

PANAMA. BOCAS DEL TORO: ENE of Cerro Pate Macho, near Finca Serrano, NE of Boquete, 1,675 m, *Hammel 6160* (MO).

***Anthurium harlingianum* Croat, sp. nov. TYPE:**

Ecuador. Napo: between Lago Agrio and Baeza at Río Oyocachi, 1,620 m, 0°20'S, 77°55'W, *Croat 50290* (holotype, MO 2819231-32; isotypes, K, NY, QCA, RSA, USM). Figures 7, 16, 149, 150, 154, 155.

Planta epiphytica; internodia brevia, 3–5(6) cm diam.; cataphyllum lanceolatum unciforme vel cucullato, persistens semi-intactum; petiolus 4.5–13 cm longus, 7–15 mm diam., adaxile uninervis, abaxile trinervis-quinque-nervis; lamina (32)50–90(150) cm longa, 18–40(60) cm lata, oblongo-oblancea; nervis primariis lateralibus 12–23 utroque. Pedunculus 21–50(100) cm longus, 3–6 mm diam.; spathe lanceolata, viridis usque ad marroninam, 6.5–22(40) cm longa, 1.5–4.5 cm lata; spadix erectus, purpureus pallescens usque ad atrasalmeneus, contractus, 10–25(47) cm longus, 4–7 mm diam. Baccae albae usque ad purpureae, oblongae, 7–8 mm longae.

Epiphytic; stem to 30 cm long; internodes short, 2.5–5(6) cm diam.; roots dense, ascending to spreading, whitish to green-gray, velutinous, to ca. 13 cm long, 3–6 mm diam.; cataphylls lanceolate and hook-shaped or cucullate, less often straight, subcoriaceous, short, to 7 cm long, persisting semi-intact. *Leaves* erect-spreading; petioles 4.5–13 cm long, 7–15 mm diam., D-shaped, obtusely angled with a medial rib adaxially, rounded to 3–5-ribbed abaxially; geniculum paler and moderately thicker than petiole, 1–2.5 cm long; sheath 2–10 cm long; blades coriaceous to subcoriaceous, broadly oblong-oblancea to  $\pm$  elliptic, acute at apex, shallowly cordate to truncate, rarely acute to narrowly acute at base (usually in younger plants), (32)50–90(150) cm long, 18–40(60) cm wide, broadest above the middle, the margins broadly undulate; upper surface weakly glossy to matte, medium green, lower surface matte, slightly paler; midrib above obtusely raised at base, becoming acutely raised toward the apex, rounded to obtusely angled below; primary lateral veins 12–23 per side, departing midrib at 30–60° angle, ascending straight to the margin, becoming arcuate near the margin, convexly to acutely raised above, convexly raised below, slightly paler than surface above and below; tertiary veins prominulous and darker than surface below; collective vein arising from about the middle of the blade (more often absent), prominulous, 3–10 mm from margin. *Inflorescences* erect-spreading, shorter than leaves; peduncle 21–50(100) cm long, 3–6 mm diam., (2.6)4–6(11)  $\times$  as long as petiole, green, sometimes tinged red-violet, terete; spathe erect-spreading to recurled, sometimes twisted,

subcoriaceous to coriaceous, green to violet-purple to maroon, lanceolate, 6.5–22(40) cm long, 1.5–4.5 cm wide, inserted at 50–70° angle on peduncle, acuminate at apex, acute at base; spadix dull salmon-pink to pale violet-purple (B & K purple 5/5), rarely greenish, sessile, slightly to moderately tapered, slightly to conspicuously curved, 10–25(47) cm long, ca. 9–10 mm diam. near base, 4–9 mm diam. midway, 2–4 mm diam. near apex, broadest at the base; flowers square to rhombic or 4-lobed, 1.6–2.5 mm long, 1.5–2.4 mm wide, the sides straight to sigmoid; 6–13 flowers visible in principal spiral, (5)8–16 in alternate spiral; tepals matte to weakly glossy, minutely papillate; lateral tepals (0.4)0.8–1.3 mm wide, the outer margins 2–4-sided, the inner margins straight to slightly rounded; pistils scarcely emergent to prominently raised, gray-green to purplish; stigma oblong-ellipsoid to slitlike, 0.3–0.6 mm long, reddish to violet-purple, darker than surrounding pistil; stamens emerging from the base of spadix, in a complete sequence, the laterals preceding the alternates by ca. 13–40 spirals, the 3rd stamen preceding the 4th by ca. 2–9 spirals; anthers yellow-red (B & K yellow-red 8/2.5), 0.4–0.6 mm long, 0.3–0.9 mm wide, inclined over the pistil; thecae broadly ovoid to ovoid-triangular, slightly or not divaricate; pollen creamy white, white when dried, the scent yeasty or like rotting fruit. *Infructescence* pendent; spathe persisting; spadix 16–28 cm long, 1.5–2.5 cm diam.; berries white to violet-red, 7–8 mm long; seeds 1–2 per fruit, oblong, 1.7–3 mm long, 1.3–2 mm wide, 0.8–1.4 mm thick, with a gelatinous appendage at both ends.

*Anthurium harlingianum* is endemic to the lower eastern slopes of the Colombian and Ecuadorian Andes at 440 to 1,800 m (mostly above 750 m), in areas of tropical wet, premontane wet, and wetter parts of tropical moist forest, where it is almost strictly epiphytic. It occurs in a broad arc from the Serranía de Macarena in Meta Dept. in southern Colombia, to the Province of Zamora-Chinchipe in Ecuador. Probably also belonging to the same species are several Peruvian collections from the vicinity of Tingo María in Huánuco, and one each from Junín and Pasco. However, there is room for doubt, since these areas are well out of the normal range, and no collections are known from a large intervening area.

*Anthurium harlingianum* is distinguished by its generally large size, hook-shaped to cucullate cataphylls, erect-spreading inflorescences, and by its leaves which usually dry dark brown.

*Anthurium harlingianum* is closely related to

and perhaps only subspecifically distinct from *A. loretense* and *A. cataniapoense*, both of which usually occur at elevations below 300 m and occupy positions at opposite ends of the arc in the lowland Amazonian region. *Anthurium loretense* occurs at the south end of the arc in eastern Loreto Dept. in Peru, and *A. cataniapoense* occurs at the north end in the watersheds of the Río Negro and Río Orinoco in Venezuela. Both of these lowland species are distinguished from *A. harlingianum* by their pendent inflorescences and more glossy leaf blades. The blades of *A. harlingianum* are typically matte with less prominent tertiary veins than those of the other two species. Of these two species, *A. loretense* is closest to *A. harlingianum* geographically and taxonomically. It differs in having an inflorescence with both the spathe and spadix averaging about 6 cm longer than in *A. harlingianum*, and the spadix is typically more long-tapered, averaging two-thirds the length of the peduncle. In *A. harlingianum*, the inflorescence is typically erect at anthesis, but may become pendent, and the spadix is usually more stubby. It averages only about half as long as the peduncle and has a proportionally somewhat shorter spathe (ca. 3/5 as long).

All three of the above taxa share a lanceolate, usually hook-shaped cataphyll and similarly short-petiolate, coriaceous, oblanceolate leaf blades which frequently have closely set primary lateral veins at the base. In addition, all three have similarly D-shaped petiole cross sections with raised margins and an obtuse medial rib, as well as purplish violet spadices (pale purple and also ranging to other colors in the case of *A. harlingianum*).

Aside from cultivated material, the spadix of *Harling & Andersson 24496*, from Morona-Santiago, represents the lower end of spadix-length range (6.5 cm long) and is unusual in being stipitate by 5 mm. *Croat 58162*, from San Martín Dept. in Peru at 700 m, also has a stipitate spadix (6 mm in back); with its larger spadix it appears to link the last-mentioned specimen with typical material from Ecuador and with collections from further south in Peru. However, in view of its terrestrial habit on limestone rocks and leaves which dry pale green, it may represent a distinct taxon. More collections of middle-elevation *Pachyneurium* from the Department of Amazonas in Peru are needed to help solve this and similar problems in the section. Two collections from the same locality in Junín, Peru (*Killip & Smith 25528, 25604*), are unusual in being quite small for typical *A. harlingianum*, with leaf blades up to 10 cm

wide, less than 50 cm long, and spadices ca. 4–7 cm long.

*Anthurium harlingianum* is named in honor of the Swedish botanist Gunnar Harling, who coauthored the Flora of Ecuador project with Benkt Sparre, and who has led several collecting expeditions to Ecuador.

COLOMBIA: META: Sierra de la Macarena, northern plateau, 1,000 m, *Philipson 2342* (BM, COL); Río Güejar-Río Sansa, 500–1,000 m, *Idrobo 479* (COL, US); Río Güejar-Morro Bello, El Tablazo, 500–1,200 m, *Chaparro et al. 74* (COL), *García et al. 440* (COL), PUTUMAYO: El Whiskey, S of Umbria, vic. Finca Santa Marta, *Plowman 2066* (F); Río Mocoa, 4 km E of Mocoa, 800 m, *Plowman 2027* (COL, F, GH); 700 m, 1°10'N, 76°33'W, *Croat 51762* (MO). ECUADOR: MORONA-SANTIAGO: 6 km E of Limón, rd. to La Unión, 1,300 m, *Harling & Andersson 24496* (GB); Gualaquiza, Misión Bomboiza, Misión Salesiana, 85 km NNE of Zamora, 700–800 m, 3°26'S, 78°32'W, *Sparre 19106* (S); Gualaquiza-Zamora, 5 km S of El Pangui, 800 m, 4°21'S, 78°50'W, *Croat 50816* (MO, QCA, RSA), *50817* (MO); 31 km N of Yangtaza, 1,000 m, 4°11'S, 78°49'W, *Croat 50786* (CM, MO); 20 km S of San Juan Bosco, 1,300 m, *Madison & Besse 7559* (MO, SEL). NAPO: Lago Agrio-Baeza, Río Quijos, ca. 21 km NNE of Baeza, El Chaco, 1,500 m, *Harling 3873* (S); Río Oyacachi, 23 km NNE of Baeza, N of El Chaco, 1,500–1,620 m, 0°18'S, 77°48'W, *Balslev & Madsen 10512* (AAU), *Croat 50290* (K, MO, NY, QCA, RSA, USM); 43 km E of Lago Agrio, 560 m, 0°07'N, 77°15'W, *Croat 50437* (MO); 67 km W of Lago Agrio, 760 m, *Croat 49506* (MO, QCA); 67.5 km W of Lago Agrio, 1,180 m, 0°01'N, 77°19'W, *Croat 50477* (MO, QCA); 72.5 km W of Lago Agrio, 1,166 m, *Croat 49518* (MO, NY, QCA); 74.5 km W of Lago Agrio, 1,220 m, 0°00'N, 77°20'W, *Croat 50455* (MO); Lago Agrio-Coco, 26 km N of Coco, 450 m, 0°29'S, 76°55'W, *Croat 50421* (BM, MO, US); Lago Agrio-Río San Miguel, 12.5 km N of Lago Agrio, 450 m, 0°6'N, 76°50'W, *Croat 50319* (MO, QCA); 2 km S of Río San Miguel, 21.2 km N of Lago Agrio, 470 m, 0°08'N, 76°50'W, *Croat 50350* (CM, MO, QCA, RSA), *50352* (M, MO), *50355* (AAU, CAS, CM, MO, QCA); Tena, *Asplund 10182* (S); Tena-Puyo, 1.7 km S of Río Napo, 440 m, 1°04'S, 77°47'W, *Croat 58899* (MO); Tena-Puyo, 5.5 km S of bridge over Río Napo, 510 m, 1°05'S, 77°47'W, *Croat 58922* (MO, QCA, UC); Tena-Puyo, 58–61.5 km N of Puyo, 500–600 m, *Croat 49629* (MO, QCA), *49663* (MO); Río Aguarico, road to Cepe Ferry Crossing, E of Lago Agrio, 450 m, 0°2'N, 76°50'W, *Croat 50429* (MO); Río Tena, 2 km W of Muyuna, 5.7 km W of Tena, 500 m, 0°01'S, 77°51'W, *Croat 58854* (CM, MO, QCZ); Cantón Archidona, Challuayacu, Carretera Hollín-Loreto, Km 25–31, 1,230 m, 0°43'S, 77°40'W, *Hurtado 1161* (MO); Carretera Hollín-Loreto-Coca, between Río Pucuno and Río Guamani, 0°46'S, 77°26'W, 1,100–1,200 m, *Céron 2901* (MO, QCNE); Cantón Loreto, Huaticocha, Carretera Hollín-Loreto, 575 m, *Hurtado et al. 1380* (MO); Reserva Biológica Jatún Sacha, Río Napo, 8 km E of Misahuallí, 1°4'S, 77°36'W, 450 m, *Céron 1227* (MO, QCNE), *Palacios 2465* (MO). PASTAZA: Mera, 1,160 m, *Harling 3689, 3815* (S); Río Pastaza, Mera, *Lugo 1116* (GB); Mera-Baños, 1 km E of Topo, 1,300 m,



1°27'S, 78°10'W, *Palacios et al.* 190 (MO, NY, QAME, QCNE); 3 km from turnoff from Puyo-Mera road, Tarabita, 1,000 m, *Croat* 49688 (MO, QCA); Puyo-Baños, 5.7 km W of Shell, 1,070 m, 1°26'S, 78°09'W, *Croat* 59076 (CM, MO, QCA); Puyo-Baños, 0.6 km E of Río Negro, 2 km W of El Topo, 1,160 m, 1°24'S, 78°12'W, *Croat* 59110 (F, MO, QCA); Puyo-Macas, 19 km S of Puyo, 1,200 m, 1°37'S, 77°53'W, *Croat* 50558 (MO, QCA), 50565 (MO, QCA), 50574 (CM, MO, QCA), 50576 (MO); Puyo-Macas, 33 km S of Puyo, 16 km S of Escuela Fiscal Cotopaxi, 900 m, 1°38'S, 77°52'W, *Croat* 58967 (MO, QCA); 3.8 km from Puyo-Macas road, road to Canelos, 850 m, 1°37'S, 77°51'W, *Croat* 58984 (MO, QCA). ZAMORA-CHINCHIPE: 2 km N of Zamora, 930 m, *Madison* 2460 (SEL); carretera de PETRO-CANADA under construction, via Aca, 115 km S of Coca, S of Río Tiguino, 320 km, 1°15'S, 76°55'W, *Zak & Rubio* 43184 (MO); Loja-Zamora, 15 km above Zamora, 1,800 m, *Madison* 2503 (SEL). PERU: HUÁNUCO: Tingo María Region, Prov. Huánuco, Huánuco-Pucallpa, Tingo María, Naranjillo, 600–700 m, *Ferreira* 2210 (USM, NY); Prov. Leoncio Prado, Río Huallaga, 650–800 m, *Croat* 57955 (F, MO, RSA, USM), *Gentry et al.* 15925 (MO), 15970 (F, MO), *Ploeman & Ramírez* 7568 (F, MO, US), *Solomon* 3387 (MO); 25 km N of Tingo María, 1,000 m, *Winter s.n.* (USDA PI#390586), cult. at Univ. of Hawaii (Kamamoto 398) (MO); Prov. Leoncio Prado, Dpto. Rupa Rupa, Cerro Quemado, E of Tingo María, 800–850 m, *Schunke* 10498 (MO); Tingo María-Pucallpa, La Divisora, 1,650 m, 9°07'S, 75°48'W, *Ploeman s.n.* (Selby Garden 78-1918) (MO). JUNIN: Pichis trail, Yapas, 1,350–1,600 m, *Killip & Smith* 25528, 25601 (NY, US), 25604 (US). PASCO: Prov. Oxapampa, 20 km from Pte. Paucartambo, rd. to Oxapampa, 1,100 m, 10°41'S, 75°24'W, *Smith* 7570 (MO). SAN MARTÍN: Moyobamba-Chachapoyas, 13.5 km W of Naranjos, km marker 415, 700 m, 5°38'S, 77°25'W, *Croat* 58162 (MO, USM).

***Anthurium holmnielsenii* Croat, sp. nov. TYPE:**

Ecuador. Pichincha: between Pacto and Nuevo Azuay, 15.3 km N of Pacto, 1,320 m, 0°11'N, 78°04'W, *Croat* 61640 (holotype, MO 3422019; isotypes, B, K). Figures 156, 157, 159–161.

Planta epiphytica vel terrestris; internodia brevía, 1.5–3.5 cm diam.; cataphyllum lanceolatum, persistens fibris linearis; petiolus (18)24–47 cm longus, 7–12 mm diam., acutè D-formatus; lamina coriacea, oblongo-oblancoolata aut oblanceolata-elliptica, apice longo-acutè, basi angustè acutè, (50)76–98.5 cm longa, (11)13–27 cm lata; nervo collectivo e basi. Pedunculus 24–64 cm longus, 3–6 mm diam., 1.4–2-plo longioris quam petiolo; spathe 6–17.5 cm longa, 1.5–2.7 cm lata; spadix 9–20.5 cm longus, viridis, longe contractus; baccae aurantiacae, 3.5–4.7 mm longae, 2.3–2.7 mm latae.

Epiphytic, occasionally terrestrial; stem 1.5–3.5 cm diam.; leaf scars 1.5–1.7 cm high, 2.2–2.5 cm wide; roots dense, descending, pale, moderately elongate; cataphylls coriaceous, lanceolate, 17–25 cm long, narrowly acute at apex, drying light brown to tan, persisting as linear fibers at the apex of the

stem. *Leaves* spreading; petioles (18)24–47 cm long, 7–12 mm diam., sharply D-shaped and slightly thicker than broad, broadly convex to weakly ribbed medially adaxially, the margins sharply raised to winged, rounded abaxially; geniculum thicker and paler than petiole, becoming fissured transversely with age, 1–3 cm long; blades coriaceous, oblong-oblancoolata to oblanceolata-elliptic, long-acuminate at apex, narrowly acute at base, (50)76–98.5 cm long, (11)13–27 cm wide, the margins broadly undulate; upper surface matte to semiglossy, dark green, lower surface semiglossy to glossy, slightly paler; both surfaces drying concolorous, green to yellowish; midrib above prominently convex and paler than surface, below thicker than broad at base of the blade, becoming prominently convex toward the apex and paler than surface; primary lateral veins numerous, to more than 20 per side, departing midrib at 45–60° angle,  $\pm$  straight to the collective vein, moderately obscure, weakly sunken to raised above, darker than surface and weakly raised below; interprimary veins almost as conspicuous as primary lateral veins, numerous; tertiary veins obscure, raised on drying; collective vein arising from near the base, weakly sunken above, equally as prominent as primary lateral veins on drying and when fresh, 5–25 mm from margin. *Inflorescences* spreading; 24–64 cm long, 3–6 mm diam., 1.4–2(3.4)  $\times$  as long as petiole, green tinged with purple, terete; spathe erect to spreading, subcoriaceous, green, sometimes heavily tinged purplish or red, broadly lanceolate to oblong-lanceolate, 6–17.5 cm long, 1.5–2.7 cm wide, broadest near the base, acuminate at apex (the acumen inrolled), acute to obtuse at base; stipe 1–2.2 cm long in front, 1–2 mm long in back; spadix green (B & K yellow-green 5/5), also reported as brownish, long-tapered, subsessile, straight to prominently curved, 9–20.5 cm long, 6–9 mm diam. near base, 3–4 mm diam. near apex; flowers square, 2.3–2.7 mm in both directions, the sides smoothly to jaggedly sigmoid; 7–8 flowers visible in principal spiral, 4–5 in alternate spiral; tepals matte, densely and minutely papillate; lateral tepals 1.2–1.4 mm wide, the inner margins straight, the outer margins 2–4-sided; pistils slightly raised, minutely papillate, green; stigma linear, 0.4–0.5 mm long, the laterals preceding the alternates by 8–9 spirals, the 3rd stamen preceding the 4th by 1–3 spirals; filaments fleshy, translucent, somewhat flattened, 0.7–0.8 mm wide; anthers dark yellow, 0.6–0.8 mm long, 0.6–0.9 mm wide; thecae oblong-ovoid, not divaricate; pollen orange. *Infructescence* with the spathe persisting; spadix 16.8–31 cm long,