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**Front Cover:** *Anthurium alluriquinense* Croat (Croat & Ferry 98449).

**Back Cover:** *Schismatoglottis gangsai* S. Y. Wong, Aisahtul & P. C. Boyce. Images © P.C. Boyce.

# A Revision of *Anthurium* (Araceae) section *Polyneurium* for Carchi Province, Ecuador

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## ABSTRACT

Thirty-four species of *Anthurium* section *Polyneurium* are described for Carchi Province in Ecuador. Species which have already been described include the following 17 species: *A. alluriquinense* Croat, *A. bernalii* Croat, *A. cuspidatum* Masters, *A. hebetatilaminatum* Croat & J. Rodríguez, *A. lancea* Sodiro, *A. lineolatum* Sodiro, *A. longicaudatum* Engl., *A. maculosum* Sodiro, *A. membranaceum* Sodiro, *A. multinervium* Engl., *A. oreophilum* Engl., *A. panduriforme* Schott, *A. pulverulentum* Sodiro var. *pulverulentum*, *A. pulverulentum* Sodiro var. *adsimile* Croat & J. Rodr., *A. rivulare* Sodiro, *A. subcarinatum* Engl. and *A. umbraculum* Sodiro. Seventeen species are new to science: *A. aciculare* Croat,

*A. aciforme* Croat & Delannay, *A. atroguttatum* Croat, *A. boylei* Croat, *A. carmenense* Croat, *A. cobbiae* Croat & Delannay, *A. dalmauii* Croat, *A. debile-emarginatum* Croat, *A. dichromum* Croat, *A. elisalevyae* Croat, *A. gelpii* Croat, *A. griseosessile* Croat, *A. melanochlorum* Croat, *A. mongonense* Croat, *A. narvaezii* Croat, *A. pseudonigrescens* Croat and *A. toisanense* Croat. Two additional species are described but are based on sterile or poor-quality specimens. These are considered to be new species but are numbered and not named. In addition, one new species from neighboring Esmeraldas Province, *A. misturatum* Croat, is also described. A dichotomous key is provided for all species.



## KEY WORDS

Araceae, *Anthurium*, sect. *Polyneurium*, Ecuador, Carchi, New species.

## INTRODUCTION

This publication deals with *Anthurium* section *Polyneurium* and is intended to be one of several publications dealing with the Araceae of Carchi Province, Ecuador.

### Araceae of Carchi Province

The Araceae is one of the larger families of flowering plants in the Neotropics but remains the most poorly known taxonomically. Ecuador is one of the richest areas in the world for Araceae and the far northeastern corner of the country which abuts Colombia is still poorly known. It is replete with undescribed species of Araceae. A total of four expeditions were made to the Department of Carchi, two of them funded by the National Geographic Society. The region has proven to be an area of high endemism. Sets of specimens have been deposited at the National Herbarium (QCNE) in Quito for the last project.

The Flora of Ecuador Checklist (Croat, 1999) reported 404 published species of Araceae (many of which are still poorly known) but it is estimated that the total aroid flora contains about 1500 species and many areas contain a high percentage of endemic species with 60% or more of the species considered to be undescribed.

Many species in the Ecuadorian flora lack complete geographical range, definitive relationships or a discussion of variability, nomenclature, phenology and biological features. The lack of good well-described herbarium material from Ecuador, the extreme morphological plasticity, and the need to study living material warrant considerable field work. The Araceae is a family renowned for high species diversity and a large percentage of endemic species (Carlsen & Croat 2007; Croat 1991, 1997, 1999, 2004; Croat & Hannon, 2015; Croat & Rodríguez 1995; Croat & Teisher, 2018; Zhu & Croat, 2004). Ecuador, which lies in the heart of the tropics on both sides of the Equator is among the richest areas on earth for the study of Araceae (Croat, 1995). This study of the Araceae in Carchi Province will not only contribute to our understanding of the biogeography of Ecuador but will be a direct benefit to the completion of the Araceae treatment for the '*Flora of Ecuador*'.

### Studies of Araceae in Carchi Province

The far western areas of Ecuador are now much better-known owing to these National Geographic sponsored studies in Carchi Province but some of the more remote areas are still poorly known. Many of the collections included in this report appear to clearly be new to science but are sterile or incomplete and eventually must be recollected to be described.

The earliest collections from the region were made on an expedition by Dr.

Michael Madison, Libby Besse and Tim Plowman, operating out of Selby Gardens in Sarasota, Florida. At that time, a road went from Tulcán on the Colombian border through the Paramo del Angel to the village of Maldonado. Madison and his group walked on to the village of El Chical, located at 1200 m then on down in the lowlands, passing through Piedras Blancas, then San Marcos. Another expedition was carried out by Scott Hoover who also collected in the region, especially at Cerro Golondrinas.

The senior author's own experience in the area began many years ago. He had been working extensively in the Lita-San Lorenzo region for several years and expected to find few species that were different from those found in the Lita-San Lorenzo region. He was surprised to find that he did not recognize many species in the region. Many of these species have proven to be new to science.

The region has since been augmented by an additional road that extends from El Chical to La Virginia (El Limonal). This has only recently been open to exploration and has proven to have many new species. As is true of all newly opened roads there is usually limited time to explore the region to collect the new species before the forest is decimated and turned into agricultural units. Already much of the region has been converted into pasture.

The number of species that have proven to be new in this very wet region is very high. For example, the Lita-San Lorenzo region with over 250 species of Araceae has proven to have nearly one half of its species being new to science and the situation in the northern perimeter in the valley of the Río San Juan has proven to be equally species-rich. New access by road is also now available in the Río Baboso area near Lita which lies near the boundaries of both Imabura and Esmeraldas Provinces.

### **Field work in Carchi Province**

The Maldonado-El Chical-Peñas Blancas Region and the El Chical to La Virginia were extensively surveyed and the portions of southern Carchi Province near Lita were also studied owing to new access over the Río Mira near Lita. The region between Peñas Blancas and San Marcos on the south side of the Río San Juan has been much degraded but still has remnants of disturbed virgin forest. A provisional road now extends for a considerable distance into the lowlands but is frequently closed to vehicular traffic by landslides. Nevertheless, the expedition was able to get down to as low as 600 m and find several very interesting areas of forest.

The expedition headquarters was set up in El Chical in the home of James Levy whose daughter Elisa Levy acted as our local representative and field assistant. Other participants included Geneviève Ferry from the University of Nancy in

France, David Scherberich from the Lyon Botanical Garden in France and Claudia Henríquez from Washington University in St. Louis, Missouri. We used this headquarters in El Chical for studies in southern Carchi Province and at El Chical which is centrally located and an easy drive to most localities approachable by road. This project has sampled Araceae in all accessible areas. While there are few roads in the western Carchi region it benefits by being an area relatively narrow with a long road running throughout much of the region. The area between El Chical and Gualchan proved particularly rich in undescribed species. Collections were field pressed and preserved in alcohol since drying facilities in the area do not exist., then were transported to Quito and dried at the Herbario Nacional in Quito (QCNE). Herbarium collections, including duplicates of all numbers and all unicate collections were deposited at the National Herbarium of Ecuador (QCNE).

A second trip was made to Carchi Province during August 2013 and participants were Natalia Castaño from the Universidad Nacional in Bogotá and Alejandro Zuluaga from the University of Wisconsin in Madison, Wisconsin.

## RESULTS

A review of the collections of the Carchi Province has shown the region to be exceedingly rich for Araceae with a total of 395 species, 247 of which are now named. The remainder all appear to be distinct

species, but the collections are not yet determined. Some are sterile or are inadequate to serve as type specimens even though they mostly appear to be undescribed species. Seventy-four of the named species represent species which are new to science and most of the other collections without names probably will prove to be undescribed species. If this proves to be the case the total number of new species would be 146 species which would represent 44 percent of the total Aroid flora.

The Araceae of Carchi Province has proven to be exceedingly rich and in portions of the region, especially at elevations between Tobar Donoso near the border of Esmeraldas and the village of Maldonado but even at elevations up to more than 2500 meters many new species have been discovered. It is clear that major investigations are required in adjacent areas of Nariño Department in Colombia where even fewer studies have been made.

*Anthurium* is the largest genus in the flora with approximately 146 named species (including 7 taxa) and 72 unnamed species. The region is particularly rich in section *Cardiolonchium* (with 35 species) and section *Calomystrium* with 29 species. Both are most abundant at middle to lower elevations. Section *Belolonchium* with 26 species is especially abundant at higher elevations. Even larger and found at middle to lower elevations is section *Polyneurium* (33 species), followed by section *Porphyrochitonium* (20 species) and section *Xialophyllum* (17 species), section *Tetraspermium* (6 species

totaling 8 taxa); section *Digitinervium* (with 7 species), section *Multinervium* (with 12 species) and section *Decurrentia* (8 species).

More than 60 percent of all species are deemed to be new to science.



**KEY TO SPECIES OF *POLYNEURIUM* FROM CARCHI PROVINCE**

1a. Leaf blades with distinct posterior lobes.

2a. Spadix violet-purple at anthesis.

3a. Sinus parabolic, V-shaped or arcuate.

4a. Sinus V-shaped.

5a. Primary lateral veins > 20 pairs.

6a. Spadix short, stubby, prominently stipitate, 10–12 cm long . . . . . *A. alluriquinense* Croat

6b. Spadix moderately long-tapered, sessile . . . . . *A. elisalevyae* Croat

5b. Primary lateral veins < 20 pairs.

7a. Small plants with blades to 41 cm long.

8a. Cataphylls persisting as fibers, spadix 6–7 cm long, plant drying brown . . . . . *A. gelpii* Croat

8b. Cataphylls persisting intact on upper nodes, spadix 8–10.5 cm long, plant drying pale green to yellow-brown . . . . . *A. cuspidatum* Masters

7b. Large plants with blades to 60 cm long, cataphylls persisting as fibers, drying green . . . . . *A. oreophilum* Sodiro

4b. Sinus parabolic or arcuate.

9a. Cataphylls persisting as fibers.

10a. Internodes much longer than broad; leaf blades drying blackened; spadix red or reddish . . . . . *A. pseudonigrescens* Croat

- 10b. Internodes short; leaf blades drying greenish to brownish to yellow-brown; spadix purple-violet or unknown.
- 11a. Primary lateral veins closely spaced.
- 12a. Leaf blades drying yellow-brown; cataphyll fibers pale and weak; spadix > 1 cm diam., moderately stubby . . . . . *A. dalmanii* Croat
- 12b. Leaf blades drying green; cataphyll fibers coarse, red-brown, spadix usually less than 5 mm diam., long-cylindroid . . . . . *A. carmenense* Croat
- 11b. Primary lateral veins widely spaced.
- 13a. Blades ovate-triangular, almost as broad as long . . . . . *A. rivulare* Sodiro
- 13b. Blades ovate, much longer than broad.
- 14a. Small plants with blades to 25 cm long and with small inflorescences with spadix to 5.5 cm long.
- 15a. Spathe green . . . . . *A. griseosessile* Croat
- 15b. Spathe purple or cream striated with purple . . . . . *A. cobbiae* Croat & Delannay
- 14b. Large plants with blades to 70 cm long, 1–1.9 times longer than wide, and large inflorescences with spadix to 21 cm long . . . . . *A. longicaudatum* Engl.
- 9b. Cataphylls persisting mostly intact.
- 16a. Leaf blades > 2.3 times longer than wide.
- 17a. Primary lateral veins 9–14 pairs, widely spaced, more than 1.5 cm apart (sometimes 2–3 cm apart); basal veins 1 (sometimes 2) free to the base . . . . . *A. lineolatum* Sodiro

- 17b. Primary lateral veins 19–23 pairs, closely spaced; tertiary veins flat, much less conspicuous than the prominently raised primary lateral veins . . . . . *A. hebetatilaminum* Croat
- 16b. Leaf blades < 1.0–1.3 times longer than broad; primary lateral veins closely spaced, less than 1.5 cm apart; basal veins 2(3) free to base.
- 18a. Cataphylls to 23 cm long; leaf blades with the posterior ribs to 1 cm long; basal veins branching near the base; tertiary veins prominently equal to primary lateral veins . . . . . *A. dichromum* Croat
- 18b. Cataphylls to 10 cm long; leaf blades with posterior ribs to 6 mm long; basal veins not branching near base.
- 19a. Species growing at low elevations (ca. 450 m) .. . *A. misturatum* Croat
- 19b. Species growing at high elevations (ca. 2000 m) .. . *A. narvaezii* Croat
- 3b. Leaf blades with sinus hippocrepiform or spatulate.
- 20a. Posterior ribs naked > 3 cm.
- 21a. Leaf blades bullate above . . . . . *A. toisanense* Croat
- 21b. Leaf blades smooth above . . . . . *A. debile-emarginatum* Croat
- 20b. Posterior ribs naked < 2 cm.
- 22a. Leaf blades drying blackened, moderately coriaceous . . . . . *A. pseudonigrescens* Croat
- 22b. Leaf blades drying greenish or greenish brown, drying moderately thin.
- 23a. Leaf blades < 25 cm long x 12 cm wide, the surface minutely black-speckled . . . . . *A. atroguttatum* Croat

- 23b. Leaf blades > 25 cm long, > 12 cm wide; surface not minutely black-speckled.
- 24a. Leaf blades with posterior ribs ending abruptly, with 3 spreading basal veins; leaf blade apex narrowly and abruptly acuminate; collective veins arising from 1<sup>st</sup> pair of basal veins, 5–6 mm from margin.
- 25a. Sinus very narrowly spathulate, posterior ribs lacking or no more than 4 mm long . . . . . *Species #2*
- 25b. Sinus wider, posterior ribs 0.7–2.1 cm long . . . *A. lineolatum* Sodiro
- 24b. Leaf blades with posterior ribs not ending abruptly, to > 3cm long with 3 branches at different distances from petiole; leaf blade apex short-weakly acuminate; collective veins arising from 4th pair of basal veins, 2–3 mm from margin . . . . . *A. mongonense* Croat
- 2b. Spadix yellow, blue-green or green (sometimes tinged with rose) at anthesis.
- 26a. Leaf blades with more than 20 primary lateral veins.
- 27a. Leaf blades upper surface bullate, with tertiary veins prominently raised below; spadix greenish brown. . . . . *A. bernalii* Croat
- 27b. Leaf blades upper surface moderately smooth (at least between the veins) with tertiary veins not forming close reticulum below; spadix bluish green, glaucous.
- 28a. Primary lateral veins ca. 25 pairs, blades drying light green above . . . . . *A. pulverulentum* Sodiro var. *pulverulentum*
- 28b. Primary lateral veins 33–38 pairs, narrowly spaced, blades generally drying green above . . . . . *A. pulverulentum* Sodiro var. *adsimile* Croat & J. Rodr.
- 26b. Leaf blades generally with fewer than 20 pairs of primary lateral veins.
- 29a. Stems with internodes elongate; sinus parabolic; spadix about 30 times longer than broad.



- 30a. Spadix green at anthesis . . . . . *Species #1*
- 30b. Spadix yellow at anthesis . . . . . *A. multinervium* Engl.
- 29b. Stems with internodes short.
- 31a. Posterior ribs lacking, sinus V-shaped, short and narrow; spadix ca. 10 times longer than broad . . . . . *A. melanochlorum* Croat
- 31b. Posterior ribs present and conspicuous; sinus parabolic to arcuate-decurrent, sometimes hippocrepiform.
- 32a. Leaf blades drying pale green & glossy; sinus parabolic; spadix bright yellow . . . . . *A. panduriforme* Schott
- 32b. Leaf blades drying brown or blackened.
- 33a. Medium-size plants with blades to 48 cm long, 1.2–1.3 times longer than wide; spadix dark green . . . . . *A. lancea* Sodiro
- 33b. Large plants with blades to 90 cm long, ca. 1.5 times longer than wide; spadix green, yellow to yellowish, brown or reddish to red . . . . . *A. umbraculum* Sodiro
- 1b. Leaf blades lacking distinct posterior lobes, sometimes subcordate.
- 34a. Leaf blades rounded or nearly so at base.
- 35a. Blades less than 3 times longer than wide.
- 36a. Blades 19–33 pairs of closely spaced primary lateral veins . . . . . *A. membranaceum* Sodiro
- 36b. Blades 6–8 pairs of widely spaced primary lateral veins . . . . . *A. maculosum* Sodiro
- 35b. Blades more than 3 times longer than wide.

- 37a. Blades drying green . . . . . *A. subcarinatum* Engl.
- 37b. Blades drying reddish brown . . . . . *A. aciforme* Croat & Delannay
- 34b. Leaf blades acute or attenuate at base.
- 38a. Spathe linear-lanceolate, green; spadix purplish . . . . . *A. aciculare* Croat
- 38b. Spathe ovate to ovate-elliptic, purple, twisted; spadix cylindroid, whitish, curved . . . . . *A. boylei* Croat

***Anthurium aciculare*** Croat, **sp. nov.** Type: Ecuador. Esmeraldas: Lita-San Lorenzo Road, 19.4 km W of Río Lita, (new road), vic. Alto Tambo, 00°54'N, 78°32'41"W, 829 m, 5 Oct. 1999, *Croat, R. Mansell, L. P. Hannon & B. Owen 83022* (holotype, MO-4967691; isotypes, K, QCNE). **Figures 1–4.**

The species is a member of section *Polyneurium* characterized by its narrowly lanceolate and markedly acuminate leaves with a large length-width ratio, and by its dark purple-violet to purple-brown spadix. Also characteristic of the species is the green spathe with frequently purple-tinged margins as well as the green berries turning purple at maturity.

Terrestrial to epiphytic; **internodes** short, to 4 cm long, 4–10 mm diam.; **cataphylls** to 6.5 cm long, green, deciduous, sometimes persisting semi-intact or as fibers. LEAVES with **petioles** 13.8–33.7 cm long, 1.5–2.5 mm diam., terete, weakly narrowly and obtusely sulcate,

medium to dark green, weakly glossy; geniculum to 1.5 cm long, obtusely and broadly sulcate, drying slightly darker than petiole to almost black; **blades** lanceolate, 18.3–39.7 cm long, 4.2–7.7(10) cm wide, 3–6 (8.6) times longer than wide, as long as to 2.2 times longer than petiole, markedly long-acuminate or caudate-acuminate at apex with acumen to 3.5 cm long, attenuate to weakly obtuse at base, subcoriaceous, densely and concolorously granular above and below, dark green and subvelvety to weakly glossy above, moderately paler and semiglossy below, rarely matte-sublustrous above and matte below, drying gray to yellow-brown (rarely gray-green) above, gray-green to gray-yellow below, generally paler below, epunctate; **midrib** narrowly raised often in valley above, round-raised and paler below, drying concolorous above, noticeably paler below; **primary lateral veins** 9–11 per side, arising at a 30–40° angle from midrib and curving toward apex, sunken or weakly quilted-sunken and concolorous above, prominently narrowly raised and concolorous below, drying concolorous above, slightly paler below;



**Figure 1.** *Anthurium aciculare* Croat (*Croat et al.* 82419). View of plant base with stem, adventitious roots and petioles.





**Figure 2.** *Anthurium aciculare* Croat (Croat 82317). View of leaf blades, adaxial surface.





**Figure 3.** *Anthurium aciculare* Croat (Croat et al. 82419). View of inflorescence and leaf blade, abaxial surface.





**Figure 4.** *Anthurium aciculare* Croat (not collected). View of infructescence.

**collective veins** arising near base, prominently sunken above, prominently raised below, to 1 cm from the margin; antimarginal vein to 1 mm from margin along entire blade length. INFLORESCENCE erect; **peduncle** 14–33.9 cm long, 1.5–2 mm diam., medium green, drying yellow-brown; **spathe** lanceolate and spreading, 2.2–4.5 cm long, 0.6–0.9 cm wide, green (often with margins tinged purple), drying brown; **spadix** lanceolate, 2.6–7 cm long, 2–4 mm diam., dark violet-purple to purple-brown, semiglossy, immature spadix yellow-green to green; **pistils** weakly emergent. INFRUCTESCENCE with **berries** green turning purple, early emergent.

*Anthurium aciculare* ranges from Colombia (Nariño) to Ecuador (Esmeraldas, Carchi). It is mostly known from throughout the eastern part of the Lita-San Lorenzo region, Esmeraldas Province at 425–1000 m in *Premontane wet forest*, *Premontane rain forest* and *Tropical wet forest* life zones.

This species resembles some species of section *Xialophyllum* in blade shape, but is included here because it differs from members of that section in having a violet-purple spadix and generally darker drying and glossier blades.

Data from collection *Aulestia* 768 indicates the spathe color as pink and the mature berry color as red. However, the

specimen was seen in fruit, which may account for some of the color differences.

*Specimens seen:* ECUADOR. **Carchi:** Maldonado, Parroquia Tobar Donoso, Reserva Etnica Awá, Sabalera, 00°55'N, 78°32'W, 900 m, 22 Nov. 1992, *C. Aulestia, Milton Aulestia & M. Guanga* 725 (MO, QCNE); *C. Aulestia, Milton Aulestia & M. Guanga* 766 (MO, NY); *C. Aulestia, Milton Aulestia & M. Guanga* 768 (MO, QCNE); Wet plateau above San Marcos de los Coaiqueres, on trail towards Gualpi Bajo, 01°06'N, 78°17'W, 1000 m, 7 Feb. 1985, *B. Øllgaard, J. Korning, K. Thomsen & T. Illum* 57266 (AAU, MO); Tulcán, Parroquia Tobar Donoso, Sector Sabalera, Reserva Indígena Awá, Noreste Casa Comunal, 01°00'N, 78°24'W, 650–1000 m, 19–28 June 1992, *Galo A. Tipaz, Jorge Zuleta & N. Guanga* 1405 (MO, QCNE); Tulcán, Parroquia Chical, Sector Gualpi medio, Reserva Indígena Awá, sendero a San Marcos al norte de la casa communal, 01°02'N, 78°16'W, 1000 m, 23–27 May 1992, *Galo A. Tipaz, Carlos Quelal & Cantincuz, Gonzalo* 1085 (MO, QCNE).

***Anthurium aciforme*** Croat & Delannay, **sp. nov.** Type: Ecuador. Carchi: Tobar Donoso, Río San Juan, bosque siempre verde de tierras bajas, 01°10'N, 78°29'W, 125 m, 4 Sep. 2009, *Efraín Freire & Quillupangui, R.* 8762 (holotype, QCNE). **Figure 5.**

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





**Figure 5.** *Anthurium aciforme* Croat (Freire & Quillupangui 8762, QCNE). Herbarium specimen showing stem, leaf blades, adaxial and abaxial surfaces, petioles and inflorescence.





**Figure 6.** *Anthurium alluriquinense* Croat (Croat & Ferry 98449). Whole plant with stem, petioles, leaf blade, abaxial surface, and inflorescence.





**Figure 7.** *Anthurium alluriquinense* Croat (Croat & Ferry 98449). Close-up of leaf blade, abaxial surface, and inflorescence.

epiphytic habit, short stature, lanceolate blades 4.1–4.7 times longer than wide and rounded at the base, and by its small inflorescences with a green spathe and a purplish brown spadix.

Epiphytic; **internodes** short, 1 cm diam.; **cataphylls** 11 cm long, 7 mm diam., deciduous except of the intact basal portion. LEAVES with **petioles** 13–15 cm long, drying 2 mm diam.; **blades** oblong-ob lanceolate, 35–38 cm long, 8–8.5 cm wide, 4.1–4.7 times longer than wide, 2.5–2.7 times longer than petiole, rounded to slightly cuneate at the base, acute and short-acuminate at apex, broadest at the middle to the upper third, drying semiglossy and reddish brown above, semiglossy and yellowish brown below; **midrib** drying slightly raised and concolorous above, round-raised and moderately darker below; **primary lateral veins** 18–20 pairs, arising at a 50° angle, interprimary veins present; **collective veins** arising from the 1<sup>st</sup> pair of primary lateral veins, 2–3 mm from margin; **tertiary veins** indistinct. INFLORESCENCE erect; **peduncle** 25.5 cm long, drying 1–2 mm diam.; **spathe** lanceolate, erect-spreading, decurrent, 7.5 cm long, 1–1.5 cm wide in the middle, long-acuminate, green; **spadix** cylindrical, 6.5 cm long, 3–4 mm diam., purplish brown.

*Anthurium aciforme* is endemic to Ecuador, found only in Carchi Province at 125 m in a *Premontane wet forest* life zone.

With its lanceolate blades, *Anthurium aciforme* resembles *Anthurium aciculare* Croat and *Anthurium subcarinatum* Engl. but *A. aciculare* differs by having blades that are attenuate at the base and by its purple spadix and *A. subcarinatum* differs by its blades narrower at the base and drying light grayish brown and by its lower number of primary lateral veins arising at a sharper angle.

***Anthurium alluriquinense*** Croat, *Aroideana* 31: 25–28. 2008. Type: Ecuador. Pichincha: Along old road from Santo Domingo de los Colorados to Quito via Chiriboga and San Juan, 10.9 km NE of La Unión and Río Pilatón, 00°18'21"S, 78°53'03"W, 1233 m, 17 Mar. 2006, T. B. Croat, C. Davidson & S. Christoph 95987 (holotype, MO-5971382–3; isotypes, AAU, B, COL, F, K, NY, QCNE, US). **Figures 6–7.**

The species is a member of sect. *Polyneurium* characterized by its green-drying, narrowly ovate blades with numerous primary lateral veins but especially for its long-pedunculate inflorescence with the reddish spathe with frequently broadly undulate margins and the bright red spadix with prominently protruding pistils.

Terrestrial; **internodes** short, 2–4 cm diam.; **cataphylls** 6–8 cm long, intact at upper nodes, dark brown and loosely fibrous below. LEAVES with **petioles** sharply C-shaped with narrow, bluntly

acute-raised margins, often acutely ridged along one side near the base, the opposite side faintly 3-ribbed, semiglossy, medium to dark green, drying light to dark brown, 44–114 cm long, 3–9 mm diam., blade/petiole ratio 0.6–1.0; **blades** ovate, 36–58 cm long, 18–32 cm wide, 1.8–2.6 times longer than wide, dark green and semiglossy to matte-subvelvety above, slightly paler and weakly glossy to semiglossy below, subcoriaceous, caudate-acuminate at apex; **anterior lobe** 31–48 cm long; **posterior lobes** directed toward base, 4–10 cm long, 8–13 cm wide; **basal veins** 5 per side, normally free to base, on occasion 4<sup>th</sup> and 5<sup>th</sup> fused at about 1 cm, all joining collective veins; **midrib** narrowly rounded and paler above, convex at base becoming bluntly acute toward apex, round-raised and paler below with marginal acute ribs, often acutely 5-ridged below; **primary lateral veins** 13–15 pairs, arising at a 20–45° angle, slightly to deeply sunken and concolorous above, round-raised and paler below, **collective veins** arising from lowermost basal veins; **tertiary veins** weak and sunken above, some more obvious below. INFLORESCENCE erect or erect-spreading; **peduncle** 25–57 cm long, 27 mm diam., typically drying brown; **spathe** 4.5–8 cm long, 1.0–1.5 cm diam., pale green to almost white, tinged with maroon or purple, the margins wavy, sometimes reflexed, usually prominently twisted or undulate along margins; **spadix** cylindroid, 5–15 cm long, 0.5–1.2 cm diam., dark violet-purple; tepals glossy to semiglossy, becoming brownish; **pistils** early emergent. INFRUCTESCENCE 17–24 cm long, 22–27 mm diam. with berries partly emergent;

berries 8–10 mm long, 4–5 mm diam., pointed at apex, bright red in apical 1/2–3/5, white below; seeds greenish white, 4–5 mm long, 3 mm wide, 2 mm thick with a short sticky appendage.

*Anthurium alluriquinense* ranges from Colombia (Chocó, Nariño) to Ecuador (Carchi, Pichincha, El Oro) at 740–1800 m in *Premontane wet forest*, *Lower montane moist forest*, *Lower montane wet forest* and *Montane wet forest* life zones.

*Specimens seen:* ECUADOR. **Carchi.** El Pailon, ca. 45 km below Maldonado along a foot path to Tobar Donoso, wet montane forest., 800 m, 29 Nov. 1979, *Madison & Besse 7182* (SEL); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3241* (MO, QCA); *W. Scott Hoover 3245* (MO, QCA); Forest area along Río Verde going downstream from point where trail to Rafael's Mountain finca crosses river, 00°52'N, 78°08'W, 1840 m, 29 Nov. 1987, *W. Scott Hoover 2070* (MO); Trail beginning above Rafael Quindí Finca, above Untal (along road to Chical) and partly ascending Cerro Obsura, 00°52'N, 78°09'W, 1670 m, 26 Nov. 1987, *W. Scott Hoover & S. Wormley. 1672* (MO); Near encampment in Gualpi Chico area of Awá Reserve, 00°58'N, 78°16'W, 1330 m, 20 Jan. 1988, *W. Scott Hoover, Ana Argüello, P. Gelpi & R.A. Lorentzen 2862* (MO, QCA); Along road from El Chical to El Carmen via unfinished road, departing main El Chical-Peñas Blancas road, 0.6 km W of bridge over Río Chical, just west of El Chical, 4.9 km south

of jct. with main road, 00°59'01"N, 78°11'37"W, 1350 m, 8 Aug, 2004, T. B. Croat & Geneviève Ferry, 93091 (MO, QCNE); Vicinity of El Chical, along road to El Carmen, departing main El Chical-Peñas Blancas Rd., 0.5 km from bridge over El Chical, 3.6–4.6 km up road to El Carmen, 00°55'19"N, 78°21'14"W – 00°55'20"N, 78°12'05"W, 1435–1503 m, 17 Feb. 2005, T. B. Croat, C. Davidson & Sharon Christoph 94802 (MO, QCNE); Along unfinished road from El Chical to El Carmen, departing main El Chical-Peñas Blancas Road, 0.6 km W of bridge over Río Chical, 4.9 km S of jct. with main road, 00°59'01"N, 78°11'37"W, 1350 m, 9 Aug. 2004, T. B. Croat & Geneviève Ferry 93108 (MO).

***Anthurium atroguttatum* Croat, sp.nov.**

Type: Ecuador. Carchi: Chical, stream margin along tributary of Río Pablo, near cable bridge along trail to Pailon, 00°56'N, 78°14'W, 1130m, 22 Nov. 1987, W.S. Hoover & S. Wormley 1401 (holotype, MO–3633597; isotype, QCA).

The species is a member of sect. *Polyneurium* characterized by its short internodes, cataphylls persisting mostly as reddish-brown fibers, sulcate petioles, narrowly ovate–sagittate and pale-green-yellow-drying blades that are twice as long as wide, 2–3 pairs of basal veins with the 1<sup>st</sup> free to the base, and long-pedunculate inflorescences with short spadix. Particularly characteristic are the densely purple

speckled blades which is not common in sect. *Polyneurium*.

Terrestrial; **roots** slender, 9–11 cm long, 1–2 mm diam.; **internodes** short, 1–1.5 cm diam.; leaf scars 2–4 mm wide; **cataphylls** 3–4 cm long, persisting mostly as reddish-brown fibers with the apical portion more or less intact. LEAVES with **petioles** 25–28.5 cm long, terete, sulcate, drying pale green; geniculum 0.9–1.1 cm long, 2 mm wide, drying slightly darker than petiole; **blades** narrowly ovate–sagittate, 21–22.5 cm long, 10.5–11.5 cm wide, 1.9–2 times longer than wide, broadest slightly above petiole attachment, 0.7–0.9 times as long as petiole, drying pale green–yellow above, pale brown–gray below, brittle, densely purple-speckled on both surfaces under magnification; **anterior lobe** 16–18 cm long, convex along margins; **posterior lobes** 5–7 cm long, 4–5 cm wide, directed toward base; **midrib** drying convex and finely ribbed, concolorous to darker than surface above, round-raised and ribbed with some ribs narrowly winged toward base, becoming much thicker than broad with a bluntly acute rib toward the apex, paler than surface below; **primary lateral veins** 11–12 pairs, drying light brown, arising at a 45–60° angle, drying narrowly raised and darker above, narrowly raised to convex and concolorous above; **tertiary veins** narrowly rounded and weakly raised, concolorous below; **collective veins** arising from the 1<sup>st</sup> or 2<sup>nd</sup> basal pair of veins; **basal veins** 2–3 pairs, 1<sup>st</sup> pair free to the base, 2<sup>nd</sup> pair almost free to the base, all but lowermost veins naked; **posterior ribs** 7–10 mm long,



angled downward, naked 4–10 mm; **sinus** spatulate, 4–5 cm deep, 1–1.5 cm wide, parabolic to almost rhombic in shape. **INFLORESCENCE** to 37.5 cm long; **peduncle** 34 cm long, 3–4 mm diam., drying slightly darker brown than petioles; **spathe** 1.5 cm wide, folded longitudinally, drying 11 mm wide and dark brown; **spadix** weakly tapered, probably green, 4 cm long, 2 mm diam.; **flowers** 4–5 visible per spiral; 1.5–1.8 mm long, 1.2–1.7 mm wide; tepals minutely papillate, lateral tepals 1.1–1.3 mm wide; berries not seen.

*Anthurium atroguttatum* is endemic to Ecuador in Carchi and Esmeraldas Provinces, at 650–1130 m elevation in *Premontane wet forest* and *Premontane rain forest* life zones.

In Lucid this species tracks to *A. balslevii* Croat which differs by having proportionately narrower blades mostly 2.2–5 times longer than wide, collective veins arising from the uppermost pairs of basal veins or the lower primary lateral veins and with collective veins only 1–2 pairs and free to the base; *A. cuspidatum* Masters, differing by having a more broadly ovate, usually greenish-drying blade, and *A. hieronymi* Sodiro, differing by having a proportionately longer blade with closer more numerous primary lateral veins and inequilaterally rounded posterior lobe.

The species epithet is from the Latin “atro” (meaning blackened and “gutta”

(meaning speck) owing to the dark-speckled leaf blade surfaces.

*Paratype*: ECUADOR. **Esmeraldas**: San Lorenzo Cantón, Parroquia Alto Tambo, frente Finca de Sr. Lalama, a 1.5 km del sector de El Cristal, 00°30'N, 78°30'W, 650 m, 13 May 1992, *Carlos Quelal & J. Luteyn 500* (QCNE).

*Anthurium bernalii* Croat, *Aroideana* 32: 45–48, 5a–d. 2009. Type: Colombia. Nariño: La Planada, 7 km above Chucunés, on the road between Tuquerres and Ricaurte, in regrowth secondary forest, with elements of primary forest, and along the trail above La Posada, 01°05'N, 78°01'W, 1780 m, 26 July 1988, *Thomas B. Croat 69573* (holotype, MO-6063781–83; isotypes, AAU, B, COL, CUVC, F, G, GB, HUA, K, M, NY, QCNE, PSO, RB, S, SEL, UB, US). **Figures 8–12.**

The species is a member of sect. *Polyneurium* and is characterized by its moderately short internodes, the persisting fibrous cataphylls, terete petioles and especially by the conspicuously bullate, ovate-triangular blades as well as by its long, slender green spadix which turns purple before anthesis.

Terrestrial as juvenile or preadult, usually epiphytic as adult; **juvenile plants** with **petioles** 15–20 cm long, 1–2 mm diam., **blades** ovate-triangular, slightly to moderately cordate, 15–20 cm long, 5–9 cm



**Figure 8.** *Anthurium bernalii* Croat (*Croat et al.* 104232). View of plant base with stem, fibrous remnants of cataphylls and bases of petioles.





**Figure 9.** *Anthurium bernalii* Croat (Croat *et al.* 104232). View of leaf blades, abaxial surface, and infructescence.

wide; **adult plants** with **internodes** to 5 cm long, 1.5–4 cm diam.; **cataphylls** persisting intact at upper nodes, as linear bases of fibers at lower nodes, 12–16 cm long, drying medium tan. **LEAVES** with **petioles** 70–100 cm long (averaging 73.3 cm), 4–7 mm diam. at middle, terete, sometimes tinged maroon; **blades** ovate-triangular, acuminate at apex, cordate at base, (25–) 55–81 cm long, (11.3–) 27–44 cm wide (averaging 72.2 x 35.6 cm), 1.8–2.2 times longer than broad,

0.8–1.0 times longer than the petioles, broadest at or slightly above point of petiole attachment (sometimes broadest below the petiole attachment), subcoriaceous; surfaces slightly bicolorous, drying medium olive; upper surface semiglossy and bullate; lower surface matte; **anterior lobe** 33–65 cm long, broadly convex to slightly concave along the margin; **posterior lobes** 13–21 cm long, 12–20 cm wide, directed either inward or outward;





**Figure 10.** *Anthurium bernalii* Croat (Croat et al. 104232). Close up of leaf blade, adaxial surface,

**sinus** spatulate to parabolic, 7–10 cm deep, 5–9 cm wide; **midrib** convex and paler than surface above, round-raised and paler than surface below; **basal veins** 6–7 pairs, first one or two free to base, the remainder coalesced for 2–3 cm; **posterior ribs** naked for 1–2 cm; **primary lateral veins** (20–) 25–30 per side, sunken above, raised below; interprimary veins nearly as conspicuous as primary lateral veins; **collective vein** arising from one of basal veins, 2–5 mm from margin; all other veins prominently sunken above, prominently raised below; **all veins** hispid-puberulous

below. **INFLORESCENCE** erect-spreading; **peduncle** 30–55 (–70) cm long, 3–5 mm diam. at middle; **spathe** lanceolate, 12–13 cm long, 1 cm wide, green, reddish green, or light green; **spadix** green or brownish green, becoming purplish before anthesis, weakly glossy, narrowly tapered, 22.5–34 cm long, 5 mm diam. near middle, 3.5 mm diam. at 1 cm from apex; **flowers** visible 5–7 per spiral, 2.3–2.5 mm long, 1.7–1.9 mm wide; tepals minutely granular, lateral tepals 1.0–1.3 mm wide, the outer margins 3–4 sided (shield-shaped); pistils green, acute, early-emergent. **INFRUCTESCENCES** to





**Figure 11.** *Anthurium bernalii* Croat (Croat et al. 104232). Close up of leaf blade, abaxial surface,

40 cm long, moderately dark green; **tepals** green in early fruit.

*Anthurium bernalii* is known from Colombia (Antioquia, Cauca, Nariño) and Ecuador (Carchi, Esmeraldas), at 1450–2740 m, in *Premontane wet forest* and *Upper montane rain forest* life zones.

*Anthurium bernalii* is perhaps closest to *A. pulverulentum* Sodiro. That species differs in having longer internodes which are transversely fissured, cataphylls which

are more than 30 cm long, petioles that are several-ribbed adaxially and a bluish green spadix.

*T. B. Croat et al. 104232* has the fruiting spadix cylindrical instead of tapered but still appears to be this species.

*Specimens seen:* ECUADOR. **Carchi:** Cerro Golondrinas, valley bottom ca. 1 km NNE of summit, mossy upper montane forest, with tall trees to 30 m high near creek margin, stunted elfin forest on ridge crest,





**Figure 12.** *Anthurium bernalii* Croat (Croat et al. 104232). View of inflorescence,

00°48'00"N, 78°01'00"W, 2740 m, 20 July 1994, Brad Boyle, Alice Boyle, Jason C. Bradford & N. Skinner 3345 (MO); Cerro Golondrinas, Upper Río Gualpí headwaters, north-facing slope beyond (to north of) ridge crest at 2300 m which rises above the settlements of El Carmen and La Primavera, primary Upper Montane Pluvial Forest, 00°50'N, 78°13'W, 2250–2265 m, 15–20 July 1993, Brad Boyle, Chamorro, P., M. Fleury, Peter Hibbs & Quer, M. 2231 (MO); Reserva Golondrinas, El Corazón, recorrido por el sendero a La Cortadera hasta El Mirador, Bosque Muy Húmedo Montano,

00°50'N, 78°06'W, 23 Jan. 2004, Homero Vargas L., Edwin Narváez, Wendy Torres & P. Escobar 4340 (MO, QCNE); Parroquia Tobar Donoso, Reserva Indígena Awá, Centro El Baboso, 00°53'N, 78°25'W, 17 Aug. 1992–27 Aug. 1992, Tipaz 1876 (MO); Trail from Rafael Quindís mountain finca above Río Verde, 00°52'N, 78°08'W, 1600 m, 27 Nov. 1987, W. Scott Hoover & S. Wormley 1804 (MO); Embankments along Río Verde, from point at which trail from Rafael's Mountain Finca crosses river, 1.5 km, 00°52'N, 78°08'W, 1890 m, 29 Nov. 1987, W. Scott Hoover 1923 (MO); Further



Figure 13. *Anthurium boylei* Croat (Croat 72383, MO-4076781). Herbarium specimen showing stem, leaf blades, adaxial and abaxial surfaces, petioles and inflorescence.





**Figure 14.** *Anthurium boylei* Croat (Croat 71654). Live plant showing petioles, leaf blades, abaxial surface, inflorescence and infructescence.



**Figure 15.** *Anthurium boylei* Croat (Croat 71654). View of leaf blades, adaxial surface.





**Figure 16.** *Anthurium boylei* Croat (Croat 71654). Close-up of inflorescence and infructescence.

ascent of Río Verde past stream and waterfall entering from SW and continuing beyond principal drainage stream of large Cerro Golondrinas into drainage streams of medium Golondrinas mountains, 00°52'N, 78°07'W, 1200 m, 1 Dec. 1987, *W. Scott Hoover 2203* (MO); Along road from El Chical to El Limonal (Imbabura), 16 km S of junction with main El Chical - Peñas Blancas road, 2 km S of Río Gualpi Bridge, vicinity of Km 15.5–15.8 markers, 00°52'N, 78°13'W, 2200 m, 13 Oct. 2012, *T. B. Croat, Geneviève Ferry, David Scherberich, Claudia L. Henríquez R. & Elisa Levy 104232* (MO, QCNE).

***Anthurium boylei* Croat, sp. nov.** Type: Ecuador. Esmeraldas: San Lorenzo Cantón, Lita San-Lorenzo Road, 18 km W of Lita, 00° 55'N, 78° 28'W, 500m., 22 February 1992, *Thomas B. Croat 72383* (holotype, MO-4076781; isotype, QCNE). **Figures 13–16.**

The species is a member of sect. *Polyneurium* characterized by its epiphytic habit, short, slender internodes, subterete petioles which sub-equal the blades, elliptic greenish to yellowish brown-drying blades which are prominently acuminate at the apex and attenuate at the base as well as by the broad, somewhat purplish spathe and cylindroid, curved spadix.

Epiphytic; **internodes** short, 0.75–1.5 cm diam.; **cataphylls** intact, green, bases of old ones red-brown, eventually becoming fibrous, drying almost white to pale yellow-

brown intact or light brown fibers. LEAVES with **petioles** 20–50 cm long, 2–3.5 cm diam., narrowly and sharply flattened to obtusely sulcate adaxially; geniculum to 1 cm long, 3–3.5 mm diam., drying dark brown to almost black; **blade** 26–46.7 cm long, 8–18.5 cm wide, 2.4–3.1 times longer than wide, 9–1.3 times as long as petiole, elliptic to oblong elliptic, acuminate at apex with acumen to 4 cm long, weakly attenuate at base, subcoriaceous, medium green and semiglossy above, slightly paler and matte below, drying yellow-brown to grayish brown to grayish yellow-green above and below; **midrib** raised in valleys and paler than leaf surface above, round-raised and paler than surface below, drying paler to roughly concolorous above and below; **primary lateral veins** 10–15 pairs, arising at a 20–40 degree angle from midrib, sunken above, convex and paler below, drying concolorous with leaf above and paler to roughly concolorous below; interprimary veins only slightly less prominent than primary lateral veins; **collective veins** arising from the 1<sup>st</sup> primary lateral vein, 3–5 mm from the margin. INFLORESCENCE erect; **peduncle** 18–44 cm long, 1–3 mm diam.; **spathe** 4–6.5 cm long, 2–2.5 cm wide, recurled, purple or green, drying medium to dark brown; **spadix** cylindroid, strongly curved, 5.8–7.7 cm long, 5–6 mm diam. (16 mm diam. when fruiting), whitish, drying medium brown; **flowers** 1.8–2.2 mm long, 1.9–2.4 mm wide; tepals moderately granular; lateral tepals 1.2–1.4 mm wide; inner margin rounded, outer margin 2-sided; INFRUCTESCENCE with **berries** purplish.



*Anthurium boylei* is found in Colombia (Nariño) and Ecuador (Carchi, Esmeraldas) at 500–1800 m in a *Premontane wet forest* life zone.

*Anthurium boylei* is similar in blade shape to *A. longeinternodum* Croat and *A. impolita-ellipticum* Croat. It differs from those species by its relatively wide spathe and a strongly curved pale spadix.

*Paratypes*: COLOMBIA. **Nariño**: Between Altaquer and Junin, 7 km W of Altaquer, 01°18'N, 78°04'W, 1100 m, 21 Mar. 1990, *T. B. Croat 71654* (MO). ECUADOR. **Carchi**: Parroquia Tobar Donoso, Reserva Indígena Awá, Centro El Baboso, 00°53'N, 78°25'W, 1800 m, 17–27 Aug. 1992, *Galo A. Tipaz, Milton Tirado, C. Aulestia, Neill Gale & Patriciño Ortiz 1824* (MO, QCNE); Gualpi Chico, vicinity of Awá encampment, 00°58'N, 78°16'W, 1330 m, 17 Jan. 1988, *W. Scott Hoover, Ana Argüello, P. Gelpi & R.A. Lorentzen 2697* (MO, QCA); Gualpi Chico, vicinity of Awá encampment headed across trail up from encampment east, 00°58'N, 78°16'W, 1300–1400 m, 18 Jan. 1888, *W. Scott Hoover, P. Gelpi, Ana Argüello & R.A. Lorentzen 2909* (MO, QCA).

***Anthurium carmenense* Croat, sp. nov.**

Type: Ecuador. Carchi: Mira Cantón; Camino a Chical, 00°17'N, 78°13'W, 2000–2200 m, 10 Feb. 1992, *Walter Palacios, Gallo Tipaz, Edgar Gudiño & P. Cuamacás 9708* (holotype, MO-4383120; isotype, QCNE). **Figure 17.**

The species is a member of sect. *Polyneurium* characterized by its terrestrial habit, short internodes, reddish brown mostly fibrous cataphylls, subterete petioles, ovate grayish-green drying narrowly acuminate blades with the base subtruncate to weakly subcordate and the numerous primary lateral veins, the oblong-lanceolate greenish violet reflexed spathe and the narrowly oblong more or less purplish violet spadix.

Terrestrial; **stem** to 15 cm long; **internodes** short, mostly 1–2 cm long, 1–1.5 cm diam. (drying 8–10 mm diam.); **cataphylls** 4.3–5 cm long, persisting as red-brown fibers with fragments of epidermis. LEAVES with **petioles** 37.6–64 cm long, 3 mm diam., subterete, drying deeply and narrowly sulcate, yellow-brown; **blades** narrowly ovate, 26.6–32 cm long, 14.1–23 cm wide, broadest slightly below middle, 1.4–1.7 times longer than broad, 0.47–0.70 times as long as petiole, abruptly and narrowly long-acuminate (acumen downturned), weakly subcordate to surrounded at base, subcoriaceous, yellow-brown and matte above, gray-brown and semiglossy below, epunctate; **anterior lobe** 19.7–29 cm long, broadly rounded on margins; **posterior lobes** broadly rounded, 3.5–8 cm long, 5.3–8 cm wide; **sinus** broadly arcuate, 1–4 cm deep; **upper surface**, smooth but faintly granular at higher magnification; **lower surface** weakly and sparsely granular, densely and minutely dark-speckled and irregularly and sparsely purplish-mottled; **midrib** narrowly rounded, drying slightly darker than surface above, round-raised and



Figure 17. *Anthurium carmenense* Croat (Palacios et al. 9708, MO-4383120). Herbarium specimen showing stem, leaf blades, adaxial and abaxial surfaces, petioles and inflorescence.

weakly several-ribbed on drying; **basal veins** 3–4(5) pairs, all free to the base; **posterior ribs** absent; **primary lateral veins** ca. 18–19 pairs, arising from the midrib at (40)°56–66° angle, narrowly raised to convex in valleys, drying paler than surface above, narrowly raised and paler below; **collective veins** arising from one of the lower primary lateral veins or upper basal veins, mostly 3–4 mm from the margin. INFLORESCENCE ca. 44 cm long, erect; **peduncle** 33.3–40 cm long, 2–3 mm diam., drying dark brown, more or less matte; **stipe** 7 mm long, 1.5 mm diam.; **spathe** green tinged with violet, oblong-lanceolate, reflexed; **spadix** narrowly cylindroid, more or less violet, 5.5–11 cm long, 3.7–4 mm diam.; **flowers** 5–6 per spiral, 2–3 mm long, 1.5–2 mm wide; tepals moderately smooth; **lateral tepals** 1.0–1.2 mm wide, inner margin broadly rounded, outer margin 2-sided; stamens not seen.

*Anthurium carmenense* is endemic to Ecuador, known only from the type locality in Carchi Province at 2000–2200 m in a *Montane moist forest* life zone.

In the Carchi region the species is most similar to *A. dichromum* Croat (described in this paper) owing to having leaf blades of similar shape and drying color but that species differs in having several of the basal veins prominently fused at least near the base and by having the primary lateral veins drying acute on the lower surface.

*Anthurium carmenense* is most similar to *A. yatacuyense* Croat from the western slopes of the Cordillera Occidental in Valle Department which differs in having longer internodes, pale brown cataphylls with closely arranged fibers and tiny fragments of epidermis, larger blades with the primary lateral veins more widely spaced, the collective veins more remote from the margin. In the Lucid *Anthurium* key it also keys to *A. bullianum* Engl. which differs in having blades with more widely spaced primary lateral veins and a short stubby spadix and *A. cordulatum* Sodiro which differs in having larger sagittate blades with widely spaced primary lateral veins.

The species is named for the type locality near Norte del Carmen in Mira Cantón in Carchi Province.

*Paratype*: Ecuador. **Carchi**: Mira Cantón; Camino a Chical, 00°17'N, 78°13'W, 2000–2200 m, 10 Feb. 1992, *Walter Palacios, G. Tipaz, E. Gudiño & P. Cuamacás* 9762 (MO, QCNE); Cantón Gualchán, along road between Gualcán and El Chical, on lower south slopes of divide separating watershed of Río Miras and Río San Juan, 00°49'46"N, 78°13'25"W, 2044 m, 16 Aug. 2013, *T. B. Croat, Alejandro Zuluaga & Natalia Castaño Rubiano* 104820 (MO, QCNE).

***Anthurium cobbiae*** Croat & Delannay, **sp. nov.** Type: ECUADOR. Esmeraldas: Environs of Lita, on the Ibarra-San Lorenzo R.R., wet submontane forest, 00°50'00"N, 78°28'00"W, 550–

650 m, 8 June 1978, *Michael T. Madison, Timothy C. Plowman, Helen Kennedy & Elizabeth L. Besse 4998* (holotype, SEL-620795; isotypes, F, K, MO, QCA, US). **Figure 18.**

The species is a member of sect. *Polyneurium* and is characterized by its small size, light-brownish-green-drying ovate-cordate blades with a narrow U-shaped sinus and by its small inflorescences with a short purple or cream striated with purple spathe and a short purple spadix stipitate at the base.

Terrestrial or epiphytic of small size; **internodes** short, 8–10 mm diam.; **cataphylls** to 5 cm long, eventually fibrous at base, drying light brown. LEAVES erect; **petioles** 14–29 cm long, drying light green; **blades** ovate-cordate, broadest below the middle, 3–5 cm above petiolar plexus, (9)17–20.5 cm long, (4.3) 8.5–10.5 cm wide, 1.75–2.4 times longer than wide, 0.6–0.9(1.4) times as long as petiole, long-acuminate at apex with acumen to 2 cm long, weakly sagittate to subcordate at base, drying light brownish green above, slightly paler below; **anterior lobe** 15–17 cm long, margin broadly convex; **posterior lobes** directed toward base, 2–3 cm long, 3–4.5 cm wide; **basal veins** 4–5 pairs, 1<sup>st</sup> and 2<sup>nd</sup> pairs free to the base; **posterior ribs** 5 mm long; **sinus** narrowly U-shaped to parabolic, 2–3 cm deep, 0.5–1.5 cm wide; **midrib** acutely raised and concolorous above, narrowly round-raised and paler below; **primary lateral veins** 7–8 pairs, arising at a 50–60° angle, drying

concolorous above and below; **interprimary veins** present and almost indistinguishable from primary lateral veins; **collective veins** arising from 2<sup>nd</sup> pair of basal veins, 2–3 mm from margin. INFLORESCENCE erect; **peduncle** 12–12.5 cm long; **spathe** lanceolate, 1.5 cm long, 3–8 mm wide near the base, purple or cream striated with purple, erect-spreading to reflexed, drying greenish brown; **spadix** stipitate 2–3 mm, short, cylindroid, 1.8–2.8 cm long, 3–5 mm diam., purple, drying almost black.

*Anthurium cobbiae* is endemic to Ecuador, found only in Esmeraldas and Carchi Provinces at 300–650 m in a *Submontane wet forest* life zone.

*Anthurium cobbiae* has been confused with *Anthurium cuspidatum* Masters but it differs from that species by its much smaller size and its very small inflorescences with the spathe purple or cream striated purple instead of green in the case of *A. cuspidatum*.

The species is named for Laura Cobb who was one of the first collectors. Laura Cobb collected in Esmeraldas Department, especially in the Lita area and in the area around Borbon in 1978 while she was a graduate student.

*Paratypes:* ECUADOR. **Carchi:** On trail from Quebrada Peñas Blancas to Quebrada Quinchul, 00°58'N, 78°12'W, 10 Aug, 1983, *Sue A. Thompson & John E. Rawlins 1032*





Figure 18. *Anthurium cobbiae* Croat & Delannay (*Madison et al.* 4998, SEL-620795). Herbarium specimen showing stem, leaf blades, adaxial and abaxial surfaces, petioles and inflorescence.

(CM). **Esmeraldas:** Less than 300 m, Oct. 1980, *Laura Cobb 70A* (MO).

***Anthurium cuspidatum*** Masters, *Gard. Chron.* 3:428. 1875. Type: Colombia, *Hort. Vietch*, Jan. 1875, *Masters s.n.* (holotype, K). **Figures 19–20.**

*Anthurium urbanii* Sodiro, *Anturios Ecuador* 2: 224. 1903. Type: Ecuador. Cañar: Río Rircay, 500 m, *Rimbach 43* (holotype, QPLS).

*Anthurium propinquum* Sodiro, *Anturios Ecuador*. 2: 7. 1903. Type: Ecuador. Valley of Río Cañar, Hacienda de San Nicolás, 1500 m, *Rimbach 88* (holotype, US).

*Anthurium williamsii* K. Krause, *Notizblat. Bot. Gart. Berlin-Dablem* 11: 610. 1932. Type: Panama. Darién: Cana, ca. 07°45'N, 77°40'W, 548 m, *Williams 817* (holotype, US).

The species is a member of sect. *Polyneurium* and is characterized by its short internodes, more or less intact cataphylls, subterete, narrowly and obtusely sulcate petioles, ovate-elliptic-sagittate blades broadest between the petiolar plexus and blade middle with posterior lobes frequently overlapping, more or less free basal veins and a dark violet-purple spadix.

Terrestrial or epiphytic; **internodes** short, 1–2.5 cm diam.; **cataphylls** 5–6 cm long, drying reddish brown, persisting intact

at uppermost nodes, as a loose reticulum of tan or red fibers lower. **LEAVES** with **petioles** subterete, 29.8–70.1 cm long, 2–5.5 mm diam. at middle, often narrowly and obtusely weakly sulcate, rarely flattened and very faintly ribbed as in *Croat et al. 82388*, medium green, weakly glossy; **blades** ovate-elliptic-sagittate, caudate-acuminate at apex, 24.3–41.3 cm long, 12.8–27.5 cm wide, 1.5–1.9 times longer than broad, 0.5–1.1 times longer than the petioles, broadest between point of petiole attachment and middle, convex at margins, moderately thin; subcoriaceous, dark green and matte-subvelvety to weakly glossy above, slightly paler and semiglossy below, drying pale green to yellow-brown; **anterior lobe** 20.3–35 cm long, moderately to very broadly curved; **posterior lobes** 3.5–9.3 cm long, 5.3–10.3 cm wide, frequently overlapping below petiolar plexus; **sinus** triangular to closed and mitered, to 6.6 cm deep; **midrib** convex to narrowly raised and concolorous or slightly paler above, round-raised, moderately paler and acutely 1- to 3-ribbed below, drying concolorous above, yellow to yellow-brown below; **basal veins** 4–6 pairs, free to base; **primary lateral veins** 9–12 pairs, departing midrib at 30–40° angles, ascending to collective veins, quilted-sunken or etched-sunken and concolorous above, narrow to pleated-raised and concolorous below, drying concolorous above, yellow to yellow-brown below, scarcely more prominent than interprimary veins; **tertiary veins** in part sunken above, raised below; **collective veins** arising from 3–5<sup>th</sup> basal vein, 2–4 mm from margin. **INFLORESCENCE** erect; **peduncle** 22–





**Figure 19.** *Anthurium cuspidatum* Mast. (Croat et al. 82388). View of petiole and leaf blades, adaxial and abaxial surfaces.





**Figure 20.** *Anthurium cuspidatum* Mast. (Croat *et al.* 82388). Close-up of leaf blade, adaxial surface, and inflorescence.



Figure 21. *Anthurium dalmauii* Croat (Boyle & Dalmau 1747). Herbarium specimen showing leaf blade, adaxial surface, inflorescence, petiole and cataphylls.



55 cm long, 2–4 mm diam. at middle; **spathe** reflexed-spreading, chartaceous, yellow-green to medium green (greenish purple in *Palacios et al. 1972*), purplish in fruit, lanceolate, 4–9 cm long, 0.8–1.5 cm wide; **spadix** maroon to dark purple or purple-violet, matte, 8–10.5 cm long, 3–5 mm diam., drying dark brown to almost black. INFRUCTESCENCE with **berries** green turning purple or red.

*Anthurium cuspidatum* ranges from Costa Rica to central Ecuador, on the Pacific slopes of the Cordillera for Colombia and Ecuador. In Carchi the species ranges from 1200–2200 m elevation in *Montane moist forest* and *Premontane wet forest* life zones.

*Specimen seen*: ECUADOR. **Carchi**: Reserva Etnica Awá, Parroquia El Chical, Sector Gualpí Medio, Río Canumbí, topografía muy irregular, suelo negro franco-arcilloso, 01°02'N, 78°15'W, 1150 m, 19–28 Feb. 1993, *Grijalva, Aulestia & Taicuz* 496 (MO, QCNE).

*Anthurium dalmauii* Croat, **sp.nov.** Type: Ecuador. **Carchi**: Cerro Golondrinas, Upper Rio Pablo drainage, along crest of ridge to north of river, Transect 1750–3, 00°52'N, 78°10'W, 1740–1780 m, 24 Apr. 1993, *Brad Boyle & Luis Dalman 1747* (holotype, MO-4652764, isotype, F). **Figure 21.**

The species is a member of sect. *Polyneurium* and is characterized by its hemi-

epiphytic habit, moderately short internodes, weakly persistent thin pale fibrous semi-intact cataphyll fibers, terete dark brown-drying finely acute-ribbed petioles, narrowly ovate-sagittate yellowish brown-drying the blades with a parabolic sinus, short posterior ribs which are naked about a third of their length, close primary lateral veins and collective veins arising from the base and close to the margins.

Hemi-epiphyte; **internodes** short, about as long as broad, 8 mm long, 12 mm wide; **cataphylls** persisting semi intact as disorganized thin pale fibers at upper nodes, ultimately deciduous. LEAVES with **petioles** to 19 or more cm long, terete, sulcate, drying reddish-brown, matte, finely and acutely ribbed throughout; **blades** simple, ovate, 34–37 cm long, 19–22 cm wide, usually 1.6 times longer than wide, drying pale yellow-brown, thin, brittle, broadest in lower 1/3, concolorous, gradually acuminate at apex, prominently lobed at base; **anterior lobe** 31 cm long, convex along margins; **posterior lobes** 10 cm long, 5–6 cm wide, directed downward; **midrib** quilted and sunken above, yellow-brown, concolorous with blade color; convex, round raised, finely ribbed on lower surface, brown; **primary lateral veins** 19–20 pairs arising at a 50–65 degree angle from midrib, drying narrowly raised and darker below; **tertiary veins** narrowly rounded and raised, brown; **collective veins** arising from the lowermost basal veins, 3–4 mm from margins; **basal veins** 6(7) basal veins, 1<sup>st</sup> pair free to the base; 2<sup>nd</sup> fused pairs 4–5 mm, 3<sup>rd</sup> pair fused 10–12 mm, 4<sup>th</sup> pairs



fused 1.8–2.5 cm; **posterior ribs** 4.5–4.7 cm long; naked 1.8–2 cm long; **sinus** 8 cm deep, 5.5 cm wide, parabolic. INFLORESCENCE erect-spreading to 57 cm long; **peduncle** 39 cm long, 1 cm diam., terete, sulcate, drying reddish-brown and finely closely acute-ribbed, matte; **spathe** green, 16 cm long, 3 cm wide, drying reddish brown, matte, brittle; **spadix** 19.5 cm long, 1–1.2 cm diam., purple, stipulate 5 mm; **flowers** 19–22 visible per spiral, slightly post-anthesis.

*Anthurium dalmauii* is known only from the type locality in Carchi Province of Ecuador at 1740–1780 m elevation in a *Premontane wet forest* life zone.

*Anthurium dalmauii* is most easily confused with *A. pulverulentum* Sodiro which also occurs in the region but differs from that species by its smaller more ovate blades, more broadly convex margins and by the proportionately less long-tapered purple spadix.

This species is named in honor of Spanish (Catalán) collector Lluís Dalmau who along with Brad Boyle gathered the type specimen. Brad's transects were in hellish remote and steep areas and Brad Boyle remembers Lluís as his favorite field worker who thrived on the rain and filth of the field. Lluís has a strong interest in orchids and now lives with his Peruvian wife in Tarapoto Peru where they own and operate a hotel and a couple of tourist facilities. One of these is the lovely Puma

Rinri Lodge, located on the banks of the Río Huallaga where I visited as a guest of Lluís.

***Anthurium debile-emarginatum*** Croat, **sp. nov.** Type: Ecuador. Carchi: Tulcán Canton. Parroquia Maldonado to Tulcán, on road to Chilma Bajo, 1 km beyond turnoff of Maldonado-Tulcán rd., 00°51'26"N, 78°03'42"W, 20 Oct. 2012, *Thomas B. Croat, Genevieve Ferry, David Scherberich & Elisa Levy 104534* (holotype, MO-6436445–6). **Figure 22.**

The species is a member of sect. *Polyneurium* and is characterized by its terrestrial habit, short internodes, ovate-sagittate leaves that are 2.5–2.8 times longer than broad, weakly emarginate with a short apiculum at apex and dry dark brownish-green above and medium green below, long posterior rib naked throughout its length, its 33–35 pairs of primary lateral veins, and long inflorescence with a green reflexed-spreading spathe.

Terrestrial; **internodes** short, 5.5 cm diam.; **cataphylls** 37.5 cm long, persisting semi-intact, pale fibrous lower down, drying pale brown. LEAVES with **petioles** 84–102 cm long, terete, 1.3 cm diam., medium green, weakly glossy, drying pale grayish-brown, matte, sulcate and smooth; geniculum 2–3 cm long, 1 mm wide, drying brown; **blades** ovate-sagittate, 73–79 cm long, 26–27 cm wide, (aver. 78 x 56 cm), 2.5–2.8 times longer than broad, 0.7–0.9



Figure 22. *Anthurium debile-emarginatum* Croat (Croat et al. 104534, MO-6436445, sheet 2). Herbarium specimen showing stem, petioles and inflorescence.



Figure 23. *Anthurium debile-emarginatum* Croat (Croat et al. 104534, MO-6436446, sheet 1). Herbarium specimen showing leaf blade, adaxial and abaxial surfaces.



times as long as petiole, subcoriaceous, dark green and semiglossy above, paler and glossy below epunctate, narrowly rounded and weakly emarginate and with a short apiculum at apex; **anterior lobe** 54–59 cm long, broadly rounded along margins; **posterior lobes** 25–26 cm long, 17–21 cm wide midway; **basal veins** 9(10), 1<sup>st</sup> pair free to base, 2<sup>nd</sup> pair fused 1.5 cm, 3<sup>rd</sup> pair fused 3 cm the remainder regularly branching off, acroscopic to the end of the posterior ribs; **posterior ribs** 7–8 cm long, naked throughout its length, ca 1 cm before the posterior ribs ends, weakly curved; **sinus** hippocrepiform-spathulate, 18–20 cm deep, 4–5 cm wide; **midrib** bluntly acute and concolorous above, narrowly rounded and paler below, drying slightly pale, brownish and matte; **primary lateral veins** 33–35 pairs arising at 45–65°, sunken and concolorous above, narrowly raised, bluntly acute and paler below, drying weakly raised in valleys above, narrowly round-raised and matte below; **tertiary veins** mostly raised below, apicular; **collective veins** arising from 5<sup>th</sup> or 6<sup>th</sup> pair of basal veins; **upper surface** densely and irregularly dark-speckled; **lower surface** moderately smooth but faintly granular on higher magnification. **INFLORESCENCE** pendent, 96 cm long, **peduncle** 30–35 cm long, 1.5–2 cm diam. drying dark brown; **spathe** green, reflexed spreading, mostly absent, drying pale brown; **spadix** 30–32 cm long; color at anthesis unknown; **flowers** 10–11 visible per spiral, 1.7–1.8 cm long, 1.5–1.6 wide; tepals drying light brown, moderately smooth; lateral tepals 1.2–1.4 long; inner margin broadly

rounded to straight, outer margin 2-sided. **INFRACTESCENCE** pendent, the fruiting spadix to 35 cm long, 2.5 cm diam.; pistils green, emergent ca. 2 mm, pistils prominently exerted, narrowly acute.

*Anthurium debile-emarginatum* is endemic to Ecuador, known only from the type locality in Carchi Province at 2317 m in a *Premontane wet forest* life zone.

In the Lucid *Anthurium* key the species tracks to *A. chorense* Engl., which differs by having much smaller leaves which are bullate on the upper surface and only 5 pairs of basal veins; *A. clathratum* Sod., differs in having blades which dry darker and have 2–3 pairs of basal veins free to the base; *A. pulverulentum* Sodiro differs from by having a light green-drying blade, more primary lateral veins, more basal veins, a much larger spadix with more flowers per spiral and having a much larger petiole, cataphyll and blade; *A. corrugatum* Sodiro., differing by having the veins on the lower blade surface markedly pubescent; *A. lloense* Sodiro, differing by having veins on the upper blade surface scabrid; and *A. umbraculum* Sodiro differs in having more broadly ovate blades with up to 3 basal veins free to the base and with the collective veins arising from the uppermost pair of basal veins.

The specific epithet “*debile-emarginatum*” is from the Latin (*debilis*) meaning weak and (*emarginatus*) meaning emarginate or shallowly notched referring to

the strange narrowly rounded apex with the weakly emarginate tip.

***Anthurium dichromum*** Croat, **sp. nov.**

Type: Ecuador. Carchi: Ascent up main river, medium Cerro Golondrinas beginning at principal stream division; 00°52'N, 78°07'W, 2030 m, 2 Dec. 1987, *W.S. Hoover 2235* (holotype, MO-3624225).

**Figure 23.**

The species is a member of sect. *Polyneurium* and is characterized by its epiphytic habit, short internodes, persisting fully intact, ovate-cordate blades 1.4 times as long as wide and drying greenish brown on upper surface, short posterior lobes, short posterior ribs, 4–5 pairs of basal veins, and 28–29 pairs of primary lateral veins.

Epiphytic; **internodes** short; **cataphylls** 21 cm long, persisting fully intact, drying brown. LEAVES with **petioles** sulcate, ca. 61 cm long, 4–6 mm diam., drying reddish brown; **blades** subcoriaceous, ovate-cordate, ca. 38 cm long, 27 cm wide, 1.4 times as long as wide, drying greenish brown on upper surface, light green on lower surface, underside of blade contains several uniformly spaced black punctuations; **anterior lobe** 33 cm long, broadly convex; **posterior lobes** short; **sinus** 4 cm deep, 3.5 cm wide, parabolic to v-shaped; **midrib** round-raised below with minute clusters of cells or microscopic prickles, sulcate, convex; **primary lateral veins** 28–29 pairs, arising

at a 55–65° angle, flat above, prominently raised below, ribs of veins are exfoliating or breaking free, veins have narrow ridge, winged ribs, sometimes medial ridge; **tertiary veins** raised, pale brown on lower surface, gray on upper surface, quilted; **collective veins** arising from lowermost basal vein, running 2 mm from margin; **basal veins** 4–5 pairs; **posterior ribs** 5 mm long, extends laterally. INFRUCTESCENCE with **peduncle** sulcate, smooth, 64 cm long, 5 mm diam., **spathe** deciduous or merely broken off; drying reddish-brown; **spadix** 26 cm long, 2.5 cm diam.; **flowers** 6–8 per spiral, 2 mm wide, 1 mm long, lateral tepals 1 mm wide, drying reddish-brown; **berries** red and white.

This species is endemic to Ecuador, known only from the type locality at 2030 m in a *Lower montane wet forest* life zone.

*Anthurium dichromum* is seemingly closest to *A. cordulatum* Sodiro, from Guayas Province which differs by having typically larger leaf blades (35–60 cm long) which are proportionately longer (1.6–2.1 times longer than broad) and with the basal veins scarcely or not at all fused at the base.

In the Carchi region *A. dichromum* is similar to *A. carmenense* (described in this paper) owing to its blade of similar shape and drying color but that species has the basal veins free to the base and the primary lateral veins on the lower blade surface narrowly raised but not acute.

In the Lucid *Anthurium* key the species also tracks to *A. argyrostachyum* Sodiro, which differs by its long posterior lobes and long, naked posterior ribs; *A. bullianum* Engl., differing by its subcordate, ovate-triangular blades without substantial posterior lobes; *A. conspicuum* Sodiro, differing by having the posterior ribs naked 3–10 cm; *A. cornejoi* Croat, differing by its broader blades that dry dark brown or dark brownish green and its prominent posterior ribs; *A. ochreatum* Sodiro, differing in having blades drying light to medium green and the collective vein running farther from the margin; *A. ortegianum* Engl. differing by more elongated blades and its localion in Cauca Department of Colombia, far away from Carchi; and *A. striolatum* Sodiro differing by having promptly decomposing cataphylls, blades which are concave toward the base and proportionately longer (2.9–3 times longer than wide).

This species is named from the Greek “dichromum” meaning bicolored referring to its bicolored fruits.

***Anthurium elisalevyae* Croat, sp. nov.**

Type: Ecuador. Carchi: Along road from El Chical to El Limonal (Imbabura), 16 km S of junction with main El Chical-Peñas Blancas road, 2 km S of Río Gualpi Bridge, vicinity of Km 15.5–15.8 markers, 00°52'N, 78°13'W, 13 Oct. 2012, T.B. Croat, G. Ferry, D. Scherberich, C. Henríquez R., E. Levy 104236 (holotype, MO–6429042–43; isotypes, K, QCNE, US). **Figures 24–25.**

The species is a member of sect. *Polyneurium* and is characterized by its terrestrial habit, long persistent reddish brown intact cataphylls, terete smooth yellow-brown-drying petioles, ovate-cordate to ovate-sagittate-acuminate grayish brown-drying blades with 5–6 pairs of basal veins, 1 pair of which is free to the base, 2nd–5th briefly fused near the base, short posterior ribs which is not at all naked along sinus, 33–36 closely spaced primary lateral veins, collective veins arising from the 5th pair of basal veins and regularly moderately close to the margin as well as by the long-pedunculate inflorescence with a green spreading lanceolate spathe and a long tapered faintly reddish spadix.

Terrestrial; **internodes** short, 5 cm diam.; **cataphylls** persisting intact, drying dark brown. LEAVES with **petioles** 61–142 cm long, 8 mm diam. on drying, medium green, semiglossy, turning dark brown, matte and smooth; **blades** ovate-cordate to cordate-sagittate, 53–71 cm long, 16.2–33 cm wide (aver. 61.8 x 22.8), 1.5–1.9 times longer than broad, 0.3–1 times as long as petiole, subcoriaceous, dark green and matte above, paler and semiglossy below, drying dark brown and matte above, moderately paler and semiglossy below; **anterior lobe** 44–58.6 cm long, broadly rounded on margins; **posterior lobes** rounded to subrounded, 4.5–12.4 cm long, 13–14.5 cm wide midway; **sinus** more or less broadly V-shaped, 4.6–9.6 cm deep, 3.5–7 cm wide midway; **midrib** acute to narrowly rounded and paler above, narrowly rounded to narrowly round-raised and paler below,





Figure 24. *Anthurium dichromum* Croat (Hoover 2235, MO-3634225). Herbarium specimen showing stem, petiole, leaf blade, adaxial and abaxial surfaces, and infructescence.



Figure 25. *Anthurium elisalevyae* Croat (Croat et al. 104236, MO-6429042, sheet 2). Herbarium specimen showing stem, petiole and inflorescence.

drying narrowly rounded and darker above, round-raised darker and weakly ribbed below; **primary lateral veins** 33–36 pairs, quilted-sunken above, acute, prominently raised and paler below, weakly raised and concolorous above, narrowly and prominently raised, darker and matte below; **basal veins** 5–6 (7 interbasal veins) per side, 1 pair free to base, 2<sup>nd</sup>–4<sup>th</sup> fused to ca. 1 cm; **posterior ribs** 0.6–0.9 cm long, not at all naked; **tertiary veins** in part raised below; **collective veins** arising from one of lowermost basal veins, 3–4 mm from margin. **INFLORESCENCE** erect; **peduncle** 57–71 cm long; **spathe** 15–20 cm long, to 4.5 cm wide, medium green and glossy outside, matte and tinged purplish inside; **spadix** 21 cm long, 2.5–2.7 cm diam. near base, 2.8 cm diam. at 1 cm from apex, faintly reddish; **flowers** 8–9 visible per spiral, 2.1 mm long, 1.3 mm wide; tepals both weakly pitted and obtusely granular; lateral tepals 1.5–2.6 mm wide, inner margin rounded; outer margin 2-sided; stamens held at level of tepals; anthers 0.6 mm long, 0.7 mm wide, thecae sometimes weakly divergent; pistils protruding.

*Anthurium elisalevyae* is found in Carchi and Cotopaxi Provinces of Ecuador at 1970m–2400m elevation in a *Premontane wet forest* to a *Lower montane wet forest* life zones. It is expected to be found in adjacent Nariño Department in Colombia.

*Anthurium elisalevyae* is probably closest to *A. chuchubiense* Croat from the Lita-San Lorenzo region which differs in having proportionately longer green-drying

blades with dark violet-purple spadices as well as to *A. cuspidatum* Sodiro which differs in having blades drying pale green.

In the Lucid *Anthurium* key the species tracks to *Anthurium longicaudatum* Engl. which differs in having proportionately narrower blades with fewer more widely spaced primary lateral veins and a broader, less markedly V-shaped sinus; *A. chorense* Engl. which differs by having leaf blades about 3 times longer than wide with more prominent tertiary veins; *A. conspicuum* Sodiro differing by having a much larger blade, a parabolic sinus and a posterior rib which is naked 8–9 cm long; *A. longifilamentum* Croat, differing by its closed to hippocrepiform sinus and *A. cuspidatum* Sodiro, differing by having typically broader green-drying blades as well as by having a dark purple or white spadix.

*Croat et al.* 104479 from El Chical resembles *Anthurium elisalevyae* but it differs by its lower number of primary lateral veins (ca. 18 pairs) which are more widely spaced than for *A. elisalevyae*. It also occurs at a lower elevation (1200–1400 m instead of 2000–2400 m). It may represent a different species.

The species is named in honor of Ecuadorian biologist Elisa Levy who collected the type specimen. Elisa was born and raised in the area of El Chical and knows everyone in the region so she was a tremendous help on our several expeditions to Carchi Province. She is a graduate of the



Universidad Católica and is an expert on butterflies in Ecuador.

*Paratypes:* ECUADOR. **Carchi:** Reserva Golondrinas, El Corazón, recorrido por el sendero a La Cortadera hasta El Mirador, 00°50'N, 78°06'W, 2390 m, 23 Jan. 2004, *Homero Vargas L., Edwin Narváez, Wendy Torres & P. Escobar 4366* (QCNE). **Cotopaxi:** Reserva Ecológica Los Ilinizas, Cerro Tilipulo, filo de cumbre, Cordillera Tilinche, 00°46'30"S, 79°05'45"W, 2022 m, 25 July 2003, *Philip A. Silverstone-Sopkin, N. Paz, A. Giraldo & Marco Cerna 9506* (QCNE).

***Anthurium gelpii*** Croat, **sp.nov.** Type: Ecuador. Esmeraldas: Along road between Lita and San Lorenzo, vicinity of Alto Tambo, 17.8 km NW of Lita, vicinity of abandoned white house, 2.3 km E of RR tracks in Alto Tambo, 00°54'00"N, 78°32'36"W, 841 m, 21 Feb. 2005, *Thomas B. Croat 95209* (holotype, MO-4859460; isotype, QCNE). **Figure 26.**

The species is a member of sect *Polyneurium* and is characterized by its epiphytic habit, short internodes, short loosely organized persistent pale brown cataphylls, slender subterete petioles which dry light greenish brown and narrowly sulcate with a densely granular surface, narrowly ovate-elliptic-subcordate greenish brown-drying blades with 9–11 pairs of primary lateral veins as well as by its long-pedunculate inflorescence, slender oblong-

lanceolate spathe and long slender brownish purple spadix.

Epiphyte or hemi-epiphyte, **internodes** short, 2–2.3 cm long; **cataphylls** 3–3.7 cm long, drying reddish brown, persisting as disorganized brownish fibers. LEAVES with **petioles** 30–51 cm long, 4 mm diam., smooth, sub-terete, sulcate, drying brown; geniculum 0.5–1 cm long, 2 mm wide, drying much darker than petiole, dark brown; **blades** narrowly-ovate-elliptic, abruptly and narrowly long-acuminate at apex, subcordate at base, 21–31 cm long, 8–15 cm wide, 2.0–2.8 times longer than broad, (average 2.5) 0.5–0.6 times as long as petioles, drying brown; **anterior lobe** 19–28 cm long, mostly broadly convex on margins, sometimes slightly concave above the middle on one side; **posterior lobes** 2–5 cm long, 3–5 cm wide midway; **posterior ribs** 2–3 mm long, angled downward; **sinus** V-shaped, 2.5–3 cm deep, 1.5 cm wide; **basal veins** 3–5; **sinus** 1–3 cm long, 0.5–1 wide, triangular to a very narrowly V-shaped (sometimes closed with the lobes in contact); **midrib** drying convex and finely ribbed, concolorous to darker than surface above, round-raised below, drying paler and 3–5-winged-ribbed below; **primary lateral veins** 9–11 pairs, rising at a 45–50° angle; **tertiary veins** narrowly rounded and weakly raised and, concolorous below; **collective veins** arising from the 2–3<sup>rd</sup> pair of basal veins; **upper surface** thinly coriaceous, drying dark grayish-brown, weakly glossy above, smooth; **lower surface** brownish green and semi-glossy below, smooth with



Figure 26. *Anthurium elisalevyae* Croat (Croat et al. 104236, MO-6429043, sheet 1). Herbarium specimen showing leaf blade, adaxial and abaxial surfaces.



Figure 27. *Anthurium gelpii* Croat (Croat 95209, MO-4859460). Herbarium specimen showing stem, petioles, leaf blade, adaxial and abaxial surfaces, and inflorescence.



small bumps. INFLORESCENCE to 28 cm long, **peduncle** 16–23 cm long, 2–4 mm diam., drying paler brown than petiole; **spathe** 3–5 cm long, 0.5–1 cm wide, oblong-lanceolate, drying dark brown; **spadix** 6–7.2 cm long, 2.1–2.4 mm diam., brownish purple; **flowers** 3–4 visible per spiral, 1.4–1.8 mm long, 1.2–1.3 mm; tepals smooth, drying dark brown, matte; lateral tepals, 0.8–0.9 mm wide, inner margin rounded, outer margin 2-sided, stamens not seen. Berries not seen.

*Anthurium gelpii* is endemic to Ecuador, found in Carchi and Esmeraldas Provinces at 840–1330 m elevation in a *Premontane wet forest* life zone.

In the Lucid *Anthurium* key the species tracks to *A. cordulatum* Sodiro which differs by having large intact cataphylls, larger leaf blades (35–60 cm long) and longer peduncles; *A. nitens* Sodiro differing by its more broadly ovate, glossier blade and the parabolic sinus and *A. oreophilum* Sodiro differing by its much larger green-drying blades, broader parabolic to V-shaped sinus and 20–25 primary lateral veins.

This species named in honor of Peter Gelpi who assisted Scott Hoover in the collection of the paratypes. Peter was a student at Williams College in Williamstown, Massachusetts.

*Paratypes:* ECUADOR. **Carchi:** Near encampment in Gualpi Chico area of Awá Reserve, 00°58'N, 78°16'W, 1330 m, 20 Jan.

1988; *W.S. Hoover, A. Arguello, P. Gelpi & R. A. Lorentzen* 2846 (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W.S. Hoover, P. Gelpi, R. A. Lorentzen & A. Arguello* 3235 (MO, QCA).

***Anthurium griseosessile* Croat, sp. nov.**

Type: Ecuador. Carchi: Vicinity of El Chical; along road to El Carmen, departing main El Chical-Peñas Blancas Rd., 0.5 km from bridge over El Chical, 3.6–4.6 km up road to El Carmen. 1435–1503 m, 00°55'19"N, 78°21'14"W, 17 Feb., 2005 *Croat* 94762 (holotype, MO-4850287; isotype, QCNE). **Figure 27.**

The species is a member of section *Polyneurium* and is characterized by its terrestrial habit, short internodes, persistent yellow-brown, semi-organized cataphyll fibers, terete petioles, weakly glossy narrowly ovate-sagittate grayish green-drying long acuminate blades as well as by the sessile, dark violet-purple (drying dark gray), narrowly cylindroid spadix with early emergent dark violet-purple berries.

Terrestrial; **internodes** short, 1–1.3 cm diam.; **cataphylls** more or less 5 cm long, fibers, yellow-brown, semi-organized. LEAVES with **petioles** 28–31 cm long, 2–2.5 mm diam., terete, drying deeply and weakly sulcate, yellow-brown, geniculum 1 cm long, 2.5 mm diam., drying slightly darker than petiole; **blades** narrowly ovate,

22–25.3 cm long, 10–11.2 cm wide, broadest slightly below middle, 2.2 times longer than broad, 0.8 times as long as petiole, long-acuminate (acumen downturned) at apex, sagittate at base, subcoriaceous, dark green, weakly glossy above, paler and semiglossy below, epunctate (lacking glandular punctations); **anterior lobe** 20–20.9 cm long to the middle, broadly rounded on margins; **posterior lobes** rounded, 2–5.5 cm long, 4.5–5 cm wide; **sinus** parabolic, 1.5–4.4 cm deep, 1–2 cm wide; **upper surface** moderately smooth on magnification; **lower surface** weakly and sparsely granular, densely and minutely dark-speckled and irregularly pale-pustular; **midrib** acute, concolorous above, round-raised, weak ridges, paler than surface below; **basal veins** 6 pairs, 2 pairs free to the base, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> & 6<sup>th</sup> fused 5–7 mm; **posterior ribs** naked, 4 mm long; **primary lateral veins** 9–10 pairs, arising from the midrib at (40)48–64° angle, quilted-sunken, concolorous above, narrowly raised concolorous below; **collective veins** arising from the 2<sup>nd</sup> pair of the basal veins, 1–3.5 mm from the margin. INFLORESCENCE 22–26 cm long, erect; **peduncle** 17–23.2 cm long, 0.8–2 mm diam., drying yellow-brown; **spathe** green, oblong-lanceolate, 3.5 cm long, 3–7 mm wide; **spadix** stipitate (**stipe** 2.2 mm long, 1.2 mm diam., drying darker than peduncle), narrowly cylindroid, dark purple and matte, drying dark gray, 2.3–5.3 cm long, 1.5–3.5 mm diam.; **flowers** 3–4 per spiral, 1.8–2 mm long, 1.5–1.7 mm wide; tepals moderately smooth; **lateral tepals** 0.5–0.7 mm wide, inner margin

broadly rounded, outer margin 2-sided; stamens not exerted, 1.5 mm diam., thecae narrowly ovate, scarcely divaricate.

*Anthurium griseosessile* is known from Ecuador (Carchi, Imbabura) at 565–1503 m in a *Premontane wet forest* life zone.

*Anthurium griseosessile* is most similar to *Anthurium longicaudatum* Engl. which differs in having a larger stature, larger blades (21–70 cm long, 14–44 cm wide), 14–22 pairs primary lateral veins and a spadix 6–21 cm long, 4–12 mm diam.

The species epithet “griseosessile” from the Latin “griseus” (meaning gray) and sessilis (sessile or not stalked) referring to the spadix which is both sessile and dries dark gray.

*Paratypes*: ECUADOR. **Carchi**: Vicinity of El Chical; along road to El Carmen, departing main El Chical-Peñas Blancas Rd., 0.5 km from bridge over El Chical, 3.6–4.6 km up road to El Carmen. 1435–1503 m, 00°55'19"N, 78°21'14"W, 17 Feb., 2005, T. B. Croat 94810 (holotype, MO-4850287; isotype, QCNE); Along road between Lita and Babosa, 3 km NE of Lita, 00°53'05"N, 78°27'04"W, 565 m, 14 Aug. 2013, T. B. Croat, Alejandro Zuluaga & Natalia Castaño Rubiano 104684 (MO, QCNE). **Imbabura**: Railroad line from Lita to 2 km above, 00°51'03"N, 78°27'50"W, 812 m, 1 Sep. 1982, William G. D'Arcy 14873 (MO).

***Anthurium hebetatilaminum*** Croat & J. Rodríguez, *Aroideana* 18: 73–75. (1995). Type: Ecuador. Pichincha: ENDESA reserve, Quito-Puerto Quito, km 113, 10 km N, 00°05'N, 79°02'W, Rodríguez 270 (holotype, MO-3160586; isotype, SCZ). **Figure 28.**

The species is a member of sect. *Polyneurium* and is characterized by its appressed epiphytic habit, short internodes with only the pale bases of cataphyll fibers persisting, by its sharply sulcate, C-shaped petioles, blades 2.2–3.1 times longer than wide and matte to weakly glossy on the lower surface, the long-pedunculate inflorescence, as well as by the usually dark violet-purple spadix and violet-purple berries.

Appressed epiphyte or rarely terrestrial; **stems** to 50 cm long, **internodes** short, 1–4 cm long, 2–2.5 cm diam.; **cataphylls** 15–20 cm long, persisting intact toward apex, decomposing into fibers and persisting below. **LEAVES** with **petioles** 40–63 cm long, 3–5 mm diam., sulcate to sharply c-shaped, sometimes 5-ribbed, sheathed 5–6.5 cm; geniculum 1.6–2.7 cm long, drying darker; **blades** narrowly ovate, 45–60 cm long, 16–21 cm wide, broadest at the point of petiole insertion, subcoriaceous, gradually to abruptly acuminate at apex, truncate to subcordate at base, dark green and semi-glossy above, paler and matte below, drying greenish brown and matte to weakly glossy above, slightly paler and matte to weakly glossy

below; **midrib** convex above, round-raised below, sometimes purplish and weakly striate; **primary lateral veins** 19–23 pairs, narrowly sunken above, convex below, arising at 43–47 degree angle, tertiary; veins prominent below, weakly raised; **basal veins** 2–4 pairs, free or with the 2<sup>nd</sup> pair coalesced 1–1.5 cm; **collective veins** arising from one of the lowermost primary lateral veins or the uppermost basal veins, 3–5 mm from the margin. **INFLORESCENCE** erect; **peduncle** 30–45 cm long, sometimes sulcate and 5-ribbed, 1/3–2/3 as long as petioles; **spathe** lanceolate, green, sometimes with purplish veins, 13–20 cm long, 1.4–1.7 cm wide, erect-spreading, inserted at an angle of 45 degrees, margins meeting acutely at base; **spadix** 14–20 cm long, sessile, narrowly long-tapered, dark violet-purple; **flowers** quadrangular to rhombic, 3.5–3.2 mm diam., 7–9 per spiral; tepals 2.8–2 mm perpendicular to the axis; lateral tepals with the inner margins convex; stamens to 1.7 mm long; anthers yellowish red. **INFRUCTESCENCE** purplish, to 25 cm long, 1.5 cm diam., erect; **berries** 3.5–4.5 mm long, globose to obovoid, purple, sometimes longitudinally streaked with yellow-green; pericarp thin; mesocarp mucilaginous, translucent; **seeds** 2–3 mm long, 1 mm wide, olive-green, 1 per locule.

*Anthurium hebetatilaminum* is a member of sect. *Polyneurium* and is known only from the western slopes of the Andes in Ecuador at 800 to 1,000 m elevation. All currently confirmed collections are from Carchi and Pichincha Provinces.





Figure 28. *Anthurium griseosessile* Croat (Croat 94762, MO-4850287). Herbarium specimen showing stem, petioles, leaf blade, abaxial surface, and inflorescence.



Figure 29. *Anthurium hebetatilaminum* Croat & Rodríguez (Rodríguez 270, MO-3160586). Herbarium specimen showing stem, petioles, leaf blade, adaxial and abaxial surfaces, and inflorescence.





**Figure 30.** *Anthurium lancea* Sodiro (not collected). View of leaf blade, adaxial surface.

In Pichincha Province the species is most similar to *A. balslevii* Croat & J. Rodr. That species differs in having blades semiglossy beneath and typically acute to weakly subcordate at the base and especially by having a greenish to yellowish spadix.

Elsewhere the species is most easily confused with *A. cuspidatum* Masters and *A. oreophilum* Sodiro, both of which have blades of similar shape but which differ in having blades glossy on the lower surface. *Tipaz et al.* 1534, collected in the Awá reserve near Tobar Donoso in Esmeraldas Province, is

perhaps also this species. It has the same matte lower blade surface with whitish speckles. It differs in having the collective veins 6–10 mm distant from the margin, versus 2–3 mm distant in *A. hebetatilaminum* from ENDESA.

Another species with which this one can be confused is represented by *Madison* 4014 and 4040 from the Río Toachí at 900 m, an apparently undescribed species which also has the lower blade surface matte. That species differs in having the lower blade



surface noticeably paler and in having a reddish-brown spadix.

*Specimens seen:* ECUADOR. **Carchi:** Trail along plain above Tobar-Donoso and to Río Gualpe, 01°10'N, 78°24'W, 244–397 m, 18 Feb. 1984, *W. Scott Hoover 1219* (MO); Parroquia Tobar Donoso, Sector Sabalera, Reserva Indígena Awá, Noreste Casa Comunal, 01°00'N, 78°24'W, 650–1000 m, 19 June 1992–28 June 1992, *Tipaꝥ et al.1534* (MO); Tulcán, Reserva Etnica Awá, Comunidad de Gualpi Medio, 01°01'N, 78°16'W, 900 m, 21 May 1992, *Carlos Quelal 710* (MO, QCNE).

***Anthurium lancea*** Sodiro, *Anal. Univ. Centr. Ecuador* 16: 273. 1902. Type: Ecuador. Cotopaxi: Angamarca, *Sodiro s.n.*, (lectotype, B; isolectotype, G). **Figures 29–30.**

*A. lancea* Sodiro, var. *canarense* Sodiro, *Anturios Ecuatorianos: Monografía II. Contribuciones al conocimiento de la flora Ecuatoriana*, Adiciones. P. 6. 1903. Type: Ecuador. Cañar: *Rimbach 88* (not seen, perhaps lost).

The species is a member of sect. *Polyneurium*. It is considerably variable throughout its range but it can be recognized by its usually terrestrial habit, its usually black-drying leaves with a prominently attenuate leaf base leading to what appears to be a remote geniculum, by the generally remote collective veins (often up to 1.5 cm from the margin), by the

prominently stipitate green spadices and purple berries.

Terrestrial, stem to 70 cm long; **internodes** 2–3 cm long, 1.5–4 cm diam.; **cataphylls** 5–15 cm long, green and persistent; leaves more or less erect. LEAVES with **petioles** 25–80 cm long, 6 mm diam., obtusely flattened to obtusely sulcate, sometimes sharply D-shaped, medium green, weakly glossy, sheathed 2–2.5 cm; geniculum 1–3 cm, darker than the petiole; **blades** broadly ovate-cordate, to triangular-hastate to elliptic or ovate-elliptic, 18–48 cm long, 13–42 cm wide, 1.2–1.3(1.6) times longer than wide, broadest at petiole insertion or near the base, coriaceous to subcoriaceous, acuminate to abruptly acuminate at apex, attenuate at base, with or without posterior lobes, the geniculum sometimes appearing remote, dark green and semiglossy above, medium green and matte to weakly glossy below, both surfaces typically drying dark brown to black; sinus arcuate with a decurrent petiole or lacking; **midrib** convex above, acute beneath, sometimes also sharply 3-ribbed, becoming acutely 1-ribbed toward the apex, darker than surface above, drying dark brown and thicker than broad below; **primary lateral veins** 6–10 pairs, departing midrib at 30–40° angle, prominently and acutely raised above; **tertiary veins** in part raised below; **basal veins** (1) 3–6 (7) pairs, the 1st free to the base, the others variously coalesced 2.5–6 cm; posterior ribs (when present) naked along the sinus for most of its length; **collective veins** arising from the 1st through 4th basal veins, 7–14 mm from the

margin (elsewhere at higher elevations from 1st basal veins or from one of the primary lateral veins). INFLORESCENCE semi-erect; **peduncle** 30–61 cm long, 5–8 mm diam.; obtusely sulcate adaxially, about as long as the petioles; **spathe** spreading, linear-lanceolate, 6–10 cm long, 1.2–1.7 cm wide, green, membranaceous, acuminate apex, the margins meeting at an obtuse angle at the base; **spadix** green, 6.5–8 cm long, 4–12 mm diam. near the base, 3–5 mm diam. near the apex, stipitate 3–1.8 cm; **flowers** rhombic, 2.8–3.4 mm long, 2–2.6 mm wide, 3–5 visible per spiral; lateral tepals 1.4–1.6 mm wide, the inner margins broadly rounded; stamens held at level of tepals; anthers cream, ovoid, 0.5 mm long, 0.6 mm wide, the thecae scarcely divaricate. INFRUCTESCENCE to 16 cm long, arcuate-pendent; **berries** early emergent, purple to violet-purple, whitish at very base, globose, maturing irregularly on the spadix; pericarp thick with raphide cells basally; mesocarp pasty, white; **seeds** 6–7 mm long, 5 mm wide, discoidal, green, 1 per locule.

*Anthurium lancea* ranges from Colombia (Chocó, Valle, Cauca, Nariño) to Ecuador (Carchí, Esmeraldas, Imbabura, Pichincha, Cotopaxi, Chimborazo, Cañar, and Azuay on the Pacific slope as well as Napo & Morona-Santiago on the eastern slope) at 650 to 1850 m elevation.

Collections of *A. lancea* from northwestern Ecuador in Carchí and Esmeraldas and in Colombia (Nariño- Croat 71415, 71634); Chocó (Croat 56645 & Forero & Gentry 791) have the collective veins

closer to the margins and a shorter stipe but otherwise match the Pichincha material reasonably well.

*Specimens seen:* ECUADOR. **Carchi:** Vic. Maldonado, 00°54'00"N, 78°06'00"W, 1800 m, 15 Apr. 1977, *Michael T. Madison 3994* (MO, SEL); El Pailon, ca. 45 km below Maldonado along foot path to Tobar Donoso, 01°02'49"N, 78°22'05"W, 800 m, 27 Nov. 1979, *Michael T. Madison & Elizabeth L. Besse 7075* (MO, SEL); Maldonado, Parroquia Tobar Donoso, Reserva Etnica Awá, Sabalera, 00°55'N, 78°32'W, 900 m, 22 Nov. 1992, *C. Aulestia, Milton Aulestia & M. Guanga 636* (MO); Near encampment in Gualpi Chico area of Awá Reserve, 00°58'N, 78°16'W, 1330 m, 20 Jan. 1988, *W. Scott Hoover, Ana Argüello, P. Gelpi & R.A. Lorentzen 2889* (MO); From Prima Vera hike about six hours up Río Gualchan drainage to shelter built by Nilo Ortiz at 1950 m, collected mostly along ridge to the north and around camp, Montane Wet/Pluvial Forest, 00°49'58"N, 78°10'01"W, 1930–2200 m, 7–8 June 1993, *Jason C. Bradford, Irene Shonle, Jason Rauscher & Sabbe, Piet 50* (MO); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover, P. Gelpi, R.A. Lorentzen & Ana Argüello 3234* (MO, QCA); Along road from El Chical to El Limonal (Imbabura), 16 km S of junction with main El Chical - Peñas Blancas road, 2 km S of Río Gualpi Bridge, vicinity of Km 15.5–15.8 markers, 00°52'N, 78°13'W, 2043 m, 13 Oct. 2012, *T. B. Croat, Geneviève Ferry, David Scherberich, Claudia L. Henriques R. & Elisa*

*Levy 104231* (MO); Espejo, Reserva Golondrinas, recorrido por el sendero de las mulas hasta la casa de la Fundación Golondrinas en Santa Rosa, Bosque Muy Húmedo Montano, 00°50'N, 78°08'W, 1790 m, 26 Jan. 2004, *Homero Vargas L., Edwin Narváez, Wendy Torres & P. Escobar 4482* (QCNE); Tulcán, Parroquia Tobar Donoso, Reserva Indígena Awá, Centro El Baboso, 00°53'N, 78°25'W, 1800 m, 17–27 Aug 1992, *Galo A. Tipaz, Milton Tirado, C. Aulestia, Neill Gale & Patriciño Ortiz 1868* (MO, QCNE); Tulcán, Reserva Etnica Awá, Comunidad de Gualpi Medio, Bosque pluvial Premontano, 01°01'N, 78°16'W, 900 m, 21 May 1992, *Carlos Quelal, Galo A. Tipaz & J. Taicúz 705* (MO); Tulcán, Parroquia Tobar Donoso, Reserva Indígena Awá, Centro El Baboso, 00°53'N, 78°25'W, 1800 m, 17–27 Aug 1992, *Galo A. Tipaz, Milton Tirado, C. Aulestia, Neill Gale & Patriciño Ortiz 1965* (MO); Property of Humberto Rosero, on N side of Río Mira, just above cable crossing, upstream from Lita and downstream from Cachaco, Primary premontane wet forest, on steep W-facing slope, 00°52'N, 78°26'W, 760–780 m, 20 Aug. 1994, *Brad Boyle, Kelperis, J., Smith, R. & Uebel, V. 3635* (MO).

***Anthurium lineolatum*** Sodiro, *Revista Chilena Hist. Nat.* 9: 260. 1905. Type: ECUADOR. Esmeraldas: between Río Cachabí and Lita, Aug. 1904. (Type lost), neotype: Ecuador. Esmeraldas, without locality, Sodiro s.n. (QPLS-167). **Figures 31–32.**

The species is a member of sect. *Polyneurium* and is characterized by its long, terete petioles, narrowly ovate, matte-subvelvety, conspicuously cordate-sagittate, caudate-acuminate blades with widely-spaced prominent venation and the dark purple-violet, narrowly tapered spadix. The specimens observed in this study match the original type description and photograph well with scattered and minor exceptions in individual measurements. These discrepancies are insufficient to justify the identification of a new species which would be virtually indistinguishable from Sodiro's.

Terrestrial or epiphytic; **internodes** short, 1.5–4 cm diam.; **cataphylls** to 25 cm long, dark brown, persisting intact at upper nodes, deciduous or less commonly persisting as loose fibers lower, drying dark brown. LEAVES with **petioles** elongated, terete, 41.3–111.3 cm long, 4–8 mm diam., yellow-green to dark olive-green, semiglossy; geniculum 0.5–2 cm long; **blades** ovate-subcordate-sagittate, 43–72 cm long, 16–35.4 cm wide, 1.4–2.7 (averaging 2.3) times longer than wide, 0.4–1.4 (averaging 0.8) times as long as petiole, caudate-acuminate at apex with acumen to 2 cm long, subcordate-sagittate or sometimes nearly truncate at base, subcoriaceous, dark green and matte to matte-subvelvety above, slightly to moderately paler and matte below, sometimes weakly glossy or almost matte below, drying grayish green to yellow-brown below, darker above (rarely drying shades of green as in Gentry 70046), epunctate; **anterior lobe** 37–56 cm long with margins weakly curved; **posterior**





Figure 31. *Anthurium lancea* Sodiro (not collected). View of inflorescence.





**Figure 32.** *Anthurium lineolatum* Sodiro (Croat et al. 83121). Live plant showing petioles, leaf blades, abaxial surface, and inflorescence.

**lobes** directed toward the base, 6.5–17 cm long, 5.5–14.5 cm wide; **basal veins** 3–5 pairs, 1st pair free to the base, 2nd pair fused to 2 cm, 3rd–5th pairs fused into posterior ribs (rarely all free to the base); **posterior ribs** 0.7–2.1 cm long, naked along none to all of its length (also match “ribs” to “its”); sinus parabolic to spatulate (arcuate on *Croat 74022*), 4–8.5 cm long; **midrib** acute to narrowly rounded and slightly paler to concolorous above, round-raised (rarely thicker than broad) and paler or purplish below, sometimes with 2 or more acute lateral ribs, drying concolorous above, medium to dark yellow-brown below; **primary lateral veins** 9–14 pairs, arising at a 30–40° angle from midrib, turning toward apex before joining collective veins, sunken or quilted-sunken and concolorous above, narrowly raised and slightly paler or purplish below, drying concolorous above, darker than leaf blade below; **collective veins** arising from 3rd–5th basal vein, continuing from near the base to the apex of the blade, less than 1 cm from margin. INFLORESCENCE erect or erect-spreading; **peduncle** 26–48 cm long, significantly shorter than blade; **spathe** lanceolate, reflexed to spreading, 8.3–17 cm long, 1.3–2.3 cm wide, green, sometimes tinged with purple; **spadix** sessile or weakly stipitate, slightly tapered, 9–21 cm long, 4–8 mm diam., often longer than spathe, dark purple-violet, matte or weakly glossy. INFRUCTESCENCE with berries red.

*Anthurium lineolatum* is known primarily from the middle of the Lita-San Lorenzo region of Esmeraldas Province of

Ecuador, extending northward to the Colombian border at 60–300 m elevation in *Tropical moist forest*, *Tropical wet forest* and *Premontane rain forest* life zones. It is also found in western Carchi Province, close to Esmeraldas.

The species may be confused with specimens of *A. cuspidatum* Masters which have similar blade shapes, but the latter differs in having the basal veins all free to the base or nearly so and in having the posterior lobes typically overlapped with a closed sinus, whereas *A. lineolatum* typically has the basal veins more prominently fused into a posterior rib and a parabolic to spatulate sinus. In addition, the primary lateral veins on *A. lineolatum* are much more widely spaced than on *A. cuspidatum*. Another species described by Sodiro from Pinchincha, *A. oreophilum*, is similar to this species but possesses larger posterior lobes that are directed more outward.

*Specimens seen:* **Carchi:** Along road to Baboso, along Río Baboso, 2 km N of Río Mira Bridge, near old Lita Railroad Station, 00°53'32"N, 78°27'05"W, 618 m, 9 Oct. 2012, T. B. Croat, Geneviève Ferry, David Scherberich & Claudia L. Henríquez R. 104042 (MO, QCNE); Reserva Etnica y Forestal Awá-San Marcos, 01°05'N, 78°15'W, 900 m, 11 Mar. 1988, Concepción Rodríguez-Jiménez 686 (QCA).

*Anthurium longicaudatum* Engl., *Bot. Jahrb. Syst.* 25: 388. 1898. Type: Ecuador. Pallantanga near Pte de



Chimba, *Sodiro s.n.* (T: QPLS).  
**Figures 33–34.**

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

The species is a member of section *Polyneurium* and is characterized by its large cordate or subcordate leaves with very long petioles, its 14–22 pairs of lateral veins bluntly acute below, and its mature spadix burgundy or purple.

Epiphyte, hemiepiphyte or terrestrial plant; **caudex** to 0.5 m long; **internodes** usually short, sometimes slightly longer than broad, 1–5 cm long, 1–4 cm diam., dark green and glossy, soon gray-green, becoming closely transverse-fissured; **cataphylls** up to 15 cm long, first yellow-green then dark brown, persisting semi-intact at upper nodes, eventually only the bases persisting as dark brown fibers. LEAVES with **petioles** terete or obtusely to sharply flattened, sometimes with weakly erect margins and faint medial rib, 32–110 cm long, 3–10 mm diam., medium green, maroon or tinged purple, semiglossy; **blades** ovate to ovate-elliptic, cordate or subcordate at the base, acuminate at the tip, 21–70 cm long, 14–44 cm wide, averaging 36 x 24 cm, 1.1–1.9 times longer than wide, 0.5–0.9 times as long as petioles, thinly coriaceous, dark green and matte-subvelvety to weakly glossy above, slightly paler and semiglossy below; **midrib** moderately rounded and paler above, round-raised, acutely 3-ribbed and moderately paler or

maroon below; **primary lateral veins** 14–22 pairs, quilted-sunken and concolorous above, bluntly acute and paler or maroon below; **tertiary veins** mostly not raised below; **collective veins** arising from 3rd–4th pair of basal veins, running 2–5 mm from the margin. INFLORESCENCES erect-spreading; basal veins 4–6, free to base; **peduncle** erect, 22–78 cm long, 2–8 mm diam., maroon; **spathe** spreading or reflexed, lanceolate, acuminate, clasping the stipe at the base, 4.5–15 cm long, 0.7–2.5 cm wide, averaging 9 x 1.6 cm, green, pink, pinkish green, greenish purple or lilac; **spadix** straight or curved, cylindrical, rounded at apex, 6–21 cm long, 4–12 mm diam., light green, reddish green, burgundy, dark purple or purple-violet, glossy, stipitate 2–8 mm. INFRUTESCENCES spreading, **berries** green when young, purple at maturity.

*Anthurium longicaudatum* ranges from Colombia (Nariño) to Ecuador (Carchi, Cotopaxi, Esmeraldas, Imbabura, Pichincha) at 250–2500 m elevation in *Premontane wet forest*, *Lower montane wet forest*, *Montane wet forest*, *Tropical rain forest* and *Montane rain forest* life zones.

*Specimens seen:* ECUADOR. **Carchi:** Río Blanco drainage above Chical, tributary of Río San Juan, ca. 12 km W of Maldonado, 1300–1500 m, 25 Sep. 1979, *A. Gentry & Gene Schupp* 26556 (SEL); Cerro Golondrinas, upper Río Gualpí headwaters, north-facing slope beyond (to north of) ridge crest at 2300 m which rises above the settlements of El Carmen and La



**Figure 33.** *Anthurium lineolatum* Sodiro (Croat *et al.* 83121). View of leaf blade, adaxial surface.





**Figure 34.** *Anthurium longicaudatum* Engl. (Croat & Ferry 98309). Live plant showing petioles, leaf blades, adaxial surface, and inflorescence.





**Figure 35.** *Anthurium longicaudatum* Engl. (Croat & Ferry 98309). View of leaf blade, adaxial surface.

Primavera, 00°50'N, 78°13'W, 2250–2265 m, 15 July 1993–20 July 1993, *Brad Boyle, P. Chamorro, M. Fleury, P. Hibbs & M. Quer 2184* (K, MEXU, MO, QCNE); Maldonado, Parroquia Tobar Donoso, Reserva Etnica Awá. Sabalera, 00°55'N, 78°32'W, 900 m, 22 Nov. 1992, *Carlos Aulestia, E. Aulestia & M. Guanga 664* (MO); Vic. Maldonado, 1800 m, 15 Apr. 1977, *M.T. Madison 4000* (SEL); Tulcán-Maldonado, Campamento Machines, ca. 10 km SE of Maldonado, 2200–2400 m, 28 Feb. 1974, *G. Harling & L. Andersson 12306* (GB); Valle de Maldonado, km 71 on

Tulcán-Maldonado, 00°54'N, 78°06'W, 2100–2200 m, 20 May 1973, *L.B. Holm-Nielsen, S. Jeppesen, B. Løjtnant & B. Øllgaard 6008* (AAU); Espejo, El Gualtal, Faldas de Cerro Golondrina Hembra, 00°51'N, 78°07'W, 2450 m, 21 Aug. 1994, *Walter Palacios 12618* (CM, MO, QCNE); Mira, N del Carmen, camino a Chical, 00°51'N, 78°13'W, 2000–2200 m, 10 Feb. 1992, *Walter Palacios et al. 9708* (MO); *Walter Palacios, G. Típaş, E. Gudiño & B. Cuamacás 9820* (MO, US); Tulcán, Arriba de Maldonado, frontera con Colombia, Sitio Chilmá, 00°51'N,

78°02'W, 2000 m, 20 May 1991, *Walter Palacios & D. Rubio 7305* (MO); Parroquia Tobar Donoso, Reserva Indígena Awá, Centro El Baboso, 00°53'N, 78°25'W, 1800 m, 17 Aug. 1992–27 Aug. 1992, *Galo Tipaz, M. Tirado, C. Aulestia, N. Gale & P. Ortiz 1784* (MO).

***Anthurium maculosum*** Sodiro, *Anales Univ. Centr. Ecuador* 15: 388. 1902. Type: ECUADOR. Cordillera de Angamarca, Nov, 1899, *Sodiro sn.* Neotype: Angamarca, *Sodiro s. n.*, Nov. 1900. (holoneotypes, B; isolectotype, QPLS). **Figure 35.**

The species is a member of sect. *Polyneurium* and is characterized by its purple and green mottled or maculate petioles, elliptic blades with weakly curved margins, few and widely spaced primary lateral veins, pendent inflorescence, long-tapered green spadix and its lavender berries.

Epiphyte; **internodes** short, 2–2.5 cm diam.; **cataphylls** persisting intact; roots densely packed. LEAVES with **petioles** 27.2–73 cm long, 2–7 mm diam., terete, sometimes obtusely flattened adaxially, matte or weakly glossy, dark purple maculate (*Croat 71945* recorded as purple with green spots), drying concolorous with midrib with mottling more or less prominent; **geniculum** prominently swollen; **blades** elongate-elliptic, 27.8–51.5 cm long, 11.5–18.8 cm wide, 2–3 times longer than wide, 0.7–1.4 times as long as petiole, acuminate at apex with acumen to 2 cm long, obtuse-truncate

at base, subcoriaceous to moderately coriaceous, dark green and semiglossy to glossy above, much paler and matte and glaucous below, drying grayish yellow to yellow-brown to dark yellow-brown above, generally paler below; **basal veins** 1 major pair with faint 2<sup>nd</sup> pair near base of leaf; **midrib** convex or bluntly acute and slightly paler above, narrowly raised and paler below, drying roughly concolorous above and concolorous to slightly darker than surface below; **primary lateral veins** 6–8 pairs, arising at a 30–40° from midrib, prominently unsunken above, pleated-raised and pale below, drying roughly concolorous above and below; tertiary veins moderately distinct; **collective veins** arising from the 1<sup>st</sup> basal vein or 1<sup>st</sup> primary lateral vein and continuing to the apex 6–10 mm from the margins; interprimary lateral veins almost as prominent at primary lateral veins. INFLORESCENCE pendent to erect-spreading; **peduncle** 45.8–60.5 cm long; **spathe** erect or drooping, 4.8–8 cm long, 0.7–1.4 cm wide, green; **spadix** erect or drooping, slightly tapered to apex, 5.5–12.5 cm long, 4–6 mm diam., green, semiglossy, becoming grayish; **berries** lavender.

*Anthurium maculosum* is known only from Ecuador (Carchi, Cotopaxi, Esmeraldas, Pichincha) at (400)685–1800(2000) m elevation in a *Premontane wet forest* life zone.

*Anthurium maculosum* most closely resembles *A. michelii* Guillaumin but the latter species differs by having petioles that are not mottled purple and green, a

generally shorter spadix that is more significantly stipitate and dries darker and in having blades that are generally more attenuate at the base. However, due to the variability seen in specimens from this region, the mottled nature of the petiole may be the only reliable distinguishing characteristic.

*Specimen seen*: ECUADOR. **Carchi**: Cantón Gualchán, along trail between Las Juntas and Golandrinas Park then 1 km E, 00°48'18"N, 78°09'23"W, 1345–1360 m, 15 June 2013, T. B. Croat, Alejandro Zuluaga & Natalia Castaño Rubiano 104805 (MO, QCNE).

***Anthurium melanochlorum*** Croat, sp.nov. Type: ECUADOR. Esmeraldas: Lita-San Lorenzo Road, 6.4 km W. of Rio Lita (old road), 00°52'04"N, 78°29'03"W, 685 m, 30 June 1998, T. Croat, R. Mansell, L. Hannon & J. Whitehill 82168 (holotype, MO-05026657; isotype, QCNE) **Figures 36–37**.

The species is a member of sect. *Polyneurium* and is characterized by its very dark green broadly ovate-subcordate blades, short peduncle, cylindroid green spadix and short green reflexed spathe.

Terrestrial; **internodes** short, 0.5–2.5 cm long, 0.8–2 cm diam., dark green and glossy; **cataphylls** mostly deciduous, sometimes persisting intact up to 8.5 cm, drying pale yellow-brown. LEAVES with

**petioles** subterete to terete, obtusely sulcate adaxially, sometimes narrowly and sharply flattened toward apex, medium to very dark green, weakly glossy to glossy; **blades** broadly ovate, 28.9–40.7 cm long, 16.1–29.1 cm wide, 1.25–1.8 times longer than wide, 0.6–0.75(1.2) times longer than petiole, broadly subcordate at base, briefly acuminate at apex, subcoriaceous, dark green to black-green and glossy above, moderately to slightly paler and semiglossy below; **anterior lobe** 28–36.7 cm long, moderately to broadly rounded; **posterior lobes** directed toward base, 7.2–8.5 cm long and 7.7–9.8 cm wide where sinus is greater than 2 cm; **basal veins** 2–3 pairs, free to petiolar plexus; **sinus** arcuate to parabolic, 0.9–4 cm deep; **midrib** bluntly acute and slightly paler to weakly raised and concolorous above, round-raised to bluntly acute and paler below, drying concolorous above, paler than blade below; **primary lateral veins** 9–10 pairs, weakly sunken, etched and concolorous above, narrowly raised and concolorous to slightly paler below; tertiary veins moderately obscure below; **collective veins** arising from the 1<sup>st</sup> basal veins or the 1<sup>st</sup> primary lateral veins, prominently loop-connecting primary lateral veins, 5–10 mm from margin. INFLORESCENCE erect to spreading; **peduncle** short, 8.5–14.8 cm long, dark green and semiglossy; **spathe** reflexed, 4.2–6.5 cm long, 1–1.6 cm wide; **spadix** cylindroid, 6–9 cm long, 3–7 mm diam., dark green, matte.

*Anthurium melanochlorum* ranges from Colombia (Nariño in the municipio of





**Figure 36.** *Anthurium maculosum* Sodiro (Brussels Bot. Gard. 19910023–94). View of leaf blade, adaxial surface.





**Figure 37.** *Anthurium melanochlorum* Croat (Anthura, Inc. 369). View of leaf blade, adaxial surface.





**Figure 38.** *Anthurium melanochlorum* Croat (Anthura, Inc. 369). Close-up of spadix.



Barbacoas) to Ecuador (Carchi and Esmeraldas) at 390–1250 m in *Premontane rain forest*.

*Paratype*: ECUADOR. **Carchi**: Tulcán, Parroquia Tobar Donoso, Sector Sabalera, Reserva Indígena Awá, bosque primario Noreste Casa Comunal, 01°00'N, 78°24'W, 100–650 m, 19–28 June 1992, *Tipaz 1525* (MO, QCNE).

***Anthurium membranaceum*** Sodiro, *Anal. Univ. Central del Ecuador* 19(136): 294. 1905. Type: holotype: ECUADOR: Esmeraldas. Río Cachabí, near Ventanas, Aug 1904, *Sodiro s.n.* (holotype, G). **Figure 38**.

The species is a member of sect. *Polyneurium*. It is highly variable in leaf size and shape but is distinguished by its leaves which are on average twice as long as wide and dry a light green color with paler venation on the lower surface as well as by its narrow, straight spadix drying pale yellow-brown.

Epiphytic or terrestrial; internodes short to 3 cm long, 1–2 cm diam., medium green, semiglossy; **cataphylls** to 25 cm, drying light brown almost white, deciduous but with persisting brown fibers. LEAVES with **petioles** 15–50 cm long, 0.3–1 cm diam., terete to obtusely flattened or sulcate, rarely sharply sulcate or with acute marginal ribs, medium green, matte to semiglossy; **blades** narrowly elliptic to ovate, caudate-

acuminate at apex with acumen 1–2 cm long, cuneate to obtuse or weakly cordate at base with sinus to 2.5 cm deep, 25–62.7 cm long, 12.3–30.4 cm wide, 1.6–3.1 (average 2.2) times longer than wide, 0.9–2.5 times longer than petiole, subcoriaceous, dark green and matte-subvelvety to weakly glossy above, moderately paler and matte below, drying various shades of green, brown and gray above, typically paler and grayer below; **basal veins** 2–4 pairs, free to petiolar plexus; **midrib** narrowly raised and concolorous to slightly paler above, round-raised and concolorous to paler below, drying generally concolorous above and slightly to moderately paler than blade below; **primary lateral veins** 19–33 pairs arising at a 30–50° angle from the midrib, closely-spaced, narrowly to quilted sunken and concolorous above, narrowly raised to round-raised and concolorous to slightly paler (slightly darker than blade on *Croat 87559*) below, drying concolorous above and concolorous to moderately paler than surface below; interprimary veins virtually indistinguishable from primary veins, drying concolorous above and concolorous to moderately paler than surface below; **tertiary veins** very weakly raised, drying concolorous above and concolorous to paler than surface below; **collective veins** arising from basal veins or 1<sup>st</sup> primary lateral vein, 2–6 mm from margin. INFLORESCENCE erect; **peduncle** 8.5–29.5 cm long, drying thinner and darker than petiole; **spathe** reflexed to spreading (coiled in *Neill et al. 13972*), lanceolate, 6.5–15.5 cm long, 0.45–1.5 cm wide, creamy yellow to medium green; **spadix** sessile to

shortly stipitate, narrow and straight, 5.5–19 cm long, 0.25–.6 cm diam., yellow, drying pale yellow-brown or rarely reddish-brown. INFRUCTESCENCE not seen.

*Anthurium membranaceum* ranges from southern Columbia (Nariño) to Ecuador (Carchi & Esmeraldas) ranging from 130–1450 m elevation in *Premontane wet forest*, *Tropical wet forest* and *Premontane rain forest* life zones. It could reasonably be placed in either section *Xiallophyllum* or *Polyneurium* and awaits a molecular analysis to determine its certain placement. In the Lita-San Lorenzo Region the species ranges from 250–841 m elevation.

*Specimens seen:* ECUADOR. **Carchi:** Maldonado, Parroquia Tobar Donoso. Reserva Etnica Awá, Sabalera, 00°55'N, 78°32'W, 900 m, 22 Nov. 1992, *C. Aulestia*, *Milton Aulestia* & *M. Guanga 633* (MO); From Prima Vera hike about six hours up Río Gualchan drainage to shelter built by Nilo Ortiz at 1950 m, collected mostly along ridge to the north, and around camp, Montane Wet/Pluvial Forest, 00°49'58"N, 78°10'01"W, 1930–2200 m, 7–8 June 1993, *Jason C. Bradford*, *Irene Shonle*, *Jason Rauscher* & *Sabbe, Piet 70*; El Pailon, ca. 45 km below Maldonado along a foot path to Tobar Donoso, wet montane forest, 01°02'49"N, 78°22'05"W, 800 m, 29 Nov. 1979, *Michael T. Madison 7184* (MO, SEL); El Pailon, ca. 45 km below Maldonado along a foot path to Tobar Donoso, wet montane forest, 01°02'49"N, 78°22'05"W, 800 m, 26 Nov. 1979, *Michael T. Madison 7032* (MO, SEL); vic. Maldonado, 00°54'00"N, 78°06'00"W,

1800 m, 15 Apr. 1977, *Michael T. Madison 3996* (MO, QCA); Environs of Chical, 12 km below Maldonado on the Río San Juan, Wet montane forest, 01°04'N, 78°17'W, 1200 m, 29 May 1978, *Michael T. Madison*, *Timothy C. Plowman*, *Helen Kennedy* & *Elizabeth L. Besse 4752* (F, SEL); Environs of Maldonado, wet montane forest, 00°54'00"N, 78°06'00"W, 1450–1650 m, 1 Jun 1978, *Michael T. Madison*, *Timothy C. Plowman*, *Helen Kennedy* & *Elizabeth L. Besse 4859* (MO, SEL); Peñas Blancas, 20 km below Maldonado on the Río San Juan. Wet montane forest., 00°54'00"N 078°11'58"W, 900–1000 m, 27 May 1978, *Michael T. Madison*, *Timothy C. Plowman*, *Helen Kennedy* & *Elizabeth L. Besse 4600* (MO, SEL); Along road from El Chical to Tulcán, 7.4 km E of El Chical, 00°55'50"N, 78°07'52"W, 1393 m, 19 Feb. 2004, *T. B. Croat 94833A* (MO); Along road from El Chical to Tulcán, 7.4 km E of El Chical, 00°55'50"N, 78°07'52"W, 1393 m, 19 Feb. 2004, *T. B. Croat 94933A* (MO); Cantón Gualchán, along road between Gualcán and El Chical, on lower south slopes of divide separating watershed of Río Miras and Río San Juan, 00°49'46"N, 78°13'25"W, 2044 m, 16 Aug. 2013, *T. B. Croat*, *Alejandro Zuluaga* & *Natalia Castaño Rubiano 104823* (MO); Along road from Limonal to El Chical via Gualchan, La Primavera and El Carmen, 5 km S of summit of divide, 26 km S of main El Chical - Peñas Blancas Rd, 00°50'02"N, 78°13'12"W, 1954 m, 12 Oct. 2012, *T. B. Croat*, *Geneviève Ferry*, *David Scherberich* & *Claudia L. Henríquez R. 104188* (MO); Along road between El Chical and Gualchan, vicinity of Km post 18, ca. 4 km above Río

Gualpi, 18 km above, junction at road to El Chical - Peñas Blancas, 00°53'22"N, 78°13'23"W, 1970 m, 13 Oct. 2012, *T. B. Croat, Geneviève Ferry, David Scherberich, Claudia L. Henríquez R. & Elisa Levy 104257* (MO); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3232* (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3238* (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3253* (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3254* (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3257* (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3258* (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3259* (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3260* (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3262* (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3264* (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3266* (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3268* (MO, QCA); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3270* (MO, QCA); Southeast trail, primary forest in Gualpi Chicó area near Awá encampment, 00°58'N, 78°16'W, 1330 m, 18 Jan. 1988, *W. Scott Hoover 2721* (MO); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3278* (MO, QCA); Further ascent of Río Verde approaching headwaters of river at base of Cerro Golondrinas stopping at point where prominent stream with waterfall enters from SW, 00°52'N, 78°17'W, 1900 m, 30 Nov. 1987, *W. Scott Hoover 2113* (MO, QCA); Near encampment in Gualpi Chico area of Awá Reserve, 00°58'N, 78°16'W, 1330 m, 20 Jan. 1988, *W. Scott Hoover, Ana Argüello, P. Gelpi & R.A. Lorentzen 2866* (MO, QCA); Espejo, Reserva Golondrinas, El Corazón, sendero a Río El Corazón, Bosque Muy Húmedo Montano, 00°50'N, 78°08'W, 2010 m, 24 Jan. 2004, *Homero Vargas L., Edwin Narváez, Wendy Torres & P. Escobar 4397* (MO, QCNE); Parroquia Guatal, Mirador de las Golondrinas (Fundación Golondrinas), trail from Santa Rosa (El Rosal) to the refugio at El Corazon, 00°49'N, 78°07'W, 1600–2000 m, 5 July 03, *John L. Clark 8432* (QCNE,



US); Parroquia Guatal, Mirador de las Golondrinas (Fundación Golondrinas), trail from Santa Rosa (El Rosal) towards Las Juntas, 00°49'40"N, 78°07'47"W, 1600–1900 m, 7 July 2003, *John L. Clark 8482* (MO, QCNE, US); Cantón Espejo, nueva vía El Carmen-Chical, 00°15'13"N, 78°13'50"W, 2200 m, 14 May 2009, *Walter A. Palacios 16725* (MO, QCNE, US); Mira, Parroquia Jijon Y Camaño, unfinished road from El Carmen towards Chical, Agua Amarilla, 00°49'N, 78°12'W, 1700–2300 m, 8 July 2003, *John L. Clark 8527* (MO, QCNE, US); Parroquia Gualchan, along road from El Chical and Gualchan, eastern slopes of divide between El Chical and Gualchan, 19 km S of bridge over Río Gualpi, 00°50'02"N, 78°13'13"W, 1929 m, 16 Oct. 2012, *T. B. Croat, Geneviève Ferry, David Scherberich, Claudia L. Henríquez R. & Elisa Levy 104405* (MO); Parroquia Gualchan, along road between El Chical and Gualchan, 14 km S of Río Gualpi Bridge, S slope of the divide between El Chical and Gualchan, 14 km N of bridge over Río Gualpi, 00°49'46"N, 78°12'38"W, 1671 m, 16 Oct. 2012, *T. B. Croat, Geneviève Ferry, David Scherberich, Claudia L. Henríquez R. & Elisa Levy 104389* (MO); El Carmen, Cerro Golondrinas, Bosque Montano, bosque primario en colinas, 00°50'N, 78°11'W, 2000–2400 m, 18–25 Aug. 1994, *Tirado 1177* (MO, NY, QCNE); Norte del Carmen, camino a Chical, 00°17'N, 78°13'W, 2000–2200 m, 10 Feb. 1992, *Walter A. Palacios, Galo A. Tipaz, Edgar Gudiño & S. Bibiana Cuamacás 9764* (MO); Norte del Carmen, camino a Chical, 00°51'N, 78°13'W, 2000–2200 m, 10 Feb. 1992, *Walter*

*A. Palacios, Galo A. Tipaz, Edgar Gudiño & S. Bibiana Cuamacás 9699* (MO); Tulcán, Parroquia Tobar Donoso, Reserva Indígena Awá, Centro El Baboso, 00°53'N, 078°25'W, 1800 m, 17–27 Aug. 1992, *Galo A. Tipaz & et al. 1877* (MO, QCNE); Reserva Indígena Awá, Parroquia Tobar Donoso, sector El Baboso, Bosque pluvial Premontano, 00°53'N, 78°20'W, 1600 m, 3 Oct. 1991, *Galo A. Tipaz, Daniel Rubio & Taicuz, Marcelino 243* (MO); Parroquia Tobar Donoso, Reserva Indígena Awá, Centro El Baboso, 00°53'N, 78°25'W, 1800 m, 17–27 Aug. 1992, *Galo A. Tipaz, Milton Tirado, C. Aulestia, Neill Gale & Patriciño Ortiz 1966* (MO); Parroquia El Chical, along road from El Chical to Gualchan, 10 km S of main El Chical - Peñas Blancas Road, 00°53'55"N, 78°13'08"W, 1761 m, 19 Oct. 2012, *T. B. Croat, Geneviève Ferry, David Scherberich & Elisa Levy 104509* (MO); Parroquia El Chical, along road from El Chical to Gualchan, ca. 13 km N of junction of El Chical - Peñas Blancas Road, 00°53'22"N, 78°13'23"W, 1970 m, 19 Oct. 2012, *T. B. Croat, Geneviève Ferry, David Scherberich & Elisa Levy 104524* (MO, US); Parroquia El Chical, vicinity of Peñas Blancas, ca. 6 km N of El Chical, vicinity Quebrada Peñas Blancas, 00°58'30"N, 78°11'55"W, 1086 m, 21 Oct. 2012, *T. B. Croat, Geneviève Ferry, David Scherberich & Elisa Levy 104557* (HUA, MO, NY).

***Anthurium misturatum* Croat, sp. nov.**

Type: Ecuador. Esmeraldas: Lita-San Lorenzo Road, 17 km W of bridge over Río Lita (old road near Lita RR Station), 00°52'11"N, 78°27'06"W,



**Figure 39.** *Anthurium membranaceum* Sodiro (Croat et al. 104567). Live plant showing petiole, leaf blade, abaxial surface, and inflorescence.

425 m, *Thomas B. Croat 82382B* (holotype, MO-6474101). **Figure 39.**

The species is a member of sect. *Polyneurium* and is characterized by its short internodes, intact reddish brown cataphylls, subterete sulcate petioles, ovate subcordate brown-drying, gradually long-acuminate blades with an arcuate sinus with the petiole decurrent, 3 pairs of basal veins, a short posterior rib no part of which is naked, moderately bicolorous surfaces, more or less matte above and semiglossy below, 20–22 pairs of primary lateral veins, **collective veins** arising from the 1st or 2nd pairs of basal veins, prominent reticulate veins on the lower surface with prominent granules in the aerioles as well as by a moderately short-pedunculate inflorescence with a reflexed green spathe and a weakly stipitate dark violet-purple spadix.

Terrestrial; **internodes** short; **cataphylls** persisting mostly intact; **blades** ovate-cordate, 29 cm long, 16 cm wide, 1.8 times long as wide, petiole as long as or to 0.89 times as long as blade, drying dark brown, glossy below, semi glossy above, blade decurrent onto petiole; **anterior lobe** 26.5–29.7 cm long, margins slightly convex; **posterior lobe** rounded, 5 cm long, 4 cm wide; **basal veins** 3–4 pairs, 1<sup>st</sup> pair free to the base, naked, **posterior ribs** 3–4 mm long; ; **sinus** arcuate, 3 cm wide, 1–1.4 cm deep; **midrib** narrowly rounded, brownish-drying above, **round-raised** below, medium reddish brown, finely ribbed, matte below; **primary lateral veins** 20–22 pairs, departing at a 45–60 degree angle from

midrib; **upper surface** minutely and densely granular; **lower surface** more coarsely and sparsely granular. INFLORESCENCE with peduncle 23 cm long, 0.5 cm diam., drying gray-green, **spathe** green, 8 cm long, 1 cm wide, **spadix** purple-violet, 7 cm long, flowers 4–5 visible per axil, 1.8–1.9 mm long, 1.1–1.5 mm wide, tepals papillate; lateral tepals 7–9 mm wide, inner margin rounded, outer margin 2-sided. Fruits not seen.

*Anthurium misturatum* is endemic to Ecuador, known only from the type locality in Esmeraldas Province at 425 m in a *Tropical wet forest* life zone.

The species is closely related to *A. decursivum* Croat with which it was initially confused. That species differs in having finely fibrous cataphyll fibrous, in having blades that dry light green with the lower blade surface having inconspicuous tertiary veins and in lacking conspicuous granules in the areoles of the tertiary veins.

The species epithet is from the Latin “misturatus” meaning “mixed”, referring to the fact that it has been previously mixed or confused with *A. decursivum* Croat.

***Anthurium mongonense* Croat, sp. nov.**

Type: Ecuador. Carchi: Along north bank of Quebrada Mongon at point where Scott finished on 1/18/88, 00°58'N, 78°16'W, 1200–1400m, 19 Jan. 1988, *W.S. Hoover, P. Gelpi, A.*



*Arguello* & R.A. *Lorentzen* 2946  
(holotype, QCA). **Figure 40.**

The species is a member of sect. *Polyneurium* and is characterized by its grayish-green-drying ovate-sagittate blades 1.5 times longer than wide and with long posterior lobes and a parabolic-spathulate sinus, its 12–13 pairs of primary lateral veins, and its long-pedunculated infructescences with a green spathe

Terrestrial to 1 m tall; **internodes** short, 2 cm diam., drying 1.5 cm diam.; **cataphylls** 2–4 cm long, persisting as pale brown fibers. LEAVES with **petioles** to at least 50 cm long, 6–8 mm diam., sulcate, smooth, pale gray-brown; geniculum ca. 2 cm long, slightly darker than surface; **blade** ovate-sagittate, 51 cm long, 34 cm wide, 1.5 times longer than wide, gradually acuminate, drying grayish-green and weakly glossy above, grayish green and semiglossy below; **anterior lobe** 42 cm long, convex along margin; **posterior lobes** 15 cm long, 12 cm wide, directed downward; **sinus** 8 cm deep, 2 cm wide at middle, parabolic-spathulate; **midrib** narrowly rounded, nearly concolorous above, narrowly round-raised, smooth, pale brown and slightly paler below; **primary lateral veins** 12–13 pairs, gray on upper surface, narrowly round-raised and paler below, arising at 55–65° angle; **tertiary veins** scarcely more visible than surface above, weakly prominulous below; **collective veins** arising from lowermost pair of basal veins, 4 mm from margin; **basal veins** 5(6) pairs, none of them free to the base, 1<sup>st</sup> pair fused ca. 6

mm, 2<sup>nd</sup> pair fused ca. 1 cm; 3<sup>rd</sup> pair fused to 2 cm; **posterior ribs** naked 1.8 cm. INFRUCTESCENCE 54 cm long, erect, **peduncle** 41 cm long, 8 mm diam., drying light brown; fruits drying reddish yellow, 5 mm long, 3 mm wide; **spathe** lanceolate, green, 1.8 cm wide, drying pale brown; **spadix** 13 cm long, 5–6 mm diam., drying reddish brown; **flowers** 4–5 visible per spiral, 2.0–3 mm long, 1–1.6 mm wide, tepals smooth; lateral tepals 1.1 mm wide; inner margins rounded, outer margins 2-sided.

*Anthurium mongonense* is known only from the type locality in Carchi Province of Ecuador at 1200–1400 m in a *Premontane wet forest* life zone.

In the Lucid *Anthurium* key the species tracks to *A. albobirescens* Sodiro which differs in having more or less bullate blades with the major veins discolored along the margins; *A. cuspidatum* Sodiro, differing by having a more narrow, V-shaped sinus, more numerous primary lateral veins, *A. pirottiae* Sodio, differing by longer internodes (6–8 cm long) and its reddish spathe; *A. polyneuron* Sodiro, differs by having its leaf blades constricted above the petiolar plexus and by having 15–18 pairs of primary lateral veins.

The species is named for the type locality along the Quebrada Mongon in Carchi Province of Ecuador.



Figure 40. *Anthurium misturatum* Croat (Croat 82382B, MO-6474101). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescences.



Figure 41. *Anthurium mongonense* Croat (Hoover et al. 2946, QCA). Herbarium specimen showing stem, petiole, leaf blade, adaxial and abaxial surfaces, and infructescence.



*Anthurium multinervium* Engl., *Bot. Jahrb.* 25: 389. 1898. Type: Colombia. Valle: Río Dagua, 17 Mar. 1883, *Lebmann* 2780 (holotype, B). **Figure 41.**

The species is a member of section *Polyneurium* and is characterized by its elongate internodes, cataphylls which dry medium brown with paler margins at the upper nodes, ovate-cordate blades which are matte on the lower surface with many primary lateral veins usually drying blackish brown, and the short-pedunculate, bright yellow spadices.

Terrestrial or epiphytic; stem scandent; **internodes** 2–15 cm long, 5–20 mm wide, semiglossy, green becoming light brown, somewhat scurfy, drying gray or brown; roots few to several per node, branching; **cataphylls** 7–14 cm long, persisting intact at upper nodes, weathering to coarse pale fibers, drying medium brown with light brown margins, deciduous at lower nodes, sometimes essentially throughout. LEAVES erect-spreading; **petioles** 18–49 (62) cm long, drying 3–7 mm in diam., sharply C-shaped, narrowly sulcate, somewhat flattened near apex, sometimes with a faint medial rib, stiff, flexible, semiglossy, dark green, drying light brown; geniculum swollen, paler, 5–20 mm long, drying dark brown; **blades** subcoriaceous, ovate, acuminate at apex, cordate at base, 28–50 (66.5) cm long, 13.5–24.5 (39) cm wide, 1.5–2.2 (3.6) times longer than wide, 1–1.6 times longer than petiole, broadest near point of petiole attachment or beyond, upper surface semiglossy to

velvety, dark green, drying glossy, medium brown to blackish brown, lower surface matte to weakly glossy, paler, drying semiglossy and slightly paler than above; anterior lobe 23–40 (48) cm long, 13.5–24.5 (39) cm wide, 2.4–3.5 times longer than posterior lobes; **posterior lobes** 7–15 (20) cm long, 6.5–13.5 (19) cm wide, rounded to obtuse at apex; **sinus** parabolic to spatulate, 4–11.5 (16.5) cm deep; major veins drying concolorous, barely raised above, darker, round-raised below; **midrib** narrowly convex to acute, slightly paler above, convex to round-raised, paler than surface below; **primary lateral veins** 9–12 (15) per side, departing midrib at a 35°–45° angle, curving gradually to collective vein, narrowly raised in valleys to obscure above, convex to obscure below; **basal veins** 5–7 per side, 1–2 free to base, 3–6 coalesced to 5 cm, posterior ribs naked to 2 cm; **collective veins** 4–5 mm from blade margin throughout blade length, originating from the next to last basal veins; tertiary veins drying raised below. INFLORESCENCES spreading to erect; **peduncle** 5.5–22 cm long, shorter than petiole, terete medium green, drying dark brown; **spathe** reflexed to spreading, 7–15 cm long, yellow-green to green to pale green, acuminate; **spadix** sessile or stipitate to 12 mm, cylindrical, blunt at apex, 6.5–11 (21.8) cm long, 4–6 cm in diam. (dry), semiglossy, yellowish green to pale yellow or bright yellow, becoming dark green to brown in fruit; flowers rhombic, 1.6–2 mm long, 1.4–1.8 mm wide; **pistils** weakly exerted; thecae obovoid, to 0.5 mm long. INFRUCTESCENCE to 9 cm long;

**berries** pale green (immature), becoming maroon-red.

*Anthurium multinervium* ranges along the Pacific Andean slopes of Colombia and to the Province of Carchi, Ecuador, occurring in *Tropical wet forest*, *Premontane wet forest*, and *Tropical wet forest* transition to *Premontane*, from sea level to 1800 m. In the Bajo Calima region it was collected in primary and regrowth forest.

The species is a member of section *Polyneurium* and is characterized by its elongate internodes, cataphylls which dry medium brown with paler margins at the upper nodes, ovate-cordate blades which are matte on the lower surface with many primary lateral veins usually drying blackish brown, and the short-pedunculate, bright yellow spadices.

The species may be confused with *A. nigrescens* Engler, known from higher elevations in the Department of Valle, and which differs in having blades with narrower anterior and posterior lobes, collective veins which originate from the 2nd or 3rd basal veins, and long magenta to dark purplish spadices.

*Specimens seen:* ECUADOR. **Carchi:** Vicinity Maldonado wet forest, 00°54'00"N, 78°06'00"W, 1500–1900 m, 15 Apr. 1977, *Madison 3882* (MO, QCA, SEL); Canton Tulcán, along road from El Chical to Tulcán, on side road to Chilma Bajo, ca. 1 km beyond turnoff, 00°51'23"N,

78°03'36"W, 2278 m, 18 Aug. 2013, *T. B. Croat, Alejandro Zuluaga & Natalia Castaño Rubiano 104901* (MO, QCNE); Tulcán, Reserva Indígena Awá, Comunidad Gualpi Alto, parroquia Chical, Bosque pluvial Montano Bajo, 01°02'N, 78°14'W, 1800 m, 15–28 June 1991, *Daniel Rubio, Carlos Quelal & Nastacua, P. 1561* (MO); *Daniel Rubio, Carlos Quelal & Nastacua, P. 1562* (MO); *Daniel Rubio, Carlos Quelal & Nastacua, P. 1601* (MO); Tulcán, Reserva Etnica Awá, Comunidad San Marcos, 25 km al NW de El Chical, parroquia Maldonado, Bosque pluvial Premontano, 01°06'N, 78°14'W, 1500 m, 16–30 Nov. 1990, *Daniel Rubio, Carlos Quelal & José Pai 976* (K, MO, US); Tulcán, Parroquia Tobar Donoso, Sector Sabalera, Reserva Indígena Awá, Bosque primario Noreste Casa Comunal, 01°00'N, 78°24'W, 650–1000 m, 19–28 June 1992, *Galo A. Tipaz, Jorge Zuleta & N. Guanga 1481* (MO); *Galo A. Tipaz, Jorge Zuleta & N. Guanga 1521* (MO); Tulcán, Reserva Etnica Awá, Comunidad de Gualpi Medio, Bosque pluvial Premontano, 01°01'N, 78°16'W, 900 m, 21 May 1992, *Carlos Quelal, Galo A. Tipaz & J. Taicúz 624* (MO, QCNE); *Carlos Quelal, Galo A. Tipaz & J. Taicúz 711* (MO, QCNE).

***Anthurium narvaezii* Croat, sp. nov.** Type: Ecuador. Carchi: Along road from El Chical to El Limonal (Imbabura), 16 km S of junction with main El Chical - Peñas Blancas road, 2 km S of Río Gualpi Bridge, vicinity of Km 15.5–15.8 markers, 00°52'N, 78°13'W, 2043 m, 13 Oct. 2012, *Thomas B. Croat, Genevieve Ferry, David Scherberich, Claudia L. Henriquez R. & Elisa Levy*

104220 (holotype, MO-6429274; isotypes, B, COL, K, QCNE, S, US).  
**Figure 42.**

Terrestrial; **internodes** short 1.7 cm diam.; **cataphylls** persisting as dark brown fragments LEAVES with **petioles** 13–53 cm (avg. 34.4), diam. 0.8–1.5 (Avg. 1.1) terete to sharply C-shaped, tinged purplish; geniculum 1 cm long, 1.5 cm diam., medium green, drying dark brown, much thicker; **blades** cordate-ovate, 13–30 cm long, (average 21.2 cm), 9–21 cm wide (average 15 cm), 1.2–1.43 times long as wide, moderately thin, brittle, dark green and weakly glossy above, paler and semi glossy below; **anterior lobe** 10–28 (average 20.1), margin convex; **posterior lobe** 3.5–7 cm long (average 4.8 cm), 1–6 cm wide (avg. 3.2 cm); **basal veins** 4–5, only the upper most vein is free to the base, not at all naked; **posterior ribs** straight throughout **sinus** 1–3.5 cm, 2–7 cm, parabolic to V-shaped; **midrib** narrowly raised in valley and paler above, round-raised and paler below; **primary lateral veins** 22–24, quilted-sunken and concolorous above, narrowly raised and concolorous below, departing midrib at a 45–60 degree angle; **collective veins** 1–2 mm from margins; **tertiary veins** in part raised below; **upper blade surface** smooth/papillate; **lower blade surface** muricate. INFLORESCENCE erect; peduncle terete, weakly tinged purplish; **spathe** 3.5–7.5 cm long, 0.6–1 cm wide, medium green, matte and tinged purplish inside, glossy outside, drying dark brown; **spadix** sessile or stipitate to 7 mm, dark violet-purple, semiglossy. 8–9 flowers per

spiral on large specimens, 4–5 on smaller specimens, tepals 1 mm long, 0.7 mm wide, lateral tepal 0.35 mm wide;

*Anthurium narvaezii* is endemic to Ecuador, found only in Carchi Province at 2000–2200 m in a *Montane wet forest* life zone.

The species is a member of sect. *Polyneurium* characterized by its terrestrial habit, moderately small size, usually short internodes, terete to sharply C-shaped petioles, thin, prominently veiny ovate-subcordate, narrowly long-acuminate semiglossy bicolorous greenish drying blades with 4–5 pairs of basal veins, the 1<sup>st</sup> or 2<sup>nd</sup> pairs of which are free to the base with a short posterior rib which is not at all naked

*Anthurium narvaezii* is closest to *A. longicaudatum* Engl. which differs by having larger leaves with more oblong/ovate blades with a more arcuate sinus, s, a thicker petiole and a much longer spadix.

In Lucid the species tracks to *A. chorense* Engl., differing by having bullate leaves, a spatulate sinus and collective veins 3–4 mm from the margins and more prominently raised tertiary veins; *A. cordulatum* Sodiro from the Province of Guayas which differs by having blades proportionately longer, 1.7–2.1 times longer than broad (versis 1.1–1.4 times longer than broad for *A. narvaezii*) and *A. lineolatum* Sodiro differs by having an intact cataphyll,





Figure 42. *Anthurium multinervium* Engl. (Lehmann 2780, B, type). Herbarium specimen showing stem, petiole, leaf blade, abaxial surface, and inflorescence.

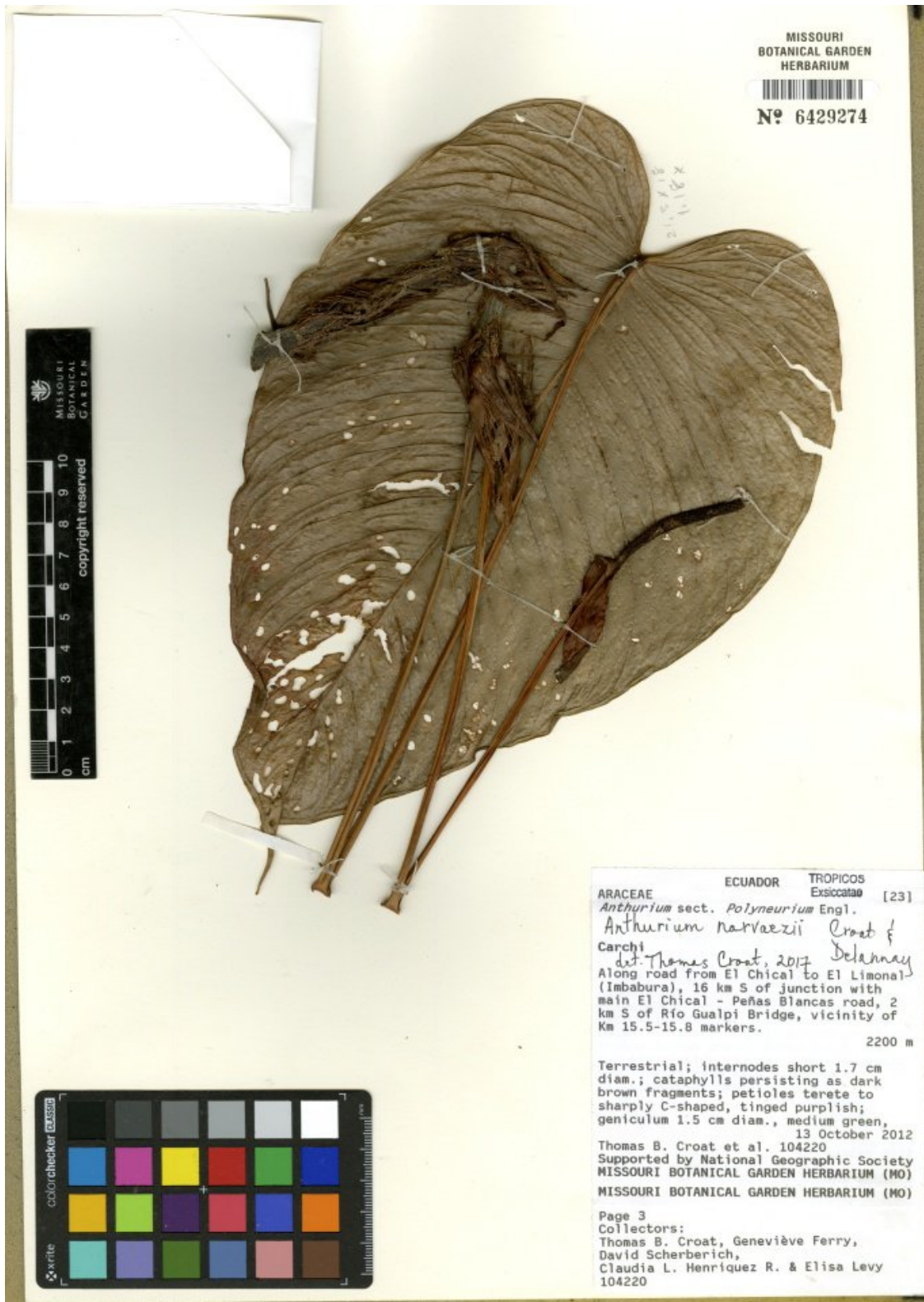


Figure 43. *Anthurium narvaezii* Croat (Croat et al. 104220, MO-6429274). Herbarium specimen showing stem with remnants of cataphylls, petiole, leaf blade, abaxial surface, and inflorescence.

a deeper/wider sinus and having a much larger leaf as well as having fewer basal veins, a thicker midrib and a longer petiole drying green as opposed to brown.

The species is named for Ecuadorian botanist Edwin Narváez who collected the first known specimen in 2004 along with Homero Vargas, Wendy Torres and P. Escobar.

*Paratype:* ECUADOR. **Carchi:** Reserva Golondrinas, sendero entre la Estación Santa Rosa y El Corazón, Bosque Muy Húmedo Montano, 00°50'N, 78°07'W, 1700–2050 m, 21 Jan. 2004, *Homero Vargas L., Edwin Narváez, Wendy Torres & P. Escobar 4208* (QCNE); 7.8 mi SE of Maldonado on road to Tulcán; 00°53'N, 78°05'W, ca. 2400 m, *S. A. Thompson & J. E. Rawlins 889* (MO).

*Anthurium oreophilum* Sodiro, *Anales Univ. Centr. Ecuador* 15(108): 15. 1901. Type: Ecuador: Pichincha: In forest W of Mt. Pichincha, 1400–2000 m, *Sodiro, L. s.n.* (holotype, B). **Figure 43.**

The species is a member of sect. *Polyneurium* and is characterized by its short internodes, cataphylls persisting as fibers, subcordate or cordate to ovate-cordate or triangular-cordate, abruptly acuminate greenish drying blades which are velvety above and matte below with the posterior lobes downward to outward or inward and/or overlapping, the posterior ribs not

naked along the sinus or naked up to 3 cm, basal veins 4–5(–8) pairs, 2–5 free to base; 15–22 pairs primary lateral veins, collective vein arising from one of the lowermost basal veins as well as by the linear to lanceolate green spathe and the cylindroid or tapered, magenta to purplish spadix.

Epiphyte or terrestrial; **internodes** broader than or about as broad as long, 0.5–2 long; **cataphylls** persisting as fibers, 5–25 long; LEAVES supervolute; **petioles** longer than leaf blade, 35–110 long, subterete to terete, convex adaxially, rounded abaxially, petiole margins lacking; geniculum 0.5–2.5 long; **blades** subcordate or cordate to ovate-cordate or triangular-cordate, abruptly acuminate at apex, margins convex, 20–60 long, 10–35 wide, concolorous or moderately bicolorous, broadest above petiolar plexus but below middle, velvety above, matte below, texture smooth or bullate or rugose above, drying to greenish to olive-green or reddish brown above, drying to greenish to olive-green or reddish brown below, dark glandular punctations absent, anterior lobe 27–40(–46) long, lobes downward to outward or inward and/or overlapping, posterior lobes 4–20 long, sinus 1–13 deep, shape parabolic or triangular, posterior ribs not naked along the sinus, length of denuded portion of the posterior ribs naked 0.01–3 long; **midrib** narrow to sharply acute above, multi-ribbed below; **primary lateral veins** 15–22 pairs, departing at a 50–70° angle, quilted above, raised below; **basal veins** 4–5(–8) pairs, 2–5 free to base; **collective veins** arising from one of the lowermost basal veins, distance



from margin 0.2–0.8. INFLORESCENCE shorter than leaves; **spathe** 5–15 long, 0.5–2.5 wide, linear to lanceolate, 3-dimensional shape fully expanded, reflexed, green to greenish; **spadix** cylindroid or tapered, 4–15 cm long, 0.2–0.8 diam., magenta to purplish to maroon or brown. INFRUCTESCENCE purplish.

*Anthurium oreophilum* ranges from Colombia to Ecuador at 50–2100 m a Tropical wet forest, Premontane wet forest and Premontane rain forest life zones.

*Specimen seen:* **Carchi:** Cerro Golondrinas, Upper Río Pablo drainage, along crest of ridge to north of river, very wet, primary cloud forest, 00°53'N, 78°10'W, 1740–1780 m, 24 Apr 1993 – 02 May 1993, *Brad Boyle & Dalman*, L. 1761 (MO, TEX).

*Anthurium panduriforme* Schott, *Prod. Aroid.* 536. (1860). Type: Costa Rica. San Miguel, *Wendland* 776 (GOET). **Figures 44–45.**

The species is a member of in the section *Polyneurium* and is characterized by its short internodes, shiny panduriform blades and bright golden-yellow inflorescence.

Terrestrial; stems to 60 cm long; **internodes** 1– cm long, 0.5–3 cm diam.; **cataphylls** 20–25 cm long, initially persisting as fibers then deciduous. LEAVES erect; **petioles** 40–60 cm long, 5 mm diam., subterete to obtusely D-shaped

toward apex, obtusely sulcate, sheathed 2–5 cm; geniculum 1–1.5 cm long, darker than the remainder; **blades** somewhat panduriform, 30–54 cm long, 20–36 cm wide, broadest at the petiole insertion, acute to acuminate at apex, deeply lobed at base, subcoriaceous, dark green and glossy, drying grayish green above, much paler and glossy, drying yellow-green and glossy below, sometimes with obscure glandular dots; **posterior lobes** 16–26 cm long, rounded, directed downward or outward; **sinus** spatulate to hippocrepiform; **midrib** weakly raised and concolorous above, more prominent and tinged brownish below; **primary lateral veins** 19–21 per side, sunken above, convex, drying paler than surface beneath, arising at 30–45 degree angle, prominently raised below; **basal veins** 7–8 pairs, the 1<sup>st</sup> 1–2 free to the base; **posterior ribs** naked 2–5 cm, arcuate; **collective veins** arising from the 3rd or 4th basal vein, 1.5–5 mm from the margin; antimarginal veins present. INFLORESCENCE with **peduncle** 15–30 cm long, 3 mm diam., sulcate adaxially, sometimes striate, green tinged maroon, 1/4–1/3 as long as the petioles; **spathe** linear-lanceolate, green with purplish violet lines, 8–15 cm long, 1–2.5 cm wide, subcoriaceous, inserted at 45 degree angle, recurved, acuminate at apex, the margins meeting at an angle of ca. 110 degrees at the base; **spadix** golden-yellow to yellowish orange, sessile, 8–15 cm long, 5–8 mm diam.; **flowers** rhombic to quadrangular, 2.1–2.3 mm diam., 7–8 visible per spiral; lateral tepals 1.5 mm wide, the inner margins convex, with raphides on the lateral



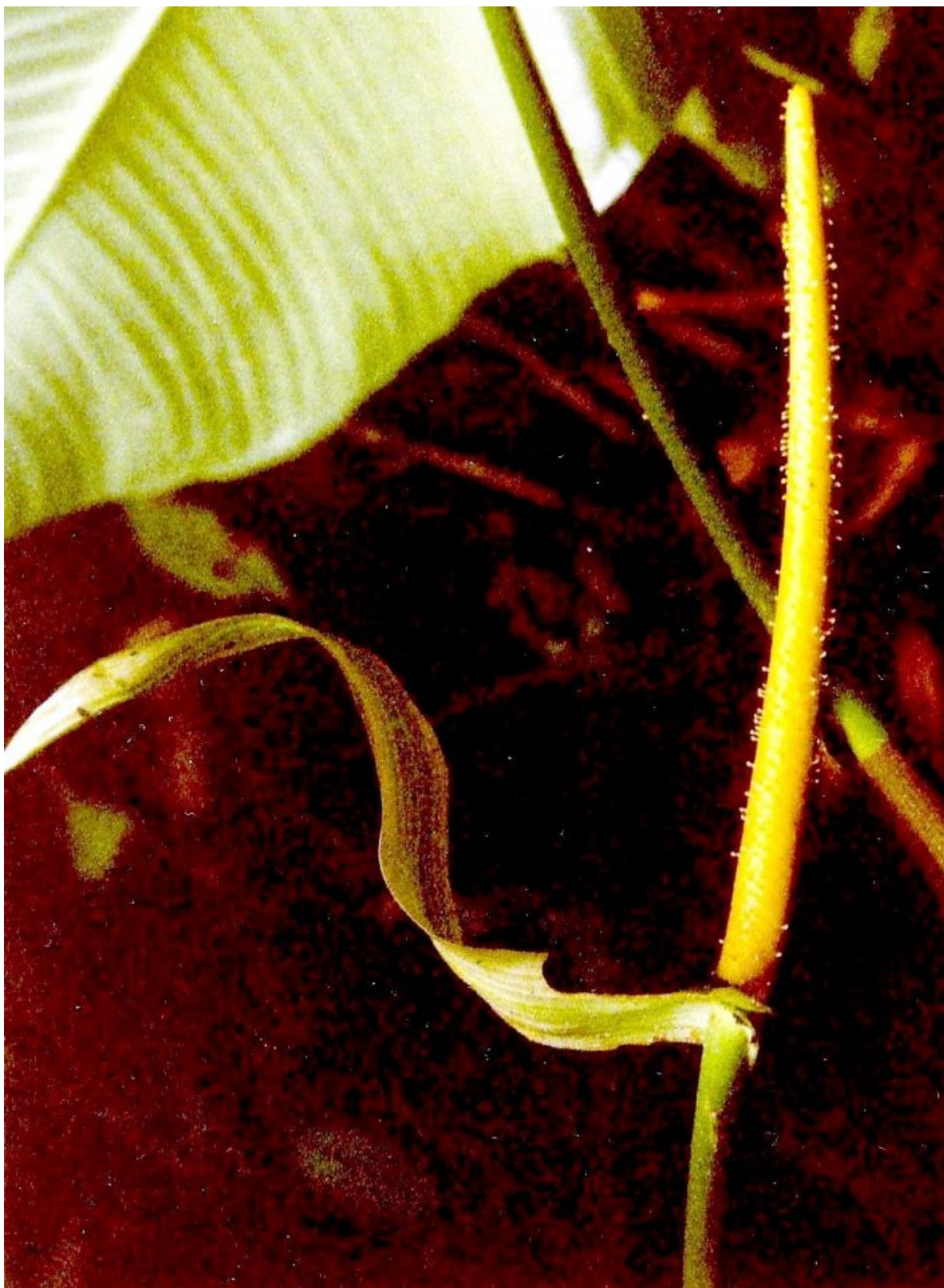
**Figure 44.** *Anthurium oreophilum* Sodiro (Sodiro s.n., P, type). Herbarium specimen showing petiole, leaf blade, mostly abaxial surface, and inflorescence.





**Figure 45.** *Anthurium panduriforme* Schott (Croat et al. 82144). View of leaf blade, adaxial surface.





**Figure 46.** *Anthurium panduriforme* Schott (Croat *et al.* 82144). View of inflorescence.





**Figure 47.** *Anthurium pseudonigrescens* Croat (Croat et al. 82381). Live plant showing petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

walls; stamens 1.6 mm long, prominently exerted; anthers yellow; **berries** ovoid, pale green; seeds greenish white, 2.3–2.5 mm long, 0.8–1 mm wide, 1 per locule.

*Anthurium panduriforme* ranges from Costa Rica to Ecuador at elevations from 400 to 1,560 m elevation in *Tropical wet forest*, *Premontane wet forest* and *Premontane rain forest* life zones.

*Specimen seen:* ECUADOR. **Carchi:** Parroquia El Chical, Reserva Cerro Oscuro, James Levy property on Río Blanco, ca. 3 km S of El Chical, 00°54'49"N, 78°11'39"W – 00°54'35"N, 78°11'40"W, 1200–1390 m, 18 Oct. 2012, T. B. Croat, Geneviève Ferry, David Scherberich, Claudia L. Henríquez R. & Elisa Levy 104478 (MO, QCNE); Along road from Chical to Tobar Donoso, 11 km NW of Río El Chical, 01°00'24"N, 78°13'11"W, 1094 m, 21 Oct. 2012, T. B. Croat, Geneviève Ferry, David Scherberich & Elisa Levy 104584 (MO, QCNE); El Pailón, ca. 45 km below Maldonado, along path to Tobar Donoso, 800 m, 15 July 1986, Madison & Besse 7177, 7180 (MO, SEL); Near encampment in Gualpi Chico area of Awá Reserve, 00°58'N, 78°16'W, 1330 m, 20 Jan. 1988, W. Scott Hoover, Ana Argüello, P. Gelpi & R.A. Lorentzen 2882 (MO, QCA).

***Anthurium pseudonigrescens* Croat, sp. nov.** Type: ECUADOR. Esmeraldas: Lita-San Lorenzo Road, 19.1 km E. of Río Tululbi, 5.2 km W. of El Durango, 0.6 km down gravel road going N to Río Tululbi and crossing

Río San José, vicinity of Río San José; 01°04'47"N, 78°38'55"W, 73 m, 13 Oct 1999, T. Croat, R. Mansell, L. Hannon and B. Owen 83273 (holotype: MO-5161248–9; isotypes, AAU, B, COL, K, NY, QCNE, S, SEL, US). **Figures 46–47.**

The species is a member of sect. *Polyneurium* and is characterized by its elongate internodes, generally subterete petioles, ovate-sagittate blades drying dark grayish green or brown, parabolic sinus with a posterior rib naked along most of its length and by its long-tapered violet-purple spadix and narrowly lanceolate green spathe.

Terrestrial to epiphytic; **internodes** elongate, 9–22 cm long, 6–18 mm diam., dark green to pale red-brown and semi-glossy to glossy; **cataphylls** persisting as fibers with fragments of epidermis, intact at the apex, (9)14–16 cm long. LEAVES with **petioles** 21.7–49 cm long, 2–6 mm diam., subterete and shallowly to deeply sharply or obtusely sulcate (terete on *Croat et al. 99817*), sometimes C- or D-shaped, medium to dark or olive-green and weakly glossy; geniculum to 2.4 cm long, scarcely thicker than petiole, drying darker than petiole to almost black; **blades** narrowly triangular-ovate- to narrowly ovate-sagittate, abruptly to gradually acuminate at apex (acumen to 1.5 cm long), prominently sagittate at base; 24.6–47.5 cm long, (8)14.3–26.7 cm wide, 1.7–2.1(2.8) times as long as wide, roughly as long as petiole, broadest above middle, subcoriaceous, medium to dark green and



subvelvety-matte above, paler and matte to weakly glossy below, drying grayish green to grayish brown below, grayish green to darker brown or grayish brown above, epunctate; anterior lobe 20.9–39.8 cm long, margins slightly to moderately rounded, usually slightly constricted above petiolar plexus; **posterior lobes** directed toward base or very slightly outward, 4.8–13.5 cm long, 3.2–9.4 cm wide; **basal veins** 4–6 pairs, 1st and 2nd pairs generally free to the base, 3<sup>rd</sup>–6th pairs fused to 3 cm on average; **posterior ribs** 1.7–4.9 cm long, naked along most of its length 1.4–3.3 cm from petiolar plexus, moderately to strongly curved; **sinus** narrowly to widely parabolic, 3.5–9.2 cm deep; **midrib** narrowly or bluntly acute to narrowly raised and slightly paler above, narrowly to round-raised and paler below, drying generally concolorous above, concolorous to slightly darker than blade below; **primary lateral veins** 8–13 pairs, arising at a 20–30(40)° angle from midrib, quilted-sunken or etched above, narrowly rounded or raised and slightly paler below, drying concolorous above, generally concolorous to slightly darker than blade below; interprimary veins uncommon; **tertiary veins** weakly prominulous and darker than blade surface above, paler below; **collective veins** arising from 4th or 5th basal vein, 2–5 mm from margin. **INFLORESCENCE** erect; **peduncle** medium green, frequently ribbed, 8.6–26.6 cm long; **spathe** narrowly lanceolate, pendant to reflexed-spreading, 7.2–16.5 cm long, 0.6–2.6 cm wide, pale yellow-green to medium dark green, moderately glossy, drying medium to dark brown; **spadix** long

and slightly tapered, 9–18 cm long, 3.5–8 mm diam., reddish to dark violet-purple, subsessile to sessile. **INFRUCTESCENCE** dark green to red with fruits red to violet-purple.

*Anthurium pseudonigrescens* is endemic to Ecuador, known only from Esmeraldas and Carchi Provinces at 60–1000 m in *Tropical wet forest*, *Premontane wet forest* and *Premontane rain forest* life zones. It is expected to also be found in nearby Nariño department of Colombia.

*Anthurium pseudonigrescens* is easily confused with *A. cornejoii* Croat, a species with similar blade shape and drying color. *A. pseudonigrescens* differs in having blades 1.7–2.8 times longer than wide with posterior lobes directed more towards the base and consequently a narrower sinus. In contrast, *A. cornejoii* has blades 0.9–1.7 times longer than wide with posterior lobes directed more outward and a wider sinus. *A. pseudonigrescens* typically has petioles obtusely sulcate and spadices which are dark reddish or violet-purple, whereas *A. cornejoii* has sharply flattened, frequently winged petioles and yellow-green spadices which become red as they mature. The posterior rib in *A. pseudonigrescens* is typically naked along most of its length, while in *A. cornejoii* the posterior rib is usually naked along little more than half of its length, posterior lobes that form a closed sinus as well as a spadix that is rosy green.

*Paratype*: ECUADOR. **Carchi**: Above San Marcos de los Coaiqueres, on trail towards Gualpí Bajo, on trail towards Gualpí Bajo, 01°06'N, 78°17'W, 1000 m, 7 Feb. 1985, *B. Øllgaard 57502* (QCA); Trail through forest near San Marcos 45 km W of Chical, 01°02'N, 78°14'W, 702 m, 13 Feb. 1984, *W. Scott Hoover 1072* (MO); *W. Scott Hoover 1092* (MO); Trail to Río Gualpi Chico, along ridge line near AWA encampment, 00°58'N, 78°16'W, 1330 m, 17 Jan. 1988, *W. Scott Hoover 2523* (MO, QCA); Tulcán, Parroquia Tobar Donoso, Sector Sabalera, Reserva Indígena Awá, Bosque primario Noreste Casa Comunal, 01°00'N, 78°24'W, 650–1000 m, 19–28 June 1992, *Galo A. Tipaz, Jorge Zuleta & N. Guanga 1481* (MO, QCNE).

***Anthurium pulverulentum*** Sodiro var. ***pulverulentum***, *Anal. Univ. Centr. Ecuador* 15 (108): 11. 1901. Type: Ecuador. Pichincha: Volcán Atacatzo along the Río Pilatón 1400–2000 m, *Sodiro s.n.* (QPLS). **Figures 48–49.**

*Anthurium pulverulentum* is a member of sect. *Polyneurium*. It is part of a group of species which share in common thin, prominently veined blades and bluish green, glaucous spadices. The group includes *A. coerulescens* Engl. and *A. argyrostachyum* Sodiro both of which have the blades markedly concave on the anterior lobe. *A. adsimile* Sodiro, a species which is slightly concave on the margins is deemed to be only subspecifically distinct and is reduced to a variety of *A. pulverulentum*. *A. pulverulentum* is further recognized by its elongate internodes

which dry light brown with longitudinal ridges and finely cracked transverse fissures.

Terrestrial; **stems** elongate, to ca 80 cm long; **internodes** 5–18 cm long, 2–2.5 (4) cm diam., pale green, drying light brown to gray-brown, matte, closely ribbed longitudinally and closely transverse fissured; **cataphylls** 20–25 cm long, pale green, acuminate and aristate at apex, promptly weathering to fine fibers, persisting at upper nodes, eventually deciduous. LEAVES with **petioles** to 71 cm long, ca. 8 mm diam., equal to or shorter than the blades, briefly sheathed at the base, terete to subterete, weakly & obtusely sulcate to obtusely V-sulcate or narrowly and sharply sulcate, drying yellowish brown; geniculum 2.5–3 cm long, sulcate like the remainder of the petiole; **blades** narrowly ovate, (37)50–83 cm long, (18)23–47 cm wide, 1.5–2 times longer than wide, broadest somewhat above the petiole attachment, acuminate at apex, deeply cordate at the base, slightly bicolorous, thinly coriaceous, usually matte, sometimes subvelvety above, paler and matte or sometimes weakly glossy below; **posterior lobes** 15–18 cm long, slightly longer than broad; **sinus** spatulate, 12–17 cm deep, 4–6(12) cm wide; **midrib** and basal veins acute to convex above, convex to round-raised below; **primary lateral veins** 25–40 pairs, sunken above, convex to narrowly raised or round-raised below, arising 30–45° angle, almost straight to the **collective veins**; secondary and tertiary veins drying prominent below; **basal veins** 5–9 pairs, the 1st pair free to the base, the 2nd almost free, 5th and higher veins coalesced 6.5–11 cm;



**Figure 48.** *Anthurium pseudonigrescens* Croat (Croat et al. 82381). View of inflorescence.





**Figure 49.** *Anthurium pulverulentum* Sodiro var. *pulverulentum* (Croat et al. 96523). Base of live plant showing stem, adventitious roots and bases of petioles.

the posterior rib naked along the sinus about half its length, 3.5–6 cm; **collective veins** arising from one of the lowermost basal veins, 2–5 mm from the margins; **tertiary veins** in part raised below. INFLORESCENCE with **peduncles** 11–47 cm long, sometimes angular; **spathe** reflexed, moderately thin, pale green, linear-lanceolate, 4–13 cm long, 1.2 (2.4) cm wide, acuminate, brittle; **spadix** long-tapered, bluish green, matte, 12–20 cm long, 5–7 mm diam., somewhat pendulous; **flowers** rhombic, ca 7 per spiral; pistils promptly exerted after anthesis; tepals matte. INFRUCTESCENCE with **spathe** to 27 cm long, **spadix** 30–52 cm long, 2.5 cm diam.; **berries** greenish.

*Anthurium pulverulentum* is known from Colombia (Chocó, Valle and Nariño) and Ecuador, where it occurs along the western slopes of the Andes at 700–2200 m elevation in *Premontane wet forest*, *Premontane wet forest* and *Lower montane wet forest* life zones.

*Anthurium pulverulentum* Sodiro var. *adsimile* Croat & J. Rodr. differs from var. *pulverulentum* by its more numerous (32–38 pairs) and more closely spaced primary lateral veins and by its darker drying color (dark green on the upper surface versus light yellowish green for var. *pulverulentum*).

An apparently undescribed species from northern Ecuador and southern Colombia has similar leaves but with internodes typically thicker than broad or as thick as broad, usually 3–6 cm diam. The

species is represented by the following collections: Ecuador. *Madison & Besse 7231* (Carchí: El Pailón, 800 m), *Madison et al. 4602* (Carchí: Peñas Blancas), *Madison et al. 5145* (Esmeraldas: Lita, 600 m). Colombia. *Croat 71410* (Nariño: Ricaurte, Río Imbi, 1,100 m) and *Croat 72426* (Nariño: Junín, 1,130 m).

*Specimens seen:* ECUADOR. **Carchi:** Vicinity of Maldonado, wet forest, 00°54'00"N, 78°06'00"W, 1500–1900 m, 15 Apr. 1977, *Michael T. Madison 3919* (MO, QCA, SEL); Gualpi Chico, Forestry Reserve, vicinity of encampment in Awá Ethnic, 00°58'N, 78°16'W, 1330 m, 15 Jan. 1988, *W. Scott Hoover 3231* (MO, QCA); *W. Scott Hoover 3243* (MO, QCA); *W. Scott Hoover 3249* (MO, QCA); *W. Scott Hoover 3261* (MO, QCA); *W. Scott Hoover 3263* (MO, QCA); *W. Scott Hoover 3273* (MO, QCA); South-east trail, primary forest in Gualpi Chicó area near Awá encampment, 00°58'N, 78°16'W, 1330 m, 18 Jan. 1988, *W. Scott Hoover 2710* (MO); Between Chical and Peñas Blancas, trail side and forest edge, valley of Río San Juan on Colombia border, 00°59'29"N, 78°11'49"W, 1100–1250 m, 24 Sep. 1979, *Gentry & Schupp 26471* (MO, SEL); Peñas Blancas, 20 km below Maldonado on the Río San Juan, 01°00'42"N, 78°14'49"W, 900–1000 m, 27 May 1978, *Michael T. Madison 4602* (MO, SEL); El Pailon, ca. 45 km below Maldonado along a foot path to Tobar Donoso, 01°02'49"N, 78°22'05"W, 800 m, 1 Dec. 1979, *Michael T. Madison 7231* (MO, SEL); Río San Juan valley, 4 hour walk below Chical, at Ortiz ranch between Peñas Blancas and El Pailón, known locally as Goaltal, North-facing slope below ridge

crest above Río San Juan, Primary Wet to Pluvial Premontane Forest, heavily laden with epiphytes, 01°02'N, 78°15'W, 1230–1250 m, 10 June 1993, *Brad Boyle, A. Butler & Lloyd, E. 2117* (MO); On trail from Quebrada Peñas Blancas to Quebrada Quinchul, 00°58'N, 78°12'W, 10 Aug. 1983, *Sue A. Thompson & John E. Rawlins 1037* (MO); Maldonado, Parroquia Tobar Donoso, Reserva Etnica Awá, Sabalera, 00°55'N, 78°32'W, 900 m, 22 Nov. 1992, *C. Aulestia, Milton Aulestia & M. Guanga 729* (MO); Along road from El Chical to San Marcos, ca. 12 km NE of El Chical, 01°00'00"N, 78°13'00"W, 990 m, 17 Aug. 2013, *T. B. Croat, Alejandro Zuluaga & Natalia Castaño Rubiano 104862* (MO, QCNE); Canton Tulcán, along road from El Chical to Tulcán, along side road to Chilma Bajo, 1 3/4 km from turnoff at Chilma Alto, 00°51'26"N, 78°03'35"W, 2230 m, 18 Aug. 2013, *T. B. Croat, Alejandro Zuluaga & Natalia Castaño Rubiano 104958* (MO, QCNE); *T. B. Croat, Alejandro Zuluaga & Natalia Castaño Rubiano 104959* (MO, QCNE); *T. B. Croat, Alejandro Zuluaga & Natalia Castaño Rubiano 104960* (MO, QCNE); Espejo, Reserva Golondrinas, Sendero entre la Estación Santa Rosa y El Corazón, 00°50'N, 78°07'W, 1700–2050 m, 21 Jan. 2004, *Homero Vargas L., Edwin Narváez, Wendy Torres & P. Escobar 4230* (QCNE); Espejo, Parroquia Guatal, Mirador de las Golondrinas (Fundación Golondrinas), trail from Santa Rosa (El Rosal) towards Las Juntas, 00°49'N, 78°07'W, 1600–1900 m, 7 July 2003, *John L. Clark 8484* (MO, QCNE, US); Mira Cantón, N of Carmen, trail to Chical, 2000–2200 m, 00°17'N, 78°13'W, *Palacios et al. 9744* (MO); Mira, Parroquia Gualchan, along road between El Chical and Gualchan, valley of Río Blanco, 15 km S of Río Gualpi Bridge, southern slope of the divide on road between El Chical and Gualchan, 00°49'16"N, 78°12'37"W, 1540 m, 16 Oct. 2012, *T. B. Croat, Geneviève Ferry, David Scherberich, Claudia L. Henríquez R. & Elisa Levy 104365* (MO, QCNE); *T. B. Croat, Geneviève Ferry, David Scherberich, Claudia L. Henríquez R. & Elisa Levy 104369* (MO, QCNE); Mira, Parroquia Gualchan, along road from El Chical and Gualchan, eastern slopes of divide between El Chical and Gualchan, 19 km S of bridge over Río Gualpi, 00°50'02"N, 78°13'13"W, 1929 m, 16 Oct. 2012, *T. B. Croat, Geneviève Ferry, David Scherberich, Claudia L. Henríquez R. & Elisa Levy 104400* (MO, QCNE); Tulcán, Parroquia El Chical, along road from El Chical to Gualchan, ca. 13 km N of junction of El Chical - Peñas Blancas Road, 00°53'22"N, 78°13'23"W, 1970 m, 19 Oct. 2012, *T. B. Croat, Geneviève Ferry, David Scherberich & Elisa Levy 104528* (MO, QCNE); Tulcán Cantón, Awá reserve, Gualpi Medio, 00°01'N, 78°16'W, 900 m, 21 May 1992, *Quelal et al. 607* (MO, QCNE); Tulcán, Parroquia Tobar Donoso, Sector Sabalera, Reserva Indígena Awá, bosque primario Noreste Casa Comunal, 01°00'N, 78°24'W, 650–1000 m, 19–28 June 1992, *Galo A. Tipaz, Jorge Zuleta & N. Guanga 1549* (MO, QCNE); Tulcán, Parroquia Tobar Donoso, Centro El Baboso, 00°53'N, 78°25'W, 1800 m, 17–27 Aug. 1992, *Galo A. Tipaz & et al. 1981* (MO, QCNE); *Galo A. Tipaz & et al. 1987* (MO, QCNE); Tulcán,





**Figure 50.** *Anthurium pulverulentum* Sodiro var. *pulverulentum* (Croat et al. 96523). View of leaf blade, adaxial surface.

El Baboso Community, 8 km N of Lita, 00°50'N, 78°20'W, 800 m, 15 Oct. 1991, *Daniel Rubio, Galo A. Tipaz & J. Taicúz 2163* (MO, QCNE).

***Anthurium pulverulentum*** Sodiro var. ***ad simile*** Croat & J. Rodr., *Aroideana* 18: 122–123. 1995. Type: Ecuador. Pichincha: Volcán Atacatzo along the Río Pilatón 1400–2000 m, *Sodiro s.n.* (QPLS). **Figure 50.**

*Anthurium ad simile* Sodiro, *Anturios Ecuador*. 219. 1903.

The species is a member of sect. *Polyneurium* and is characterized by its many-veined blade with straight or concave margins and numerous close primary lateral veins mostly about 1 cm apart and numbering over 30 per side and by the bluish green spadix.

Terrestrial or appressed-climbing near the ground; **stems** to 2 m long; **internodes** 3–12 cm long, 1–2.0 cm diam., dark green, semiglossy, turning light brown to graybrown; **cataphylls** 22–25 cm long, green and promptly deciduous or persisting as a network of pale fibers with fragments of epidermis. LEAVES with petioles erect-spreading and blades pendent; **petioles** 40–70 cm long, ca. 8 mm diam., subterete, obtusely and narrowly sulcate, medium green, semiglossy, sheathed 8–10 cm, geniculum 1.8–3.5 cm long; **blades** oblong-triangular, 35–70 cm long, 20–40 cm wide, broadest at the point of petiole insertion or

at the base, acuminate at apex, cordate-sagittate at base (the lobes directed slightly outward), subcoriaceous, broadly undulate around margins especially in lower third; **upper surface** dark green and semiglossy, drying chartaceous, dark yellow-brown to dark greenish brown; **lower surface** moderately paler and matte to semiglossy, drying yellow-brown; **sinus** spatulate to hippocrepiform, 12–15 cm deep; **midrib** acute and concolorous above, convex and round-raised and slightly paler below; **primary lateral veins** 32–39 pairs, arising at a 58–60° angle, narrowly sunken above, narrowly raised and acute below; **basal veins** 4–6 pairs; **collective veins** arising from the 3<sup>rd</sup> basal vein, 2–4 mm from margin; **tertiary veins** in part raised below. INFLORESCENCES erect to erect-spreading; **peduncle** 12–32 cm long, 3 mm diam., terete with 3–5 weak channels, up to one half as long as the petioles; **spathe** linear-lanceolate, green to yellow-green, 14–23 cm long, 10–13 mm wide, membranaceous, inserted at a 15° angle, then reflexed; **spadix** bluish green, weakly glaucous, matte, 10–20 cm long, 5 mm diam., stipitate 1–2 mm; **flowers** rhombic, 2.0–2.3 mm diam., 4–6 visible per spiral; lateral tepals 1–1.3 mm wide; stamens 0.7–0.8 mm long (full length), positioned just above tepals; anthers creamy-orange; pollen white; pistils constricted apically, becoming weakly exerted after anthesis. INFRUCTESCENCE to 36 cm long, curved; berries ovoid, green, to 5 mm long; pericarp with raphides; mesocarp mucilaginous, translucent; seeds 3 mm long, 2.5 mm wide, green, 1 per locule.

*Anthurium pulverulentum* var. *adsimile* is endemic to the western slopes of the Andes in Ecuador at 300–2000 m in Tropical wet forest, Premontane wet forest and Premontane rain forest life zones. .

*Anthurium pulverulentum* Sodiro var. *adsimile* Croat & J. Rodr. differs from *A. pulverulentum* var. *pulverulentum* by its more numerous (32–38 pairs) and more closely spaced primary lateral veins and by its darker drying color (dark green on the upper surface versus light yellowish green for var. *pulverulentum*).

*Specimen seen:* ECUADOR. **Carchi:** Along road from El Chical to El Carmen via unfinished road, departing main El Chical-Peñas Blancas road, 0.6 km W of bridge over Río Chical, just west of El Chical, 4.9 km south of jct. with main road, 00°59'01"N, 78°11'37"W, 1350 m, 8 Aug. 2004, T. B. Croat & Geneviève Ferry 93092 (MO, QCNE).

*Anthurium rivulare* Sodiro, *Anales Univ. Centr. Ecuador* 15(108): 12. (1901). Type: Ecuador. Bolívar: San Miguel Cantón: Balsapamba, Sodiro *s.n.*, lectotype (G). **Figures 51–52.**

The species is a member of sect. *Polyneurium* and is characterized by its terrestrial habit, apparently always found on rocks or rocky banks along streams or in streams, as well as by its short internodes, persistent semi-intact cataphyll fibers, subterete petioles, ovate-cordate blades with

prominently paler major veins on the lower surface and with the basal veins prominently branching. Also characteristic is the dark purple spadix and the red berries.

Terrestrial, rupicolous herb; **internodes** short, 1–4 cm diam.; **cataphylls** 8–10 cm long, persistent semi-intact at upper nodes, brown, soon pale-fibrous and semi-intact, sometimes in a net-like reticulum below. LEAVES with **petioles** terete to U-shaped, narrowly sulcate, (19)54–71 cm long, 1.1–1.5 times longer than the blades, semiglossy, medium green to moderately dark, drying light yellowish brown; **blades** ovate-cordate, (14) 28–35 cm long, (10)19–26 cm wide, 1.1–1.3 times longer than wide, abruptly acuminate at apex coriaceous to subcoriaceous, dark green and semiglossy above, drying yellow-green to yellow-brown, paler and semiglossy below; **sinus** arcuate to hippocrepiform to rarely closed with the lobes overlapping, mostly 5–8 cm deep; **midrib** convex or narrowly raised in a valley above, convex or thicker than broad and paler below; **primary lateral veins** 5–7(8), narrowly sunken above, convex or narrowly raised and paler below, drying paler beneath; **basal veins** 5–8 pairs, 2–3 free to the base and arising at an acute angle then promptly branching with subequal branches, the branches extending at 20–30° angle to the margin; **collective veins** arising from one of the upper basal veins, loop-connecting and 1–3 mm from the margin; **tertiary veins** flat and darker than the surface, a few raised below. INFLORESCENCE erect; **peduncle** 19–62 cm long; **spathe** 3.5–7.5





**Figure 51.** *Anthurium pulverulentum* Sodiro var. *adsimile* Croat (Croat & Ferry 93092). View of plant base showing stems, cataphylls, bases of petioles, and leaf blade, adaxial surface.



**Figure 52.** *Anthurium rivulare* Sodiro (Croat et al. 104063). View of leaf blade, adaxial surface.

cm long, 6–15 mm wide, green to greenish cream, sometimes heavily tinged purplish, reflexed-spreading; **spadix** dark violet-purple to purple, (3)6–13 cm long, 4–6 mm diam., stipitate 1–2 mm; 4–6 **flowers** visible per spiral, 1.8–2.8 mm long, 1.6–1.8 mm wide; **tepals** weakly glossy, lateral tepals with inner margin 1.3–1.5 mm wide; stamens held at the surface of the tepals; anthers orange; pollen golden. **INFRUCTESCENCE** erect to spreading; **berries** red, obovoid, 5–7 mm wide.

*Anthurium rivulare* is known from southern Colombia (Chocó) and Ecuador, ranging from 100 to 1,800 m elevation in Tropical wet forest, Premontane wet forest and Premontane rain forest life zones. In Ecuador it has been found from Carchí to Chimborazo Provinces on the western slopes of the Andes. In Colombia it has been collected along the Río Ñambí and the Río Imbí at about 1,100 m elevation.

*Specimens seen:* ECUADOR. **Carchi:** San Marcos, 00°08'N, 78°20'W, 600 m, 8 July





**Figure 53.** *Anthurium rivulare* Sodiro (Croat et al. 104063). View of inflorescence.





**Figure 54.** *Anthurium subcarinatum* Engl. (Croat & Llanos 106188). Live plant showing stem, petioles, leaf blades, adaxial surface, and inflorescence.

1983, *Thompson et al.* 778 (CM); Tulcán Cantón, Parroquia Tobar Donoso, Sector Sabalera, Awá Reserve, NE of Casa Comunal, 01°N, 78°24'W, 650–100 m, 19 June 1992, *Tipaz et al.* 1501 (MO, QCNE); Reserva Indígena Awa, Centro El Baboso, Parroquia Tobar Donoso, 00°53'N, 78°25'W, 1800 m, 17–27 Aug. 1992, *Tipaz et al.* 1827 (MO, QCNE); Chical, west of Maldonado on trail to Penas Blancas, 1200–1350 m, 23 Sep. 1979, *Gentry & Shupp* 26395 (SEL, MO); Reserva Etnica-Forestal Awa, 01°10'N, 78°25'W, 800–1000 m, 12 Mar. 1988, *Jorgensen et al.* 65222 (AAU); San Marcos valley, 01°7'N, 78°22'W, 600 m, 20 Nov. 1983, *Kvist & Nissen* 48782 (AAU). 900 m, 00°55'N, 78°32'W, 22 Nov. 1992, *Aulestia et al.* 666 (BM, L, MO, RSA, TEX; El Pailon, *Plowman* 14072 (Selby 79–2020)(F); Reserva Awa, Parroquia El Chical, Centro San Marcos, 01°6'N, 78°14'W, 750 m, 23 Apr. 1993, *Méndez et al.* 223 (MO, QCNE); Reserva Awa, Centro Gualpí Medio, Río Canumbí, 01°02'N, 78°15'W, 1150 m, 19–28 Feb. 1992, *Grijalva et al.* 496, 596 (MO); Reserva Etnica Awa, 900 m, 01°01'N, 78°16'W, 21 May 1992, *Quelal et al.* 615 (MO, QCNE); Comunidad Gualpí Alto, 1800 m, 01°02'N, 78°14'W, 15–28 June 1991, *Rubio et al.* 1541 (MO, QCNE); Along Río Blanco on the trail from Chical to San Marcos, 01°04'N, 78°15'W, 800–1000 m, 9 July 1983, *Sue A. Thompson, John E. Rawlins & James Levy* 803 (MO); Border area between Prov. Carchi and Esmeraldas, about 20 km past Lita on road Lita-Alto Tambo, selectively logged forest, 00°53'N, 78°30'W, 550 m, 25 June 1991, *H. van der Werff, Bruce Gray & Galo A. Tipaz* 12013 (AAU, MEXU,

MO); Along road from Lita to Baboso, along Río Baboso, near bridge, 00°53'00"N, 78°27'00"W, 672 m, 9 Oct. 2012, *T. B. Croat, Geneviève Ferry, David Scherberich & Claudia L. Henríquez* R. 104063 (HUA, MO, QCNE).

*Anthurium subcarinatum* Engl., Pflanzendr. IV 23B. 117. 1905. Type: Colombia. Valle: above Dapa, 1500 m, *Lehmann* 802 (holotype, B). **Figures 53–54.**

The species is a member of sect. *Polyneurium* and is characterized by its typically short internodes, modest size, weakly persistent cataphylls, moderately large lanceolate-oblong somewhat brownish-drying leaves with a green reflexed to spreading lanceolate spathe and a greenish weakly tapered spadix and pale green berries.

Terrestrial or epiphytic; internodes about as long as broad or 1–3(6) cm long, 0.6–1.5 cm diam., medium to dark green, to gray-green or dark gray, semiglossy to glossy; **cataphylls** to 18 cm long, pale green, the bases persistent, reddish brown, often with persistent fibers, deciduous with prominent scars lower down. LEAVES with **petioles** 17–20 cm long, subterete, sharply C-shaped, narrowly and sharply sulcate, semiglossy; geniculum much larger, sharp-sulcate; **blades** lanceolate-oblong, rounded or cuneate at the base, long-apiculate at the apex, 32–39 cm long, 5–10 cm wide, 3.9–6.4 times longer than wide, 1.8–2.2 times longer

than petiole, subcoriaceous, dark green and velvety to matte-subvelvety above, moderately paler and weakly glossy to semiglossy below; **midrib** narrow-rounded in deep valley and concolorous above, round-raised to narrowly raised below, slightly to moderately paler and matte below; **primary lateral veins** 18–20 pairs, narrowly sunken to etched-sunken above, prominently raised below, interprimary veins present; **collective veins** from first basal veins; **tertiary veins** weakly darker flattened to prominent below. INFLORESCENCE erect; **peduncle** 21–30 cm long; **spathe** 7–11.5 cm long, 1–1.7 cm wide, pale green, spreading to reflexed; **spadix** 6–19 cm long, 3–5 cm diam., green, semiglossy, becoming yellowish in areas, especially at tip, sometimes dark green at apex, pale green toward base; pistils early emergent; berries pale green, subglobose, 4 mm diam., semiglossy.

*Anthurium subcarinatum* ranges from Colombia (Caldas, Cauca, Chocó, Nariño, Valle) to Ecuador (Carchi) at 800–2500 m elevation.

In the Carchi region the species might be confused with small plants of *A. membranaceum* Sodiro but that species has more elliptic leaf blade with a more prominently rounded base.

*Specimens seen:* ECUADOR. **Carchi:** Quebrada Naranjo, near the waterfall, 00°54'N, 78°06'W, 2000 m, 13 Nov. 1988, L. Dorr 6095 (QCA); Trail from Rafael

Quindi's finca to Río Verde and along Río Verde, 00°53'N, 78°08'W, 1700 m, 26 Nov. 1987, W. Scott Hoover & S. Wormley. 1694 (MO, QCA); Gualpi Chico, 00°58'N, 78°16'W, 1330 m, 17 Jan. 1988, W. Scott Hoover, Ana Argüello, P. Gelpi & R.A. Lorentzen 2692 (MO, QCA); Trail through forest near San Marcos 45 km W of Chical, 01°02'N, 78°14'W, 2300 m, 13 Feb. 1984, W.S. Hoover 1071 (MO); Trail from Paílón to Gualpi Chico area of Awá Reservation, 1.5 km past Río Blanco, forest areas, 00°51'N, 78°16'W, 1000–1450 m, 14 Jan. 1988, W.S. Hoover 2420 (MO, QCA); W.S. Hoover 2436 (MO, QCA); Near encampment in Gualpi Chico area of Awá Reserve, 00°58'N, 78°16'W, 1330 m, 20 Jan. 1988, W. Scott Hoover, Ana Argüello, P. Gelpi & R.A. Lorentzen 2883 (MO, QCA); Trail beginning above Rafael Quindi Finca, above Untal (along road to Chical) and partly ascending Cerro Obsura, 00°52'N, 78°09'W, 1670 m, 26 Nov. 1987, W. Scott Hoover & S. Wormley. 1685 (MO).

***Anthurium toisanense* Croat, sp. nov.**

Type: Ecuador. Imbabura: Cantón Cotacachi, Paroquia Intag, Comuna Santa Rosa de Pucua, Reserva Privada Intag, Cordillera de Toisán, Reserva Privada Intag, 00°22'N, 78°28'W, 1850 m, Montane wet forest, 6 Mar. 2002, Jorge Caranqui, M. Melampy & J. Lara 527 (holotype, MO-5898362–63; isotype, QCNE). **Figure 55.**

The species is a member of sect. *Polyneurium* and is characterized by its terrestrial or epiphytic habit, sub-terete



obtusely sulcate petiole, large ovate-sagittate-cordate gray-green-drying leaf blades with overlapping posterior lobes, 9 pairs of basal veins, 1–2 free to the base, a well-developed posterior rib, the collective veins arising from one of the lowermost basal veins, the major veins all drying darker than surface and prominently ridge-winged as well as by the long-pedunculate inflorescence with the light green spathe directed more or less forward and hooding spadix and the brownish purple long-tapered spadix which is light green in early fruit.

Terrestrial or epiphytic, **stem** to 5 m long; **cataphylls** ca. 10 cm long, persistent. LEAVES with **petioles** sub-terete and obtusely sulcate, 27–78 cm long, 4–7 cm diam.; **blades** ovate-sagittate-cordate, conspicuously bullate, 17–78 cm long, 11–50 cm wide, 1.5–1.9 times as long as wide, 0.5–1.0 times as long as petiole, drying gray-green; posterior lobes inward-curving, 5–18 cm long, 4–12.5 cm wide; **sinus** spatulate, closed and the end by overlapping posterior lobes; **midrib and major veins** all drying darker than surface and prominently ridge-winged below; **primary lateral** veins 7–11 pairs, arising at a 50–60° angle, joined by a dense network of prominent minor veins; **basal veins** 5–9 pairs, the first 1–2 free to the base; **posterior ribs** naked 1–4 cm; **collective veins** arising from one of the lowermost basal veins. INFLORESCENCE long-pedunculate; **spathe** light green, directed more or less forward and hooding spadix; **spadix** long-tapered, brownish purple, light green in early fruit. Note: The

field label indicates that the spathe was erect but owing to the length of the peduncle and the size of the spadix this seems unlikely and the inflorescence was surely at most spreading with the spathe also spreading and hooding the presumably pendent spadix.

*Anthurium toisanense* is endemic to Ecuador, known only from Carchi and Imbabura Provinces at 2400–2700 m in *Montane wet forest* life zones.

*Anthurium toisanense* is most easily confused with *A. umbraculum* Sodiro which differs in having the major veins on the lower surface merely narrowly rounded, not at all winged, having the lower surface densely dark granular with usually prominently raised tertiary veins, in contrast to having the lower surface faintly pale-speckled and only weakly raised tertiary veins. It also resembles *A. corrugatum* Sodiro but differs from that species in not being densely short-puberulent.

The species is named for the type locality in the Cordillera de Toisán in the Cantón Cotacachi

*Paratypes*: Ecuador: **Carchi**: Tufino-Maldonado road, Km 39, 00°50'00"N, 78°02'11"W, 2700 m, 19 Feb. 1995, *Michael Schwerdtfeger 21938* (MO); 7.8 mi SE of Maldonado on road to Tulcán, wet hillside near road, 00°53'N, 78°05'W, 2400 m, 27 July 1983, *Sue A. Thompson & John E. Rawlins 890* (MO); Km 21, Maldonado-



**Figure 55.** *Anthurium subcarinatum* Engl. (Croat & Llanos 106188). Close-up of leaf blades, adaxial and abaxial surfaces, and inflorescence.



**Figure 56.** *Anthurium toisanense* Croat (Clark 7429, MO-4818279). Herbarium specimen showing petiole and leaf blade, abaxial surface.





**Figure 57.** *Anthurium umbraculum* Sodiro (Croat 100930). View of leaf blade, adaxial surface.

Tulcán, wet montane forest, 2700 m, 25 Nov. 1985, *Elizabeth L. Besse, Harry E. Luther, Joseph S. Halton & A. Besse* 2250 (SEL). **Imbabura:** Cantón Cotacachi, Parroquia García Moreno, Cordillera de Toisán, Cerro de La Plata, Bosque Protector Los Cedros, Sendero Observatorio (SW of lodge), 1300–1600 m, 00°18'N, 78°46'W, Premontane/Montane wet forest, 18 Mar. 2003, *J. L. Clark, F. Nicolalde & R. Hall* 7406 (MO, QCNE); Parroquia García Moreno, Cordillera de Toisán, Cerro de la Plata, Bosque Protector Los Cedros, Sendero Camino del Oso (north of Lodge), 00°01'N, 78°46'W, 1500–2600 m, 19 Mar. 2003, *J. L. Clark, F. Nicolalde & R. Hall* 7429 (MO, QCNE, US).

***Anthurium umbraculum*** Sodiro, *Anales Univ. Centr. Ecuador* 16: 101. 1902. Type: Ecuador. Pichincha: Volcán Pichincha, Nono, *Sodiro s.n.* (LT: MO; ILT: B destr.?, G; photo: F(B)). **Figures 56–58.**

The species is a member of sect. *Polyneurium* and is characterized by its large leaves with cordate to ovate-cordate or triangular-cordate blades bullate or rugose above and drying greenish to olive-green, numerous primary lateral veins sometimes inconspicuous, 6–10 pairs of clearly visible basal veins, 1–3 free to base, and its inflorescence with a long green spathe spreading or twisted and along tapered spadix that can be green, yellow to yellowish, brown or reddish to red.

Epiphyte or terrestrial, appressed-climber; **internodes** broader than or about as broad as long, 0.5–4 cm long; **roots** lax; **cataphylls** deciduous, persisting intact, persisting as fibers or persisting as rotting mass, 5–20 cm long. LEAVES with **petioles** erect, 40–125(–160) cm long, 0.7–1.2 cm diam., terete, firm, obtusely and narrowly sulcate; geniculum 1.5–3.5 cm long; **blades** cordate to ovate-cordate, (35–)50–90(–130) cm long, (23–)30–66(100) cm wide, 0.9–1.1 times longer than wide, broadest above petiolar plexus but below middle or at petiolar plexus, sometimes at petiolar plexus, gradually acuminate or abruptly acuminate at apex, prominently lobed at base, margins convex, strong undulate, moderately bicolorous, matte or matte-subvelvety and bullate or rugose above, semiglossy below, drying greenish to olive-green above, greenish to olive-green or grayish below; **anterior lobe** 31–65 cm long, lobes downward to outward or inward and/or overlapping, **posterior lobes** 10–26 cm long; **sinus** 7.5–24 cm deep, spatulate to hippocrepiform or closed, **posterior ribs** 9–14 cm long, naked along the sinus 5.5–12.5 cm; **midrib** midrib convex and slightly paler above, convex below broadly convex or round-raised below; **primary lateral veins** 13–21 pairs, departing at a 40–60° angle, narrowly raised and paler above, thicker, narrowly raised and paler below; **basal veins** clearly visible, 6–10 pairs, 1–3 free to base; **tertiary veins** in part raised below; **collective veins** arising from one of the uppermost basal veins, 2–3 mm from margin. INFLORESCENCE length shorter than leaves; **peduncle** 25–33 cm long;





**Figure 58.** *Anthurium umbraculum* Sodiro (Croat 100930). View of petiole and inflorescence.



**spathe** 12–28 cm long, 1.5–2.5 cm wide, lanceolate, spreading or twisted, greenish, brittle; **spadix** tapered, 18–28 cm long, 0.8–1.3 cm diam., green to yellow-green; pollen yellowish; pistils early-emergent. INFRUCTESCENCE semi-erect, green to 57 cm long, 3.7 cm diameter; fruits greenish at maturity.

*Anthurium umbraculum* ranges from Colombia (Nariño) to most of Ecuador, at 780–3100 m, in multiple life zones.

*Specimens seen:* ECUADOR. **Carchi:** Carretera Tulcán - Tufino, sector La Pradera, 2200 m, 12 Oct. 1986, *Carmen Ulloa 257* (QCA); Cerro Golondrinas, Upper Río Gualpí headwaters, north-facing slope beyond (to north of) ridge crest at 2300 m which rises above the settlements of El Carmen and La Primavera, Primary Upper Montane Pluvial Forest, 00°50'N, 78°13'W, 2250–2265 m, 15–20 July 1993, *Brad Boyle, Chamorro, P., M. Fleury, Peter Hibbs & Quer, M. 2243* (MO).

## NUMERICAL SPECIES

**Distinct and likely new species which are sterile or of insufficient quality and thus will not be described as new.**

### *Anthurium* species #1. Figure 59.

Hemi-epiphyte; **internodes** much longer than broad, to 6 cm long or more, drying tan-brown, semiglossy, smooth; **cataphylls** to 11.3 cm long, persisting

weakly intact with a network of fibers. LEAVES with **petioles** 28.5 cm long, drying 3 mm diam., sulcate with sharp ridges, with one or more medial ribs, smooth, semiglossy, drying light gray-brown; geniculum darker and slightly thicker than petiole; **blades** 32 cm long, 13 cm wide, 2.4 times long as wide, broadest near the area of the petiolar plexus, 4.5 times longer than petiole, abruptly and narrowly acuminate at apex, deeply and narrowly lobed at base, drying dark brown and matte above, slightly paler and semiglossy below, parabolic-hippocrepiform base; **anterior lobe** 26 cm long, broadly convex along margin; **posterior lobes** 7 cm long, 4.3–4.6 cm wide, directed toward the base and slightly outward, widest near the petiolar plexus; **basal veins** 4–5 pairs, 1st pair free to the base, 2nd pair fused 1.4–1.5 cm, 3rd pair fused 2.2–2.3 cm, 4th & 5th pairs fused 2.7–3 cm; **posterior ribs** broadly curved, naked 1.7–2.5 cm; **sinus** 6 cm deep, 5 cm wide parabolic-hippocrepiform; **midrib** drying narrowly acute and concolorous above, narrowly raised and darker below; **primary lateral veins** 6 pairs, departing at 40–50° angle; **tertiary veins** visible, flat, from upper surface, slightly raised on lower surface; **collective veins** arising from lowermost pair of basal veins, equally prominent as primary veins, 3 mm from margins; **upper surface** minutely granular; **lower surface** smooth between the aerieles but faintly short pale-lineate. INFLORESCENCE 31 cm long; **peduncle** 18 cm long, shorter than petiole, brown, drying flattened; **spathe** green, spreading, decurrent on peduncle for 5 mm; **spadix**



Figure 59. *Anthurium* species #1 (Rodríguez 709, QCA). Herbarium specimen showing stem with cataphyll remnants, petiole, leaf blade, mostly adaxial surface with abaxial surface folded at the tip, and inflorescence.

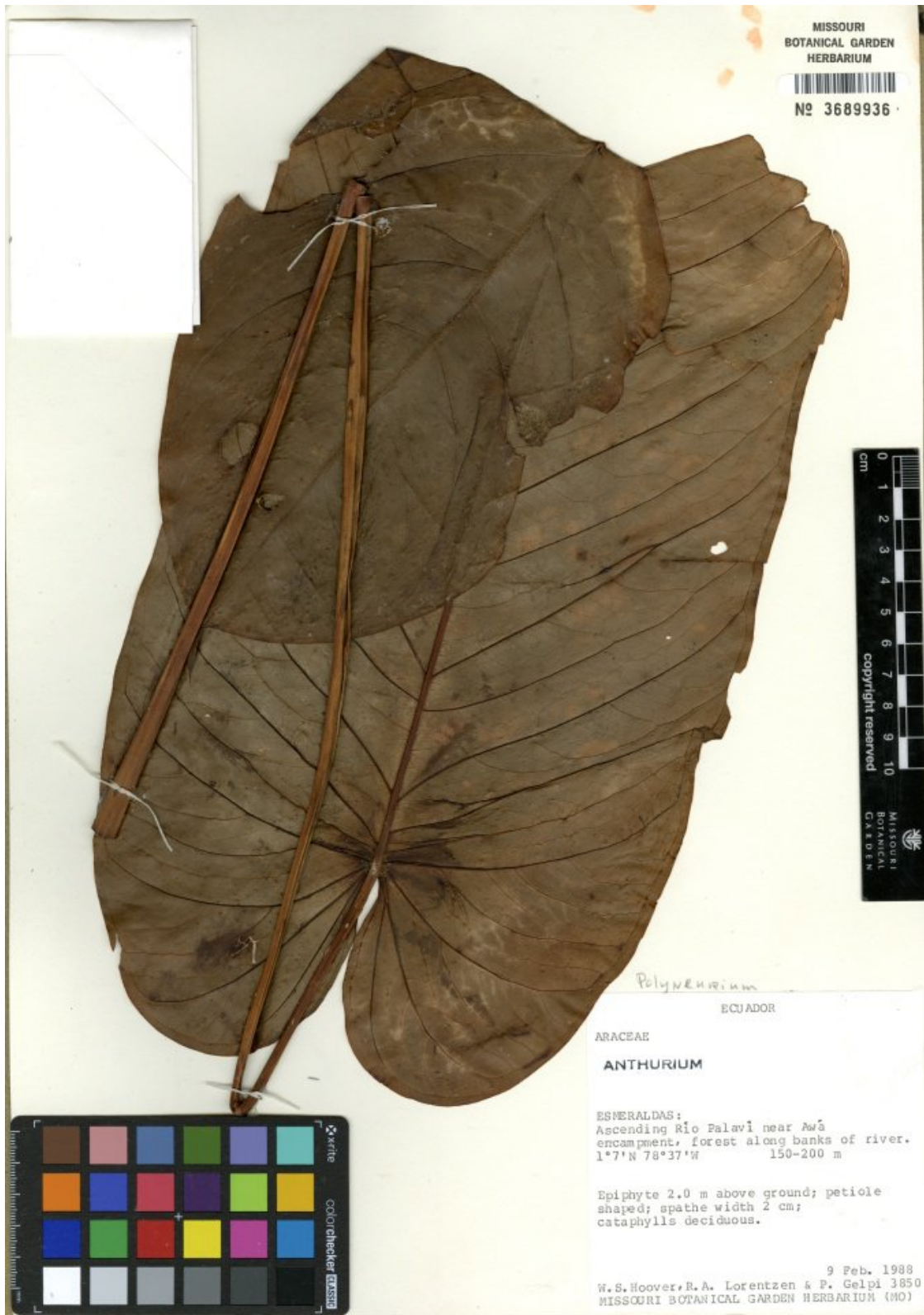


Figure 60. *Anthurium* species #2 (Hoover 3850, MO-3689936). Herbarium specimen showing petiole and leaf blade, adaxial and abaxial surfaces.



green, 13 cm long, 4 mm diam., curved forward; **flowers** 8–10 flowers per spiral, 1.6 mm long. 1.2–1.4 mm wide, lateral tepals 0.8–1.0mm wide, rounded on inner margin, 2-sided on outer margin; collected green, drying brown.

This species is very similar to *A. pseudonigrescens* Croat but that species has a spadix that is reddish to dark violet-purple and while the Rodríguez collection may prove to be a new species it is preferable to await additional collections.

*Specimen seen:* ECUADOR. **Carchi:** Reserva Etnica y Forestal AWA, Camino desde Gualpi Bajo hacia Tarabita, 01°08'N, 78°23'W, 700 m, 13 Mar. 1988, *Jimena Rodríguez 709* (QCA). **Figure 59.**

### *Anthurium* species #2. Figure 60.

Epiphyte. **cataphylls** deciduous; LEAVES with **petioles** 61cm long, sulcate with acute margins, longer than blade, matte red-brown; geniculum shaped like petiole, slightly paler brown; **blades** 51cm long, 9 cm wide, triangular ovate, darker surface above, blade 0.8 times as long as the petiole, apex gradually acuminate; **anterior lobe** 45cm long; **posterior lobes** 9 cm long; **basal veins** 4–5 pairs, not naked except near the petiolar plexus; **posterior ribs** 3mm long, very narrow, straight, linear from attachment to midrib; **sinus** nearly closed, obovate.; **midrib** convexly raised at the base, becoming flat towards the apex; **primary lateral veins** 18–19 pairs degree

angle 45–55 near the middle of blade and towards the apex, 65–75 near the base; **tertiary veins** flat; **collective veins** 4mm from margin, arising from lowermost basal vein; **upper surface** smooth **lower surface** with pale lineation's on lower surface, greenish-brown on lower surface.

The species resembles *Anthurium lineolatum* Sodiro but it differs from it by its narrowly spatulate sinus with the posterior ribs lacking or no more than 4 mm long.

*Specimen seen:* ECUADOR. **Carchi:** Ascending Rio Palavi near Awa encampment, forest along banks of river. 01°07'N, 78°37'W, 150–200 m, 9 Feb. 1988, W. Scott Hoover 3850 (MO-3689936).

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