadly and acutely sulcate; **blades** ovate-elliptic, 25–51 cm long, 10–26 cm wide, 1.6–5.1 times longer than wide, 0.7–1.2 times as long as petiole, rounded at the base, obtuse at apex, subcoriaceous, weakly glossy, dark green above, semiglossy and moderately paler below, drying dark reddish brown; **midrib** deeply sunken and weakly paler above, narrowly raised and moderately paler below; **primary lateral veins** weakly quilted-sunken and concolorous above, narrowly convex and concolorous below. INFLORESCENCE with **peduncle** 11–15 cm long, 7 mm diam., medium green, semiglossy; **spathe** 14–15 cm long, pale green and semiglossy outside, whitish and glossy inside, flattening to 11.5 cm wide, deciduous; **spadix** 9.7–19 cm long, 1.0 cm diam. at base, 1.2–1.4 cm diam. midway, 1.0 cm diam. tapering towards the tip, pink or pale pinkish orange, matte, stipitate 5–8 mm; **stigmas** dark purple.

Rhodospatha latifolia ranges from southern Colombia (Caquetá, Putamayo) to eastern Ecuador, Peru, Brazil (Acre) and Bolivia at 200–1900 m in *Tropical moist*,



Figure 249. *Rhodospatha latifolia* Poepp. (Croat 96951). Live plant showing stem rooting at the nodes and bases of petioles.



Figure 250. *Rhodospatha latifolia* Poepp. (Croat 96951). Close-up view of leaf blade, adaxial surface, and inflorescence with deciduous spathe and pink spadix.



Figure 251. *Rhodospatha latifolia* Poepp. (Croat 96951). Close-up view of leaf blade, abaxial surface, and inflorescence with deciduous spathe and pink spadix.

Premontane wet, Tropical wet and Premontane wet forest life zones. It is also found in parts of Venezuela, Guyana and French Guiana.

Rhodospatha latifolia differs from *Rhodospatha katipas* Croat which also occurs in the Cordillera del Cóndor area by its petioles with an entire sheath (rather than persisting as a network of fibers in the case of *R. katipas*). It also dries a darker reddish-brown color rather than being a lighter grayish brown in the case of *R. katipas*.

Specimens seen: ECUADOR. **Morona-Santiago:** Campamento La Playa, road construction camp, 23 km SE of San Juan Bosco, 03°16'00"S, 78°26'00"W, 1050 m, 28 Jan. 1981, *A.H. Gentry, Carmen Bonifaz B. & Jorge Llor C. 30959* (F, MO); Cordillera del Cóndor, densely forested ridge on sandstone substrate, south of Río Warints, east of main ridge of Cordillera del Cóndor, 03°13'54"S, 78°15'10"W, 1190 m, 13 Dec. 2002, *David A. Neill & et al. 14128* (QCNE); Cordillera de Huaracayo, east of Cordillera del Cóndor and Río Coangos, forest on sandstone ridge, east of Shuar village of Tinkimints, 03°15'44"S, 78°12'01"W, 1380 m, 25 Mar. 2001, *David A. Neill & José M. Manzanares 13200* (MO, QCNE); Along road into Cordillera del Condor departing from Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via Numbaima into Cordillera del Condor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 91026* (MO, QCNE). **Zamora-Chinchi:**

Río Nangaritza valley, forest near Shaime, Transect # 1, 04°18'S, 78°40'W, 930 m, 31 July 1993, *A.H. Gentry 80807* (MO, QCNE); Río Nangaritza, upper valley, 3 km east of Miazi, near disputed Peru-Ecuador border, 04°18'S, 78°40'W, 1000 m, 11 Dec. 1990, *David A. Neill & Walter A. Palacios 9680* (MO, QCNE); Campamento Miazi, along Río Nangaritza, along trail towards El Hito, 04°16'S, 78°39'W, 900–1100 m, 20 Feb. 1994, *H. van der Werff, Bruce Gray, Efraín Freire & Milton Tirado 13342* (MO, QCNE); Parroquia Zurmi, Comunidad Centro Shaime (along Río Nangaritza), forest 2–4 km NW of Centro Shaime, forest on limestone outcrop, 04°18'06"S, 78°41'02"W, 1000 m, 15 Dec. 2001, *John L. Clark 9536* (MO, QCA, QCNE, US); Cordillera del Cóndor, vertiente occidental de la cordillera del Cóndor, arriba del valle del Río Quimi, 03°30'26"S, 78°25'15"W, 1300 m, 11 Dec. 2000, *Jorge Caranqui & et al. 181* (MO, QCNE); Cordillera del Cóndor, valle del río Quimi, bosque alterado y potrero, en suelo aluvial del valle, 03°31'33"S, 78°26'52"W, 920 m, 9 Dec. 2000, *Jorge Caranqui & et al. 244* (MO, QCNE); Along road between Los Encuentros and El Sarsa, 4.7 km E of Los Encuentros, 03°46'42"S, 78°38'32"W, 822 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89571* (MO, QCNE); Along road from Quime Ferry Crossing on road leading to summit of Cordillera del Condor, 23.2 km above the crossing at Río Zamora on road leading to summit, 03°38'00"S, 78°26'03"W, 1552 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 91041* (MO, QCNE); Along road to Cordillera del Condor

beyond Paquisha, 27.3 km E of Zumbi, 8.6 km E of Río Nangaritza Bridge, 03°56'17"S, 78°37'45"W, 1259 m, 16 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan* 91227 (MO, QCNE); Cordillera del Cóndor region, vicinity of Ecuacoriente copper mine development, Río Waiwaime drainage, along road to mine site, 7.2 km S of mine headquarters, 4.2 km S of locked gate, 03°34'41"S, 78°25'38"W, 1174 m, 9 Apr. 2006, *Thomas B. Croat* 96800 (MO, QCNE, S, US); Cordillera del Cóndor region, vicinity of Ecuacoriente copper mine development, valley of Río Waiwaime, along road to mine site, 2.5 km from end of road, 03°34'30"S, 78°37'W, 1280 m, 9 Apr. 2006, *Thomas B. Croat* 96827 (MO, QCNE); Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from the military outpost to Cóndor Mirador military outpost, 7.1 km S of junction in road to Tandaime, San Marcos and Ecuacoriente copper mine headquarters, 03°36'42"S, 78°28'02"W, 1128 m, 12 Apr. 2006, *Thomas B. Croat* 96951 (MO, QCNE); Cordillera del Cóndor region, vicinity of Río Zamora and village of Quime, along road from military post to Condor Mirador military outpost, ca. 3.5 km S of junction in road to Tandaime, San Marcos and Ecuacoriente copper mine headquarters, 03°36'21"S, 78°28'17"W, 1135 m, 12 Apr. 2006, *Thomas B. Croat* 96991 (MO, QCNE); Valley of Río Waiwaime, near mouth at Río Quime, 03°33'40"S, 78°27'47"W, 1000 m, 22 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 96026 (MO, QCNE); Río Nangaritza, centro Shuar shaim., 04°18'54"S, 78°40'06"W, 900 m, 31

Jan. 1997, *Veerle Van den Eyden, Pablo Lozano, Ingrid Lauweers & Omar Cabrera* 923 (MO); Shaimi, SE de Campamento Militar, margen derecha del Río Nangaritza, bosque primario sobre pendientes 45%, rocas calizas aflorando, 04°18'S, 78°43'W, 930 m, 27 Oct. 1991, *Walter A. Palacios, I. Vargas & Efraín Freire* 8771 (MEXU, MO, QCNE); Miazí, margen derecha Río Nangaritza, bosque primario, 04°16'S, 78°42'W, 930 m, 26 Oct. 1991, *Walter A. Palacios, I. Vargas & M. Ruiz* 8594 (CM, MO, QCNE); *Walter A. Palacios, I. Vargas & M. Ruiz* 8637 (MO, QCNE).

***Rhodospatha neillii* Croat, sp. nov.** Type: ECUADOR. Zamora-Chinchipec: Cordillera del Cóndor region, Tandaime, Valle del Quime, along right bank of Río Quime, 4.2 km from bridge over Río Waiwaime near headquarters of Ecuacoriente copper mine, 03°31'55"S, 78°27'10"W, 1200 m, 13 Apr. 2006, *T.B. Croat* 96995 (holotype, MO-5931381–83; isotypes, COL!, ECUAMZ!, K!, S!, US!). **Figures 252–255.**

The species is characterized by its epiphytic habit, frequently transversely fissured stems, mostly deciduous petioles sheaths, its oblong-elliptic to ovate-elliptic blades which are weakly glossy or matte-subvelvety above as well as by its creamy to pink spathe and pink to pale reddish violet, stipitate spadix.

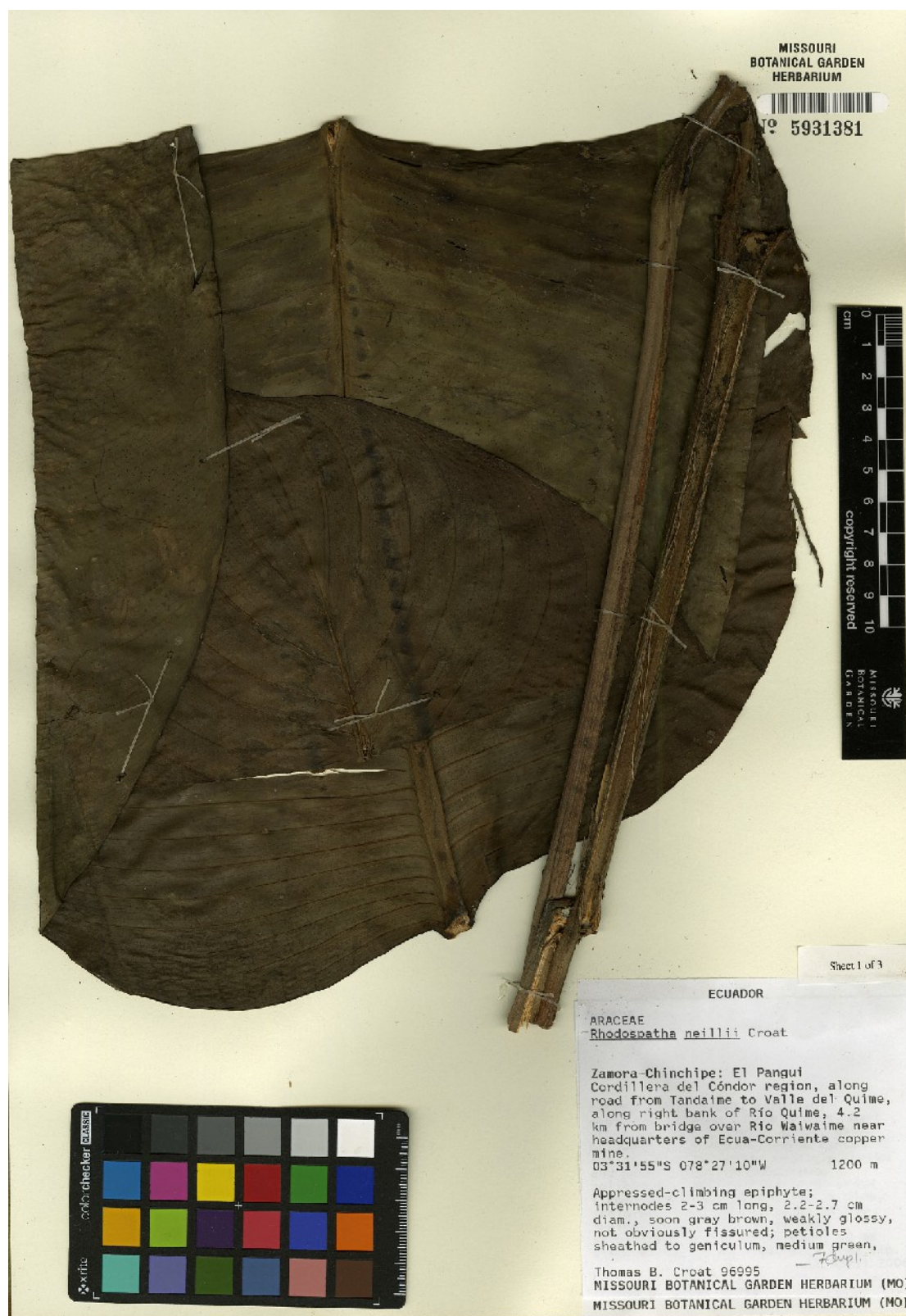


Figure 252. *Rhodospatha neillii* Croat (Croat 96995; MO-5931381, sheet 1). Herbarium specimen showing petiole and leaf blade, adaxial and abaxial surfaces.



Figure 253. *Rhodospatha neillii* Croat (Croat 96995; MO-5931382, sheet 2). Herbarium specimen showing stem, petiole bases and inflorescence.



Figure 254. *Rhodospatha neillii* Croat (Croat 73425). Live plant showing appressed-climbing habit, stem, petioles, leaf blades, adaxial surface, and inflorescence.



Figure 255. *Rhodospatha neillii* Croat (Croat 73425). Close-up view of inflorescence showing wilting spathe and pink spadix.

Appressed hemiepiphytic climber or vine; **internodes** 1–7 cm long, 1.5–4 cm diam, dark green to brown, matte to weakly glossy, transversely fissured or not fissured, sometimes scurfy. **LEAVES** with **petioles** medium to dark green and weakly glossy, matte, the margin initially darker green, finally pale toward margins but margins soon becoming fibrous and deciduous, sheath deciduous intact or becoming dark brown-fibrous and thin, incurled; geniculum 3 cm long, sharply and narrowly sulcate, margins undulate drying blackened and shrunk; **blades** oblong-elliptic to ovate-

elliptic, 28–51 cm long, 15.5–31.5 cm wide (averaging 37.7 x 22.9 cm), 1.2–2 times longer than wide, 0.8–1.5 times longer than petiole moderately coriaceous to subcoriaceous, medium to dark green and weakly glossy, matte-subvelvety above, semiglossy matte and moderately paler below; drying dark brown above, medium brown below; **midrib** slightly to deeply sunken and marginally discolored to not discolored above, narrowly rounded and paler, obtusely sulcate adaxially, narrowly raised above, thickly convex to narrowly raised and matte below; **primary lateral**

veins 24–28 pairs, weakly to obtusely sunken and quilted, concolorous to pale above, narrowly rounded, convex and slightly paler below; interprimary veins visible and darker, 1–3 pair per pair of primary lateral veins; **minor veins** moderately visible and darker than surface; **INFLORESCENCE** solitary, faintly purplish brown and erect; **peduncle** 18–27 cm long; **spathe** 14.5–21.5 cm long, fallen or unopened and creamy to pink color, semiglossy outside, pale yellow-green and glossy inside, moderately coriaceous; **spadix** 12–22 cm, 1.5–2 cm diam, pink to pale reddish violet or green, near anthesis becoming faintly lavender, matte; stipitate 8 mm, 11 mm at base, 12 mm diameter; **pistils** matte.

Rhodospatha neillii ranges from Colombia (Amazonas, Caquetá) to Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Sucumbíos, Zamora-Chinchipe) and Peru (Loreto, San Martín) at 100–400 m in *Tropical moist forest*, *Tropical wet forest* and *Lower montane moist forest* life zones.

Rhodospatha neillii could be confused with *Rhodospatha katipas* Croat which occur in the same area, but the latter differs by its lower blade surface densely reddish granular-punctate on magnification and its midrib drying granular and with pale raphide cells visible on magnification. It also resembles *Rhodospatha latifolia* Poepp. but that species has the petiole sheathed almost to the apex and with the sheath persisting intact and inrolled (rather than being mostly deciduous for *R. neillii*).

The species is named in honor American botanist Dr. David Neill, Curator of the Herbario ECUAMZ at the Universidad Estatal Amazónica in Puyo, Ecuador. David has been an intrepid explorer in Ecuador since 1985. He received his Ph.D. from Washington University in 1984 working with *Erythrina* (Leguminosae) and continues his interest in legumes but his interests are broad, especially with inventories of trees and the ecology of forests in Ecuador. Along with his wife Mercedes Azanza, David has been a phenomenal force in education of Ecuadorian students including many indigenous plant collectors. David Neill collected many new species during the more than 34 years he has spent in Ecuador.

Paratypes: COLOMBIA. **Amazonas:** Mpo. de Leticia, Parque Nacional Natural Amacayacu, Centro Administrativo Mata-mata (Inderena), 03°47'S, 70°15'W, 110–120 m, 15 Aug. 1991, *A. Rudas et al.* 2896 (COL, MO, US). **Caquetá:** Florencia, Vereda Villaraz, Quebrada El Caraño, Km 20 on road to Neiva, Finca La Estrella, 01°43'34"N, 75°40'06"W, 900 m, 26 Aug. 2007, *Thomas B. Croat & Edwin Trujillo* 98162 (MO, QCNE). ECUADOR. **Morona-Santiago:** *A. Warush s.n.* (NY); Palora - Llushín, departing main Palora-San Vicente de Tarqui Road, 8.7 km NW of Palora, 3.4 km S of Río Amundalo, 2.1 km E on road to Llushín, 01°41'46"S, 78°01'21"W, 922 m, 25 Aug. 2002, *Thomas B. Croat & Lynn Hannon* 86957 (MO, QCNE). Gualaquiza, Río Bomboiza, Gualaquiza - Nueva Targui, Along Río

Bomboiza at bridge, 03°26'S, 78°36'W, 1300 m, 6 Mar. 1992, *Thomas B. Croat 72751* (MO, QCNE); *Thomas B. Croat 72755* (MO, QCNE). Limón Indanza, Cordillera del Condor, cuenca del Río Coangos, Comunidad Shuar de Kuankus. sendero que conduce hacia la comunidad Yunkumas, Informante: José Saant, 03°02'36"S, 78°13'03"W, 850 m, 14 June 2005, *Carlos Morales & M. Tupiza 1209* (QCNE, MO). **Napo:** vic. Lago Agrio, 350 m, 15 Dec 1999, *Thomas B. Croat 83593* (MO, QCNE). Cantón Orellana, Sector Huashito, 20 km al norte de Coca, propiedad de palmoriente, 00°20'S, 77°05'W, 250 m, 3 Nov. 1989–21 Nov. 1989, *Edgar Gudiño 125* (MO); Coca - Río Tigüino, 6.3 km S of Petroecuador Camp "Amazonas", 00°52'S, 76°52'W, 350 m, 1 Mar. 1992, *Thomas B. Croat 72582* (AAU, B, CAS, F, K, MEXU, MO, NY, QCNE, SEL, US); Estación experimental de INIAP, San Carlos, 6 km SE of Los Sachas, 250 m, 19 Apr. 1985, *Marc A. Baker & Nichole Trushell 6077* (MO); Tena - Puyo, 61.5 km N of Puyo, 500 m, 22 Dec. 1979, *Thomas B. Croat 49655* (MO, QCNE); Environs of Limoncocha, 240 m, 16 June 1978, *M.T. Madison et al. 5345* (SEL); Limoncocha, *M. T. Madison et al. 5431* (SEL); 20 km W of Coca, al Sur del Río Napo, por Via de los Zorros, 00°35'S, 77°03'W, 350 m, 22 Apr. 1985–23 Apr. 1985, *David Neill et al. 6394* (MO); Jatun Sacha: Reserva, ca. 8 km ESE of Puerto Mishualli, Transect 3, Primary forest along the Mishualli- Coca road, 01°04'S, 77°37'W, 450 m, 8 July 1986, *James S. Miller & W. Wilbert & S.F.S. Med. Bot. Class 2474* (MO); *James S. Miller & W. Wilbert & S.F.S. Med.*

Bot. Class 125 (MO); Reserva Biológica Jatun Sacha, Río Napo, 8.0 km abajo de Misahuallí, 01°04'S, 77°36'W, 450 m, 17 Jan. 1987–6 Feb. 1987, *Carlos Cerón 814* (MO); Jatun Sacha Biological Station, 8 km E of Misahualli, 01°04'S, 77°36'W, 450 m, 30 Dec. 1987, *A.H. Gentry, D. Neill & P. Keating 60177* (MO, QCNE); Yasuni, Añangu, Parque Nacional Yasuní, 00°31'S, 76°23'W, 260–350 m, 30 May 1982–21 June 1982, *B. Øllgaard et al. 39014* (AAU). **Orellana:** Parque Nacional Sumaco Napo-Galeras, Zona de amortiguamiento fuera del parque, Reserva Comuna Coca-Sardinas a 12 km al oeste del Río Coca, Bloque 18, Línea sísmica 02, Helipuerto 2 E, Compañía AMOCO, Bosque muy húmedo Tropical, bosque primario, 00°10'S, 77°08'W, 400 m, 28 Sep. 1996, *Homero Vargas L. & Alberto Angel Alvarado 1000* (MO, QCNE); Yuca - Taracoa de la Esperanza, along oil exploration road to Yuca and Taracoa de la Esperanza, beyond Taracoa, 22.5 km E of junction with main Coca - Río Tigüino road S of Coca (departing main N-6 road 14.2 km S of bridge over Río Napo), 00°34'S, 76°42'W, 350 m, 29 Feb. 1992, *Thomas B. Croat 72549* (M, QCNEO); Coca - Yuca, Coca (Pto. Francisco de Orellana) - E to Yuca, 7.5 km E of junction with Coca-Río Tigüino Road. (departing main road 14.2 km S of bridge over Río Napo (center), 00°34'S, 76°50'W, 355 m, 29 Feb. 1992, *Thomas B. Croat 72536* (MO, QCNE); *Thomas B. Croat 72543* (MO, QCNE); Yasuní National Park, Añangu, on south bank of Río Napo, mature forest on floodplain, flat terrain, trail from village to Laguna Añangu Cocha, 00°31'S, 76°23'W,

220 m, 13 Nov 1991, *David Neill & Wilson Rojas 9966* (MO, QCNE). Tena, Estacion Biologica Jatun Sacha, along S bank of Río Napo, 8 km E of Puerto Misahualii, 01°04'S, 77°36'W, 450 m, 1 Apr. 1992, *Thomas B. Croat 73388* (HUA, MO, PMA); Estacion Biologica Jatun Sacha; along S bank of Río Napo, 8 km E of Puerto Misahualii, 01°04'S, 77°36'W, 450 m, 2 Apr. 1992, *Thomas B. Croat 73396* (CUVC, F, HUA, MO, QCNE); Estación Biológica Jatun Sacha, along S bank of Río Napo, 8 km E of Puerto Misahualii, 01°04'S, 77°36'W, 450 m, 2 Apr. 1992, *Thomas B. Croat 73425* (MO, QCNE); Estacion Cientifica Yasuní, Río Tiputini, al noroeste de la confluencia con el Río Tivacuno, este de la carretera Repsol-YPF, Km 7 desvío hacia el pozo Tivacuno, este de la Parcela de 50 ha. Bajío, 00°38'S, 76°30'W, 200–300 m, 11 Apr. 2004, *Verónica Sandoza & asistente huaorani 48* (MO, QCA); Vicinity of San José, Payamino Estación Científica, Timburi Cocha, along banks of Río Paymino, 00°28'29"S, 77°17'06"W, 321 m, 9 Feb. 2015, *Thomas B. Croat, Geneviève Ferry & David Scherberich 106085* (MO, QCNE). **Pastaza:** Carretera de PETRO-CANADA en construcción. Vía Auca, 115 km al sur de Coca, 5 km al sur del Río Tigüino, 01°15'S, 76°55'W, 320 m, 1 Mar. 1989–6 Mar. 1989, *Vlastimil Zak 4136* (MO, QCNE); Tarqui ca. 5 km S of Puyo, 850 m, 8 Mar. 1980, *G. Harling & L. Andersson 17083* (MO); Villano, Cantón Puyo, Comunidad Santa Cecilia, 01°30'S, 77°27'W, 380 m, 1 May 1992, *Walter Palacios 10062* (MO, QCNE). Pozo petrolero "Ramirez", 20 km al sur de la población de Curaray, bosque primario;

árboles cortados por las obras petroleras andoyas, 01°32'S, 76°51'W, 300 m, 21 Feb. 1990–28 Feb. 1990, *Vlastimil Zak & Severo Espinoza 4887* (MO). **Sucumbíos:** Sacha Lodge, 3 km NW of the village Añangu, near the Napo river, 00°30'S, 76°26'W, 200 m, 11 June 1995, *John L. Clark, Liz Demattia & Tim Miller 1149* (QCNE, MO); Above road from Lumbaquí to Lago Agrio, 7.3 km E of jct. on road to La Bonita, near Río Aguarico in Lumbaquí, 62.3 km S of Rosa Florida, 80.7 km S of La Bonita, 00°00'44"N, 77°16'14"W, 437 m, 20 Aug. 2004, *Thomas B. Croat & G. Ferry 93645* (MO, QCNE). **Zamora-Chinchipe:** Cordillera del Cóndor, Parroquia Tundayme, Valle del Río Quimi, Bosque muy húmedo premontano, bosque maduro, intervenido por actividad ganadera y minera, 820 m, 8 Oct. 2006, *Carlos Morales & Diego Reyes 1984* (MO, QCNE); 31 km N of Yangzatta, 03°55'S, 78°46'W, 1000 m, 19 Oct. 1981, *Thomas B. Croat 50780* (MO, QCA); El Pangui - Monterrey, 5.8 km E of Monterrey, 11.9 km W of main Gualaquiza-Zamora Road, 03°32'26"S, 78°37'16"W, 950 m, 25 May 2003, *Thomas B. Croat & Marck Menke 89388* (MO, QCNE); Cordillera del Condor, Río Nangaritzza, camino de Shaime a Shamatak, 800 m, 3 Dec. 1996, *Omar Cabrera & Ingrid Lauwers 860* (MO); Along road to Cordillera del Condor beyond Paquisha, 27.3 km E of Zumbi, 8.6 km E of Río Nangaritzza Bridge, 03°56'17"S, 78°37'45"W, 1259 m, 16 July 2004, *Thomas B. Croat, Lynn Hannon, Greg Walbert & Tuntiak Katan Jua 91218* (MO, QCNE); Paquisha south - Las Orchídeas and end of road on Río Nangaritzza via Guayzimi,

beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 16 July 2004, *Thomas B. Croat, Lynn Hannon, Greg Walbert & Tuntiak Katan Jua 91251* (MO, QCNE); *Thomas B. Croat, Lynn Hannon, Greg Walbert & Tuntiak Katan Jua 91301* (HUA, MO, PMA, QCNE, US); Along road from near Paquisha, south to Las Orchídeas, and end of road at Río Nangaritzza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 47.0 km S of Intersection near Paquisha, 2.6 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 875 m, 17 July 2004, *Thomas B. Croat, Lynn Hannon, Greg Walbert & Tuntiak Katan Jua 91344* (AAU, GB, MO); Vicinity of Las Orchídeas, in forest across from Cabañas Yankuam, 04°15'05"S, 78°39'29"W, 870–890 m, 15 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98625* (MO, QCNE). Nangaritzza, Parroquia Guayzimi, Campamento Militar Miazzi al sur del Río Nangaritzza, 04°16'S, 78°42'W, 1060–1100 m, 21 Oct. 1991, *Carlos E. Cerón, Marcel Chango, Valdano Tapur & Gerardo Aymard 16870* (MO); Parroquia Zurmi, Comunidad Centro Shaime (along Río Nangaritzza). forest 2–4 km NW of Centro Shaime, 4°04'S, 78°54'W, 1000 m, 13 Dec. 2001, *J.L. Clark, K. Elmers, A. Lucia, M. Terry & M. Sharupe 6442* (MO, QCNE, QCA, US); *J.L. Clark, M. Terry & B. Kukush 6530* (MO, QCNE, QCA, US); Lower slopes of Cordillera del Cóndor, above Pachicutza, Río Nangaritzza valley, 04°07'S, 78°38'W, 1000–1200 m, 6 Dec. 1990, *David Neill & W. Palacios 9558* (MO, QCNE); Miazzi, flood plain forest along Río Nangaritzza, Transect 1, 04°18'S, 78°40'W,

850 m, 28 July 1993, *A.H. Gentry 80519* (MO, QCNE); Cordillera del Cóndor region, vicinity of Las Orchídeas forest near Cabañas Yancuam, ca. 3 km S of Las Orchídeas, slopes W of Río Nangaritzza, 04°15'01"S, 78°39'33"W, 1130–1140 m, 16 Apr. 2006, *Thomas B. Croat 97096* (MO, PMA, QCNE, SEL); Along Río Nangaritzza, between Las Orchídeas and Miasi, 04°17'53"S, 78°39'00"W, 872 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98802* (MO, QCNE). Yantzaza, Río Zamora, Zamora - Gualaquiza, 29.2 km N of bridge over Río Zamora in Zamora, 03°54'S, 78°48'W, 1200 m, 5 Mar. 1992, *Thomas B. Croat 72707* (MO, QCNE); Zamora, 44 km E of Loja on road to Zamora, 1550 m, 15 Dec. 1972, *M.T. Madison 921* (GH). El Pangui, Zamora - Gualaquiza, on side road departing main road at Chuchumbletza (on Río Chuchumbletza), 3.8 km S of village of Chuchumbetza, steep rocky area below high cliffs, towering perhaps 100 m above collecting area, 03°33'S, 78°30'W, 750 m, 4 Mar. 1992, *Thomas B. Croat 72741* (MO, QCNE); Along graveled road roughly paralleling the Chuchumbleza-Yantzaza Highway, E along Río Chuchumbleza, then SW to Chicaña and back to main highway (entering road from main highway 4.8 km S of Río Chuchumbleza and re-entering main highway 9.6 km N of plaza in Yantzaza) via Guisme, Miasi, Uwents, Kunki, El Oso, and Chicaña, vicinity of Uwents, 21.5 km N of Chicaña, 6.2 km N of Kunki and Río Uens del Kunki bridge, 03°36'02"S, 78°41'16"W, 1500 m, 14 Apr. 2006, *Thomas B. Croat 97070* (MO, QCNE); Cordillera del Cóndor

region, vicinity of Río Zamora and village of Quime, along road from the military outpost to Condor Mirador military outpost, 7.1 km S of junction in road to Tandaime, San Marcos and Ecuacoriente copper mine headquarters, 03°36'42"S, 78°28'02"W, 1128 m, 12 Apr. 2006, *Thomas B. Croat 96959* (MO, QCNE); Río Zamora, Zamora - Gualaquiza, 70.9 km N of bridge over river in Zamora, Los Encuentros - El Pangui, 03°42'S, 78°25'W, 935 m, 4 Mar. 1992, *Thomas B. Croat 72711* (MO, QCNE). PERU. **Loreto.** Alto Amazonas, Andoas, Río Pastaza near Ecuador border, mature forest, 02°48'S, 76°28'W, 210 m, 15 Aug. 1980, *A.H. Gentry, R. Vásquez & N. Jaramillo 29721* (MO). Maynas, Sargento Lores, Esperanza (Río Tahuayo), bosque primario, 04°10'S, 73°15'W, 120 m, 12 Dec. 1989, *R. Vásquez & N. Jaramillo 13199* (MO); Dto. Iquitos, Puerto Almendras (Río Nanay), bosque primario, 03°48'S, 73°25'W, 122 m, 29 Mar. 1990, *R. Vásquez & N. Jaramillo 13667* (MO). **San Martín.** Mariscal Cáceres, Dto. Tocache Nuevo, Quebrada Mantención, cerca a la Chacra del Sr. Hernán Ortiz, epífita, en bosque alto, 700 m, 21 June 1982, *José Schunke-V. 13748* (IBE, MO).

Cultivated Plants: Selby Gardens. Ecuador: Collected Sep. 25–27, 1999. Collected by Besse, Halton and Baker *Selby 82–559*. (SEL).

Spathiphyllum Schott, in Schott & Endlicher, *Melet. Bot.* 22. 1832. TYPE: *S. lanceifolium* (Jacquin) Schott in H.W. Schott & S. L. Endlicher

Melet. Bot. 22. 1832. (“*lancaefolium*”; *Dracontium lanceaefolium* Jacquin *Collectanea* 4: 118 1791. *Massowia lanceifolia* (Jacq.) K. Koch, *Bonplandia* 4: 11. 1856.

Hydnostachyon Liebm., Type: *Hydnostachyon cochlearispathum* Liebm. (lecto, designated by Nicolson, 1967). [= *Spathiphyllum cochlearispathum* (Liebm.) Engl.]. *Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn* 1849: 23 (1849);

Massowia K. Koch, Type: *Massowia cannifolia* (Dryand. ex Sims) K. Koch (*Pothos cannifolius* Dryand. ex Sims). [= *Spathiphyllum cannifolium* (Dryand. ex Sims) Schott]. *Bot. Zeitung* (Berlin) 10: 277 (1852).

Spathiphyllopsis J. E. Teysmann & S. Binnendijk, Type: *Spathiphyllopsis minabassae* Teysm. & Binn. [= *Spathiphyllum commutatum* Schott]. *Natuurk. Tijdschr. Ned.-Indië* 25: 400 (1863);

Amomophyllum Engler in *Gard. Chron.*, Type: *Amomophyllum patinii* (B.S. Williams ex Mast.) Engl. (*Anthurium patinii* B.S. Williams ex Mast.) (lecto, designated by Nicolson, 1967) [= *Spathiphyllum patinii* (B.S. Williams ex Mast.) N.E.Br.] ser. 2, 7: 139 (1877, non Watelet 1866) [*Massovia* Benth. & J. D. Hooker, *Gen. Pl.* 3: 998 (1883), *orth. var.*]

Terrestrial herb; rhizome creeping, often just below the surface of the ground, the plant appearing to be acaulescent; internodes short; roots emerging through the petiole bases; leaves several, mostly erect to erect-spreading; petioles often fully sheathed, with apical geniculum; blades oblong to elliptic to narrowly elliptic, acuminate at apex; midrib sunken above, narrowly raised below; primary lateral veins moderately numerous, extending to the margins; interprimary veins and minor veins nearly always present, usually alternating with descending order of size; higher order veins transverse-reticulate. Inflorescence solitary; peduncles as long or longer than leaves; spathe oblong-elliptic to elliptic or obovate, acuminate at apex, acute to obtuse or rounded and sometimes conspicuously decurrent at base, midrib and primary lateral veins, white or green but turning green in fruit; spadix cylindric, erect, shorter than spathe, stipitate, rarely sessile, stipe often adnate in part to the spathe; flowers bisexual, perigonate; tepals 4–6, arching over pistil and rarely fused into a ring;

stamens 4–6, free, filaments short, flattened; connective slender; thecae oblong-ellipsoid to ovoid, dehiscent by longitudinal slit; pollen inaperturate, inaperturate, ellipsoid to ellipsoid-oblong; gynoecium ovoid, subcylindric, obovoid or flask-shaped; ovary 3-locular, rarely 2–4-locular, ovules 2, 4, 6 or 8 per locule, anatropous to hemianatropous; placentation axile; style conic and sometimes prominently exserted, sometimes truncate; stigma 2–3-lobed or subcapitate. Berries 1–8 seeded, greenish; seeds oblong, elliptic to ovate or reniform, pale yellow to brown, striate-verrucose; embryo axile, elongate, slightly curved; endosperm copious.

Tropical America Central America from central Mexico along both coasts to Panama and throughout the northern third of South America to Trinidad; the Guianas to Brazil and Peru; Eastern Malay Archipelago, New Guinea to the Pacific Islands (Melanesia, Moluccas, Palau Is, Sulawesi, New Britain, New Ireland).

Key to *Spathiphyllum* species

1. Very small plants to 17 cm tall with rosettes of 10–15 narrowly elliptic blades with a very strong midrib and 3–5 pairs of primary lateral veins; inflorescences shorter than the leaves *Spathiphyllum pygmaeum* Bogner
1. Plants much larger, primary lateral veins more than 5 pairs.
 2. Moderately small plants to 30 cm tall.

3. Epiphytic plants; blades ovate-elliptic, ca. 3 times longer than wide; interprimary veins almost as prominent at the primary lateral veins *Spathiphyllum davidneillii* Croat
3. Terrestrial plants; blades narrowly oblong-elliptic, 4–6 times longer than wide; interprimary veins weaker than the primary lateral veins *Spathiphyllum barbourii* Croat
2. Larger terrestrial plants; interprimary veins weaker than the primary lateral veins, intervening area without fine striations or long trichosclereids.
4. Plants growing in swampy habitats; minor veins moderately obscure between the primary lateral veins and the interprimary veins; spathe reflexed, white inside, pale green outside; spadix creamy-white, with lilac-like scent at anthesis *Spathiphyllum cannifolium* (Dryand. ex Sims) Schott
4. Plants not growing in swampy habitats; minor veins prominent, running parallel between the primary lateral veins and the interprimary veins; spathe erect-spreading, green, sometimes whitish; spadix greenish, sometimes orangish to yellowish *Spathiphyllum juninense* K.Krause

Spathiphyllum barbourii Croat, *Rodriguésia* 56: 117. 2005. Type: Peru. Amazonas: Bagua, 43 km. (by road), northeast of Chiriaco, along roadside from Chiriaco to Puente Venezuela, 04°56'00"S, 78°11'00"W, 315–720 m, 5 Nov. 1978, P.J. Barbour 4460 (holotype: MO!). **Figure 256.**

The species is characterized by its narrowly lanceolate to oblong-elliptic to narrowly oblanceolate blades drying dark brown above and yellowish brown below, as well as by a narrowly lanceolate white to

green, long-acuminate spathe and stipitate white to green spadix.

Terrestrial; **internodes** short. LEAVES erect-spreading with **petioles** 12–21 cm long, drying 1–2 mm diam., narrowly and deeply sulcate at and below geniculum, sheathed, drying medium to light brown; sheath extending 4/10 to 2/3 the length of the petiole, usually prominently decurrent, margins sometimes breaking off; **blades** narrowly lanceolate to oblanceolate or oblong-elliptic, 10–17 × 2.1–4.1 cm, sometimes inequilateral (one side up to 6 mm wider), gradually acuminate, (acumen



Figure 256. *Spathiphyllum barbourii* Croat (Barbour 4460; MO-2802691). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.



Figure 257. *Spathiphyllum cannifolium* (Dryand. ex Sims) Schott (not collected). Live plant showing leaf blades, adaxial surface, inflorescence and infructescence.

1.5–2.5 cm long), cuneate (often times one margin of the blade becomes folded under on drying, making the base appear inequilateral); upper surface drying dark brown, sometimes tinged with gray; lower surface drying pale yellow-brown, obscurely pale punctate at higher magnifications; **midrib** flat to broadly convex above, concolorous, rounded, sometimes narrowly rounded, concolorous to slightly darker below; **primary lateral veins** 6–9 per side, scarcely more conspicuous than interprimary veins. **INFLORESCENCE** with **peduncle** 20–32 cm long; **spathe**

reflexed-spreading to spreading, green or white, lanceolate, 5–7.2 cm long, drying 1–1.7 cm diam. at widest point in lower 1/3, apex gradually long-acuminate; **spadix** green or white, cylindrical, stipitate (stipe 1.0–1.8 cm long), 1.8–3 cm long, drying 4–5 mm diam.; **flowers** 2.5–3 × 2.7–2.8 mm; lateral tepals 1.1–1.8 mm wide.

Spathiphyllum barbourii ranges from southern Ecuador (Zamora-Chinchipec) to northern Peru (Amazonas, Loreto) at 250–1120 m in *Tropical rain forest*, *Tropical wet forest* and *Premontane wet forest* life zones.



Figure 258. *Spathiphyllum cannifolium* (Dryand. ex Sims) Schott (not collected). Close-up view of inflorescence with white spathe and creamy-white spadix.

Spathiphyllum barbourii is most closely related *S. minor* Bunting which shares similarly shaped blades and a slenderly stipitate spadix. The latter differs in having blades that are more broadly elliptic and dry dark olive-green to gray-green on the upper surface and grayish yellow-green on lower surface. In addition, *S. minor* has a purple-brown spadix, while *S. barbourii* has a spadix that is initially white, then turning to green.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Campamento Miazi, along Río Nangaritza, at base of vertical limestone bluffs, 04°16'S, 78°40'W, 900 m, 17 Feb. 1994, *H. van der Werff, Bruce Gray, Efraín Freire & Milton Tirado 13166* (CAS, L, M, MO, NY); Hills behind Campamento Miazi along Río Nangaritza, 04°16'S, 78°40'W, 900–1200 m, 18 Feb. 1994, *H. van der Werff, Bruce Gray, Efraín Freire & Milton Tirado 13247* (MO); Along Río Nangaritza, riverside, 04°15'S, 78°39'W, 1000 m, 12 Mar. 2017, *Xavier Cornejo S., Claes Persson & J.H.E. Rova 8995* (MO, NY); Río Nangaritza, Miazi, hill above military post, 04°18'S, 78°40'W, 1000 m, 9 Dec. 1990, *David A. Neill & Walter A. Palacios 9633* (MO, QCNE); Río Nangaritza, Miazi, en la confluencia de Ríos Chumbiriatza y Nangaritza, 04°18'S, 78°40'W, 1100 m, 9 Dec. 1990, *Walter A. Palacios & David A. Neill 6684* (MO, QCNE); Miazi, detrás Campamento Militar, 04°16'S, 78°42'W, 900–1000 m, 21 Oct. 1991, *Walter A. Palacios, I. Vargas, Galarza, César & Romero, J. 8576* (CAS, COL, MO, QCNE, US); Región de la Cordillera del Cóndor, cuenca alta del Río Nangaritza, Centro Shuar Shaime, por

la unión de los Ríos Nangaritza y Numpatakaima, sitio La Wantza, Bosque muy húmedo premontano, 04°19'19"S, 78°38'43"W, 1200 m, 1 Mar. 2003, *Wilson Quizhpe, D. Pardo & J. Zhunaula 603* (MO, QCNE); Cordillera del Cóndor región, along upper Río Nangaritza between Las Orquídeas and Shaime, 04°15'29"S, 78°39'21"W, 900 m, 5 Nov. 2006, *H. van der Werff, Bruce Gray & Wilson Quizhpe 21936* (MO); Vicinity of Las Orchideas, near Cabañas Yankuam, along Río Nangaritza, Los Tepuis Conservation Area, 04°15'08"S, 78°39'53"W, 1120 m, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98713* (MO, QCNE).

Spathiphyllum cannifolium (Dryand. ex Sims) Schott., Cultivated Hort. Kew, 1790, anon. s.n. (holotype, BM sheet BM00093835, seen online: <https://data.nhm.ac.uk/dataset/collection-specimens/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb/record/2476156>).

Aroideae 1: 1. 1853. — *Pothos cannifolius* Dryand. ex Sims, *Bot. Mag.* 17: t. 603. 1802. — *Dracunculus cannifolius* (Dryand. ex Sims) Raf., *Fl. Tellur.* 3: 65. 1836. — *Philodendron cannifolium* (Dryand. ex Sims) Sweet, *Hort. Brit.* 3: 632. 1839. — *Massowia cannifolia* (Dryand. ex Sims) K.Koch, *Bot. Zeitung (Berlin)* 10: 278. 1852.
Figures 257 & 258.

The species is recognized by its swampy habitat, moderately small size (usually to less than 1 m tall), petioles about

as long as blades and sheathed nearly to the geniculum and free-ending at apex with the sheath margins ultimately fibrous, mostly oblanceolate-elliptic mostly acuminate blades which are acute at base, many primary lateral veins, peduncles mostly 1.5–2 times longer than blades, a mostly reflexed white usually lanceolate spathe which is white on the inside and green on the outside, a white spadix with mostly 3-locular ovaries with 2–6 ovules per locule. Most importantly the tepals form a complete ring-like perianth.

Terrestrial in swampy area, to less than 1 m tall; **internodes** short, 1–4 cm diam. LEAVES with **petioles** 26–55 cm long, medium to dark green, matte, sheathed nearly to the geniculum and free-ending at apex with the sheath margins ultimately fibrous; geniculum narrowly and sharply sulcate in apical $\frac{1}{2}$; **blades** mostly oblanceolate-elliptic, 25–42 cm long, 11.5–21 cm wide, 1.9–2.7 times longer than wide, 0.75–0.95 times as long as petiole, acuminate at apex, acute at the base, subcoriaceous, dark green and matte or semiglossy above, moderately paler and matte or semiglossy below, sometimes with perforations or splits to the midrib along a primary lateral vein, drying dark olive-brown above, medium olive-brown below; **midrib** weakly and broadly sunken and concolorous above, narrowly rounded and concolorous below; **primary lateral veins** 14–18 pairs, arising at a 40–60° angle, quilted and concolorous above, narrowly rounded and darker below; interprimary veins present; **minor veins** moderately

obscure between the primary lateral veins and the interprimary veins. INFLORESCENCE held at level of leaves; **peduncle** 39–53 cm long; **spathe** reflexed, lanceolate, 12.5–25 cm long, 3–6 cm wide, white and semiglossy inside, pale green and matte outside; **spadix** prominently stipitate (1.5–2.5 cm), 4–13.5 cm long, 5–9 mm diam., creamy-white, fragrant of lilac-like scent at anthesis, turning yellow-green on upside post-anthesis; entire spadix turning green, semiglossy post-anthesis; **tepals** forming a complete ring-like perianth; **ovaries** mostly 3-locular with 2–6 ovules per locule.

Spathiphyllum cannifolium is easily the most widespread species in the genus, ranging throughout most of the Amazon basin and extending north into the Lesser Antilles. The species occurs in most Amazonian localities from Venezuela (Amazonas, Apure, Bolívar, Tachira, Zulia to Guayana), Brazil (Amazonas, Roraima), Colombia (Amazonas, Boyacá, Caquetá, Cundinamarca, Guaviare, Meta, Putumayo, Vaupéz, Vichada), Ecuador (Morona-Santiago, Napo, Pastaza, Sucumbíos, Zamora-Chinchipe) and Peru (Amazonas, Loreto, Pasco, Ucayali). The species also ranges widely in elevation from as low as 30 m to as much as 1000 m but it mostly occurs between 200 and 600 m elevation.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, parroquia Zurmi, vicinity of Las Orquideas, Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritzza,



Figure 259. *Spathiphyllum davidneillii* Croat (Neill *et al.* 14091; QCNE-169964). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

04°15'01"S, 78°39'33"W, 1128–1250 m, 18 Apr. 2006, *Thomas B. Croat 97229* (CAS, MO, NY, QCNE, UB); Río Nangaritza up river from Cabañas Yankuam, 04°15'35"S, 78°39'23"W, 852 m, 17 Oct. 2007, *Thomas B. Croat & Geneviève Ferry 98738* (MO, QCNE); Río Nangaritza, Miazi, rocky river banks and adjacent forest, Tropical Premontane Wet Forest, 04°18'S, 78°40'W, 1000 m, *David A. Neill 9649* (MO); Hill about 2 km downstream from Campamento Shaime along Río Nangaritza, upper parts with mossy forest growing in humus layer over rocks, without soil visible, 04°19'S, 78°40'W, 900–1200 m, 15 Feb. 1994, *H. van der Werff, Bruce Gray, Efraín Freire & Milton Tirado 13075* (CAS, F, MO, QCNE, US).

***Spathiphyllum davidneillii* Croat, sp. nov.**

Type: Ecuador. Morona-Santiago: Canton Limón Indanza, Cordillera del Cóndor, Centro Shuar Warints, dense low forest, canopy of about 8 m tall, on edge of nearly level sandstone plateau, 03°09'16"S, 78°14'50"W, 1020 m, 5 Oct. 2002, *D.A. Neill 14091* (holotype, QCNE-169964). **Figure 259.**

The species is characterized by its epiphytic habit, moderately small size, dark-brown-drying ovate-elliptic blades with the interprimary veins almost as prominent at the primary lateral veins and with the intervening area on the lower surface finely pale granular-striate and filled with dense clusters of long trichosclereids easily scraped free to the surface, and by the long-

pedunculate inflorescences with a white spathe and a green spadix.

Moderately small epiphytic herb; **internodes** short, 5–7 mm long, 7–8 mm diam. on drying, blackened, matte, minutely granular. LEAVES 38.5–46.5 cm long; **petioles** 22.8–27 cm long, sheathed 0.47–0.57 % their length, drying dark brown to blackened, finely low-ribbed, densely filled with trichosclereids; sheath 11–15 cm long, ending acute at apex, margins tightly inrolled, thin but not fragmenting; free part 11–14.2 cm long, narrowly sulcate at apex, subterete lower down; geniculum 1.3 cm long, drying blackened and somewhat thicker; **blades** ovate-elliptic, 15.7–19.5 cm long, 5.7–6 cm wide, 3.4 times longer than wide, 0.6–0.72 times as long as petioles, dark green above, slightly paler below, drying dark brown and weakly glossy above, slightly paler, slightly yellowish brown, semiglossy below, gradually long acuminate at apex, rounded and weakly attenuate at base; **midrib** drying broadly rounded and concolorous above, narrowly rounded and slightly darker below; **primary lateral veins** 14–15 pairs, arising at 50–60° angle, drying scarcely raised and concolorous above, weakly raised and slightly darker below; interprimary veins almost as prominent at primaries, weakly raised and concolorous above, weakly raised and darker below; the intervening area on lower surface finely and pale granular-striate closely ribbed, these filled with dense clusters of long trichosclereids easily scraped free to the surface. INFLORESCENCE erect, 55 cm long, held among the leaves; **peduncle** 50

cm long, drying 1 mm diam., drying blackened, 1 mm diam; **spathe** white, erect-spreading, 9 cm long, 2.1 cm wide, narrowly ovate-elliptic, abruptly long-acuminate and down-turned at apex, subrounded and weakly attached at base, drying medium dark brown and matte on both surfaces; **spadix** 4.2 cm long, drying 5 mm diam., cylindroid, green; tepals free from one another, 1.4–1.5 mm wide, inner margin straight to concave, outer margin 3–4-side; pistils bluntly protruding ca. 1 mm on drying; stamens included, not emergent, 1 mm long, 0.6 mm wide; ovary ovoid, 2.6–2.8 mm long, 1.8–3.1 mm diam., 3-locular; ovules 1 per locule. Mature berries not seen; immature **seeds** drying black, smooth, 2 mm long, 1.6 mm wide, 1.5 mm thick.

Spathiphyllum davidneillii is endemic to the Cordillera del Condor in Ecuador at 1020 m but could be expected in adjacent Peru.

The species is a member of section *Dysspathiphyllum* Engl. owing to its bluntly and weakly protruding pistils. Section *Dysspathiphyllum* has been represented up till now by a single species in the northern Amazon basin, namely *S. humboldtianum* Schott.

At least superficially *Spathiphyllum davidneillii* appears to be most similar to *S. juninense* K. Krause but that species differs by having much larger and more narrowly ovate leaf blades and much larger inflorescences.

The species is named for American botanist David Neill who collected the type specimen. David, formerly employed at the Missouri Botanical Garden, works as a Professor of Biology at the Universidad Amazonica in Pastaza Province in Ecuador. David has collaborated with botanist from all over the world, trained countless Ecuadorian biologists and has been heavily involved with conservation as one of the founders of the Jatun Sacha Foundation. He is the foremost collaborator with indigenous groups in Ecuador. My contact with him dates back to his days as Peace Corp volunteer in Nicaragua where he first served as a botanist.

Spathiphyllum juninense K.Krause, *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 615. 1932. Type: Peru. Junín: Pichis Trail, Santa Rosa, dense forest, 625–900 m, 6–7 July 1929, *E. P. Killip & A.C. Smith* 26157 (holotype, : B; isotype:US). **Figures 260–262.**

The species is characterized by its modest size (usually about 1 m to 1.2 m, sometimes to 40 cm), ovate to ovate-elliptic acuminate blade which typically dry dark brown to dark gray-brown above and moderately paler, dark to medium yellow-brown below and are rounded or acute to weakly attenuate at the base as well as by its typically green, sometimes whitish mostly lanceolate spreading spathe and greenish sometimes orangish to yellowish usually prominently stipitate spadix with acute somewhat protruding pistils.



Figure 260. *Spathiphyllum juninense* K. Krause (Croat 83502). Live plant showing base of plant with stem and base of petioles.



Figure 261. *Spathiphyllum juninense* K. Krause (Croat 83502). Close-up view of leaf blade, adaxial surface.



Figure 262. *Spathiphyllum juninense* K. Krause (Croat 83502). Close-up view of inflorescence with green spathe and green spadix.



Figure 263. *Spathiphyllum pygmaeum* Bogner (Bogner 3002; MO-6900135). Herbarium specimen showing petioles, leaf blades, adaxial and abaxial surfaces, and inflorescences.

Terrestrial to ca. 1 m tall; **internodes** short, (0.5)1.5–2.5 cm diam. LEAVES with **petioles** slightly thicker than broad, 34–66 cm long, 4–6 mm diam., minutely speckled, sheathed in lower 1/3, free part narrowly sulcate, medium to dark green, weakly glossy, sometimes tinged with purple on sheath; geniculum sulcate; **blades** ovate to ovate-elliptic, 27–39 cm long, 10–17 cm wide, 2–2.9 times longer than wide, 0.6–0.8 times as long as petiole, long-acuminate at apex, rounded or obtuse at the base, widest near the middle, subcoriaceous, dark green and matte-subvelvety above, much paler and matte below, drying dark brown to dark gray-brown above and moderately paler, dark to medium yellow-brown below; **midrib** deeply sunken and slightly paler or concolorous above, narrowly rounded and concolorous below; **primary lateral veins** 16–18 pairs, arising at a 50–70° angle, weakly quilted-sunken and concolorous above, convex and slightly darker below; interprimary veins present; **minor veins** prominent, running parallel between the primary lateral veins and the interprimary veins. INFLORESCENCE held at ca. level of leaves; **peduncle** 19–81 cm long; **spathe** erect-spreading, lanceolate, 8–21 cm long, 1.5–5 cm wide, green, sometimes whitish, weakly glossy inside, matte outside; **spadix** prominently stipitate (to 2.5 cm), 4–13.5 cm long, 5–8 mm diam., tapering at the apex, greenish, sometimes orangish to yellowish, matte or weakly glossy, stipe dark green; **pistils** weakly exserted, rounded at apex, yellow-green or pale green; stamens white, protruding about as long as the pistils. INFRUCTESCENCE with **spadix** dark

green; tepals dark green and matte fruits green, early-emergent; pistils pale green, early-emergent.

Spathiphyllum juninense ranges in the Amazon Basin from Colombia (Caquetá, Nariño) to Ecuador (Morona-Santiago, Napo, Pastaza, Sucumbíos, Zamora-Chinchipe) and Peru (Amazonas, Cusco, Huánuco, Junín, Loreto, Madre de Dios, Pasco, Puno, San Martín, Ucayali) at 250–1250 m, in *Tropical moist forest*, *Tropical wet forest* *Lower montane wet forest* and *Premontane wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Región de la Cordillera del Cóndor, cuenca del Río Coangos, Comunidad Shuar de Kuankus, sendero que conduce hacia el Río Coangos al sur de la comunidad. Bosque maduro intervenido, Bosque Húmedo Tropical, suelos arcillosos rojizos, 03°02'33"S, 78°12'58"W, 620 m, 12 June 2005, *Carlos Morales 1177* (MO, QCNE); Región de la Cordillera del Cóndor, cuenca del Río Coangos, Comunidad Shuar de Kuankus, sendero que conduce hacia la comunidad Yunkumas, bosque maduro, Bosque Húmedo Premontano, suelos arcillosos rojizos, 03°02'36"S, 78°13'03"W, 850 m, 14 June 2005, *Carlos Morales 1212* (MO, QCNE). **Zamora-Chinchipe:** Vicinity of Ecuacorrientes mining company, Valley of Río Quime, trail along Río Waiwaime near its mouth at Río Quime, 03°33'45"S, 78°27'47"W, 1000 m, 23 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 99093* (MO, QCNE); Cordillera del Cóndor, vertiente

occidental, Parroquia Tundayme, Cuenca del Río Wawaime, afluyente del Río Quimi, Bosque muy húmedo montano bajo, bosque intervenido, a lo largo de la carretera desde el campamento de Ecuacorriente hacia el sitio de la futura mina de cobre, 03°33'59"S, 78°26'29"W, 1000 m, 29 Sep. 2006, *Wilson Quizhpe & Abel Wisum 2365* (HUA, K, LOJA, MO, NY, QCNE, US); Cordillera del Cóndor, vertiente occidental, Parroquia Tundayme, Cuenca del Río Wawaime, afluyente del Río Quimi, Parcela permanente de una hectárea de inventario de bosque primario, "Parcela Wawaime", en vertiente de montaña con suelo arenoso-limoso, terreno de la empresa minera Ecuacorriente, 03°34'22"S, 78°26'44"W, 1200 m, 10 Feb. 2008, *Wilson Quizhpe, C. Juanga & Lee Mayacu 2777* (ECUAMZ, MO, QCNE); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza), and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritza, 03°54'18"S, 78°35'W, 792 m, 27 May 2003, *Thomas B. Croat & Mark Menke 89553* (MO, QCNE); Río Nangaritza, Pachicutza, camino al hito de Pachicutza, bosque primario sobre pendientes de 60%, suelos lentizoles, 04°07'S, 78°37'W, 900–1000 m, 18 Oct. 1991, *Walter A. Palacios & et al. 8194* (COL, MO, USM); Campamento Miazi, along Río Nangaritza, at base of vertical limestone bluffs, 04°16'S, 78°40'W, 900 m, 17 Feb. 1994, *H. van der Werff, Bruce Gray, Efraín Freire & Milton Tirado 13168* (L, MO, QCNE, TEX); Río Nangaritza, Miazi, en la confluencia de Ríos Chumbiriatza y Nangaritza, bosque primario, Bosque muy húmedo Premontano, 04°18'S, 78°40'W,

1100 m, 9 Dec. 1990, *Walter A. Palacios & David A. Neill 6679* (MO); *Walter A. Palacios & David A. Neill 6695* (MO).

Spathiphyllum pygmaeum Bogner, *Willdenowia* 41: 125–127. 2011. Type: Ecuador. Zamora-Chinchipe: near the river Nangaritza, living plants originally collected by Mary Sizemore and cultivated in the Botanical Garden München-Nymphenburg, flowering preserved on 15.1.2011, *J. Bogner 3002* (holotype, M!; isotype, MO!). **Figure 263.**

The species is the smallest known species of the genus. It is characterized by its very small size, rosettes of 10–15 narrowly elliptic blades with a very strong midrib and 3–5 pairs of primary lateral veins, and by its inflorescences shorter than the leaves with the spathe pure white on both sides but with a light green midrib, and a green spadix.

Plant small, 13–17 cm tall, perennial; **stem** short, upright; **roots** of first order strong, 1.8–2.2 mm diam. **LEAVES** many (10–15), in a rosette, middle green; **petioles** 5–7 cm long, above the sheath c. 2 mm in diam., middle green, canaliculate on upper side, sheath 4.5–6.5 cm long and almost reaching the geniculum, membranous, light green, apex rounded, distance between the sheath and geniculum only 2–5 mm; geniculum 4–5 mm long, slightly thicker than petiole and whitish green below; **blades** narrowly elliptic, 7–10 cm long, 1.6–

2.4 cm wide, middle green above, somewhat lighter colored below, base cuneate, apex acuminate; **venation** parallel-pinnate, **midrib** very strong and somewhat lighter colored above, whitish green below, **primary lateral veins** 3–5 pairs; interprimary veins only slightly thinner, **tertiary veins** very thin and inconspicuous. INFLORESCENCE shorter than the leaves; **peduncle** ca. 8 cm long, 1.8 mm in diam., terete, green, mostly enclosed by the sheath of the preceding leaf and projecting for only ca. 1 cm beyond; **spathe** narrowly elliptic, ca. 3 cm long, 9 mm wide, pure white on both sides but midrib light green, base decurrent, acumen ca. 8 mm long, green, margin of spathe recurved; **spadix** subcylindric to slightly conoid (narrowing towards apex), ca. 2 cm long, to 5 mm diam.; stipe ca. 1 cm long, 1.2 mm diam., green; **flowers** bisexual, ca. 1.8 mm diam.; tepals 6, truncate, ca. 1.5 mm long, upper part green and 0.8 mm wide, lower part white; gynoecium ca. 2 mm long; ovary obovoid, 1.4–1.5 mm long, in upper part 1.3–1.4 mm diam., at base ca. 0.9 mm diam., 2-locular; ovules anatropous, 1 ovule in each locule, ca. 0.5 mm long; style conoid, white, ca. 0.5 mm long, exerted from the tepals; stigma small, disk-like, ca. 0.4 mm diam., whitish when fresh, becoming brownish; tissue of gynoecium with many trichoslereids; stamens 6, filament flat, 1–1.1 mm long 0.7–0.8 mm wide, shorter than the tepals during the female stage, elongated to about 1.5 mm length at maturity (in the male stage), white, somewhat trapezoid (broader above and narrower below), thecae exerted above the

tepals at anthesis, nearly rectangular, ca. 0.7 mm long, 0.5–0.6 mm wide, opening by a slit; pollen ellipsoid, 25–28 μm long, 21–22 μm wide, polyaperturate, exine striate.

Spathiphyllum pygmaeum has been found only in Ecuador (Zamora-Chinchipe) near the river Nangaritza, growing in the rainforest on the forest floor in deep shade, ca. 30 m from the river bank. The species is only known from the type locality close to the Peruvian border, thus it can be expected to occur also in Peru.

Stenospermatum Schott, Type: *Stenospermatum mathewsii* Schott (lecto, designated by Nicolson, 1967. *Gen. Aroid.* 70: 1858.

Epiphytic, climbing hemiepiphytic or rarely terrestrial; caudices rooting at the nodes, short or moderately elongate, slender to stout; leaves distichous; petioles moderately long, prominently sheathed, geniculate at apex; blades oblong to oblong-elliptic or lanceolate, moderately coriaceous to subcoriaceous; midrib narrowly sunken on upper surface, often marginally discolored, prominently raised on the lower surface; primary lateral veins inconspicuous, often scarcely visible, scarcely more prominent than the primary lateral veins when dried, often drying weakly raised and appearing numerous, straight or weakly arcuate to the margin and not forming a collective vein; inflorescence erect, shorter than the leaves, the peduncle usually cernuous near the apex, later erect;

spathe usually white, moderately coriaceous to subcoriaceous, promptly deciduous, usually naviculiform and cuspidate at the apex, convolute or nearly so at base; spadix sessile or stipitate, usually uniform, white; flowers perfect and naked; stamens 4, the filaments flattened, abruptly narrowed at apex into a slender connective, about as long at the ovary but never exerted; anthers with thecae oblong-ovoid, acute, dehiscent by lateral slits that do not reach the base of the cell, ovary obpyramidal to prismatic, truncate at apex, (1)2-celled, ovules four to

many per locule, collateral, anatropous, arranged in two rows; funicles long; the style short, thicker than the ovary, the stigma linear-oblong, slightly raised; fruits scarcely enlarged from the pistils, baccate, obovoid; seeds 3 or more per cell, clavate-cylindric, slender, with a thick testa; endosperm copious. Species c. 60.

Guatemala to the Guianas, Brazil and Bolivia; 59 species published; Estimated 250.

Key to *Stenospermation* species

1. Arborescent plants to 2 m tall; stem semi-woody, to 1.7 m tall and 5 cm diam.; blades 21–51 cm long *Stenospermation arborescens* Madison
1. Plants much smaller, not arborescent; blades at most 30 cm long.
 2. Small plants with blades at most 13 cm long.
 3. Plants with a scandent habit, with stems highly branched, sometimes completely festooning a tree; petioles with sheath clasping the stem for most their length; spadix 1.5–3 cm long, white, turning green . . . *Stenospermation parvum* Croat & A.Gómez
 3. Plants not prominently scandent, not heavily branching; petioles with sheath clasping the stem only at the very base; spadix 5 cm long, orange-yellow *Stenospermation condorensis* Croat & Delannay
 2. Medium-size plants with blades 13–30 cm long.
 4. Inflorescences with peduncle more than 37 cm long; spadix 6.5–18 cm long, yellow or green.

5. Inflorescences with peduncle 42–61 cm long; spathe persistent (marcescent), 10–17 cm long, white turning brown; spadix 6.5–10 cm long *Stenospermation rusbyi* N.E.Br.
5. Inflorescences with peduncle 37–41 cm long; spathe deciduous; spadix 11–18 cm long *Stenospermation longistamineum* Croat & Neely
4. Inflorescences with peduncle 13–33 cm long; spadix 3.6–7 cm long, whitish or pale green.
6. Mostly epiphytic; petioles sheathed $2/5$ – $1/2$ their length; inflorescences with spathe deciduous *Stenospermation amomifolium* (Poepp.) Schott
6. Mostly terrestrial; petioles sheathed from $2/3$ their length to the geniculum; inflorescences with spathe persisting after anthesis *Stenospermation zeacarpium* Madison

Stenospermation amomifolium (Poepp.) Schott, *Prodr. Syst. Aroid.* 348. 1860. Type: Subäcuatoriale andine Provinz: Pompayaco, *Poeppig s.n* (Holotipo: B). **Figures 264 & 265.**

Monstera amomifolia Poepp. *Nov. Gen. Sp. Pl.* 3:88. 1845. Type: Poeppig 1277 (isotype, B)

Rhodospatha amomifolia (Poepp.) J.F.McBride, *Field Mus. Mus. Nat. Hist. Bot. Series* 11(1): 7. 1931

The species is characterized by its erect, frequently epiphytic habit, stems with short internodes, petioles sheathed to half their length, dark-brown-drying broadly lanceolate or oblanceolate blades and the

inflorescences with a short, thin spadix and a deciduous spathe.

Mostly epiphytic, sometimes terrestrial; **internodes** 1–4 cm long, 1.2–2.7 cm diam., medium green, matte or semiglossy, soon scurfy brown. LEAVES with **petioles** 18–26.5 cm long, drying 2–4 mm diam., dark green and semiglossy, sheathed $2/5$ – $1/2$ their length, free part terete, slightly thicker than broad, not sulcate or narrowly sulcate, dark green, weakly glossy; **blades** broadly lanceolate or oblanceolate, subcoriaceous, dark green and glossy above, slightly paler and semiglossy below, 18.5–25.5 cm long, 4.8–8 cm wide, about as long as petiole, 3.2–3.9 times longer than broad, obtuse or rounded at apex, acute and tapering into petiole at the



Figure 264. *Stenospermation amomifolium* (Poepp.) Schott (Croat 87861). Live plant showing stem, petioles, leaf blades, adaxial surface, and inflorescence.



Figure 265. *Stenospermation amomifolium* (Poepp.) Schott (Croat 87861). Close-up view of leaf blade, adaxial surface.



Figure 266. *Stenospermation arborescens* Madison (Ecuador, Estación Biológica San Francisco, not collected). Live plant showing stem, petioles, leaf blades, adaxial surface, and inflorescence with brown spadix.



Figure 267. *Stenospermation arborescens* Madison (Ecuador, Estación Biológica San Francisco, not collected).
Close-up of plant base showing semi-woody stem.



Figure 268. *Stenospermation arborescens* Madison (Ecuador, Estación Biológica San Francisco, not collected).
Close-up view of infructescence.

base, short-acuminate, drying dark brown; **midrib** narrowly sunken above, marginally discolored above, narrowly raised and slightly paler below; **primary lateral veins** not visible above, weakly visible below; **minor veins** weakly visible above, weaker below. **INFLORESCENCE** erect; **peduncle** 15–20 cm long; **spathe** 7 cm long, 1.2 cm wide, medium green, unopened, greenish white on inner surface, deciduous; **spadix** 4.8–5.8 cm long, 7 mm diam., whitish at anthesis, stipe 6–9 mm long; **pistils** 7 visible per spiral. **INFRUCTESCENCE** with **spadix** 6.5 cm long, 1.3 cm diam., red-orange or pink.

Stenospermation amomifolium ranges from Brazil (Amazonas, Bahia) to Colombia (Amazonas, Caquetá) and Ecuador (Morona-Santiago, Napo, Pastaza, Sucumbios, Tungurahua, Zamora-Chinchipe) at 100–1800 m elevation in a *Premontane wet forest* life zone.

Stenospermation amomifolium resembles *Stenospermation rusbyi* N.E. Br. which can also be found in the Cordillera del Cóndor region, but the latter differs by its broader blades obtuse or rounded at both ends, its upper blade surface shiny and with a dense network of closely spaced ridges when viewed under magnification, and its larger inflorescences with a very long peduncle and a persistent spathe.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor, ridge top above Banderas, near disputed Ecuador-

Peru border, primary forest, 03°28'S, 78°15'W, 1350 m, 17 Jul. 1993, *A.H. Gentry 79998* (CAS, F, MEXU, MO, P, QCNE); Cordillera del Cóndor, summit ridge of the Cordillera, headwaters of the Río Warintza, southwest of Shuar village of Warints, 03°15'37"S, 78°19'18"W, 2700 m, 16 Dec. 2002, *David A. Neill & et al. 14173* (MO, QCNE); Cordillera del Cóndor, trail from Comunidad Warints to camp #1 towards crest of Cordillera del Cóndor, Premontane wet forest, 03°13'58"S, 78°15'11"W, 830–1200 m, 11 Dec. 2002, *John L. Clark 6946* (MO, QCNE, US); Cordillera del Condor, trail from camp #1 to camp #2 towards crest of Cordillera del Condor, ca. 10–15 km S/SE of Shuar village, Warints, Premontane wet forest, 03°14'S, 78°16'W, 1200–1800 m, 13 Dec. 2002, *John L. Clark 6973* (MO, QCNE, US). **Zamora-Chinchipe:** Along road from near Paquisha, south to Las Orchídeas, and end of road at Río Nangaritzza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 47.0 km S of Intersection near Paquisha, 2.6 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 875 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 91355* (MO, QCNE); *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 91396* (MO, PMA, QCNE); Along road from Namirez to Nambija, along mining road, 10.0 km S of Namirez and Río Zamora, vicinity of Nambija, along road to mine headquarters ca. 5 km long, just south of Nambija, 04°03'44"S, 78°47'29"W, 1779 m, 23 July 2004, *Thomas B. Croat 92060* (MO, QCNE); Cuenca del Río Jamboe,

Romerillos Bajo, sendero hacia la Cordillera de Curintza, 04°15'S, 78°55'W, 1600 m, 27 Aug. 1999, *Patricio Fuentes, P. Conza & P. Villa 1001* (MO, QCNE); *Patricio Fuentes, P. Conza & P. Villa 1006* (MO, QCNE).

Stenospermation arborescens Madison, *Phytologia* 37: 65–66. Type: Ecuador. Morona-Santiago: Cordillera de Cutucú, western slopes, along a trail from Logroño to Yaupi, 02°46'S, 78°06'W, 2000 m, Nov. 1976, *M.T. Madison 3589* (holotype : SEL!; isotype: US!). **Figures 266–268.**

The species is characterized by its large arborescent size to 2 m tall or more, its semi-woody stem to 1.7 m tall, its leaves with a thick petiole broadly sheathed at the base and large elliptic blades, and by its large inflorescences with the peduncle longer than the leaves and the spathe and spadix whitish or pale yellow.

Large terrestrial herb to more than 2 m tall, forming clumps in open areas; **stem** semi-woody, 1–2 m tall; **internodes** 2–3 cm long, (1.5)2–5 cm diam. **LEAVES** stiffly erect; **petioles** terete, thick, 25–68 cm long, sulcate near apex, broadly sheathed for half their length, medium green, matte, faintly grooved toward apex; **blades** elliptic, 21.5–51 cm long, 12.5–17 cm wide, 2–3.2 times longer than wide, 0.75–1.2 times as long as petiole, widest near the middle, obtuse at the apex, rounded or obtuse at the base, moderately coriaceous but flexible, dark green and matte or semiglossy above, paler

and matte or glossy below; **midrib** narrowly sunken, scarcely discolorous marginally; **primary lateral veins** obscure; **upper surface** with minor veins running (3)5–11 mm apart, slightly raised and slightly lighter than surface, the intervening area usually with (2)3 weaker medial ribs 2–3 mm apart, separated by yet another weaker rib running between them, with a network of slightly raised anastomosing ridges and sometimes oblique cross-ridges connecting those sets of veins (visible on magnification); epidermis either very glossy or completely matte depending on the specimen, sometimes with sparse to dense short pale lineations; **lower surface** with only the more prominent minor veins visible, also either glossy or matte depending on the specimen, sometimes with a few short pale lineations visible. **INFLORESCENCE** erect; **peduncle** 40–78 cm long, longer than the leaves, with the base enclosed by the sheath of the subtending leaf, pale yellow; **spathe** cylindrical, 18–26 cm long, broader at the base and tapering toward the apex, completely enclosing spadix before anthesis, white or pale yellow; **spadix** cylindrical, 16–24 cm long, 1.5–1.8 cm diam., creamy white or light yellow-green; stipe 2 cm long.

Stenospermation arborescens is found in southeastern Ecuador (Morona-Santiago, Zamora-Chinchipec) and adjacent parts of Peru (Cajamarca, Loreto) at 1400–2050 m in *Premontane wet forest* and *Lower montane moist forest* life zones

Some specimens have highly glossy blades while others have the blades

completely matte. It is not clear whether this corresponds to distinct forms of the species or just to natural variation. It would be useful for future field collectors of this species to study this trait further on live specimens and see if other characteristics might be associated with this variation in blade texture.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor, vertiente occidental de la Cordillera del Cóndor, arriba del valle del Quimi, Bosque montano sobre roca arenisca, 03°30'38"S, 78°24'55"W, 1600 m, 11 Dec. 2000, *M. Cuascota* 261 (QCNE). **Zamora-Chinchipe:** Cordillera del Cóndor, summit of sandstone plateau of Cordillera, southeast headwaters of Río Wawaime, above proposed Ecuacorriente copper mine area, Hollín sandstone substrate; thick humus layer. dwarf, very dense forest near western edge of undulating plateau, 03°35'40"S, 78°35'40"W, 1930 m, 19 Sep. 2006, *David A. Neill & Wilson Quizhpe* 15234 (ECUAMZ, MO, QCNE); Cordillera del Cóndor, cresta de la cordillera, arriba del valle del Río Quimi, bosque enano sobre meseta de roca arenisca, 03°30'45"S, 78°24'33"W, 2000 m, 11 Dec. 2000, *Jorge Caranqui et al.* 192A (F, MO, QCNE); Condor Mirador, provisional old botanical garden near road, along old ill-defined trail to summit, on right side below current landslide blocking road, 03°38'12"S, 78°25'49"W, 1400 m, 23 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 99118 (MO, NY); Cordillera del Cóndor, sandstone plateau of Contrafuerte Tres Patines, west of main Cóndor ridge, above "Jardín Botánico" of

Ecuacorriente copper company; south of Km 15 of Cóndor Mirador military road, 03°37'48"S, 78°26'50"W, 1685 m, 9 Dec. 2005, *David A. Neill & Wilson Quizhpe* 15083 (MO, QCNE); Cordillera del Cóndor, ridge crest, on sandstone substrate, 2 km north of Cóndor Mirador military post, 03°37'41"S, 78°23'42"W, 1975 m, 6 Sep. 2003, *David A. Neill, Eric F. Rodríguez Rodríguez, Wilson Quizhpe & Jürgen Homeier* 14403 (ECUAMZ, MO, QCNE, US); Bosque montano sobre roca arenisca, cerca al destacamento Cóndor Mirador (1 km), en la frontera Ecuador-Perú, 03°38'08"S, 78°23'22"W, 1800 m, 15 Dec. 2000, *Efraín Freire & Grupo Post-Grado MO-QCNE* 4361 (MO); Cordillera del Cóndor region, Río Machinaza watershed, east of Los Encuentros, summit area of Hollín sandstone plateau, northwest of "big bend" of Río Machinaza, 03°45'06"S, 78°31'23"W, 1720 m, 26 June 2009, *David A. Neill & Camilo Kajekai* 16970 (HUA, MO, QCNE); Cordillera del Cóndor region, 1 km north of Río Machinaza at Las Peñas, ridgetop with Hollín sandstone substrate, 03°46'33"S, 78°29'46"W, 1640 m, 20 Mar. 2008, *David A. Neill & Wilson Quizhpe* 16249 (K, MO, QCNE, US); Cordillera del Cóndor, Reserva Biológica Cerro Plateado, bosque denso, zona baja del Cerro, cerca al Campamento 1, primera expedición biológica al Cerro Plateado, 04°35'40"S, 78°51'15"W, 1830 m, 19 Aug. 2012, *Eduardo Cueva, David A. Neill & Mercedes Asanza* 1830 (ECUAMZ, MO).

Stenospermation condorensense Croat & Delannay, **sp. nov.** Type: Ecuador. Morona-Santiago: Gualaquiza



Figure 269. *Stenospermation condorensis* Croat & Delannay (Gentry 79999B; MO-4623268). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.



Figure 270. *Stenospermation longistamineum* Croat & Neely (Palacios & Neill 6594; MO-3850254). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

Cantón, ridge top above Banderas, near disputed Ecuador-Peru border, 03°28'S, 78°15'W, 1350 m, 17 July 1993, *A.H. Gentry 79999B* (holotype, MO-4623268). **Figure 269.**

The species is characterized by its terrestrial habit, elongated matte dark brown-drying stems with long internodes, fully sheathed petioles which clasp the stem only at the very base, the sheath rounded at apex, narrowly oblong-lanceolate short-acuminate grayish brown-drying blades which are inequilaterally acute at the base, minor veins which are narrowly and irregularly raised with the intervening area equally prominently raised and irregularly areolate-ridged and densely faint short pale-lineate with the lines contained in sunken areas between the ridges. Also characteristic is the prominently stipitate, narrowly cylindroid orange-yellow spadix with flat dark brown-drying styles and oblong stigmas.

Terrestrial plant; **internodes** 6–8 cm long, 4–6 mm diam., drying dark brown and matte, finely and closely ribbed. **LEAVES** spreading; **petioles** 3.5–4 cm long, fully sheathed, the sheath clasping the stem only at the very base, rounded and often contacting base of blade at apex; **blades** narrowly oblong-lanceolate, 11–13 cm long, 3–3.5 cm wide, 3.6–4.1 times longer than wide, 3.1–3.2 times longer than petiole, widest near the middle, inequilateral, one side 5 mm wider, gradually short-acuminate at apex, acute to weakly attenuate at base, subcoriaceous, drying grayish brown and

matte, slightly paler below; **midrib** drying raised and concolorous on both surfaces; **primary lateral veins** arising at a 15° angle, obscure on both surfaces, drying flat and concolorous above, weakly raised and concolorous below; **upper surface** drying with minor veins almost acute, somewhat wavy and irregularly raised with the intervening area equally prominently raised and irregularly areolate-ridged and densely faint short pale-lineate with the lines contained in sunken areas between the ridges; **lower surface** with minor veins drying weakly raised and concolorous, barely visible to naked eye, the intervening area uniformly and densely striate. **INFLORESCENCE** erect; **peduncle** 11 cm long, 2 mm diam., sheathed for 8 cm by petiole of small subtending leaf, drying dark brown; **spathe** deciduous, not seen; **spadix** stipitate 11 mm long, 5.2 cm long, 7 mm diam., tapered toward apex, orange-yellow, drying dark brown; **styles** flat, dark brown, 4–6-sided, often subrounded, 2.2–3 mm diam.; stigmas oblong, 0.8 mm long, 0.3 mm wide.

Stenospermation condorensis is known only from Ecuador but no doubt occurs in adjacent Peru, being restricted perhaps to elevated divide between Ecuador and Peru in the Cordillera del Condor at 1350 m in a *Premontane rain forest* life zone.

Stenospermation condorensis has been confused with *Stenospermation sodiroanum* Engl. but the latter differs by its petiolar sheaths clasping the stem for their entire length, its upper blade surface with minor

veins prominently raised and closely spaced, and the inflorescence with the peduncle sheathed only in the lower half and with the spadix green-white to white or yellowish. It also occurs only on the western side of the Cordillera Central of Ecuador and southern Nariño Department of Colombia, instead of the Amazon Basin for *S. condorensis*.

The species is named for the type locality in the Cordillera del Condor near the Peruvian border in southeastern Ecuador.

Stenospermation longistamineum Croat & Neely, **sp. nov.** Type: Ecuador. Zamora-Chinchipec: Nangaritza Cantón, faldas de la Cordillera del Cóncolor, arriba de Pachicutza in valle del Río Nangaritza, 04°07'S, 78°37'W, 1200–1300 m, 6 Dec. 1990, *W. Palacios & D. Neill 6594* (holotype, MO-3850254; isotype, QCNE). **Figure 270.**

The species is characterized by its short internodes, petioles sheathed fully to the geniculum, drying blackened with the sheath erect and ending abruptly at the apex, oblong-ob lanceolate, abruptly acuminate blades which are acute at the base with the upper blade surface drying densely areolate-ridged and lacking short pale lineations above and smooth and densely pale-speckled below in addition to the long-pedunculate cernuous inflorescence with a long-stipitate yellow spadix with long-exserted stamens.

Terrestrial herb; **internodes** short, ca. 1.3 cm long, ca. 1 mm diam., drying 1 cm long, dark reddish-brown, prominently striate, matte. **LEAVES** semi-erect, spreading; **petioles** 11.5–20.3 cm long (17.3–21.5 cm for leaves subtending inflorescence), 6–7 mm high on side, sheathed 0.84–to fully as long as petiole, drying dark grayish-brown; sheath 11.2–18.2 cm long (16.8–20.8 cm for subtending leaves), erect, drying thin, blackened, usually ending abruptly (truncate), sometimes acute at apex, margin incurled, moderately thick, mostly intact; free part weakly sulcate, 1–1.8 cm long; **blades** 9.4–30.1 cm long (14.0–20.8 cm for subtending leaves), 3.7–8.3 cm wide (5.0–6.9 cm for subtending leaves), 2.5–3.9 times longer than broad, 0.6–2.1 times as long as petiole, oblong-ob lanceolate, abruptly acuminate at apex, acute at base, drying gray-brown, matte above, dark brown, weakly glossy below; **midrib** sunken, finely and narrowly ribbed, concolorous above, broadly convex, concolorous, finely ribbed below; **primary lateral veins** absent; **minor veins** visible above, drying moderately raised, intervening area densely areolate-ridged and lacking short pale-lineations above, smooth and densely pale-speckled below. **INFLORESCENCE** probably cernuous, the subtending leaf of more or less normal size; **peduncle** 37.2–41.0 cm long, 2 mm diam., drying dark reddish-brown, semiglossy, prominently sulcate; **spathe** deciduous; **spadix** stipitate 1.0–2.2 cm long, 11.6–18.0 cm long, ca. 0.9 cm diam., green to yellow; **pistils** regular, widely-spaced on drying; **styles** 2.5–5 mm long, 2.2–2.5 mm

wide, subquadrangular to prismatic (six-sided), weakly concave at margins, drying blackened, matte; **stigmas** 0.8–1.1 mm long, 0.5–1 mm wide, subrounded to oblong, moderately raised, dark brown with pale brown margins, moderately glossy; **stamens** elongated.

Stenospermation longistamineum is endemic to Ecuador known only from the Province of Zamora-Chinchipe at 1188–1300 m in a *Premontane wet forest* life zone.

Stenospermation longistamineum is most similar to *S. ammomifolium* Poepp. which differs by having proportionately narrower and usually more dark brown drying leaves which are less conspicuously areolate-ridged and lack dark punctuations.

The species epithet “longistamineum” is from the Latin “longus” (meaning long) and “stamineus” (relating to stamens).

Paratype: ECUADOR. **Zamora-Chinchipe**: Along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89488* (F, K, MO, QCNE, S, SEL, US).

Stenospermation parvum Croat & A.Gómez, *Rodriguésia* 56:123–125. 2005. Type: Ecuador. Pastaza: Pozo Petroleo de ARCO, 75 km E of Puyo, 01°34'S, 77°25'W, 580 m, 4–

21 Oct. 1990, *E. Gudiño, C. Quelal, & N. Caiga 1077* (holotype: MO!; isotypes: CAS!, CM!, COL!, K!, MEXU!, QCNE!).

Figures 271 & 272.

Owing to its scandent habit and small leaf size the species is easily distinguished. No other *Stenospermation* species from the Amazon Basin has these characteristics.

Epiphytic vine to 3–20 m; **stems** highly branched, sometimes completely festooning tree, branches pendent; **internodes** 0.8–5.5 cm long, drying 3–5 mm diam., matte to semiglossy, initially light yellow-brown, later often purple brown, ridges moderately spaced with a series of smaller ridges between major ridges. LEAVES with **petioles** (1)2.3–3.6(4.5) cm long, drying light to dark yellow-brown, finely ridged, sheathed 0.6–0.8 times its length; sheath erect, rounded to weakly free-ending at apex; free portion sulcate on drying; **blades** elliptic to oblong-elliptic to lanceolate or broadly oblanceolate, 5–12.5 cm long, 2.1–4.7 cm wide, 2.9–4.2 times longer than wide, broadest at middle or slightly above middle, 1.8–4.5 times longer than petiole, slightly inequilateral (one side 1–4 mm wider), gradually to abruptly acuminate at apex, acute to rounded and inequilateral at base, moderately coriaceous and brittle, broadest at middle, dark green above, moderately paler below, drying dark brown to grayish yellow or grayish brown above, moderately paler and grayish yellow or yellow-brown to grayish green below; **midrib** drying moderately obscure on both



Figure 271. *Stenospermation parvum* Croat & A. Gómez (*Cornejo* 8935; photo: X. Cornejo). Live plant showing stem, petioles, leaf blades, adaxial surface, and inflorescence.

surfaces, broadly raised and \pm concolorous above, more narrowly raised and slightly darker below; **primary lateral veins** not discernable on either surface; **upper surface** with minor veins (1.5)2.4–4 mm apart, weakly raised, slightly paler or slightly darker, narrowly rounded, moderately obscure, the intervening area usually with a weak medial rib and sometimes other yet weaker ribs, uniformly and finely areolate-granular, sparsely short pale-lineate,

sometimes with an alveolate network of 2–3 rows of epidermal cells, sometimes with few short pale lineations and rather featureless except for the rows of epidermal cells at highest magnification; **lower surface** drying with minor veins equally spaced but thicker and more prominent, concolorous, the intervenal area finely to coarsely striate-ribbed and minutely granular to somewhat pustular or intermittently minutely ridged-rugulose, sometimes with a few short pale



Figure 272. *Stenospermation parvum* Croat & A. Gómez (Cornejo 8935; photo: X. Cornejo). Close-up view of leaf blade, adaxial surface, and inflorescence with white spadix.

lineations. INFLORESCENCE moderately short, usually emerging solitary or up to two, borne at the apex of the stem usually among the leaves often while the flowering branch is in a pendent position; **peduncle** 3.5–7.3 cm long, drying 1–2 mm diam., usually pale yellow-brown, sometimes dark brown; **spathe** green to greenish white, white or cream, turning yellowish, 2–3.6 cm long, slender and acutely pointed in bud, drying dark brown; **spadix** ellipsoid, white,

turning green, 1.5–3 cm long, stipitate 5–7 mm, drying dark yellow-green, to 1 cm diam and orange in fruit.

Stenospermation parvum ranges from southern Colombia to Ecuador and Peru (Amazonas) at 190–900(1700) m in *Tropical wet forest*, *Tropical moist forest*, *Premontane wet forest* and *Premontane rain forest* life zones.



Figure 273. *Stenospermation rusbyi* N. E. Br. (Lingán 382; photo: J. Lingán). Live plant showing petioles, leaf blades, adaxial and abaxial surfaces, and infructescence.



Figure 274. *Stenospermation rusbyi* N. E. Br. (*Lingán 382*; photo: J. Lingán). Close-up view of leaf blade, adaxial surface.



Figure 275. *Stenospermation rusbyi* N. E. Br. (Lingán 382; photo: J. Lingán). Close-up view of infructescence with wilting spathe and yellow spadix.

Specimens seen: ECUADOR. **Zamora-Chinchipe:** Cordillera del Cóndor, Márgen izquierda del Río Nangaritza, cerca del Destacamento Militar de Miasi, bosque intervenido, suelo limoso, 04°20'S, 78°40'W, 900 m, 20 Oct. 1991, *Jaime L. Jaramillo 14168* (MO); Pachicutza, sendero hacia el Hito, 900–1200 m, 17 Oct. 1991, *Jaime L. Jaramillo 13944* (NY); Along road from near Paquisha south to Las Orchídeas and end of road on Río Nangaritza via Guayzimi, beginning 15.9 km E of Zumbi and Río Zamora, then 49.6 km S at Las Orchídeas, in vicinity of Las Orchídeas, 04°13'44"S, 78°39'30"W, 877 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wablert & Tuntiak Katan 91299* (MO, PMA, QCNE); Vicinity of Las Orquídeas, near Cabañas Yankuam, along new trail to Summit of Los Tepuis Conservation Area, just above road from Las Orquídeas to new ferry, 04°14'55"S, 78°39'36"W, 870 m, 18 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98836* (MO, QCNE); Parroquia Guayzimi, camino al Hito de Pachicutza desde el Campamento Militar, Bosque muy Húmedo Premontano, Transectos de 50 x 2 m x 10 (0.1 Ha.), 04°07'S, 78°37'W, 1050–1100 m, 19 Oct. 1991, *Carlos E. Cerón, Marcelo Chango & Valdano Tapur 16815* (MO); Parroquia Guayzimi, Campamento Militar Miasi, al sur del Río Nangaritza, Bosque muy húmedo Premontano, Transectos de 50 x 2 m (0.1 Ha.), 04°16'S, 78°42'W, 1060–1100 m, 21 Oct. 1991, *Carlos E. Cerón, Marcelo Chango, Valdano Tapur & Gerardo Aymard 16871* (MO); Río Nangaritza, Pachicutza, Bosque muy húmedo Premontano, bosque secundario y remanentes de bosque

primario, 04°07'S, 78°37'W, 900 m, 3 Dec. 1990, *Walter A. Palacios & David A. Neill 6484* (AAU, CAS, MO, QCNE); Pachicutza, camino al Hito, 04°07'S, 78°37'W, 18 Oct. 1991, *Walter A. Palacios, Gerardo Aymard & Efraín Freire 9534* (BR, CM, F, MEXU, MO, QCNE).

Stenospermation rusbyi N.E.Br., *Bull. New York Bot. Gard.* 4: 461. 1907. Type: Bolivia. Yungas, *M. Bang 2609* (holotype? NY). **Figures 273–275.**

The species is characterized by its petioles sheathed to above the middle, oblong-elliptic blades obtuse or rounded at both ends, and large inflorescences with a long peduncle, persistent white spathe turning brown and thick yellow or green spadix.

Terrestrial or epiphytic; STEM to ca. 1 m long; **internodes** 2–4 cm long, 1.5–3 cm diam., soon dark brown and matte. LEAVES with **petioles** 16–43 cm long, sheathed to above middle, to near apex on flowering nodes, medium green, weakly glossy, sheath inrolled, free-ending weakly on one side; **blades** oblong-elliptic, 13–28.5 cm long, 6.7–9 cm broad, 2–3.2 times longer than wide, 0.7–1.3 times as long as petiole, obtuse or rounded at both ends, very shortly acuminate, subcoriaceous, semiglossy, moderately bicolorous, drying dark brown; **midrib** narrowly sunken and marginally discolored, slightly paler above, narrowly rounded and slightly darker below; **primary lateral veins** obscure on both

surfaces; **minor veins** weakly visible on both surfaces at the naked eyed; **upper surface** shiny and with a dense network of closely spaced ridges when viewed under magnification. INFLORESCENCE erect; **peduncle** 42–61 cm long, medium green, weakly glossy; **spathe** linear-lanceolate, 10–17 cm long, 1.3–2 cm wide, white, pendent, persistent and turning brown; **spadix** 6.5–10 cm long, 8–15 mm diam., yellow or green; stipe 1.2–2 cm long.

Stenospermation rusbyi ranges from Ecuador (Morona-Santiago, Pastaza) to Peru (Amazonas, Cuzco, Pasco) and Bolivia (Cochabamba, La Paz) at 280–3000 m elevation in a *Premontane wet forest* life zone.

Stenospermation rusbyi resembles *Stenospermation amomifolium* (Poepp.) Schott, which can also be found in the Cordillera del Cóndor region, but the latter differs by its narrower blades tapered at the base, its upper blade surface matte and without closely spaced ridges when viewed under magnification, and its smaller inflorescences with a short peduncle and a deciduous spathe.

Specimens seen: ECUADOR. **Morona-Santiago:** Cordillera del Cóndor, Campamento Achupalla, 15 km east of Gualaquiza, dense tangled scrubby forest, 03°27'S, 78°22'W, 2100–2150 m, 22 July 1993, *Alwyn H. Gentry 80341* (MO). PERU. **Amazonas:** Cordillera del Cóndor, Puesto de Vigilancia Alfonso Ugarte (PV3), cabeceras del Rio Comainas, tributario al

oeste del Rio Canepa, cuchilo atras del campamento al norte, 03°54'S, 78°25'W, 1200–1300 m, 16 July 1994, *Hamilton Beltrán & Robin B. Foster 835* (MO).

Stenospermation zeacarpium Madison, *Phytologia* 37: 65–66. 1977. Type: Ecuador. Morona-Santiago: Cordillera de Cutucu, between Logroño and Yaupi, *M.T. Madison et al. 3430* (holotype: SEL; isotype: US). **Figures 276–277.**

Stenospermation killipii Croat & A.P. Gomez, *Novon* 15(1): 97–99, f. 6D, 7A, B. 2005. Type: Peru. Huanuco: Leoncio Prado: Dtto. Hermillo Valdizán, La Divisora, between Pumahuasi and La Cumbre, 1600–1660 m, collected by T. Plowman, 26 June 1978, vouchered by T. Croat, 1997. *T.B. Croat 78348* (holotype, MO!; isotypes B!, F!, K!, MO!, NY!, US!, USM!).

The species is characterized by its erect, frequently terrestrial habit, long stems, often fully sheathed petioles, matte-subvelvety dark-brown-drying blades and especially by the short, stubby spadix and the persistent spathe. The species is similar to *S. wallisii* but differs in having leaf blades which dry yellow-green to light yellow-brown and lack the dense pale short lineations between the minor veins.

Terrestrial or epiphytic. STEMS clustered, (0.5)1–1.5 m tall; **internodes** 0.5–



Figure 276. *Stenospermation zeacarpium* Madison (Croat & Sizemore 81694). Live plant showing stems, petioles and leaf blades, adaxial and abaxial surfaces.

4.0 cm long, 1.2–2.0 cm diam., dark green, medium green, becoming gray-green, weakly glossy, drying dark brown, closely ridged, densely and finely granular. **LEAVES:** **petioles** 9–12.5 cm long, sheathed from 2/3 its length or to the geniculum, matte to weakly glossy, dark olive-green; sheath decurrent, incurled but mostly open, free portion sub-terete, bluntly sulcate, geniculum 1.8 cm long, sharply sulcate, drying sharply sulcate; **blades**

elliptic to oblong-elliptic or obovate-elliptic, 13–29 cm long, 3.5–8.5 cm wide, averaging 20.5 x 6.5, 2.3–4.6 times longer than wide, 1.3–2.8 times as long as petioles, subcoriaceous, acuminate at apex, acute at base, dark green and weakly glossy to subvelvety above, moderately paler and semiglossy to weakly glossy below, drying dark yellow-brown to yellowish green above, medium yellow-brown below; **midrib** obtusely and deeply sunken and



Figure 277. *Stenospermation zeacarpium* Madison (Croat & Sizemore 81694). Close-up view of inflorescence with green spathe and white spadix.

concolorous above, slightly paler below, drying darker below, drying finely striate; **primary lateral veins** not apparent above, weakly visible below; **minor veins** drying weakly raised, with numerous pale cellular inclusions, short-pale-lineate in between the minor veins above, weakly raised but less dense below with fewer pale cellular inclusions. INFLORESCENCES erect, with **peduncle** 14–33 cm long, drying dark brown 1–2 mm diam.; **spathe** brown, green, greenish white or yellowish white, 6–10 cm long, 2.5 cm wide at anthesis, 7.5 cm wide when flattened, erect, semiglossy outside, weakly glossy inside, persisting after anthesis; **spadix** white, cream or pale green, 3.6–7.0 cm long, 0.9–1.5 cm diam., with reduced flowers and bluntly pointed at apex; **pistils** 8–9 visible per spiral, 3–3.5 mm diam., 8 to 9 visible per spiral.

Stenospermation zeacarpium ranges from Ecuador (Morona-Santiago, Napo, Zamora-Chinchipe) to Peru (Amazonas, Ayacucho, Cajamarca, Cuzco, Huanuco, Junin, Loreto, Pasco, San Martín) and Bolivia (Cochabamba, La Paz), also in Brazil (Bahia); at 300–2900 m elevation in *Tropical moist forest*, *Premontane moist forest*, *Premontane wet forest*, *Lower montane rain forest*, *Montane moist forest*, *Montane wet forest*, life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Limon Indanza, Cordillera del Condor, Parroquia San Carlos, Warints, comunidad Shuar, siguiendo la trocha entre Warints y Numpatkaim, del primer campamento de la expedición hacia arriba, 03°14'16"S, 78°15'21"W, 1350–1800 m, 12

Dec. 2002, *Tuntiak Katan*, J.L. Clark, W. Quizhpe, C. Kajekai & E. Toapanta 99 (QCNE, MO). **Zamora-Chinchipe:** NW range of Cordillera del Cóndor, base camp overlooking Río Zamora at headwaters of Río Piuntza, ca 1 hr by trail N from base camp, cloud forest, 1850 m, 5 Jan. 1972, *Bruce MacBryde* 964 (MO); Hill about 2 km downstream from Campamento Shaime along Río Nangaritzza, 04°19'S, 78°40'W, 900–1200 m, 15 Feb. 1994, *H. van der Werff*, *Bruce Gray*, *Efraín Freire* & *Milton Tirado* 13062 (MO, QCNE); Pachicutza, sendero hacia el Hito, 04°09'S, 78°38'W, 1200–1350 m, 19 Oct 1991, *J. Jaramillo* 14143 (QCA); Vicinity of El Pangui, east of El Pangui, across Río Pachicuza, 0.5 km east of river, 03°39'48"S, 78°34'11"W, 900 m, 6 Sep 2002, *Thomas B. Croat* 87167 (MO, QCNE); Vicinity of El Pangui, E of El Pangui, E of Río Pachicuza, 0.5 km E of Río Pachicuza., 03°38'54"S, 78°33'58"W, 900 m, 25 May 2003, *Thomas B. Croat* & *Marck Menke* 89414 (MO, QCNE); Vicinity of Las Orquídeas, in forest across from Cabañas Yankuam, 04°15'05"S, 78°39'29"W, 870–890 m, 15 Sep. 2007, *Thomas B. Croat* & *Geneviève Ferry* 98624 (MO, QCNE); Along Río Nangaritzza, riverside, 04°15'S, 78°39'W, 1000 m, 12 Mar. 2017, *Xavier Cornejo S.*, *Persson* & *J.H.E. Rova* 9004 (MO, NY); Cordillera del Cóndor region, vicinity of Las Orquídeas forest near Cabañas Yancuam, ca. 3 km S of Las Orquídeas, slopes W of Río Nangaritzza, 04°15'01"S, 78°39'33"W, 1130–1140 m, 16 Apr. 2006, *Thomas B. Croat* 97104 (MO, QCNE); Vicinity of Las Orquídeas, near Cabañas Yankuam, along Río Nangaritzza, Los Tepuis

Conservation Area, 04°15'08"S, 78°39'53"W, 1130 m, *Thomas B. Croat* 97237 (MO, QCNE); Vicinity of Las Orquídeas, near Cabañas Yankuam, along Río Nangaritza, Los Tepuis Conservation Area, 04°15'08"S, 78°39'53"W, 1120 m, 16 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 98717 (MO, QCNE); Cuenca del Río Jamboe, Romerillos Bajo, sendero hacia la Cordillera de Curintza, 04°15'S, 78°55'W, 1600 m, 27 Aug. 1999, *Patricio Fuentes, P. Conza & P. Villa* 1006 (MO); Pachicutza, sendero hacia el Hito, 04°09'S, 78°38'W, 1000–1200 m, 18 Oct. 1991, *Jaime Jaramillo* 14080 (QCA); Cordillera del Condor, Los Encuentros - El Sarsa, 10.7 km E of Los Encuentros, 03°04'40"S, 78°38'28"W, 1066 m, 26 May 2003, *Thomas B. Croat & Marck Menke* 89464 (MO, QCNE); Along road between Zumbi (on Río Zamora, 7.7 km S of Yanzaza) and Cordillera del Cóndor, 6.8 km E of Paquisha at Río Nangaritza, 03.54.18S, 78.35W, 792 m, 27 May 2003, *Thomas B. Croat & Marck Menke* 89520 (MO, QCNE); Nangaritza, Río Nangaritza, Miazí, en la confluencia de Ríos Chumbiriatza y Nangaritza, 04°18'S, 78°40'W, 1100 m, 9 Dec 1990, *Walter Palacios & D. Neill* 6789 (MO); Región de la Cordillera del Condor, Parroquia Surmi, Sector Hito el "Empalme", Comunidad Yawi, 04°28'16"S, 78°39'09"W, 1200 m, 8 June 2005, *Wilson Quizhpe, V. Granda, D. Veintimilla, H. Salas & P. Wampash* 1231 (LOJA, MO); Yantzaza, Cordillera del Condor, Los Encuentros - el Cerro Machinaza, 03°47'42"S, 78°29'15"W, 1700 m, 23 July 2005, *Quizhpe* 1694 (LOJA, MO). PERU. **Amazonas:** Condorcanqui, Cordillera del Condor, cuchillo abajo del

Cerro Machinaza, Norte de Puesto de Vigilancia Alfonso Ugarte (PV 3), cabeceras del Río Comainas, tributario al oeste del Río Cenepa, 03°54'S, 78°26'W, 1350–1650 m, 3 Aug. 1994, *Hamilton Beltran & Robin Foster* 1582 (MO).

Syngonium Schott, *Wiener Z. Kunst* 3:780. 1929. Type: *Syngonium auritum* (L) Schott, [*Arum auritum* L; Type: *Porphyrospatha schottiana* (Wendl. ex Schott) Engl.; lecto, designated by Nicolson (1967) [= *Syngonium schottianum* Wendl. ex Schott].

Porphyrospatha Engler in A. DC., *Monogr. Phan.* 2:289. 1879.

Appressed epiphytic or hemiepiphytic climbers; sap of most parts with latex; stems usually unbranched, rooting at nodes; internodes long or short; juvenile plants terrestrial, the first blades ovate to elliptic, with succeeding stages usually sagittate; preadult plants typically climbing, with shorter internodes, their blades usually sagittate, rarely ovate to elliptic or oblong; adult plants typically with internodes moderately short; petioles elongate, sheathed often to the middle or rarely to the apex, typically angular adaxially above sheath, aplexicaule at base, lacking any obvious geniculum at apex; the sheath usually unequal at apex, sometimes free-ending; blades simple and entire, ovate to oblong-elliptic or variously divided, trisect to pedatisect with 5–11 leaflets, rarely incised-lobate, usually moderately thin, the median segments more or less equilateral,



Figure 278. *Syngonium podophyllum* Schott (Croat 71737). Live plant showing stem, petioles and trilobed leaf blades, adaxial surface.



Figure 279. *Syngonium podophyllum* Schott (Croat 53892). Live plant showing stem, petioles and leaf blades trisect with auricles, adaxial surface.

the lateral segments of trisect or pedatisect blades often conspicuously inequilateral, confluent or free from one another, the outermost pair, often conspicuously auriculate; primary lateral veins joining into 3 or more collective veins; tertiary veins reticulate, usually conspicuous; inflorescences 1 or several per axil, peduncles erect in flower, pendent in fruit; spathe tube ovoid to ellipsoid, convolute at base, green at anthesis, often colored in fruit, usually reopening to expose fruits; spathe blade caviform, white to greenish white, opening broadly at anthesis, drying promptly after anthesis, usually; deciduous; spadix much shorter than the spathe, divided into pistillate and staminate portions, each with unisexual flowers; pistillate portion basal, much shorter than the staminate portion, green to orange; staminate portion clavate, white, the basal part of the staminate portion with a section of irregular sterile staminate flowers; staminate flowers consisting of 3–4 stamens united into a synandrium, the synandria truncate to somewhat rounded at apex; connective thick; anthers opening by short slits; pollen emerging in viscid threads; pistillate flowers connate; ovary oblong to oblong-obovoid, usually 2-celled, rarely 3- or 1-celled; ovules 1, rarely 2 per cell, erect, anatropous; stigmas usually discoid or bilabiate, rarely orbicular or cup-shaped; fruits baccate, connate into an ovoid syncarp; seeds obovoid or ovoid; funicle short; testa smooth, thin, black or dark brown, shiny; endosperm lacking. Mexico to Paraguay with greatest concentration in

Central Mexico; 36 published species; 45 estimated.

Syngonium podophyllum Schott, *Bot. Zeitung (Berlin)* 9(5): 85. 1851. Type: Mexico. holotype: *Schott s.n.* (W), Schott drawing #3223. **Figures 278 & 279.**

The species is characterized by its hemiepiphytic habit, its blades of variable shape from ovate-subhastate to trisect with auricles at the base of the lateral lobes, and by its small inflorescences clustered 5–7 per axil with the spathe tube green on both surfaces.

Hemiepiphyte climbing appressed on the trunks of trees; **internodes** 3–7 cm long, 6–20 mm diam., dark green, semiglossy, bluntly sulcate on one side. LEAVES with **petioles** 13–30 cm long, medium to dark green, weakly glossy, sheathed $2/5$ – $3/5$ their length, sheath incurled, free part sharply flattened adaxially, weakly and narrowly sulcate adaxially; **blades** ovate-subhastate, deeply trilobed or more often trisect with auricles at the base of the lateral lobes, 17–24 cm long, 9–30 cm wide, thin, dark green and weakly glossy above, slightly paler and semiglossy below, drying brownish-green; **major veins** obtusely sunken and concolorous above, prominently raised and concolorous below; **midrib** narrowly round-raised and slightly darker below; **primary lateral veins** convex and more or less concolorous below; **tertiary veins** flat

and weakly prominent, darker than surface. INFLORESCENCES 5–7 per axil; **peduncle** 7–15 cm long, pale to dark green, semiglossy; **spathe** 6–7 cm long; tube 2–2.5 cm long, 8–9 mm diam., green or yellow-green outside, pale greenish white and semiglossy inside; blade pale yellowish outside, greenish white inside; **spadix** 5–5.5 cm long; staminate spadix 3.8 cm long, 7 x 8 mm diam.; pistillate spadix 1.2 cm long, 6.5 mm diam., creamy green. INFRUCTESCENCES with **spathe tube** 1.6–2.9 cm diam.; **seeds** white.

Syngonium podophyllum is widespread from Mexico and Central America to Colombia and Ecuador (on both sides of the Andes), Peru and Bolivia, extending east into Brazil, Venezuela and the Guianas, at 0–2000 m in multiple life zones. It is also widely cultivated as an ornamental in tropical gardens or as a house plant in temperate environments.

Specimens seen: ECUADOR. **Zamora-Chinchipec:** Cordillera del Cóndor, vicinity of Ecuacorrientes mining company, valley of Río Quime, trail along Río Waiwaime near its mouth at Río Quime, 03°33'45"S, 78°27'47"W, 1000 m, 23 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 99080* (MO, QCNE). PERU. **Amazonas:** Cordillera del Cóndor, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), Cabeceras del Río Comainas, tributario al oeste del Río Cenepa, subiendo cuchillo al oeste del campamento, suelos de arcilla roja o amarillo, bosque heterogéneo, dosel a 30 m, 03°54'30"S, 78°25'40"W,

1200–1400 m, 25 July 1994, *Hamilton Beltrán & Robin B. Foster 1244* (F, USM).

Xanthosoma Schott in Schott & Endlicher, *Melet. Bot.* 19. 1832. Lectotype: *X. sagittifolium* (L.) Schott ("sagittae-folium"); *Arum sagittae-folium* L.

Acontias Schott in Schott & Endlicher, *Melet. Bot.* 19. 1832. Type: *Acontias belleborifolius* (Jacq.) Schott; lecto, designated by Schott (1856: 64; see Nicolson, 1967). [*Arum belleborifolium* Jacq. = *Xanthosoma belleborifolium* (Jacq.) Schott].

Cyrtospadix K. Koch, *Index Sem. Hort. Berol.* 1853. App.: 13. 1853. Type: *Cyrtospadix striatipes* (Kunth & C.D. Bouché) K.Koch [*Philodendron striatipes* Kunth & C.D. Bouché = *Xanthosoma striatipes* (Kunth & C.D. Bouché) Madison].

Terrestrial, small to gigantic herbs, sometimes essentially arborescent, evergreen or seasonally dormant herbs; **caudex** tuberous and subterranean or growing over the surface of the ground or underground laterally or erect, rooting at least at the lower nodes, the apical portion erect, stout, often a completely underground subglobose tuber, sometimes with many small tubercles; sap with white latex. LEAVES: several, usually erect-spreading, generally glabrous, sometimes pilose at least on major veins on lower

surface, frequently with major veins densely scabridulous or scabridulous-granular; **petioles** elongate, conspicuously sheathed at the base, typically extending to near middle of petiole or above, subterete, usually somewhat flattened above the sheath, moderately spongy, typically glossy, sometimes glaucous; **blades** moderately thin; cordate, sagittate, hastate, trifid, trisect, pedatifid or pedatisect, sometimes linear-lanceolate or ovate with cordulate base; **posterior ribs** usually well developed, often naked along sinus; **midrib** sunken above, prominently raised below; **primary lateral veins** of the blades or their segments spreading toward the margins, forming several submarginal veins; **secondary and tertiary veins** conspicuous, arising from the primaries at a wide angle, forming interprimary collective veins; higher order veins reticulate. INFLORESCENCE 1 to several in each floral sympodium, usually much shorter than the leaves; **peduncle** usually moderately short, usually somewhat flattened with one side narrower than the other, green; **spathe** convolute at base, the tube usually green, sometimes tinged along the open margin with purple, constricted somewhat above the tube; the tube mostly ellipsoid, persistent after anthesis; the blade moderately thin, usually white boat-shaped, oblong to oblong-lanceolate, open and erect or sometimes reflexed at anthesis, marcescent then deciduous after anthesis; **spadix** shorter than the spathe, divided into pistillate and staminate portions, densely many-flowered; flowers unisexual, naked; pistillate portion basal, cylindroid-conoid, green to yellowish or bright orange;

staminate portion clavate, usually several times longer than the pistillate portion, slightly constricted above the sterile portion at the base; sterile portion at base of staminate section, usually with the lowermost 1–4 spirals much-thickened, the staminodia rounded to ellipsoid or narrowly ovate and tapered to apex, often colored orange or yellow, these lower staminodial portion transitioning upward into a slender section with compacted, low, narrow and elongate staminodia in 3–5 tight spirals, rounded to acute on both ends, these immediately tapering into the fertile staminodia; staminate flowers irregularly 4–6-sided, the stamens 4–6, connate to form a obpyramidal truncate synandrium; anthers lateral, nearly reaching the base of synandrium, the connective thick, thecae obversely oblong-triangular or oblong, opening at the apex of the connective by a subapical pore or short slit; ovaries oblong to ovoid, coherent by the thickened annuliform styles, 2–4-celled; pollen extruded in strands, shed in tetrads, inaperturate, ellipsoid to subspherical, medium-sized (averaging 42 microns, range 35–49 microns; tetrads averaging 76 microns, range 62–97 microns); exine minutely punctate or fossulate-verruculate); ovary ovoid, 2–4-locular, rarely 1-locular; ovules 12–20 or numerous, anatropous or hemianatropous; funicles moderately long; placentae usually pseudoaxile, or sometimes parietal or axile basally; stylar region broader than ovary, usually discoid and coherent to weakly connate to adjacent pistils; stigma discoid or hemispheric-discoid, 3-or 4-lobate; berries cylindroid, 3–4 celled,

somewhat furrowed apically, greenish, white to yellowish or orange; seeds many per locule; seeds ovoid to ellipsoid, shorter than the funicles, the testa 10 or more sulcate throughout longitudinally; embryo axile, subequal to endosperm, endosperm copious.

Mexico and West Indies to Paraguay (N. Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, French Guiana, Guatemala, Guyana, Haiti, Honduras, Jamaica, Lesser Antilles, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Surinam, Trinidad & Venezuela); Species 204 described to date, 240 expected.

Key to *Xanthosoma* species

1. Blades ovate-elliptic, at most subcordate but never deeply lobed.
 2. Leaf axils usually bearing small seed-like propagules; medium-sized inflorescences with peduncles 16–26 cm long *Xanthosoma viviparum* Madison
 2. Leaf axils without small seed-like propagules; small inflorescences with peduncles 3–8 cm long *Xanthosoma weeksii* Madison
1. Blades deeply cordate or sagittate.
 3. Robust plants 1–2 m tall, with upright stem to 10 cm diam,
 4. Petioles heavily purple-maculate; spathe tube green, heavily tinged violet-purple towards apex and on edges; pistillate spadix pale yellow-green; blades drying greenish *Xanthosoma purpureomaculatum* Croat & L.P.Hannon
 4. Petioles green, not purple-maculate.
 5. Blades with broadly parabolic sinus and with the posterior lobes often curving outward; drying medium to dark green or brownish green *Xanthosoma poeppigii* Schott
 5. Blades with sinus spathulate to narrowly hippocrepiform and with the posterior lobes directed toward the base, drying brownish green *Xanthosoma crassilaminum* Croat & L.P.Hannon
 3. Plants of more moderate size, without a thick vertical stem.
 6. Blades mostly triangular, subhastate or sagittate, widest at the tip of the posterior lobes
 7. Blades subhastate with long and narrow posterior lobes projecting markedly outwards, anterior lobe generally elongated and constricted at the base *Xanthosoma hannoniae* Croat
 7. Blades sagittate, never subhastate; posterior lobes not long and narrow; anterior lobe not constricted at the base *Xanthosoma hylaeae* Engl. & K.Krause
 6. Blades ovate, cordate or sagittate, not triangular, widest near the middle.
 8. Blades with primary lateral veins convex above *Xanthosoma nangaritense* Croat & Delannay
 8. Blades with primary lateral veins sunken above *Xanthosoma zamoraense* Croat & Delannay



Figure 280. *Xanthosoma crassilaminum* Croat & L.P. Hannon (*Croat et al. 105673*). Live plant showing petioles, leaf blades, adaxial surface, and inflorescences.

Xanthosoma crassilaminum Croat & L. P. Hannon, *Aroideana*: 135–142. 2017. Type: ECUADOR. Tungurahua: Alongrd. between Agoyan and Puyo, 8.5 km E of Represa de Agoyan, 14.8 km W of Río Negro, 01°24'24"S, 78°18'54"W, 1568 m, 4 May 2003, T.B. Croat, L.P. Hannon & M. Menke 88468 (holotype, MO-5702240–41; isotypes, AAU! B!, COL!, CUVCI, FI, GB!, HUA!, KI, MI, NY!, PMA!,

QCNE!, RB!, SI, SEL!, US!.

Figures 280 & 281.

The species is a member of group *Xanthosoma* (Croat et al., & Delannay, 2017) and is characterized by its robust size, thick moderately elongated stem, moderately long-petiolate leaves, subterete petioles sheathed in the lower 1/3, moderately coriaceous broadly ovate brownish-drying blades with rounded posterior lobes, a well-



Figure 281. *Xanthosoma crassilaminum* Croat & L.P. Hannon (*Croat et al.* 105564). View of inflorescence showing spathe tube heavily tinged purple outside.



Figure 282. *Xanthosoma hannoniae* Croat (Croat et al. 105697). Live plant showing petioles and leaf blades, adaxial surface.

developed posterior rib which is naked 2–4 cm as well as by at least 5 inflorescences per axil, with the spathe tube dark purple on both surfaces and a pale yellow pistillate spadix.

Large terrestrial herb to 2 m tall; **stem** to 1.5 m long, with remnants of old petiole bases persisting at base; **internodes** short, to 10 cm diam., with large brown fragments of petiole bases persisting; **cataphylls** broad, up to 15 cm long; **LEAVES** clustered at apex of stem; **petioles** (444)69–103 cm long, up to 4 cm

diam. near the base, 1.5 cm diam. at the end, sheathed $\frac{1}{3}$ to $\frac{1}{2}$ its length; free portion terete to obtusely flattened adaxially with faint medial rib, weakly glossy, medium to dark green, sometimes blotched with violet-purple; **blades** thinly coriaceous, ovate-sagittate, (17–29)35–86 cm long, (9.5–15)36–58 cm wide, usually 1.1–1.5 times longer than wide, weakly short-acuminate at apex, prominently sagittate at base, semi-glossy, medium to dark green on upper surface, paler and matte to weakly glossy on lower surface, drying grayish yellow-brown above, yellowish brown and weakly glossy



Figure 283. *Xanthosoma hannoniae* Croat (Croat *et al.* 88915). Close-up view of inflorescence showing spathe tube green with purple margin on the outside and cream-colored spathe blade.

below; **anterior lobe** 30.9–54 cm long, broadly rounded on margins; **posterior lobes** 22–32 cm long, (13.5)15–23 cm wide, directed at 112–130° angle; **sinus** broadly open in live condition, hippocrepiform to spatulate, sometimes parabolic when flattened, subrounded to bluntly pointed and weakly constricted near the apex on the lower side; **posterior ribs** well developed, naked (2)3.5–4(5.3) cm; **midrib** narrowly to significantly sunken and concolorous to marginally discolored above, much thicker than broad and slightly paler below; **primary lateral veins** 5–6 pairs, arising at 55–70° angle, obtusely sunken and concolorous on upper surface, narrowly round-raised and concolorous on lower surface, weakly paler than surface; **tertiary veins** faintly to moderately sunken on upper surface, weakly raised and concolorous on lower surface, drying flattened and concolorous above, flattened, slightly paler and finely narrow-ridged below; **upper surface** irregularly folded or narrowly ridged, sparsely pale-punctiform in depressions, drying granular with more or less etched minor veins; **lower surface** minutely granular, drying smooth and pale-speckled. INFLORESCENCES at least 5 per axil; **peduncle** 12–20(–34) cm long, 2.3 x 1.3 cm diam. and thicker than broad, prominently flattened on one side, matte to weakly glossy, pale to medium green; **spathe** 16–21 cm long; tube 3.1–4 cm diam., medium green to dark purple and semi-glossy outside, tinged purple or maroon at apex when mostly green, dark purple inside; blade 14 cm long, greenish white to creamy white on outer surface,

glossy and white to creamy white on inner surface; **spadix** 14–17 cm long; staminate portion 11–13 long, 1.5–2 cm diam.; sterile male portion 2–3.5 cm long, 0.5–1 cm diam.; pistillate portion 3–4 cm long, 1–1.5 cm diam., pale yellow or pale orange. INFRUDESCENCE with **peduncle** 18–38 cm long, drying 1.5 cm diam., **spathe** tube, 10–11 cm long, 4.5–6.7 cm diam.; **spadix** 6.7–9.5 cm long; **berries** 1.2–1.7 cm long, 0.6–0.8 mm diam., white, pale green or pale orange.

Xanthosoma crassilaminum is endemic to Ecuador, found in Morona-Santiago, Napo, Orellana, Pastaza, Tungurahua and Zamora-Chinchipe Provinces at 200–2000 m in *Premontane moist forest* or less frequently in *Lower montane moist forest* life zones.

Specimens seen: ECUADOR. Vicinity of Ecu-Corrientes copper mine development, valley of Río Waiwaime, 4.3 km above gate, 03°34'51"S, 78°25'53"W, 1298 m, 7 Apr. 2006, *Thomas B. Croat 96766* (MO, QCNE); Nangaritza, Cordillera del Cóndor region, Parroquia Zurmi, vicinity Las Orquideas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, *Thomas B. Croat 97161* (F, MO, RB).

Xanthosoma hannoniae Croat, *Aroideana* 40: 209–216. 2017. Type: ECUADOR. Morona-Santiago: Along rd. from Palora to Llushín, 3.8 km E of main Palora–San

Vicente de Taquí rd., 895 m; 00°40'57"S, 78°01'33"W, T.B. Croat & L.P. Hannon 87000 (holotype, MO-5745912; isotypes, AAU!, B!, COL!, CUVCI!, F!, G!, GB!, GH!, HUA!, K!, M!, NY!, PMA!, QCNE!, S!, SEL!, UB!, US!). **Figures 282 & 283.**

The species is a member of group *Xanthosoma* and is distinguished by its relatively small size, with long, narrow, dark green petioles that are densely and minutely paler-speckled, and narrow, deeply hastate or sagittate triangular blades. An unusual phenomenon was observed in the first flowering in cultivation, wherein the first inflorescence produced a spathe tube that was green on both surfaces, whereas subsequent inflorescences in the same sympodium produced tubes that were more or less dark purple on the inner surface. Such dissimilarity in spathe coloration is extremely rare in the genus, not having been previously observed, and is possibly attributable to some condition in the first flowering of a wild-collected plant in cultivation.

Moderately small terrestrial herb; **stem** erect, to 30 cm long, caulescent, with old leaf bases retained \pm intact along its length and dark brown, producing bulbils (few) near base; **bulbils** 1–1.4 cm long, 1.7–2 cm diam., subglobose, prominently scurfy, dark reddish brown; **internodes** 1–2.5 long, 1.5–4.5 cm diam., in part prominently scurfy, otherwise matte, medium to dark brown; **cataphylls** ca. 25 cm long, medium

green on outer surface, pale green along margins, acutely 2-ribbed abaxially, inequilateral and apiculate at apex, the apiculum flattened, truncate at apex, 1 cm long. **LEAVES** 5–10, erect to erect-spreading; **petioles** 33–70 cm long, glossy, medium-dark to dark green, densely moderately paler short-lineate, sheathed slightly less than $\frac{1}{2}$ of its length; sheath free-ending at apex, occasionally decurrent, erect, in-rolled at margins, yellowish green, moderately paler than petiole; free portion terete, becoming obtusely rounded adaxially, obtusely flattened in apical $\frac{1}{2}$, with margins becoming acute in apical $\frac{1}{3}$; **blades** subhastate, occasionally sagittate, narrowly to broadly triangular, 22–38 cm long, 15–34 cm wide, weakly briefly acuminate or \pm acute at apex, thinly coriaceous, moderately bicolorous, occasionally weakly constricted on one or both sides in area of petiole attachment; upper surface weakly quilted, matte to weakly glossy dark green; lower surface matte, medium yellowish green; **anterior lobe** 18–28 long, 7–19.5 cm wide, \pm triangular (lanceolate when young), broadest at or slightly above base, \pm symmetrical; **posterior lobes** 8–19 long, 2–6 cm wide, acute or weakly briefly acuminate at apex, the tip bluntly acute, broadest midway, weakly inequilateral, with inner side narrower, broadly rounded at base, decurrent onto posterior rib; outer side ca. 1.3 times wider than inner side midway; **midrib** and major veins obtusely quilted-sunken on upper surface, weakly paler and moderately glossier than surface; midrib narrowly raised on lower surface, \pm concolorous; **basal veins** 4–5, coalesced



Figure 284. *Xanthosoma hylaeae* K. Krause (Croat 87375). Live plants showing petioles and leaf blades, adaxial surface.

into prominent posterior rib, 2–3 acroscopic, 2 basisopic; **posterior rib** naked ca. 1 cm on each side, acutely narrowly raised on lower surface, \pm concolorous; **primary lateral veins** 3 pairs, arising at 35–50°, moderately arcuate, weakly convex on lower surface, concolorous to weakly darker than surface; **secondary veins** weakly quilted-sunken on upper surface, weakly prominulous on lower surface, concolorous to weakly darker than surface; **tertiary and reticulate veins** visible on lower surface, weakly darker than surface; **collective veins** 3–4, the innermost

arising from the base, weakly to moderately scalloped, ca. 4–9 mm from margin, etched-sunken and weakly quilted on upper surface, prominulous on lower surface, weakly darker than surface. **INFLORESCENCES** erect, 4–6 per axil, emitting a sweet-anise-like fragrance at anthesis; **peduncle** 13 cm long, 6 mm diam., obtusely flattened abaxially, convex adaxially and irregularly, obtusely 2-ribbed, glossy, pale green; **spathe** 12–13 cm long, thicker than broad, cuspidate at apex, with margins in-rolled in apical 1 cm; tube 5.5 cm long, 2.7 cm diam., glossy, pale-medium green on outer surface,



Figure 285. *Xanthosoma hylaeae* K. Krause (uncollected; photo: David Scherberich). Close-up of inflorescence showing spathe tube green with purple margin and apex outside.



Figure 286. *Xanthosoma nangaritzense* Croat & Delannay (Croat 97139). Live plant showing petiole, leaf blade, adaxial surface, and inflorescence.

glossy dark purple in basal $1/3-1/2$ on inner surface and otherwise green, rarely entirely medium green (first inflorescence in one sympodium), densely and minutely weakly paler-speckled on outer surface and in apical $1/2$ on inner surface; blade erect, 6.5 cm long, 1.7 cm wide, cream-colored on both surfaces, matte on outer surface, weakly glossy on inner surface, with opening broadly elliptical at anthesis, marcescent, erect after anthesis; **spadix**

sessile, 8.2 cm long; pistillate portion pale orange at anthesis, 1.8 cm long, 9 mm diam., weakly broadest toward base; staminate portion 6.5 cm long, 8 mm diam., cream-colored, weakly pink-tinged, thicker than broad, bluntly acute at apex, tapering, becoming dull pink at anther dehiscence; sterile portion matte, white, 1.4 cm long, 7 mm diam., \pm cylindrical; **pistils** 2–2.2 x 1–1.5 cm; style ca. 1 mm long; ovaries 3–4-locular, with pseudoaxile placentation;



Figure 287. *Xanthosoma nangaritense* Croat & Delannay (Croat 97139). View of leaf blade, adaxial surface.

ovules 20–24 per locule, biseriate, anatropous; funicles longer than ovules; stigma cream-colored, sessile, disc-like, ca. 0.8 mm diam.; synandria ca. 2 x 2–2.5 mm, 4–5-androus; pollen cream-colored, dehiscing apically; sterile flowers \pm densely arranged in 3 whorls, prismatic to subprismatic, ca. 1 mm long, 3–6 x 3 mm diam. and elongated in direction of axis, less so in basal whorl.

Xanthosoma hannoniae grows along a long section of the Cordillera Central, from Central Peru to Northern Ecuador at 250–

1,550 m, in *Premontane wet* to *Tropical wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Limón Indanza, Región de la Cordillera del Cóndor, Cuenca del Río Coangos, Comunidad Shuar de Kuankus, sendero que conduce hacia la comunidad Yunkumas, Informante: José Saant, 03°02'36"S, 78°13'03"W, 850 m, 14 June 2005, C. Morales 1208 (MO, QCNE); Cordillera del Cóndor region, Valley of Río Coangos, lower valley slopes, east of Shuar village of Tinkimints, 03°15'25"S,



Figure 288. *Xanthosoma nangaritense* Croat & Delannay (Croat 97139). Close-up of inflorescence and infructescences showing spathe tube green outside.

78°12'50"W, 1000 m, 25 Mar. 2001, *D. Neill* & *J.M. Manzanares 13210* (MO, QCNE).

Xanthosoma hylaeae Engl. & K. Krause, *Notizbl. Bot. Gart. Berlin-Dahlem* 6: 115. 1914. Type: BRAZIL. Acre: Am alto Acre beim Monte Mó, Dec. 1911, *E. Ule 9227* (holotype, B). **Figures 284 & 285.**

Xanthosoma purpuratum K. Krause, *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 621. 1932. Type: PERU. Loreto: Soledad, Río Itaya, 110 m, 20–22 Sep. 1929, *E.P. Killip* & *A.C. Smith 29570* (holotype, B!; isotype, US!).

The species is a member of group *Xanthosoma* and is characterized by its short stems densely covered with brown fibers, dark green or dark brownish green drying triangular-sagittate blades, broadly parabolic sinus, and inflorescences with spathe green outside and dark purple inside and a pale greenish yellow pistillate spadix.

Moderate size terrestrial plant to 1(1.5) m tall; **stems** to 50 cm long; **internodes** short, 2–6 cm diam., scurfy and densely covered with brown fibers from remnants of prophylls and petiole bases. LEAVES with **petioles** terete, (16)56–69 cm long, 6 mm diam., somewhat spongy, semiglossy, medium green toward apex, sometimes dark green and purplish-tinged toward base, obtusely angular near apex becoming sunken within 6 cm and continuing at a thin sunken line all the way

to the sheath; sheath extending ca. 1/3 its length; **blades** triangular-sagittate, (16)28–58 cm long, (10)21–44 cm wide, 1.3–1.8 times longer than wide, 0.7–0.9 times as long as petiole, widest at the tip of the posterior lobes, obtuse at the apex, thinly coriaceous, dark green and semiglossy above, lighter and semiglossy or glossy below, drying dark green or dark brownish green and semiglossy above, lighter and semiglossy or glossy below; **anterior lobe** 18–40 cm long, slightly rounded at the margins; **posterior lobes** 15–27 cm long, 6–15 cm wide, projecting markedly outwards at ca. 135° angle; **sinus** broadly to narrowly parabolic, 9–19 cm deep, 4–9 cm wide in the middle; **major veins** obtusely sunken and concolorous above, narrowly raised and slightly paler below; **primary lateral veins** 3–4 pairs, arising at a 40° angle; **basal veins** 7 pairs, the 1st free to the base, 4 acroscopic, 3 basioscopic; **posterior rib** naked 2–4 cm, directed to the tip of the posterior lobe; **tertiary veins** mostly flattened above, weakly raised below, moderately distinct, reticulated veins clearly visible on magnification. INFLORESCENCES 1–3 per axil; **peduncle** 15–22 cm long, obtusely flattened on one side, medium or pale green; **spathe** (6.5)8.5–10 cm long; tube 2.5–3.5 cm long, 1–2.2 cm diam., outside medium green and weakly glossy, sometimes tinged purple at apex and on open edge or entirely purple, inside dark purple and glossy; blades greenish-white; **spadix** (5.5)7.5–9.5 cm long; staminate portion (4)6.–8.5 cm long, 6 mm diam.; sterile portion 2 cm long, 3 mm diam., tinged yellowish at the base; pistillate portion 1 cm

long, 5 mm diam., pale greenish yellow. INFRUCTESCENCES with young **fruits** pale green (turning orange upon drying).

Xanthosoma hylaeae is widespread across the Amazon Basin from the southern tip of Colombia through Brazil (Acre), Ecuador, Peru and central Bolivia at 100–2300 m in *Premontane wet forest* and *Tropical moist forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Región de la Cordillera del Cóndor, Cuenca del Río Coangos, Comunidad Shuar de Kuankus, sendero que conduce hacia la comunidad Yunkumas, Informante: José Saant, 03°02'36"S, 78°13'03"W, 850 m, 14 June 2005, *C. Morales 1208* (MO, QCNE); Región de la Cordillera del Cóndor, Parroquia Santa Susana. Kuankus, comunidad Shuar. Noreste de la comunidad camino al Cerro Chuank Naint, Bosque primario siempre verde, 03°02'36"S, 78°13'03"W, 800 m, 15 June 2005, *Tuntiak Katan & Carlos Morales 279* (MO, QCNE); Cordillera del Cóndor region, Valley of Río Coangos, lower valley slopes, east of Shuar village of Tinkimints, 03°15'25"S, 78°12'50"W, 1000 m, 25 Mar. 2001, *D. Neill & J.M. Manzanares 13210* (MO, QCNE); Centro Shuar Yukutais, South of Centro, low-lying area at base of scarf, swampy, some places perennially flooded, 03°30'S, 78°10'W, 20 Apr. 1989, *Bradley C. Bennett & Patricia Gómez A. 3754* (QCNE); Along road into Cordillera del Condor departing from Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via

Numbaime into Cordillera del Condor, 24 km SW of Río Zamora, 03°38'11"S, 78°25'49"W, 1562 m, 14 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 91006* (HUA, MO, PMA, QCNE). **Zamora-Chinchipe:** Along road from Namirez to Nambija, along mining road, 10.0 km S of Namirez and Río Zamora, vicinity of Nambija, along road to mine headquarters ca. 5 km long, just south of Nambija, 04°03'44"S, 78°47'29"W, 1779 m, 23 July 2004, *Thomas B. Croat 92057* (F, MO, NY, PMA, QCNE, S, US); Cordillera del Cóndor region, along road from Tandaime to Valle del Quime, along right bank of Río Quime, 4.2 km from bridge over Río Waiwaime near headquarters of Ecua-Corriente copper mine, 03°31'55"S, 78°27'10"W, 1200 m, 13 Apr. 2006, *Thomas B. Croat 97011* (MO, QCNE); Along road from Tundaime to Condor Mirador, 19.4 km from main junction in road near military post, 03°38'00"S, 78°26'08"W, 1479 m, 20 Sep, 2007, *Thomas B. Croat & Geneviève Ferry 98906* (MO, QCNE); Along road between Los Encuentros and El Sarsa, 10.7 km E from Los Encuentros, beyond bridge over Río Zamora, 03°46'40"S, 78°38'28"W, 1066 m, 14 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98596* (MO, QCNE); Along road between Zamora and Romerillos Alto, via Jaumbué, 23.2 km E of Río Bombuscaro Bridge in Zamora, 10.4 km E of Pituca, 04°12'15"S, 78°56'19"W, 1425 m, 20 July 2004, *Thomas B. Croat 91639* (K, MO, QCNE, US); Along road from near Paquisha, south to Las Orchídeas, and end of road on Río Nangaritzza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río



Figure 289. *Xanthosoma poeppigii* Schott (Croat 96549). Live plant showing leaf blades, adaxial surface.

Zamora, then 38.5 km S, 11.1 km N of Las Orchídeas, 04°12'48"S, 78°38'41"W, 878 m, 17 July 2004, *Thomas B. Croat* 91398 (MO, QCNE); Along road between Namirez on Río Zamora to Nambija, 14.7 km E of Namirez and Río Zamora, 5.9 km above San Carlos, 04°03'11"S, 78°47'48"W, 917 m, 19 July 2004, *Thomas B. Croat* 91428 (MO, QCNE); Río Waiwaime Valley, vic of Ecuacorrientes Copper Mine Concession, vic of mine site, cultivated plants, Missouri Botanical Garden, 03°34'54"S, 78°26'06"W,

1330–1360 m, 21 Sep. 2007, *Thomas B. Croat* 100388 (MO, QCNE).

Xanthosoma nangaritzense Croat & Delannay, *Aroideana* 40: 294–297. 2017. Type: ECUADOR. Zamora-Chinchi: Along road between Zumbi on Río Zamora and summit of Cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza Bridge, 29.1 km E of Zumbi, 03°56'13"S 078°37'27"W,



Figure 290. *Xanthosoma poeppigii* Schott (Croat 97278). Close-up of leaf blade, adaxial surface.

1352 m, 16 July 2004, T.B. Croat, L.P. Hannon, G.A. Wahlert & Tuntiaik Katan 91213 (holotype, MO-5864991!; isotype, QCNE!). **Figures 286–288.**

The species is a member of group *Xanthosoma* and is characterized by its short stems, internodes scurfy with old leaf bases, blackish-brown-drying ovate-cordate blades with overlapping posterior lobes and the primary lateral veins convex on the upper

surface, and by its short-pedunculated inflorescences with the spathe tube dark green outside and dark purple inside and the pistillate spadix pale yellow-green.

Moderate size terrestrial plant in wet areas, to 1 m tall; **stems** short; **internodes** 4–8 cm diam., scurfy with old petiole bases. **LEAVES** with **petioles** 32–65 cm long, medium to dark green, semiglossy, sheathed to ca. middle, terete above sheath, obtusely flattened toward apex, obtusely ribbed



Figure 291. *Xanthosoma poeppigii* Schott (Croat 97278). View of petiole bases and infructescence.



Figure 292. *Xanthosoma purpureomaculatum* Croat & L.P. Hannon (Croat *et al.* 105873). Live plant showing petioles and leaf blades, adaxial surface.

adaxially; **blades** ovate-cordate, 24–64 cm long, 16–42 cm wide, 1.2–1.5 times as long as wide, 0.7–1.0 times as long as petioles, widest near the middle, obtuse to acute at the apex with a weak apiculum, prominently lobed at the base, thinly coriaceous, dark green and weakly glossy above, much paler and semiglossy below, sometimes purplish, drying blackish brown and weakly glossy above and below; **anterior lobe** 17–33 cm long, rounded on margins; **posterior lobes** very broad, inner portions overlapping or projecting upwards, 9.5–24 cm long, 6.5–19 cm wide, inner margin very rounded and

connecting to the midrib at a 90° angle, obtuse at the tip with the weak somewhat constricted tip; **sinus** usually closed by overlapping posterior lobes and subreniform or rhombic, rarely narrowly parabolic; **midrib** flattened and concolorous above, narrowly round-raised and slightly paler below; **primary lateral veins** 4 pairs, arising at a 60° angle, convex and concolorous above, narrowly raised and concolorous below; **basal veins** 7 pairs, the 1st pair free to the base, 4 pairs acroscopic, 3 basioscopic; **posterior rib** naked 1–5 cm, directed to the tip of the posterior lobe;



Figure 293. *Xanthosoma purpureomaculatum* Croat & L.P. Hannon (*Croat et al.* 87651). View of purple-maculated petiole base and inflorescence.



Figure 294. *Xanthosoma purpureomaculatum* Croat & L.P. Hannon (Croat & Ferry 98610). Close-up of inflorescence showing spathe tube green maculated with purple outside.

tertiary veins flattened and darker below. **INFLORESCENCES** 1–4 per axil; **peduncle** 3–7 cm long, 9 x 11 cm diam., markedly flattened, medium green, weakly glossy; **spathe** 18 cm long; tube 6 cm long, 2–2.7 cm diam., medium to dark green, semiglossy outside, dark purple inside; blades white both surfaces; **spadix** 12–17 cm long; staminate portion 9.5–13.5 cm long, 7–15 mm diam.; sterile portion 2.5–3 cm long, 5–7 mm diam. in the middle, 10 mm diam. at the base, staminodia in 5 rows, the lowermost with a few round staminodia ca. 2.5 mm diam., the next row up with staminodia to 5 mm long, 2 mm wide, those in the 3 remaining rows lower, paler red-brown & matte, mostly 5 x 1 mm and somewhat pointed on both ends, increasingly diminished upwards with the upper row only 3 mm long; pistillate portion 2.5–3.5 cm long, 7–8 mm diam., pale yellow green.

Xanthosoma nangaritzense is endemic to Ecuador, found only in Zamora-Chinchipe Province at 670–1350 m in a *Premontane wet forest* life zone.

Additional specimens seen: ECUADOR. **Zamora-Chinchipe:** Nangaritz, Cordillera del Cóndor region, Parroquia Zurmi, vicinity Las Orquideas, forest near Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritz, 04°15'01"S, 78°39'33"W, 1130–1250 m, 17 Apr. 2006, Thomas B. Croat 97139 (MO, QCNE).

Xanthosoma poeppigii Schott, *Osterr. Bot. Wochenbl.* 417. 1854. — *Xanthosoma mafaffa* var. *poeppigii* (Schott) Engl. in C.F.P. von Martius & auct. suc. (eds.), *Fl. Bras.* 3(2): 193. 1878. — Type: PERU: Loreto: Yurimaguas, Feb. 1831, E.F. Poeppig 2276 (W, presumed lost) photo of type represented by FZDESWild Museum photograph 29868; Schott illustration 3402 represents a drawing of *Poeppig* 2276; —). **Figures 289–291.**

Xanthosoma subandinum Schott, *Syn. Aroid.* 60. 1856. TYPE: Peru. Via subandina, Poeppig (W, now lost).

The species is a member of group *Xanthosoma* and is characterized by its medium size (1–1.5 m tall), thick internodes densely covered with persistent fibrous petiole base remnants, spongy petioles that are obtusely angular at least in the upper portion, deeply cordate-sagittate blades with a broadly parabolic sinus, weakly visible tertiary veins, and inflorescences with the spathe tube green or purple outside and dark purple inside, pistillate spadix orange and mature fruits white.

Moderate size terrestrial plant 1–1.5 m tall, stems erect, to 1 m tall; **internodes** short, 3–10 cm diam., dark green or dark brown, densely covered with persistent fibrous petiole base remnants, interior of stem yellow, sap milky. **LEAVES** with **petioles** spongy, terete near base, obtusely angular throughout or just toward apex, 40–

122 cm long, medium or dark green, almost matte with weak transverse fissures visible in sheath when held to light, sometimes tinged purplish toward apex, sheathed to just below middle, sheath erect, the margins finely undulate-crisped; **blades** subcoriaceous, weakly coriaceous, ovate-sagittate, widest across the tips of the posterior lobes, 38–72 cm long, 27–68 cm wide, 1.2–1.7 times as long as wide, 0.6–0.9 times as long as petiole, dark brownish green and semiglossy or matte-subvelvety above, moderately paler and weakly glossy below, drying medium to dark green or brownish green and matte to weakly glossy above, lighter and glossy below; **anterior lobe** 28–56 cm long, broadly rounded on margins; **posterior lobes** 17–38 cm long, 9.5–24 cm wide, projecting outward at 105–135° angle, pointed at the tip; **sinus** open, parabolic or sometimes subreniform to nearly oblong; **posterior rib** directed straight to the tip of the lobe, naked 1.5–5.5 cm; **midrib** obtusely sunken and concolorous above, round-raised and paler below, drying flattened and several-ribbed, darker than surface above, flattened and many-ribbed, dark brown below; **primary lateral veins** 6–8 pairs, arising at a 50–60° angle, obtusely and weakly raised and concolorous above, narrowly round-raised, paler and matte below, drying like the midrib; **basal veins** 6–8 pairs, 3–4 acroscopic, 3–4 basioscopic; **tertiary veins** weakly visible, few. INFLORESCENCES several per axil, with 2–3 most common; **peduncle** 7–20 cm long, 5–7 mm wide in middle, drying blackened; **spathe** 12–20 cm long; tube 4–5 cm long, 1.5–2 cm diam.,

dark green or purple outside, dark purple and weakly glossy inside; blade whitish or pink; **spadix** 9.5–18 cm long, staminate portion 7.5–15 cm long, 6–15 mm diam., white; sterile portion 2–3.5 cm long, 5 mm diam., white, the thickened staminodia in a series of two spirals, these 1.4–1.6 mm long, 0.8–1 mm wide, drying yellow-brown, the remaining sterile portion narrowly tapered with a series of 5 smaller and narrower staminodia, 1.1–1.8 mm long, ca. 0.1 mm wide; pistillate portion 2–3 cm long, 8 mm diam., orange, the pistils tightly compacted. INFRUDESCENCES with **peduncle** to 28 cm long, **spathe** tube 4–8 cm long, 1.7–4 cm diam.; **berries** pale green or white, obovoid, 5–6 mm diam., style 1.5–1.6 mm wide, dark brown; stigma 0.6–0.9 mm wide with a deep medial pore; seeds ovoid, deeply ca. 1-ridged longitudinally, 1.2–1.4 mm long, 1 mm diam., drying light manila.

Xanthosoma poeppigii is found in the Amazon Basin in Bolivia (Beni, La Paz, Santa Cruz), Colombia (Putumayo), Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Sucumbios, Zamora-Chinchipe) and Peru (Cajamarca, Huánuco, Loreto, Pasco, San Martín, Ucayali) at 100–2100 m in *Tropical moist forest*, *Tropical wet forest* and *Premontane wet forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** 27 km SE of San Juan Bosco, second growth after clearing, 03°13'00"S, 78°24'00"W, 1270 m, 27 Jan. 1981, *Ahyn H. Gentry, Carmen Bonifaz & Jorge Llor C.* 30919 (MO). **Zamora-Chinchipe:** Vicinity of Ecuacorrientes copper mine development,



Figure 295. *Xanthosoma viviparum* Madison (not collected). Live plant showing petioles and leaf blades, adaxial surface.

valley of Río Waiwaime, along road to mine site at end of road, along trail down from parking spot, 03°34'44"S, 78°26'08"W, 1312 m, 4 Apr. 2006, *Thomas B. Croat* 96549 (MO, QCNE); Nangaritzza, vicinity of Las Orquídeas, near Cabañas Yankua, along new trail to Summit of Los Tepuis Conservation Area, just above road from Las Orcheas to new ferry, 04°14'55"S, 78°39'36"W, 870 m, 18 Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 98839 (MO, QCNE); Nangaritzza, Cordillera del Cóndor region, parroquia Zurmi, vicinity of Las Orquídeas, Cabañas Yancuam, 6 km N of Las Orquídeas, 12.1

km S of Zurmi, 19.6 km S of Guayzimi, along steep stream, 04°31'54"S, 78°33'48"W, 869 m, 19 Apr. 2006, *Thomas B. Croat* 97278 (MO, QCNE); Región de la Cordillera del Condor, Parroquia Surmi, Sector Hito el "Empalme", Comunidad Yawi, bosque primario premontano, 04°28'16"S, 78°39'09"W, 1200 m, 8 June 2005, *Wilson Quizhpe, V. Granda, D. Veintimilla, H. Salas & P. Wampash* 1225 (LOJA, MO). PERU. **Amazonas:** Cordillera del Cóndor, Cabeceras del Río Comainas, Puesto de Vigilancia 'Alfonso Ugarte' (PV3), cerca del campamento, 03°54'30"S, 78°25'20"W, 1200



Figure 296. *Xanthosoma viviparum* Madison (Croat 97200). Close-up of stem with numerous bulbils in leaf axils.

m, 5 Aug. 1994, *Hamilton Beltrán & Robin B. Foster* 1609 (F, USM).

5694435–37; isotypes, B, COL, K, M, NY, QCNE, RB, S, SEL, US).
Figures 292–294.

Xanthosoma purpureomaculatum Croat & L.P.Hannon, *Aroideana* 40: 351–359. 2017. Type: ECUADOR. Napo: vic. Baeza, 2 km E of jct. of Baeza Rd. with main Papallacta-Lago Agrio Rd., 00°27'S, 77°53'W, 1913 m, 13 Apr. 2003, *T.B. Croat, L.P. Hannon & N. Altamirano* 87651 (holotype, MO-

The species is a member of group *Xanthosoma* and is characterized by its robust habit, typically elongated thick trunk with scurfy surface, petiole sheathed in the lower ¼ and streaked or blotched with purple, especially in lower 2/5 to ½, thinly coriaceous, moderately bicolorous blades



Figure 297. *Xanthosoma viviparum* Madison (Croat *et al.* 105722). View of plant base with bases of petioles, inflorescences and infructescence, showing spathe tube green outside.



Figure 298. *Xanthosoma weeksii* Madison (Croat & Qualls 105589). Live plant showing petioles and leaf blades, adaxial surface.

with the tertiary veins in part sunken above as well as by having 2–5 inflorescence per axil with the spathe tube medium green outside, dark purple on inside of tube with the female spadix pale green to yellow-green or pale yellow.

Large terrestrial plant to 2 m tall; **stems** to 1.5 m tall, (3)4–10 cm diam., scurfy with old petiole bases. **LEAVES** with **petioles** 58–101 cm long, sheathed only in lower 1/4, medium green, matte, streaked or blotched adaxially with purple, especially in lower 2/5 to 1/2, streaked elsewhere on

petiole bases on more adult plants, sometimes solid dark purple in apical 1/2, free portion obtusely flattened adaxially with medial rib near sheath, terete midway, obtusely angular toward apex; **blades** broadly ovate-sagittate, 41.5–70 cm long, 35–58.5 cm wide (average 51.9 x 44.5 cm), 0.98–1.34 times longer than wide, 0.41–0.83 times as long as petioles, thinly coriaceous, moderately bicolorous, dark green and semiglossy to matte above, much paler and weakly glossy below, drying greenish; **anterior lobe** 28–46.5 cm long, broadly rounded on margins; **posterior lobes**



Figure 299. *Xanthosoma weeksii* Madison (Croat *et al.* 87741). Close-up of inflorescence showing spathe tube light green with purple margin outside.

broadly rounded, 21.4–31.5 cm long, 15.8–23 cm wide; **midrib** and major veins obtusely sunken and concolorous above or paler toward base of midrib and primary lateral veins sunken and slightly paler above, round-raised and slightly paler below; midrib sometimes dark purple-splotched below; **tertiary veins** in part sunken above, darker and raised below; reticulate veins flat, moderately prominent below; **basal veins** 12–13 pairs, 4 acroscopic, 7 basioscopic; **posterior ribs** straight, directed to the apex of lobe, naked (1.5)3–4 cm; **sinus** spatulate and 14–20 cm deep, 5.5–7.5 cm wide or closed and (3.5)5–8.5 cm deep, 4–5.5 cm wide. INFLORESCENCES 2–5 per axil; **peduncle** 14–24 cm long, pale green to white, matte; **spathe** 13.5–16.5 cm long; spathe tube 4–6.5 cm long, 1.3–3 cm diam., medium green, matte, heavily tinged violet-purple toward apex and on edges of open face outside on and base of blade, dark purple on inside of tube; blade creamy white on both surfaces; **spadix** 15–18 cm long; staminate portion 13–15.7 cm long, emitting a sweet and powerful mint-like scented; sterile portion 3–4 cm long, 12–14 mm diam., constricted area 9 mm diam., creamy; female portion pale green to yellow-green or yellow, weakly glossy, 2.0 cm long at rear, 2.7 cm long in front, 1.2 cm diam. midway, 9–10 mm at apex, 11–12 mm diam. at base. INFRUDESCENCE erect; **peduncle** 28–30 cm long; **spathe** medium green, tinged purple outside (sometimes purple on both surfaces), dark purple within; spadix greenish white when immature; to 7.5 cm long, 5.5 cm diam. when mature; **berries** 1–1.5 cm long, 7–9

mm diam., becoming pale green, turning bright orange at maturity with the spathe exfoliating from the top, drying tan with a blackish stigma 1.4–1.6 mm diam.; **seeds** 0.8–1.1 mm long, subspherical-ellipsoid, deeply 11–13 grooved-ridged longitudinally, drying tan.

Xanthosoma purpureomaculatum is endemic to Ecuador, known only from the eastern slopes of the Andes in Azuay, Morona-Santiago, Napo, Orellana, Pastaza, Sucumbios, Tungurahua and Zamora-Chinchipe Provinces at 230–2400 m in *Tropical wet forest* to *Premontane wet forest* and *Premontane rain forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Gualaquiza, Cordillera del Cóndor, Cuangos, 20 km east of Gualaquiza, near disputed Peru-Ecuador border, trail to stream, 03°23'S, 78°27'W, 1400–1500 m, 20 July 1993, *Abryn H. Gentry 80263* (MO, QCNE). **Zamora-Chinchipe:** Cordillera del Cóndor region, vicinity of Ecuacoriente copper mine development, valley of Río Waiwaime, along road to mine site, 9.5 km from mine headquarters, 6.5 km S of locked gate, 03°35'07"S, 78°26'05"W - 03°25'25"S, 78°26'19"W, 1280–1530 m, 10 Apr. 2006, *Thomas B. Croat 96892* (MO, QCNE); Along road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 14.4 km SE of Los Encuentros, 03°47'44"S, 78°37'01"W, 1188 m, 26 May 2003, *Thomas B. Croat & Mark Menke 89498* (MO, QCNE); Vicinity of Las Orquídeas, in forest across from Cabañas Yankuam, 04°15'05"S, 78°39'29"W, 870–890 m, 15

Sep. 2007, *Thomas B. Croat & Geneviève Ferry* 98610 (MO, QCNE).

Xanthosoma viviparum Madison, *Selbyana* 5(3–4): 358. 1981. Type: ECUADOR. Napo: Limoncocha, 240 m, 17 June 1978, *M.T. Madison, T. Plowman & ? L. Besse* 5429 (holotype, SEL!; isotypes, FI, KI, QCA!, , US!). **Figures 295–297.**

The species is a member of group *Elobatum* and is characterized by its many tiny greenish propagules in leaf axils, dark brownish green-drying ovate-subcordate blades, and inflorescences with a long peduncle, spathe tube green outside and inside and pale green or yellow-green pistillate spadix.

Small terrestrial plant to 40 cm tall; **stems** creeping or erect, often with many tiny greenish propagules in leaf axils; **internodes** 1–2.2 cm long, 1–3.5 cm diam., medium to dark green, glossy or semiglossy. LEAVES with **petioles** 8–32 cm long, 2–3 mm diam. near the top, narrowly and weakly sulcate adaxially, somewhat flattened and sulcate toward apex, dark green and matte, sheathed 1/3 to 2/3 their length; **blades** ovate-subcordate, 8–29 cm long, 4.5–20 cm wide, 1.4–2.0 times as long as wide, 0.8–1.5 times as long as petioles, widest in the lower half, acuminate at the apex, rounded to weakly lobed at base, thin and succulent, dark green and semiglossy above, paler and semiglossy below, drying dark brownish green and semiglossy above, medium

grayish green and glossy below; **midrib** obtusely sunken and concolorous above, narrowly raised and paler below; **primary lateral veins** 5–6 pairs, arising at a 40° angle, weakly sunken and concolorous above, convex and slightly darker below; **tertiary veins** thin and moderately distinct. INFLORESCENCES 1–2 per axil; **peduncle** 16–26 cm long, 4–6 mm diam., pale to medium green, spongy; **spathe** 8–22 cm long; tube 3.5–4 cm long, 11–15 mm diam., dark green and matte outside, slightly paler and glossy inside; blade creamy white and semiglossy outside, creamy white and matte inside; **spadix** 7.8–8 cm long; staminate portion 5.5–6.5 cm long, 4–6 mm diam. in the middle; sterile portion 1–2.7 cm long, 2–3 mm diam. in the middle, 5 mm diam. at the base, the lowermost staminodia in 2–3 spirals, 4 mm long, 1.6 mm diam., tapered toward the apex, the upper staminodia to 5.6 mm long, 1 mm wide; pistillate portion 1.5–2.5 cm long, 4–7 mm diam., cream or pale yellow-green.

Xanthosoma viviparum is found in Brazil (Acre), Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Sucumbios, Zamora-Chinchipe) and Peru (Amazonas, Loreto, Madre de Dios, Pasco and San Martín) at 90–1500 m in *Tropical moist forest*, *Tropical wet forest* and *Premontane rain forest* life zones.

Specimens seen: ECUADOR. **Morona-Santiago:** Limón Indanza, Región de la Cordillera del Cóndor, Parroquia Santa Susana, Kuankus, comunidad Shuar, sendero hacia la tarabita, bosque primario



Figure 300. *Xanthosoma zamoraense* Croat & Delannay (Croat 87238, MO-5745916). Herbarium specimen showing stem, petiole, leaf blades, adaxial and abaxial surfaces, and inflorescence partially cut open to expose pistillate portion of spathe.



Figure 301. *Xanthosoma zamoraense* Croat & Delannay (Croat 87238). View of leaf blade, adaxial surface.

de altura 30 m, 03°02'33"S, 78°12'58"W, 650 m, 14 June 2005, *Tuntiak Katan & Carlos Morales* 250 (MO, QCNE). **Zamora-Chinchipe:** Along the road from Los Encuentros to El Sarsa, Cordillera del Cóndor, 10.7 km E of Los Encuentros., 03°40'40"S, 78°38'28"W, 1066 m, 26 May 2003, *Thomas B. Croat & Mark Menke* 89465 (MO, QAP); Valle del Río Nangaritza, Miazi, sendero al Hito de Miazi, al este del campamento military, bosque primario sobre rocas calcáreas, Bosque muy húmedo Tropical, 04°18'S, 78°40'W, 1000–1100 m, 11 Dec. 1990, *Walter A. Palacios & David Neill* 6760 (AAU, IBE, K, MO, QCNE, US); Cordillera del Cóndor, parroquia Zurmi, vicinity of Las Orquideas, Cabañas Yancuam, ca. 3 km S of Las Orquideas, slopes W of Río Nangaritza, 04°15'01"S, 78°39'33"W, 1128–1250 m, 18 Apr. 2006, *Thomas B. Croat* 97200 (MO, NY, QCNE, S); Río Nangaritza, Pachicutza, camino al hito de Pachicutza, bosque primario sobre pendientes de 60%, suelos lentizoles, 04°07'S, 78°37'W, 900–1000 m, 18 Oct. 1991, *Walter A. Palacios & et al.* 8230 (MO, QCNE); Nangaritza, Parroquia Zurmi, Comunidad Centro Shaime (along Río Nangaritza), forest 2–4 km NW of Centro Shaime, forest on limestone outcrop (i.e., presence of sinkholes, rocks, and caves), evergreen wet forest, 04°04'S, 78°54'W, 1000 m, 15 Dec. 2001, *John L. Clark* 6531 (MO, QCA, QCNE, US);

Xanthosoma weeksii Madison, *Aroideana* 1(1): 24, f.[un-numbered] 1978. Type: Cultivated Miami, FL., ex ECUADOR: Pastaza: Puyo (originally

collected in 1977 by R. Weeks), 11 November 1978, *M.T. Madison* 4216 (holotype, SEL!; isotype, US!). **Figures 298 & 299.**

The species is a member of group *Elobatum* and is characterized by its internodes scurfy brown with old leaf base remains, ovate-lanceolate blades rounded or subcordate at the base drying dark green above and light grayish green below, and by its inflorescences with short peduncles and the spathe tube light green tinged violet-purple on the margin outside and dark purple inside.

Small terrestrial plant to 60 cm tall; white sap; **internodes** short, 1.8–4 cm diam., scurfy brown with old leaf base remains and pale slender fibers, densely transverse-fissured. LEAVES with **petioles** 16–40 cm long, drying ca. 2 mm diam., dark green, matte, terete midway, obtusely flattened and medially sulcate toward apex, petioles sheathed to above middle; **blades** ovate-lanceolate, 15–28 cm long, 6–13 cm wide, 1.5–2.8 times as long as wide, 0.7–1.1 times as long as petiole, widest near the middle, rounded or subcordate at the base, acuminate at the apex, thinly coriaceous, soft, dark green and matte or weakly glossy above, much paler and semiglossy below, drying dark green and semiglossy above, light grayish green and glossy below; **major veins** bluntly sunken and concolorous above; **midrib** narrowly round-raised and concolorous below; **primary lateral veins** 5–6 pairs, arising at a 30° angle, narrowly raised and darker below; **tertiary veins**

weakly prominent below.
INFLORESCENCES 1–6 per axil;
peduncle 3–8 cm long, drying ca. 2 mm diam., pale green, matte; **spathe** 7–10 cm long; tube 2.5–3 cm long, 8–12 mm diam., light green tinged violet-purple on the margin outside, dark purple and glossy inside; **spadix** 5.5–7 cm long; staminate portion 4.5–6 cm long, 3–4 mm diam.; sterile portion 2–2.5 cm long, 0.6–3 mm diam. in the middle, 2.4–5 mm diam. at the base, the lowermost staminodia in 2 spirals, 2.8–3 mm long, 0.8–1.2 mm wide, densely dark-speckled, staminodia in the constricted portion 2.5–3 mm long, 0.3 mm wide; pistillate portion 10–12 mm long, 3–4 mm diam., pale green.

Xanthosoma weeksii is found in Ecuador (Morona-Santiago, Napo, Pastaza, Zamora-Chinchiipe) and Peru (Amazonas, Junín, Loreto, Pasco, San Martín) at 200–1700 m in *Tropical wet forest* and *Premontane rain forest* life zones.

Specimen seen: ECUADOR. **Zamora-Chinchiipe:** Nangaritza, along Río Nangaritza, between Las Orquídeas and Miasi, 04°17'53"S, 78°39'00"W, 872 m, 17 Sep. 2007, *Thomas B. Croat & Geneviève Ferry 98810* (MO, QCNE, US).

Xanthosoma zamoraense Croat & Delannay, *Aroideana* 40: 447–449. 2017. Type: ECUADOR. Zamora-Chinchiipe: Along road from El Pangui to Zamora, in vicinity of El Pincho, 12.3 km S of El Pangui, left

along road to Río Zamora, steep forested hills above Río Zamora, ca. 3.5 km E of El Pincho, 03°34'S, 78°34'W, 800 m, 7 Sep. 2002, *T.B. Croat 87238* (holotype, MO-5745916; isotype, QCNE!).

Figures 300 & 301.

The species is a member of group *Xanthosoma* and is characterized by its short stems with internodes scurfy with persistent petiole bases, its dark-greenish-brown-drying ovate-cordate blades with obtusely sunken primary lateral veins and spatulate sinus, and its big long-pedunculated infructescences with the spathe tube medium green tinged purplish toward apex outside, dark purple inside.

Moderate size terrestrial plant to 1.2 m tall; **internodes** short, 2–6 cm diam., scurfy with persistent petiole bases. **LEAVES** with **petioles** ca. 88 cm long, 1.5 cm diam. near the middle, 6 mm diam. near the apex, medium to dark green, matte, obtusely somewhat flattened adaxially with medial ridge, sheathed ca. ½ their length, sheath 3 cm wide on each side; **blades** ovate-cordate, 60–63 cm long, 44–46 cm wide, 1.3–1.4 times as long as wide, 0.7 times as long as petiole, widest near the middle, acute at the apex with a slight acumen, thinly coriaceous, dark green and weakly glossy above, paler and matte below, bullate, drying dark greenish brown or dark brown and matte above, slightly lighter and weakly glossy below; **anterior lobe** 41–42 cm long, rounded and weakly sinuate on margins; **posterior lobes** 29–30 cm long,

18–21 cm wide, obtuse at the tip; **sinus** spatulate, 20 cm deep, 5–8 cm wide in widest area; **midrib** obtusely sunken and concolorous above, round-raised and paler below; **primary lateral veins** 5 pairs, arising at a 50–60° angle, obtusely sunken and concolorous above, round-raised and paler below; **basal veins** 7 pairs, the 1st pair free to the base or nearly so, 3 pairs acroscopic, 4 basoscopic; **posterior rib** naked 4–5 cm; **tertiary veins** prominent below but not markedly raised, darker than surface, not visible above; **upper surface** moderately smooth on magnification, sparsely and distinctly whitish punctate; **lower surface** finely and weakly granular. INFLORESCENCES erect; **peduncle** 14 cm long; **spathe** blade missing; tube 4 cm long, 1.7 cm diam., medium to dark green and weakly glossy outside, medium green and matte inside; pistillate flowers old, brownish. INFRUCTESCENCES erect; **peduncle** to 27 cm long; **spathe tube** 10 cm long, 6 cm diam., medium green and semiglossy outside, tinged purplish toward apex, dark purple and matte inside.

Xanthosoma zamoraense is endemic to Ecuador, known only from the Zamora river valley in Zamora-Chinchi Province at 760–800 m in a *Premeontane wet forest* life zone.

Specimen seen: ECUADOR. **Zamora-Chinchi:** Cordillera del Cóndor, along road from Namirez (22.3 km S of Yanzaza) to Nambija, 3 km above San Carlos, 03°46'44"S, 78°38'30"W, 762 m, 28 May

2003, *Thomas B. Croat & Mark Menke 89591* (MO, QCNE).

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founding Ecuador's QCA herbarium.

Table 1. List species present in the Ecuadorian portion of the Cordillera del Cóndor, with the corresponding number of specimens found.

Species	# of specimens seen
<i>Adelonema crinipes</i> (Engl.) S.Y.Wong & Croat	2
<i>Adelonema picturatum</i> (Linden & André) S.Y. Wong & Croat	12
<i>Anthurium achupallense</i> Croat	4
<i>Anthurium amoenum</i> Kunth & C.D. Bouché	18
<i>Anthurium arisaemoides</i> Madison	17
<i>Anthurium atropurpureum</i> R.E. Schult. & Maguire	3
<i>Anthurium atropurpureum</i> var. <i>arenicola</i>	1
<i>Anthurium banderasense</i> Croat	1
<i>Anthurium bogneri</i> Croat	12
<i>Anthurium bomboizense</i> Croat	9
<i>Anthurium breviscapum</i> Kunth	46
<i>Anthurium ceronii</i> Croat	3
<i>Anthurium chloron</i> Croat	1
<i>Anthurium clarkei</i> Croat	5
<i>Anthurium clavigerum</i> Poepp.	6
<i>Anthurium constrictum</i> Croat & Carlsen	4
<i>Anthurium corrientense</i> Croat	1
<i>Anthurium curtispadix</i> Croat	1
<i>Anthurium cutucuense</i> Madison	4
<i>Anthurium dolichocnemum</i> Croat	5
<i>Anthurium dombeyanum</i> Brongn. ex Schott	1
<i>Anthurium effusilobum</i> Croat	5
<i>Anthurium effusispathum</i> Croat	5
<i>Anthurium ernestii</i> Engl. var. <i>ernestii</i> Croat	5
<i>Anthurium fasciale</i> Sodiro	2

<i>Anthurium ferryae</i> Croat	2
<i>Anthurium flavolineatum</i> Sodiro	1
<i>Anthurium fornicifolium</i> Croat	1
<i>Anthurium grex-avium</i> Madison	1
<i>Anthurium harlingianum</i> Croat	9
<i>Anthurium herthae</i> K. Krause	1
<i>Anthurium ionanthum</i> Croat	6
<i>Anthurium ivanportillae</i> Croat	1
<i>Anthurium jamboense</i> Croat	1
<i>Anthurium lapoanum</i> Croat, D.P. Hannon & Hormell	4
<i>Anthurium lingua</i> Sodiro	23
<i>Anthurium longegeniculatum</i> Engl.	3
<i>Anthurium longistrorsum</i> Croat	14
<i>Anthurium longiusculum</i> Croat	4
<i>Anthurium losencuentrosense</i> Croat	1
<i>Anthurium miazense</i> Croat	2
<i>Anthurium michelii</i> Guillaumin	6
<i>Anthurium microspadix</i> Schott	4
<i>Anthurium mindense</i> Sodiro	9
<i>Anthurium moronense</i> Croat & Carlsen	8
<i>Anthurium muyunense</i> Croat	6
<i>Anthurium nangaritense</i> Croat	6
<i>Anthurium nigrolaminum</i> Croat & D.E. Weber	3
<i>Anthurium obtusum</i> (Engl.) Grayum	1
<i>Anthurium ovatifolium</i> Engl.	15
<i>Anthurium oxybelium</i> Schott	8
<i>Anthurium pachylaminum</i> Croat	2
<i>Anthurium pallidispadix</i> Delannay, N. Hartley & Croat	4
<i>Anthurium patens</i> Croat	10
<i>Anthurium penningtonii</i> Croat	9
<i>Anthurium polyschistum</i> R.E. Schult. & Idrobo	1
<i>Anthurium pseudoclavigerum</i> Croat	1
<i>Anthurium sagittatum</i> (Sims) G. Don	8

<i>Anthurium scandens</i> (Aubl.) Engl.	3
<i>Anthurium soukupii</i> Croat	3
<i>Anthurium toasae</i> Croat	13
<i>Anthurium triphyllum</i> Brongn. ex Schott	30
<i>Anthurium truncicola</i> Engl.	14
<i>Anthurium uleanum</i> Engl.	1
<i>Anthurium valenzuelae</i> Croat & N. Altam.	5
<i>Anthurium variegatum</i> Sodiro	2
<i>Anthurium versicolor</i> Sodiro	16
<i>Anthurium waiwaimense</i> Croat	1
<i>Anthurium walhertii</i> Croat	3
<i>Anthurium walterlewisianum</i> Croat	1
<i>Anthurium warintsense</i> Croat	1
<i>Anthurium weberbaueri</i> Engl.	3
<i>Anthurium yankuamense</i> Croat	1
<i>Caladium bicolor</i> (Aiton) Vent.	1
<i>Caladium steudnerifolium</i> Engl.	7
<i>Chlorospatha longipoda</i> (K. Krause) Madison	2
<i>Chlorospatha portillae</i> Croat & L. P. Hannon	4
<i>Chlorospatha pubescens</i> Croat & L. P. Hannon	4
<i>Dieffenbachia cannifolia</i> Engl.	6
<i>Dracontium spruceanum</i> (Schott) G.H. Zhu	7
<i>Monstera adansonii</i> subsp. <i>laniata</i> (Schott) Mayo & I.M. Andrade	1
<i>Monstera aureopinnata</i> Croat	3
<i>Monstera lechleriana</i> Schott	20
<i>Monstera pinnatipartita</i> Schott	2
<i>Philodendron acutifolium</i> K. Krause	11
<i>Philodendron alliodorum</i> Croat & Grayum	6
<i>Philodendron asplundii</i> Croat & M.L. Soares	12
<i>Philodendron atratum</i> Croat	7
<i>Philodendron attenuatum</i> Croat	15
<i>Philodendron barrosoanum</i> G.S. Bunting	1
<i>Philodendron campii</i> Croat	4

<i>Philodendron colombianum</i> R.E. Schult.	7
<i>Philodendron cuangosense</i> Croat	1
<i>Philodendron deflexum</i> Poepp. ex Schott	10
<i>Philodendron ernestii</i> Engl.	9
<i>Philodendron heleniae</i> subsp. <i>amazonense</i> Croat	2
<i>Philodendron herthae</i> K. Krause	2
<i>Philodendron heterophyllum</i> Poepp.	2
<i>Philodendron huaynacapacense</i> Croat	1
<i>Philodendron kroemeri</i> Croat	9
<i>Philodendron mamei</i> André	4
<i>Philodendron micranthum</i> Poepp. ex Schott	2
<i>Philodendron nangaritense</i> Croat	2
<i>Philodendron palaciosii</i> Croat & Grayum	5
<i>Philodendron paloraense</i> Croat	2
<i>Philodendron parvilobum</i> Croat	7
<i>Philodendron pedunculum</i> Croat & Grayum	1
<i>Philodendron pseudoverrucosum</i> Croat	1
<i>Philodendron pulchrum</i> G.M. Barroso	2
<i>Philodendron ruizii</i> Schott	9
<i>Philodendron schmidtiae</i> Croat & Cerón	16
<i>Philodendron verrucosum</i> L. Mathieu ex Schott	10
<i>Rhodospatha katipas</i> Croat	7
<i>Rhodospatha latifolia</i> Poepp.	22
<i>Rhodospatha neillii</i> Croat	13
<i>Spathiphyllum barbourii</i> Croat	9
<i>Spathiphyllum cannifolium</i> (Dryand. ex Sims) Schott	4
<i>Spathiphyllum davidneillii</i> Croat	1
<i>Spathiphyllum juninense</i> K. Krause	10
<i>Spathiphyllum pygmaeum</i> Bogner	1
<i>Stenospermation amomifolium</i> (Poepp.) Schott	8
<i>Stenospermation arborescens</i> Madison	10
<i>Stenospermation condorensis</i> Croat & Delannay	1
<i>Stenospermation longistamineum</i> Croat & Neely	2

<i>Stenospermation parvum</i> Croat & A. Gómez	8
<i>Stenospermation rusbyi</i> N.E. Br.	2
<i>Stenospermation zeacarpium</i> Madison	19
<i>Syngonium podophyllum</i> Schott	2
<i>Xanthosoma crassilaminum</i> Croat & L. P. Hannon	2
<i>Xanthosoma hannoniae</i> Croat	2
<i>Xanthosoma hylaeae</i> Engl. & K. Krause	13
<i>Xanthosoma nangaritzense</i> Croat & Delannay	2
<i>Xanthosoma poeppigii</i> Schott	6
<i>Xanthosoma purpureomaculatum</i> Croat & L. P. Hannon	4
<i>Xanthosoma viviparum</i> Madison	6
<i>Xanthosoma weeksii</i> Madison	1
<i>Xanthosoma zamoraense</i> Croat & Delannay	1

Table 2. List of collectors of Araceae specimens for the Ecuadorian portion of the Cordillera del Cóndor.

George Argent	1976
Bradley Bennett	1988, 1989
Birgitte Bergmann	1991
Jorge Caranqui	2000
Carlos Cerón	1991
John Clark	2001, 2002
Tom Croat	1980, 1992, 1995, 1999, 2002, 2003, 2004, 2006, 2007, 2015
Martha Cuascota	2000
Tom Delinks	2002
Efraín Freire	2000
Patricio Fuentes	1999
Alwyn Gentry	1993
Gunnar Harling	1985
Jaime Jaramillo	1990, 1991
Bruce MacBryde	1972
Carlos Morales	2005, 2006
David Neill	1990, 2000, 2001, 2002, 2003, 2005, 2006, 2008, 2009, 2012
Walter Palacios	1990, 1991
Wilson Quizhpe	2005, 2006, 2007
Veerle Van den Eyden	1996, 1997
Hendrik van der Werff	2004



ANTHURIUM WALTERI-LEWISIANUM