

New Species of *Anthurium* (Araceae) from Central America

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ABSTRACT

A total number of 18 new species of *Anthurium* section *Calomystrium* are described as new to science: *Anthurium alturaense* Croat, *A. brevipaniculum* Croat, *A. cascajalense* Croat, *A. churchilleorum* Croat, *A. deminutum* Croat, *A. granulineare* Croat, *A. guanghuae* Croat, *A. baltonii* Croat, *A. henryi* Croat, *A. horridum* Croat, *A. ingramii* Croat, *A. kareniae* Croat, *A. laminense* Croat, *A. lilafructum* Croat, *A. luteospathum* Croat, *A. penononense* Croat, *A. roubikii* Croat, and *A. suethompsoniae* Croat.

KEY WORDS

Anthurium, sect. *Calomystrium*, Panama, Araceae.

INTRODUCTION

Anthurium sect. *Calomystrium* was last revised for Central America by the senior author in two publications, one dealing

with *Anthurium* from Mexico and Middle America (Croat, 1983) and another dealing with *Anthurium* from Panama (Croat, 1986a). *Anthurium* sect. *Calomystrium* is characterized by usually having short and thick internodes with the cataphylls persisting reddish brown, thick and intact, petioles more or less terete, blades usually ovate-sagittate to ovate-cordate, moderately coriaceous and semiglossy at least on the lower surface with typically long-pedunculate inflorescences, thick often colorful spathes and glossy often colorful spadices with thick and glossy tepals. Other features often closely associated with *Calomystrium* are the presence of short pale-lineate upper leaf blade surfaces (sometimes the lower surfaces as well) and the presence of dark somewhat diffuse punctations on the lower surface (sometimes on the upper surface as well). Berry color is variable but most fruits are red, orange to violet-purple, sometimes lavender to purple.

In Mexico and Middle America (Croat, 1983) nine species were reported as being present in the flora, *Anthurium armenianse*

Croat, A. beltianum Standl. & L. O. Wms., *A. clavatum* Croat & R. Baker, *A. formosum* Schott, *A. boffmanii* Schott, *A. buixtlense* Matuda, *A. monteverdense* Croat & R. Baker and *A. obtusilobum* Schott. One species, *A. ravenii* Croat & Baker was mistakenly included in sect. *Calomystrium* but has been moved to sect. *Cardiolonchium*. One additional species, *A. bittneri* Grayum was subsequently described for Costa Rica (Grayum, 1992). In Panama (Croat, 1986b) an additional 13 species were included, namely: *A. chromostachyum* Croat, *A. colonense* Croat, *A. cucullispathum* Croat, *A. curvispadix* Croat, *A. foreroanum* Croat, *A. fusiforme* Croat, *A. globosum* Croat, *A. hammelii* Croat, *A. kamemotoanum* Croat, *A. roseospadix* Croat, *A. sanctifidense* Croat, *A. sapense* Croat and *A. tysonii* Croat.

In preparation for the Flora Mesoamerica treatment we are processing the many collections that have accumulated since the 1986 publication dealing with Panama and a number of the specimens are proving to be undescribed, including those described in this paper. The species were keyed out and also entered into the Lucid Anthurium Key (Haigh et al., 2009), a multi-entry data base which has registration of all known species.

***Antburium alturaense* Croat, sp. nov.**

Type: PANAMA. Darién: Pierre Massif, Alturas de Nique, above Cana gold mine, 7°45'N, 77°40'W, 1,250–1,500 m, 3 Mar 1988, *G. McPherson 12198* (holotype, MO-3611702; isotype, PMA). Figs. 1A and 1B.

The species is a member of sect. *Calomystrium* characterized by its epiphytic habit, short thick internodes, persistent intact cataphylls, terete petioles, narrowly ovate-sagittate blades which dry gray-brown above and yellowish brown below with 2 pairs of free basal veins and a very short posterior rib which is scarcely or not at all naked along its margin, a spatulate to parabolic sinus, with collective veins arising from one of the primary lateral veins as well as by the long-pedunculate inflorescence with a green lanceolate spreading

spathe and a weakly tapered yellow-green spadix.

Antburium alturaense is most similar to *A. cucullispathum* Croat, which also occurs on Cerro Pierre, by having a leaf blade of similar size and shape but that species differs by being short pale-lineate on the upper surface and in being epunctate on the lower surface. In contrast *Antburium alturaense* has blades with the upper surface lacking short pale lineations and the lower surface that is moderately dark-punctate.

Epiphyte; **internodes** short, ca. 3 cm long, 2.5 cm diam.; **cataphylls** persisting intact, 10–13 cm long, 1–1.3 cm wide, drying medium yellow-brown. LEAVES with **petioles** 40–41 cm averaging 40.5 cm long, 4 mm diam. midway, terete, drying broadly and acutely sulcate, drying medium grayish brown, weakly glossy; **geniculum** 3 cm long, darker than petiole; **blades** sagittate to weakly hastate, 39.5–48 cm averaging 43.75 long, 17–21.5 cm averaging 19.25 cm wide, widest 1.5–2 cm above petiolar plexus, narrowly long acuminate (acumen 1.5–2 cm long), 2.2–2.3 times longer than broad, 1.0–1.2 times longer than petiole, coriaceous, somewhat glossy above, glossy below, drying medium grayish brown above and pale yellow-brown below, weakly glossy above and below; **upper surface** densely minutely granular even on veins, 2 areolate-ridged, sparsely pustular; **lower surface** dark punctate, minutely granular, sparsely pustular; **anterior lobe** 35–39.5 cm averaging 37.25 cm long, margins concave then straight becoming convex near the apex; **posterior lobes** 7.5–10 cm, 6.5–9.5 cm averaging 8 cm wide; **midrib** thicker than broad above, narrowly raised below, colorous and weakly glossy above, darker and matte below; **primary lateral veins** 4(5) pairs, arising at a 42–44° angle, convex above, narrowly convex below; tertiary veins inconspicuous above, slightly raised below; **collective veins** arising from the lower most primary lateral veins 4–5 mm from margin; **basal veins** 5–6 pairs, first 2–4 free to base, the remainder coalesced to 1.3 cm with the 3rd and 4th branching at 8 mm,

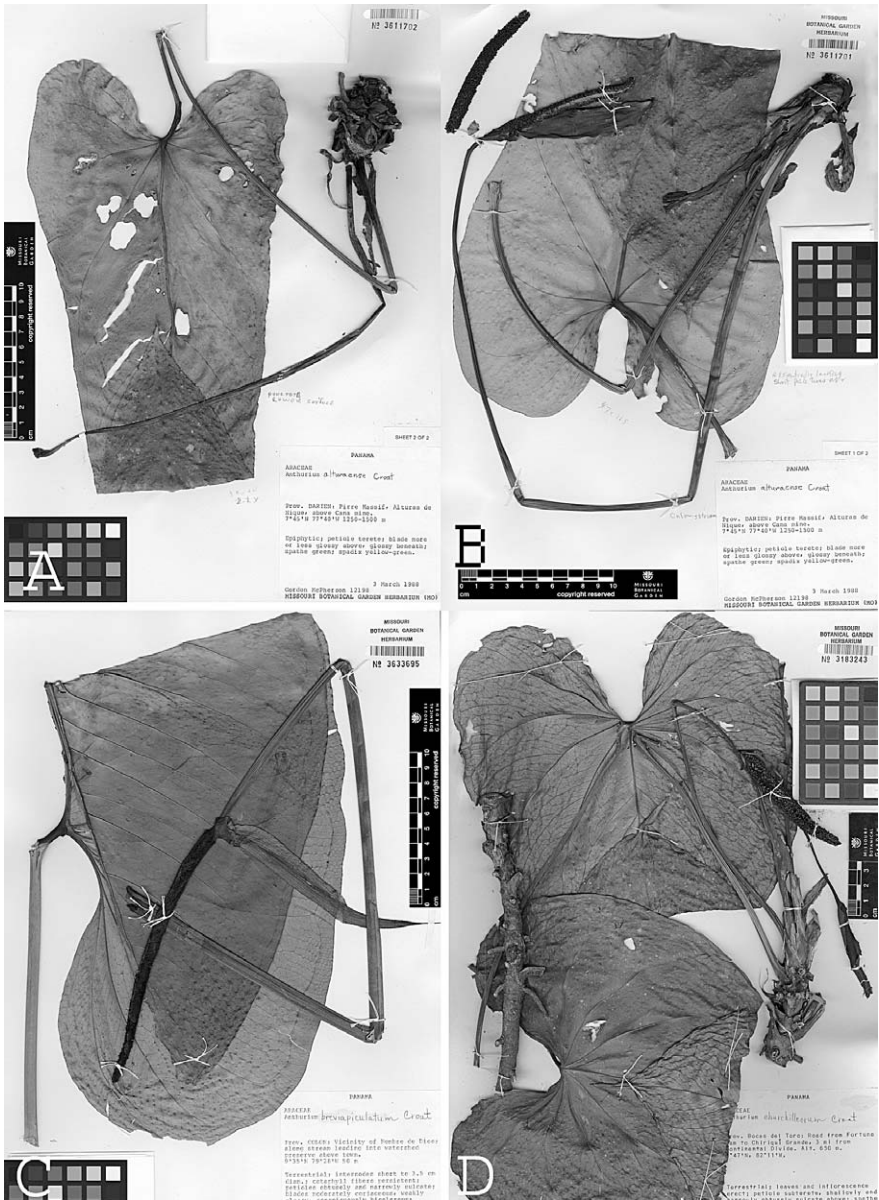


Fig. 1. A–B. *Anthurium alturaense* Croat. (McPherson 12198). A–B. Herbarium type specimens showing: A. Blade folded, apex showing adaxial surface, stem and inflorescence with spadix detached. B. Blade folded, apex showing adaxial surface; stem, petiole. C. *Anthurium brevipiculum* Croat. (Croat 67330). C. Herbarium type specimen showing blade folded, apex showing adaxial surface, stem, part of petiole; inflorescence. D. *Anthurium churchilleorum* Croat. (Churchill 6212). D. Herbarium type specimen showing blades folded, upper blade with mostly abaxial surface exposed, lower blade with mostly adaxial surface exposed; two inflorescences.

the 4th and 5th branching at 1.3 cm, and the 6th branching at 3 mm, narrowly convex to narrowly raised with a medial rib on the lower basal veins; posterior rib 1.3 cm, nowhere naked, strongly curved; sinus spatulate to parabolic, 5–8 cm deep. INFLORESCENCE erect-spreading; **peduncle** 67 cm long, 5 mm diam. midway becoming tapered near apex, broadly and obtusely sulcate, medium brown, weakly glossy, 5.8 times longer than spathe; **spathe** spreading, 11.5 cm long, 2 cm wide, oblong-lanceolate, coriaceous, green, drying medium yellow-brown; **spadix** sessile, 10.5 cm long, 8 mm diam. midway, subcylindrical tapering somewhat near apex, yellow-green, drying dark yellowish brown; **flowers** (post-anthesis), 6–9 per spiral, 2.0–2.4 mm long, 2.9–3.0 mm wide, lateral tepals 1.1–1.3 mm wide, inner margin broadly rounded, outer margin 2-sided, surface with pale cellular inclusions, stamens already withdrawn, anthers broadly divaricate, 0.5 mm long and 1.0 mm wide, thecae not present.

Anthurium alturaense is endemic to Panama, known only from the type locality on Cerro Pierre at 1,250–1,500 m in a *Premontane rain forest* life zone (Holdridge, 1971).

The species is named for the type locality on the Alturas de Nique.

***Anthurium breviapiculum* Croat, sp. nov.** Type: PANAMA. Colón: Vicinity of Nombre de Dios, along stream leading into watershed preserve above town, 9°35'N, 79°28'W, 50 m, 15 July 1987, *T. B. Croat 67330* (holotype, MO-3633695). Fig. 1C.

The species is a member of sect. *Calomystrium* characterized by its terrestrial habit, cataphylls persisting as fibers, subterete narrowly and obtusely sulcate gray-brown-drying petioles, narrowly ovate-sagittate weakly glossy blades which dry sparsely pale short-lineate and grayish yellow-brown above, minutely dark-speckled, greenish gray and moderately paler below, with a spatulate to closed sinus, 7–8 pairs of basal veins, one pair free to the base, an almost straight posterior rib which

is naked nearly throughout its length, 9–10 pairs of primary lateral veins, collective veins arising from the 4th pair of basal veins and broadly loop-connected and 1–1.8 cm from the margin as well as by the long-pedunculate inflorescence, green spreading-curved spathe and the long-tapered golden-yellow spadix.

The species was initially confused with *Anthurium ochranthum* K. Koch owing to its terrestrial habit and bright golden-yellow long-tapered spadix but that species differs by having leaf blades drying much greener, having longer and narrower posterior lobes which are often directed somewhat outward, having the collective veins arising from the uppermost pair of basal veins (or rarely from the 2nd pair of basal veins) or one of the lower primary lateral veins and course usually much closer to the margins.

In the *Lucid Anthurium Key* *A. breviapiculum* tracks to *A. colonense* Croat which differs by having a greenish spadix and by having blades which dry blackened, and *A. sanctifidense* Croat which differs by having blades with the collective veins arising from the first pair of basal veins or one of the primary lateral veins and extending close to the margin as well as by the greenish white spadix.

Terrestrial; **internodes** short, to 3.5 cm diam.; **cataphylls** persisting intact at upper nodes, persisting as fibers otherwise; **petioles** 70 cm long, obtusely and narrowly sulcate; **blades** narrowly ovate-sagittate, 56.5 cm long, 37.5 cm wide, 1.5 times longer than wide, 0.8 times as long as petioles, rounded at apex with a short apiculum, deeply lobed at base, moderately coriaceous, weakly glossy on both surfaces, moderately bicolorous; **anterior lobe** 37.8 cm long, broadly convex along margins; **posterior lobes** 23.3 cm long, 15.8 cm wide, broadly rounded, sometimes overlapping; **basal veins** 8 pairs, 1st pair free to the base, 2nd pair fused to 1.5 cm, 3rd pair fused 2.5 cm, 5th and higher pairs fused to ca. 5 cm; posterior rib weakly curved, to ca. 5.4 cm long, naked throughout most of its length; sinus narrowly spatulate, 20.3 cm long, 4.4 cm wide; **midrib**

narrowly rounded and concolorous above, narrowly round-raised and drying darker below with a subacute medial rib; **primary lateral veins** 10–11 pairs, arising at a 47–55° angle from midrib, drying prominently raised and narrowly rounded on both surfaces, concolorous above, darker below; **tertiary veins** drying narrowly rounded, densely pale-lineate below; **collective veins** arising from the 5th or 6th pair of basal veins, prominently loop-connecting the primary lateral veins, 1–2.3 cm from margins; **upper surface** moderately smooth, sparsely short-pale-lineate; **lower surface** densely dark-speckled. INFLORESCENCE erect; **peduncle** 59 cm long, 1 cm diam., drying grayish brown; **spathe** 17 cm long, 2 cm wide, green, spreading-recurved, narrowly oblong-lanceolate, narrowly long attenuate, drying greenish brown, sparsely pale-short-lineate, inserted at a 45° angle; **spadix** golden-yellow at anthesis, long-tapered, 19 cm long, 1 cm diam., drying dark brown; **flowers** 10–13 visible per spiral, 2.2–2.3 mm long, 1.6–2 mm wide; **tepals** drying smooth, lateral tepals 1.4–1.6 mm wide, inner margins broadly rounded, outer margin broadly 2-sided, stamens not seen

Anthurium breviapiculum is endemic to Panama, known only from the type locality in Colón Province at 50 m elevation in a *Premontane wet forest* life zone.

The species epithet is “breviapiculum” comes from the Latin “brevi” (meaning short) and “apiculum” (meaning a short protruding point).

***Anthurium cascajalense* Croat, sp. nov.**

Type: PANAMA. Colón: Disturbed swamp forest between Portobello and Río Cascajal (vicinity of Nuevo Tonosi), 09°33'N, 79°37'W, 50 m, 22 Mar 1976, *T. B. Croat 33654* (holotype, MO-04993794-95; isotype, PMA). Figs. 2A and 2B.

The species is a member of sect. *Calomystrium* characterized by its epiphytic habit, short internodes, thick reddish brown cataphylls persisting intact, terete petioles, narrowly sulcate geniculum, nar-

rowly ovate-sagittate grayish drying blades with spatulate sinus, 8–9 basal veins with the first two pairs free to the base, collective veins arising from the 1st pair of basal veins and situated about 1 cm from the margin, as well as by the long-pedunculate inflorescence, long green spathe narrowly long attenuate at its apex, and its long-tapered somewhat glaucous spadix with about 10 flowers per spiral.

Anthurium cascajalense resembles *Anthurium suetbompsoniae*, described in this paper, but differs by having leaves that are semiglossy with conspicuous pale short lineations and darker granulations on the upper surface, a conspicuously granular lower surface, 9 pairs of basal veins, a long cylindroid-tapered glaucous spadix, 2-sided lateral tepals, long tapered spathe, and a petiole that is not narrowly obtusely sulcate adaxially,

Epiphytic; **cataphylls** turning brown, remaining intact. LEAVES with **petioles** 66 cm long, 0.8 cm wide, terete, broadly sulcate with obtuse margins becoming ribbed toward apex, solid green, drying light yellow-brown, pulvinus narrowly canaliculate; **geniculum** 3.5 cm long, darker than petiole; blade ovate-sagittate, 63.5–67 cm long, 36–40 cm wide, widest at petiolar plexus, apex attenuate, 1.7 times longer than broad, 1 time as long as petiole, subcoriaceous, dark green and semiglossy above, paler and semiglossy below, drying light grey-brown, concolorous to somewhat darker above than below; **upper surface** minutely granular, dense short pale lineations; **lower surface** minutely granular, densely dark speckled; **anterior lobe** 49–50.5 cm long, margins broadly convex; **posterior lobes** 18–19.5 cm long, 14.5–16.5 cm wide; **midrib** narrowly raised above, prominently narrowly rounded with medial rib below; **primary lateral veins** 6–7 pairs, arising at a 50–59° angle, raised above and below; **tertiary veins** raised and concolorous above, raised and darker below; **collective veins** arising from 1st **basal veins**, 8–12 mm from margin; anti-marginal vein present; **basal veins** 8–9 pairs, 2(–3) free to base, bluntly acute to narrowly raised; posterior rib strongly

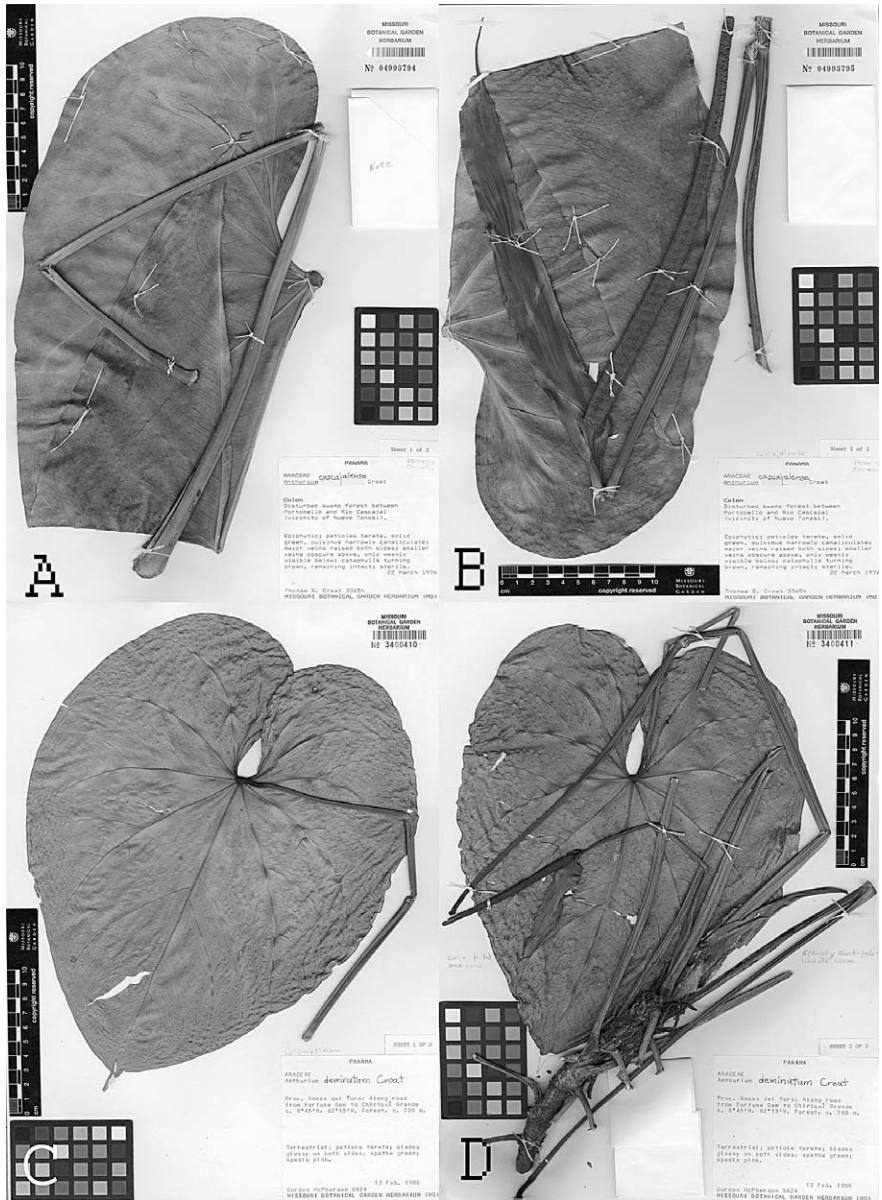


Fig. 2. A–B. *Anthurium cascajalense* Croat. (Croat 33654). A–B. Herbarium type specimens showing: A. Blade folded, apex showing adaxial surface, stem, petiole, entire petiole. B. Blade folded, apex showing adaxial surface; entire inflorescence. C–D. *Anthurium deminutum* Croat. (McPherson 8424). C. Blade showing abaxial surface. D. Herbarium type specimen showing blade folded, apex showing adaxial surface; stem, petiole & inflorescence.

curved, 4–4.5 cm long, entirely naked; sinus spatulate, 15–16 cm deep. INFLORESCENCE erect; **peduncle** 60.5 cm long, 0.6 cm wide, D-shaped and deeply ribbed, drying light yellow-brown, matte, 2.0 times longer than spathe; **spathe** 29.5 cm long, 3.5 cm wide, erect-spreading, yellow-brown, linear lanceolate with caudate apex (5 cm long), conspicuously granular surface, coriaceous; **spadix** sessile, cylindroid-tapered, 30 cm long, 1.2 cm wide measured midway, weakly glossy, glaucous; **flowers** 10–12 per spiral, 2.5–3 mm long, 2.5–3 mm wide; **lateral tepals** inner margin straight, outer margin 2-sided, stigma circular.

The species is endemic to Panama, known only from the type locality in Colón Province at about 50 m in a *Tropical wet forest* life zone.

This species is named for the type locality near the Río Cascajal in Colón Province.

Antburium churchilleorum Croat, **sp. nov.** Type: PANAMA. Bocas del Toro: Road from Fortuna Dam, 6.6 km from Continental Divide, 8°47'N, 82°11'W, 650 m, 22 Sep 1984, *H. W. Churchill & A. Churchill 6212* (holotype, MO-3183243). Fig. 1D.

The species is a member of sect. *Calomystrium* characterized by its terrestrial habit, internodes thicker than broad at the apex (longer toward the base), persistent intact cataphylls, subterete shallowly, narrowly and obtusely sulcate petioles, broadly ovate-sagittate, brownish drying, narrowly long-acuminate blades with 3 pairs of basal veins free to the base with the upper surface densely granular and with both surfaces inconspicuously short pale-lineate as well as by the long-pedunculate, green ovate-lanceolate spathe and the and the maroon, cylindroid-tapered spadix.

Antburium churchilleorum is closely related to two species, *A. henryi* and *A. kareniae*, both described in this paper. Both of these species differ in having blades drying more pale yellow-brown, not dark brown as in *Antburium church-*

illeorum, and by having very short acumens as well as greenish or pink spadices. Another similar species, *Antburium roseospadix* Croat differs by having a much less broadly ovate-cordate leaf shape with a broader sinus, having irregular stellate cellular inclusions on the upper surface of younger blades, and less darkly drying blades.

Terrestrial; stem woody, erect, moderately slender; **internodes** short, 1.5–2 cm diam.; **cataphylls** 13.5 cm long, subcoriaceous, intact at upper nodes. LEAVES with **petioles** 20.5–25.5 cm long, subterete, deeply ribbed; **geniculum** 2 cm long, darker than petioles; **blades** broadly ovate-sagittate, 29 cm long, 22.5 cm wide, widest at petiolar plexus, abruptly caudate-acuminate (acumen 2.5–3 cm long), 1.3 times longer than wide, about as long as petiole, subcoriaceous, dark green and matte above, slightly lighter green and semiglossy below, drying to medium brown above and paler yellow-brown below; **upper surface** minutely yet conspicuously coarsely granular, minutely reddish speckled and densely short-pale-lineate; **lower surface** less conspicuously granular, short-pale-lineate, dark dotted (dots with pale convex center encircled with narrow purplish ring), weakly reddish brown speckled on veins; **anterior lobe** 21.5–22.5 cm long, margins broadly convex; **posterior lobes** 9–10 cm long, 9–10 cm wide, narrowly rounded, directed downward; **midrib** narrowly rounded and concolorous above, acutely raised and dark brown below; **primary lateral veins** 5–6 pairs, arising at a 55° angle, narrowly rounded above, acutely raised below; **tertiary veins** slightly and narrowly raised above and below; **basal veins** (5–)6 pairs, 2 pair free to the base, 3rd pair almost free to base; 4th pair fused ca. 1 cm; posterior rib 1.0 cm long, naked 4–5 mm; sinus parabolic, 7 cm deep. INFLORESCENCE erect-spreading; **peduncle** 23.5 cm long, 3 mm wide, drying dark brown, 2.8 times longer than spathe; **spathe** lanceolate, 8.5 cm long, 1.9 cm wide, green, drying dark reddish brown; **spadix** sessile, 7.5 cm long, 0.5 cm wide, cylindroid-tapered, maroon,

drying dark brown; **flowers** 9 visible per spiral, 1.1–1.5 mm long, 1.1–1.2 mm wide, lateral tepals 0.8–0.9 mm, inner margin broadly rounded sometimes acute, outer margin 3-sided, surface minutely granular, stigma and stamens not present in specimen examined INFRUCTESCENCE 8.7 cm long, 1.4 cm diam. with **berries** slightly emergent.

Anthurium churchilleorum is endemic to Panama, known only from the type locality in Chiriquí Province at 650 m in a *Premontane rain forest* life zone.

The species is named in honor of the late Hugh W. Churchill and his wife Audrey Churchill who collected the type specimen. Hugh worked for the Flora of Panama Project and did general collecting during 1984. The Churchill married couple concentrated much of their efforts in the Fortuna Dam area and were rewarded with the discovery of many new species in this rich and then poorly explored region.

***Anthurium deminutum* Croat, sp. nov.**

Type: PANAMA. Bocas del Toro: Along road from Fortuna Dam to Chiriquí Grande, ca. 8°45'N, 82°15'W, ca. 700 m, 12 Feb 1986, *G. McPherson 8424* (holotype, MO-3400411; isotype, PMA). Figs. 2C and 2D.

The species is a member of sect. *Calomystrium* characterized by its terrestrial habit, short internodes, persistent intact cataphylls, terete petioles, narrowly ovate-sagittate, grayish yellow-brown drying blades with a closed sinus, two pair of basal veins and with the collective veins arising from the 1st or 2nd pair of basal veins, sparsely short-pale-lineate on upper surface and densely and weakly dark-punctate on the lower surface as well as by the green lanceolate erect-spreading spathe and pink tapered spadix.

Anthurium deminutum keys in the Lucid Anthurium Key to *A. cucullispathum* Croat but that species differs in having narrower leaf blades, a proportionately broader spathe, more frequently hooding spadix and a white spadix that is tapered

weakly toward both ends (not tapered toward the apex and pink as in *A. deminutum*).

Terrestrial; **internodes** short, ca. 1 cm long, 1.5 cm diam.; **cataphylls** persisting intact, 11–14.5 cm long, 1.5 cm wide, drying light grayish brown. LEAVES with **petioles** 41.5–55 cm long, 4–5 mm diam. midway, terete, drying obtusely and narrowly sulcate, drying yellowish brown, becoming darker nearer the apex, matte; **geniculum** 1.5–2 cm long, conspicuously darker than petiole; **blades** ovate-sagittate with posterior lobes overlapping, 32–34 cm long, 22.5–25 cm wide, widest 1 cm below petiolar plexus, abruptly acuminate (acumen 1.5 cm long), 1.4 longer than wide, 0.7 as long as petiole, subcoriaceous, glossy above and below, drying bicolorous, pale grayish yellow-brown, weakly glossy above, semiglossy below; **upper surface** sparsely short-pale-lineate; **lower surface** densely and weakly dark-punctate; **anterior lobe** 21.5–23 cm long, margin convex; **posterior lobes** 10.5–11.5 cm long, 10.5–11 cm wide; **midrib** (not observed above), narrowly convex, medium yellow-brown, matte; **primary lateral veins** 3–4 pairs, arising at a 43–60° angle, narrowly rounded; **tertiary veins** concolorous and raised below; **collective veins** arising from 3rd pair of basal veins and loop-connected to 4th–(5th) pairs of basal veins, 2–4 mm from margin, sometimes joining the margin very near the apex; **basal veins** 6 pairs, first 2 (–3) pairs free to base, the remainder coalesced 1.5–2 cm, 4th pair branching off at 1 cm, the remainder branching at 1.5–2 cm, narrowly convex to thicker than broad; posterior ribs 1.5–2 cm long, naked to 0.75 cm, weakly curved; sinus closed, narrowly obovate. INFLORESCENCE erect; **peduncle** 19.5 cm long, 3 mm diam. midway, significantly shorter than petioles, narrowly and acutely sulcate, tapering toward apex, medium yellow-brown, 2.3 times longer than spathe; **spathe** 8.5 cm long, 1.8 cm wide, narrowly lanceolate, subcoriaceous, erect-spreading, green, drying to yellow-brown; **spadix** sessile, 10 cm long, 5 mm diam. midway, tapered, pink, drying to dark brown; **flowers** 6–7 per

spiral, 2.0–2.4 mm long, 1.7–1.9 mm wide; **tepals** 1.2–1.3 mm wide, inner margin broadly rounded. outer margin 2- sometimes 3-sided, surface conspicuously granular and sparsely pustular (pustules large and mound-shaped, number varies from tepal to tepal); stamens not yet emergent.

Anthurium deminutum is known only from the type locality in Panama at 700 m in a *Lower montane rain forest* life zone.

The species epithet “deminutum” from the Latin “deminutus” meaning diminished or reduced referring to the spadix which is diminished in width, or tapered toward the apex.

***Anthurium granulineare* Croat, sp. nov.**

Type: PANAMA. Bocas del Toro: Road to Chiriquí Grande, north of Fortuna Dam, 08°45'N, 82°45'W, 650–700 m, 29 June 1987, *G. McPherson 11115A* (holotype, MO-3474598). Figs. 3A and 3B.

The species is a member of sect. *Calomystrium* characterized by its persistent erect cataphylls, terete petioles, broadly ovate yellow-brown-drying blades with a spatulate sinus, 7–8 pairs of basal veins two pairs of which are free to the base and collective veins arising from the 3rd or 4th pair of basal veins, upper blade surfaces which are both conspicuously granular and short-pale-lineate on the upper surface as well as by the long-pedunculate inflorescence with a green lanceolate spreading spathe and the moderately long-tapered pink to pale yellow spadix.

In the Lucid Anthurium Key *A. granulineare* keys out to *A. colonense* Croat differing in having blades which dry blackened and with the collective veins arising from the primary lateral veins; *A. cucullispathum* Croat differing in having narrowly ovate to ovate-triangular blades (more than 2 times longer than broad), a hooding spathe and creamy white spadix; *A. darcyi* Croat, differing in having prominently ribbed petioles; *A. obtusilobum* Schott, differing by having more narrowly ovate, often more grayish drying blades with a less conspicuously granular upper

surface, much more prominently pale lineations with the pale lineations being over twice as long as those of *A. granulineare* as well as by having a short-cylindroid spadix; *A. sanctifidense* Croat differing in having typically more coriaceous blades with the upper surface more conspicuously granular, only weakly short pale-lineate and the lower surface lacking dark punctations but possessing conspicuous pustules as well as by having a greenish white cylindroid inflorescence. The species is also similar to *Anthurium hoffmannii* Schott but differs by having the collective veins arising from the 1st or 2nd pair of basal veins.

Epiphytic or terrestrial; stem woody, erect; **internodes** 0.5–1.0 cm diam.; **cataphylls** 14–17.2 cm long, 1.2–2.2 cm wide, persisting at upper nodes, coriaceous. LEAVES with petioles 43–63 cm long, 0.4–0.5 cm wide, terete; **geniculum** 2.5–3 cm long, significantly darker than petiole; **blades** ovate-cordate, 31–35 cm long, 25.5–26.5 cm wide, averaging 33 × 26.0 cm, widest ca. 2 cm above petiolar plexus, abruptly acuminate (acumen 1.3 cm long), 1.3 times longer than broad, 0.6 times as long as petiole, matte to weakly glossy and medium green above, semi-glossy and pale green below, drying yellow-brown; **upper surface** conspicuously and minutely granular, densely pale lineate; **lower surface** sparsely and weakly short pale lineate, weakly dark granular; **anterior lobe** 21–23.5 cm long, margins broadly convex; **posterior lobes** 10.5–11.5 cm long, 10–11.5 cm wide; **midrib** round-raised with medial rib and with short pale lineations above, narrowly rounded and densely and minutely granular below, drying darker above and below; **primary lateral veins** 5–6 pairs, rising at a 33–49° angle, convex above, narrowly convex below with pale lineations; **tertiary veins** inconspicuous above, raised and darker below; **collective veins** arising from the fourth basal veins, 1.5–3 mm from margin; antimarginal veins present; **basal veins** 6–7 pairs, first 2(–3) free to base, the remainder coalesced to 1.5 cm, branching off at regular intervals; posterior rib 3 cm

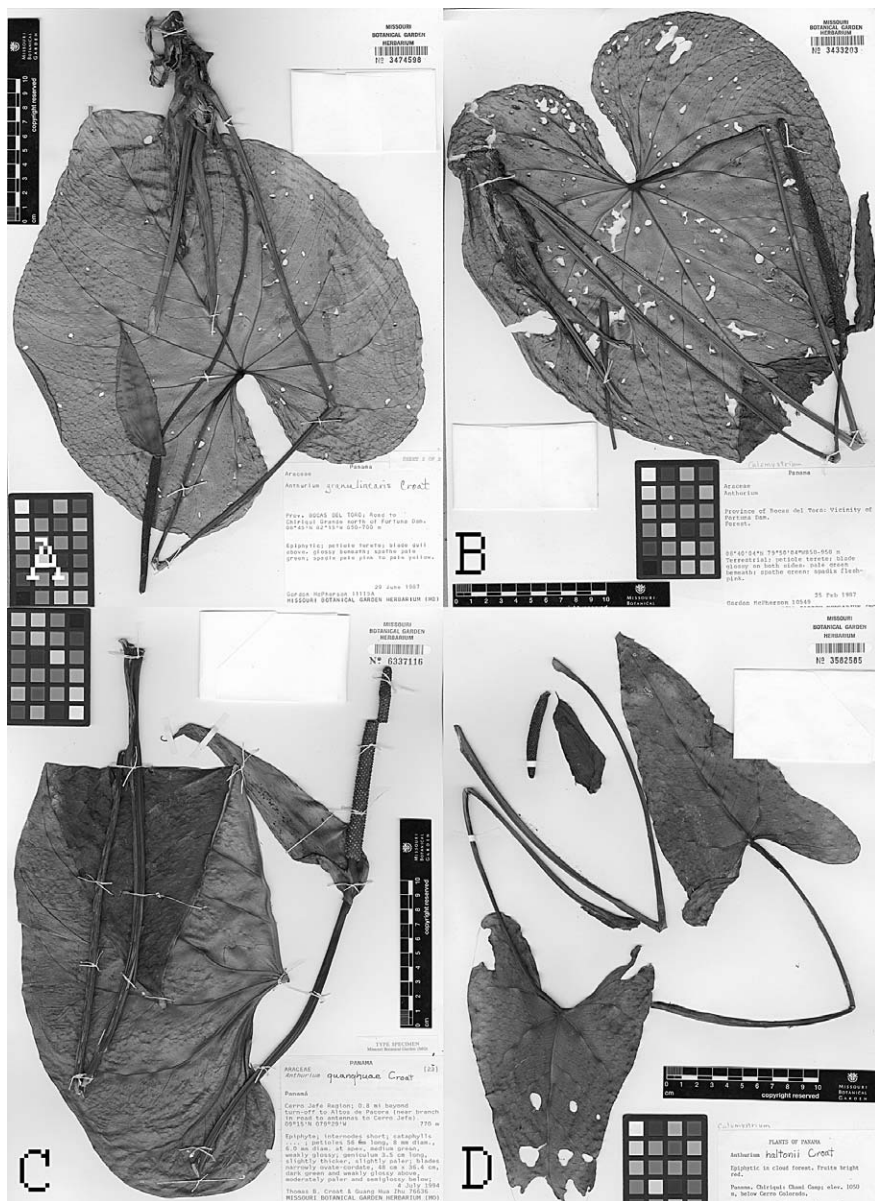


Fig. 3. A–B. *Anthurium granululare* Croat. (McPherson 1115A). A. Herbarium type specimen. A. Blade showing abaxial surface, petiole, stem & inflorescence. B. Herbarium specimen (McPherson 10549). B. Blade folded showing adaxial surface, stem, petiole & inflorescence. C. *Anthurium guangbuae* Croat. (Croat 76636). C. Herbarium type specimen showing blade folded, apex showing adaxial surface, petiole & inflorescence. D. *Anthurium haltonii* Croat. (Kress 86-1919). D. Herbarium type specimen showing two leaf blades, both showing all or mostly abaxial surfaces; inflorescence with spathe & spadix detached.

long, naked to 1 cm, weakly curved, ribbed; sinus spatulate to spathulate, 9–10 cm deep. INFLORESCENCE erect-spreading; **peduncle** 21–37.5 cm long, 3–5 mm wide, 2.7 times longer than spathe; **spathe** lanceolate, 10–11.5 cm long, 1.5–2.7 cm wide, pale green, drying reddish brown; **spadix** cylindroid to tapered, 9.5–15 cm long, 6–7 mm diam., pale pink to pale yellow, drying dark reddish brown; **flowers** 7–8 visible per spiral, 2.7–2.9 mm long, 2.2–2.7 mm wide; **lateral tepals** 1.4–1.6 mm wide; inner margin broadly rounded; outer margin 2-sided, weakly pustular; stamens 0.6 mm long, 1.2 mm wide and held in a tight cluster around stigma at the level of the tepals, thecae parallel to slightly divaricate.

Antburium granulineare is endemic to Panama, known only from the type locality in Bocas del Toro Province at 700–850 m elevation in a *Premontane rain forest* or *Tropical wet forest* life zone.

The species epithet *granulineare* comes from the Latin “granularis” meaning granular and “linearis” meaning linear referring to the presence of both granules and short pale lines on the upper blade surfaces.

Paratype: PANAMA. **Bocas del Toro**: vic. of Fortuna Dam, 08°40′04″N, 79°50′04″W, 850–950 m, 25 Feb. 1987, *Gordon McPherson 10549* (MO).

Antburium guanghuae Croat, **sp. nov.**

Type: PANAMA. Panama: Cerro Jefe Region, 0.8 mi beyond turn off to Altos de Pacora (near branch in road to the antennas on the peak of Cerro Jefe), 09°15′N, 79°29′W, 770 m, *T. B. Croat & G. H. Zhu 76636* (holotype, MO-6337116; isotypes, AAU, B, CAS, COL, CUVC, DUKE, F, G, GB, GH, HUA, IMB, K, M, MEXU, NY, PMA, QCNE, S, SEL, TEX, US, W). Fig. 3D.

The species is a member of sect. *Calomystrium* characterized by its epiphytic habit, short internodes, persistent intact cataphylls, terete petioles, ovate-sagittate weakly acuminate blades with the collective veins arising from one of the primary lateral veins in the middle of the anterior

lobe as well as by the green spreading spathe and the short-tapered pale green stipitate spadix with turns purplish in age.

In the *Antburium* of Panama treatment (Croat, 1986b), *A. guanghuae* keys to *A. fusiforme* Croat which differs in having the spadix fusiform and proportionately shorter. In the Lucid Anthurium Key the species keys to *A. cucullispathum* but that species differs in having proportionately much longer blades and a spathe that is hooding the spadix and a spadix that is shorter and more stubby, tapering toward both ends.

Epiphyte; **internodes** short; **cataphylls** persisting, intact, coriaceous, short ca. 11 cm, medium green, drying medium yellowish brown. LEAVES with petioles 50.0–58.8 cm long, subterete, weakly sulcate, 8–10 mm diam., 6 cm diam. at apex, medium green and weakly glossy, drying medium yellowish brown and weakly glossy; **geniculum** 3.5 cm long, slightly thicker and slightly paler than petiole; **blades** narrowly ovate-cordate, 44.8 cm long, 25.1 cm wide, widest at petiolar plexus, acuminate (acumen ca. 1.5 cm with aciculum), 2.1 times longer than broad, 0.8 times as long as petiole, subcoriaceous, dark green and weakly glossy above, moderately paler and semiglossy below, drying medium brown above and pale greenish brown below, weakly glossy above and glossy below; **upper surface** light-brown punctate, densely short pale-lineate, moderately granular; **lower surface** light brown punctate, moderately granular; **anterior lobe** 29.2–38.2 cm long, 28.4–30.4 cm wide, margins broadly convex; **posterior lobes** 16.5 cm long, 13 cm wide, turned inward; **midrib** convex becoming narrowly rounded toward apex and concolorous above, narrowly convex and medium yellow-brown below; **primary lateral veins** 4–5 pairs, arising at a 45–52° angle, some in sunken valleys above, narrowly rounded above and narrowly convex below; **tertiary veins** flattened and slightly darker below, drying inconspicuous above, concolorous and somewhat raised below; **collective veins** not present (primary lateral veins margin out for entire length of blade); **basal veins** 6

pairs, 1st & 2nd pair free to base, the 3rd pair branching at 2 cm, the remainder coalesced to 4 cm and branching off simultaneously at 4 cm, narrowly rounded to bluntly acute; posterior rib 4 cm long, naked to 3 cm, arcuate; sinus spatulate, 11.2–14.2 cm deep, 11.2–14.2 cm wide. INFLORESCENCE with **peduncle** 22–33.4 cm long, 8 mm diam., drying 6 mm diam., medium yellowish brown; **spathe** erect, 17.5 cm long, 4 cm wide, green, linear-lanceolate, green turning yellow post-anthesis, drying reddish brown, spreading; **spadix** stipitate 1 cm, cylindroid-tapered, pale green, turning faintly purplish violet, drying medium red-brown, 16 cm long, 1.3 cm diam. at base, 1.2 cm diam. at middle, 6 mm diam. at 1 cm from apex; **flowers** 7–8 visible per spiral, 2.8–3 mm long, 2.5 mm wide; lateral tepals 1.8–2.1 mm wide, inner margin usually broadly rounded sometimes narrowly rounded or bluntly acute, outer margin 2-sided, stamens weakly emergent, thecae parallel and not entirely exposed (upon drying).

Anthurium guanghuae is endemic to Panama, known only from the type locality in Panama Province in the Cerro Jefe region in a *Premontane wet forest* life zone.

The species is named in honor of my former Ph.D. student, the late Guanghua Zhu, who revised the genus *Dracontium* and later worked at the Missouri Botanical Garden where he coordinated work on the Flora of China Project. Guanghu continued to work on the Flora of China project at the Missouri Botanical Garden after he received his Ph.D. at the University of Missouri. There, he was responsible for most of the interaction with Chinese authors and spent much of his time traveling in China. He was a dear friend, and it is indeed an honor to name this species after him.

***Anthurium haltonii* Croat, sp. nov.**

Type: PANAMA. Chiriquí: Chami Camp, below Cerro Colorado; ca. 8°34'N, 81°56'W, 1,050 m, 19 June 1986, W. J. Kress, H. Luther, L. Besse & J. Halton 86-1919 (holotype, MO-3582585). Fig. 3D.

The species is a member of sect. *Calomystrium* characterized by its epiphytic habit, persistent intact cataphylls, long-petiolate leaves, small sub-triangular sagittate-subhastate brown-drying moderately coriaceous blades with slender narrowly pointed lobes, a parabolic sinus and a single pair of free basal veins as well as the long-pedunculate inflorescence, the narrowly ovate “green” spathe and the red spadix. In the Lucid Anthurium Key the species keys to *A. obtusilobum* Schott which differs in always having the anterior lobes convex, up to 8 basal veins with 3–4 of them fused, and with the collective veins arising from one of the lowermost basal veins and also *Anthurium hoffmannii* Schott which also has a convex anterior lobe, 4–7 pairs of basal veins with 3–4 fused.

Epiphytic; stem erect; **internodes** short; **cataphylls** persistent, coriaceous. LEAVES with **petioles** 31.5 cm long, 1.3 times longer than blades, drying 3–4 mm diam., narrowly sulcate above, matte; **geniculum** 2–2.5 cm long, concolorous to slightly darker than petiole; **blades** sub-triangular, sagittate-subhastate, 22.8 cm long, 12.2 cm wide, 1.8 times longer than broad, 0.7 times as long as petiole, broadest across the posterior lobes or at the petiolar plexus, conspicuously triangular, narrowly ovate-cordate, very narrowly acuminate at apex, prominently lobed at base, coriaceous, dark green and matte above and below, drying red-brown; **upper surface**; conspicuously areolate-ridged, conspicuously pale short-lineate; **lower surface** moderately smooth but minutely granular; **anterior lobe** 17.4 cm long, broadest at petiolar plexus, margins slightly broadly concave to broadly convex or almost straight; **posterior lobes** 7–8 cm long, 3.4–4.5 cm wide; **midrib** narrowly raised above, prominently and acutely raised below; **primary lateral veins** 6–7 pairs, arising at a 54° angle, drying slightly raised above, narrowly raised and granular below; **tertiary veins** drying slightly raised when dry; **collective veins** arising from the first pair of basal veins, or from primary lateral veins in the lower half of the blades, rather

prominently loop-connected, 3–4 mm from margin; **basal veins** 4 pairs, 1st pair free to base, 2nd pair fused to 1 cm, 3rd pair fused 2.1–2.5 cm; posterior ribs 2.0–2.5 cm long, naked 1.0–1.7 cm; sinus parabolic, 4.5–4.7 cm deep, 4–4.5 cm wide. INFLORESCENCE erect-spreading; **peduncle** 37.4 cm long, drying 4 mm diam.; **spathe** erect, 7.3 cm long, 2.4 cm wide, narrowly ovate-lanceolate, drying darker red-brown; **spadix** stipitate 5 mm, 6 cm long, 7 mm diam., cylindrical-tapered, weakly curved, drying medium brown; **flowers** 8–9 visible in the principle spiral, 12–14 flowers visible in the alternate spiral, 1.8–2.0 mm long, 1.9 mm wide; lateral tepals 0.8 mm wide, conspicuously granular; outer margin prominently 3-sided; inner margin almost straight; stamens held in tight cluster around style, anthers 0.3–0.4 mm long, 0.4–0.6 mm wide; thecae ovoid, moderately divaricate. INFRACTESCENCE with bright red **berries**.

Anthurium haltonii is endemic to Panama, known only from the Province of Chiriquí at 1,050 m elevation in a *Premontane rain forest* life zone.

The species is named in honor of the late Mr. Joe Halton, a horticulturist formerly employed at the Marie Selby Botanical Garden in Sarasota, Florida. In his job as a horticulturist at Selby, Joe was responsible for designing Selby Garden's Display House and for finding plants appropriate for the collection. He was a member of a team of collectors from Sarasota, all associated with the Selby Botanical Gardens, who made explorative trips to Ecuador and Panama, including the trip where this species was collected. Libby Besse described him as her favorite collecting partner and they shared many adventures and hardships together. Unfortunately Joe Halton died in 1989 at his home in Florida.

Anthurium henryi Croat, **sp. nov.** Type: PANAMA. Bocas del Toro: Oleoducto Road, near Continental Divide, Fortuna Dam area, 8°48'N, 82°12'W, 1,000 m, 5 Feb 1984, *H. W. Churchill, G. de Nevers & H. Stockwell 4643* (holotype, MO-3202027). Fig. 4A.

The species is a member of sect. *Calomystrium* characterized by its terrestrial habit, short internodes, persistent intact brownish cataphylls, terete petioles, ovate-cordate-sagittate brownish drying blades with up to three basal veins free to the base, a short posterior rib less than 1 cm long with the lower surface densely dark-punctate, conspicuously granular and sparsely short pale-lineate and with the upper surface conspicuously short pale-lineate. Also characteristic is the long-pedunculate inflorescence with a green oblong-lanceolate spathe and a short-tapered pink spadix.

The species is closest to another new species, *Anthurium kareniae* Croat, also published in this paper. That species differs in having blades with fewer free basal veins, more primary lateral veins, more prominent posterior ribs, a closed sinus and the lower blade surface which lacks the conspicuous dark granules and has few if any short-pale lineations on the upper surface. The species keys to *Anthurium roseospadix* Croat in the Lucid Anthurium Key but that species has more coriaceous blades with collective veins arising from one of the lower basal veins which is more remote from the margin and has a reddish violet spadix.

Terrestrial; stem woody, erect; **internodes** 2.5 cm diam.; **cataphylls** persistent, medium yellow-brown, 8–13.0 cm long, coriaceous. LEAVES with **petioles** 44.5 cm long, drying 5 mm diam. midway, subterete, obtusely and broadly sulcate becoming ribbed lower down, drying dark yellowish brown, matte; **geniculum** 1.5 cm long, moderately darker than petiole; **blades** ovate-sagittate, 31.5 cm long, 24 cm wide, widest at petiolar plexus, abruptly acuminate (acumen 1.5 cm long), 1.3 times longer than broad, 0.7 times as long as petiole, subcoriaceous, drying somewhat dark yellow-brown and weakly glossy above and paler yellow-brown and semiglossy below; **upper surface** densely pale short-lineate, densely granular; **lower surface** dark-dotted, minutely granular, sparsely short-pale lineate (these longer than on upper surface); **anterior lobe** 22.5 cm long, margins broadly

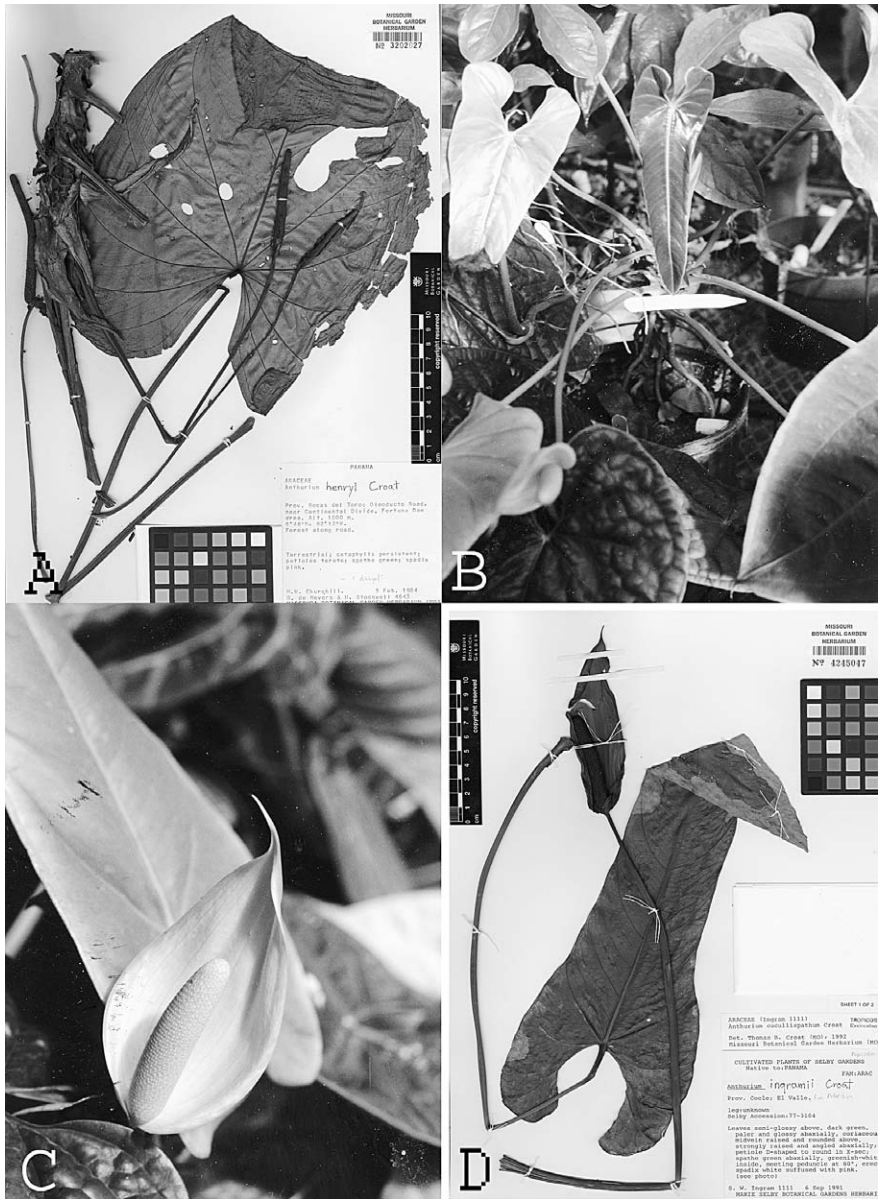


Fig. 4. A. *Anthurium henryi* Croat. (Churchill 4643). A. Herbarium type specimen showing blade folded, apex showing adaxial surface; inflorescence. B–D. *Anthurium ingramii* Croat. (Ingram 1111). B. Habit of potted plant. C. Inflorescence, close-up (face view). D. Herbarium type specimen showing blade folded, apex showing adaxial surface; stem, petiole & inflorescence.

convex; posterior lobe 11 cm long, 11 cm wide; **midrib** narrowly convex above, narrowly rounded with a medial rib and with pale lineations below; **primary lateral veins**

5 pairs, arising at a 37–40° angle, slightly rounded above and below; **tertiary veins** inconspicuous above, somewhat raised and concolorous below; **collective veins** arising

from the 2nd pair of basal veins, 1–2 mm from margin; **basal veins** 6(7) pairs, first 3 pairs free to base, the remainder coalesced to 1 cm with the 4th pair branching off at 0.5 cm and 5th and 6th branching at 1 cm, with pale lineations below; posterior rib 1 cm long, naked 6 mm, strongly curved becoming straight away from petiolar plexus; sinus parabolic, 8.5 cm deep. INFLORESCENCE erect-spreading; **peduncle** 19–33 cm long, 2–3 mm diam. midway, 3.7 times longer than spathe; **spathe** oblong-lanceolate, 7 cm long, 1 cm wide, green, drying reddish brown, spadix sessile, cylindroid-tapered, 6.5–9 cm long, 6 mm diam., pink, drying reddish brown; **flowers** 7–8 per spiral, 1.9–2.2 mm long, 1.7–2.3 mm wide, lateral tepals 1.2–1.4 mm wide, outer margin mostly 3-sided, inner margin mostly rounded sometimes bluntly angular, surface of tepal minutely granular (younger spadices have very conspicuous irregularly sized subrounded glossy cellular inclusions), stamens 1 mm long and 0.7 mm wide, emergent just above the tepals and completely covering the pistil, thecae somewhat divaricate.

Anthurium henryi is known only from the type locality in Panama, Chiriquí Province at 1,000 m elevation in an area of a *Tropical wet forest* life zone.

The species is named in honor of my friend and colleague, Dr. Henry Stockwell, who works with weevils and collaborates with the Smithsonian Tropical Research Institute. Henry is a professional pediatrician and served in that capacity for my first child, Anne, who was born at Gorgas Memorial Hospital in the Canal Zone of Panama.

Anthurium horridum Croat, **sp. nov.**

Type: PANAMA. Panamá: Along trail from Cerro Jefe to Cerro Brewster; 09°17'N, 79°17'W, 600–800 m, 20–25 Apr 1985, B. Hammel & G. de Nevers 13606 (holotype, MO-3276735). Fig. 5A.

The species is a member of sect. *Calomystrium* characterized by its epiphytic habit, short internodes, persistent intact cataphylls, subterete, weakly sulcate petioles, narrowly ovate-sagittate leaves with the collective veins arising from the first

pair of basal veins and with the upper surface sparsely short-pale-lineate and the lower surface at most obscurely punctate but especially by its very coarsely roughened infructescence with the berries prominently exerted pink fruits.

In the Lucid Anthurium Key the species keys to *A. formosum* Schott and *A. sanctifidense* Croat. The most noticeable differences between these two species and *Anthurium horridum* are the early emergent pistils on a cylindroid spadix of *A. horridum*. The lower surface of *Anthurium horridum* has plate-shaped glands and light speckles whereas *A. sanctifidense* does not. *Anthurium formosum* is not densely pale short-lineate on its upper surface.

Epiphytic; stem woody, erect; **internodes** short; **cataphylls** persistent, intact, coriaceous. LEAVES with **petioles** 57.6 cm long, subterete, weakly sulcate, drying markedly 5-ribbed, matte; **geniculum** 4 cm long, darker than petiole; **blades** ovate-sagittate, 46.9 cm long, 33.8 cm wide, widest at petiolar plexus, 1.4 times longer than broad, 0.8 times as long as petiole, abruptly acuminate with bristle (acumen 1.5 cm long), coriaceous, drying gray-brown above and yellowish gray-brown below; **upper surface** areolate-ridged, somewhat sunken sparsely pale short-lineate; **lower surface** obscurely and finely punctate, densely dark granular; **anterior lobe** 30.2 cm long, margins broadly convex; **posterior lobes** 18.5 cm long, 14 cm wide, turned inward; **midrib** narrowly rounded and concolorous above, acutely raised and dark yellow-brown below with narrow medial rib; **primary lateral veins** 5–6 pairs, arising at a 28° angle, slightly raised above, acutely raised below; **tertiary veins** not prominent; **collective veins** arising from the first basal vein, 0.7–1.0 cm from margin with lower basal veins marginating out; antimarginal vein present; **basal veins** 8 pairs, 2 pair free to the base, 3rd pair fused 2.5 cm, 4th pair fused 4.2 cm, 5th–6th fused 5.7 cm; posterior rib 5.7 cm long, naked 3.5 cm long; sinus spatulate, 14 cm deep, 5.8 cm wide. INFRUCTESCENCE erect; **peduncle** short, probably to

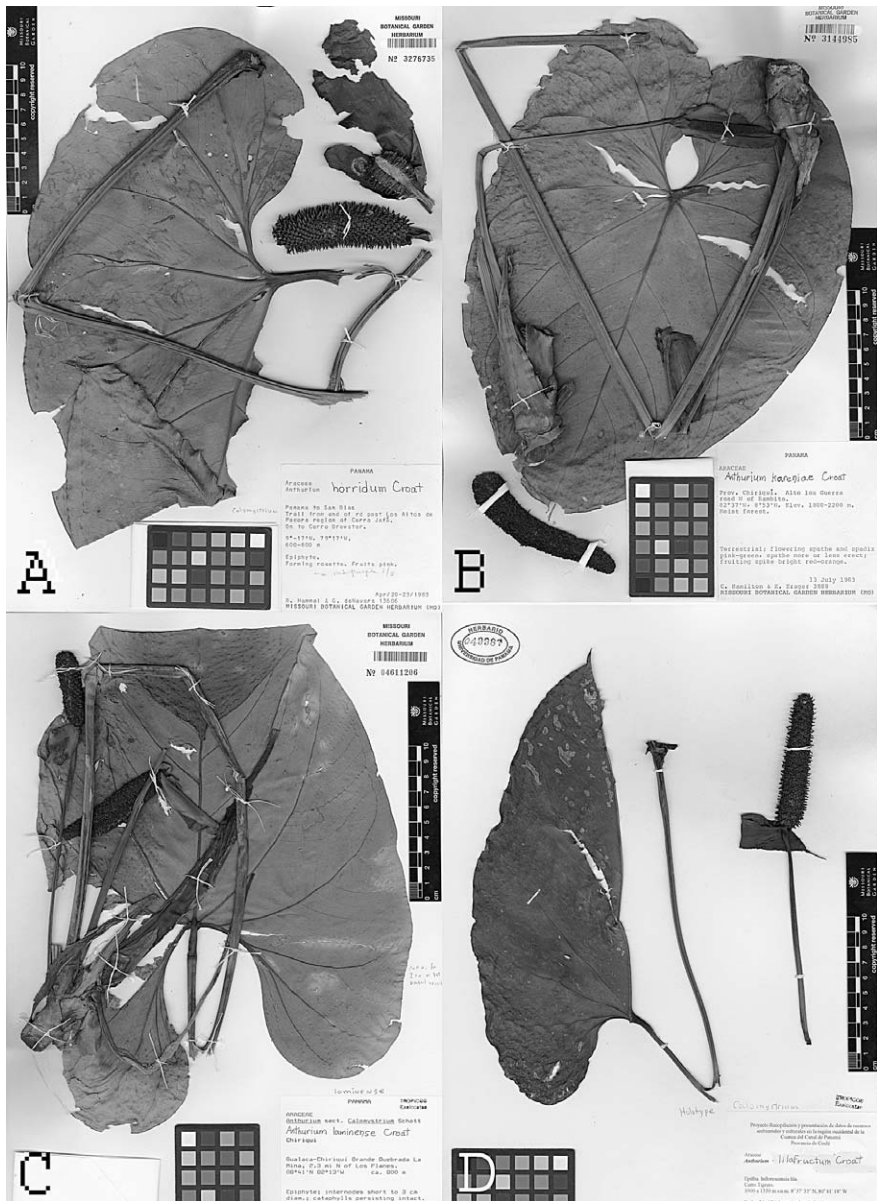


Fig. 5. A. *Anthurium horridum* Croat. (Hammel 13606). A. Herbarium type specimen showing blade folded, apex showing adaxial surface, petiole; inflorescence with spadix partially detached. B. *Anthurium kareniae* Croat. (Hamilton 3888). B. Herbarium type specimen showing blade, abaxial surface; stem in two parts; cataphylls, petiole and inflorescence (attached to stem on left). C. *Anthurium laminense* Croat. (Croat 76360). C. Herbarium type specimen showing blade folded, apex showing adaxial surface; stem, cataphylls, petiole and two complete inflorescences. D. *Anthurium lilafructum* Croat. (Mendieta 17-420). D. Herbarium type specimen showing one half of blade, adaxial surface; petiole & entire inflorescence.

no more than 3 cm long; **spathe** erect, boat-shaped, somewhat coriaceous, green, drying dark brown; **spadix** sessile, cylindrical, weakly curved, coarsely prickly with the narrowly exerted pistils, drying dark brown; **flowers** 13–15 per spiral, 3.5 mm long, 3.5 mm wide; tepals drying granular-crustose and grey-brown, surfaces dark brown and semiglossy; lateral tepals 1.5 mm wide, narrowly rounded on inside margin, outer margin 2-sided, erect and flaring apically post-anthesis; pistils 7–9 mm long, early emergent, oblong-tapered, style slender, topped with round stigma, 0.5–0.6 mm diam., pistils sometimes drying recurved, dry with blunt ribs around circumference.

Anthurium horridum is endemic to Panama, known only from the type locality in Panama Province at 600–800 m elevation in a *Premontane rain forest* life zone.

The species epithet “horridum” (Latin meaning “prickly, rough or bristly”) refers to the conspicuously and finely long pointed fruits on the infructescence.

Anthurium ingramii Croat, **sp. nov.**

Type: PANAMA. Coclé: El Valle, Selby accession number 77-3104, voucher prepared 6 Sep 1991, *Steve W. Ingram 1111* (holotype, MO-4245048; isotypes, PMA, SEL). Fig. 4B–D.

The species is a member of sect. *Calomystrum* characterized by its short internodes, obtusely D-shaped to terete petioles, the narrowly triangular-sagittate dark brown-drying blades with a hippocrepiform sinus, a single pair of free basal veins with the anterior lobe broadly concave margins and the collective veins arising from one of the basal veins as well as by the long-pedunculate inflorescence with a hooding spathe that is green outside and greenish white inside and a sessile cylindrical-fusiform white spadix tinged with pink.

Anthurium ingramii is most similar to *A. curvispadix* Croat which has a similar hooding spathe and a cylindrical-fusiform spadix but that species differs in having much more broadly ovate blades with

broadly convex margins on the anterior lobe. In the Lucid Anthurium Key *A. ingramii* keys to *A. obtusilobum* Schott which differs in having much more broadly ovate blades with broadly convex margins on the anterior lobe and *A. fusiforme* Croat which has both a broadly convex anterior lobe but also has the collective veins arising from the primary lateral veins.

Internodes short, ca. 1.5 cm diam.; **cataphylls** persisting intact, 4 cm long, drying dark brown, subcoriaceous. LEAVES with **petioles** 39.5–42 cm averaging 40.75 cm long, 4–5 mm diam. midway, D-shaped to round, drying obtusely and broadly sulcate, drying medium yellowish brown, matte; **geniculum** 2.5–3.5 cm long, darker than petiole; blade narrowly triangular-sagittate, 39.5–46.5 cm averaging 44 cm long, 12–16 cm averaging 14 cm wide, widest 1–4 cm below petiolar plexus, attenuate, 2.9–3.3 times longer than wide, 0.9–1.2 as long as petiole, subcoriaceous, medium green and matte above and paler and semiglossy below, drying medium yellowish brown sometimes greenish brown, concolorous to slightly darker above, matte above and weakly glossy below; **upper surface** raised punctate, +/- areolate-ridged with short oblong ridges; **lower surface** sparsely dark punctate, pale speckled with smaller dark speckles; **anterior lobe** 32.5–39.5 cm averaging 37 cm long, margin concave to straight; **posterior lobes** 7.5–9.5 cm averaging 8.8 cm long, 3.5–6.5 cm averaging 5 cm wide, mostly straight sometime slightly turned inward; **midrib** narrowly convex above, round-raised with wings below, paler to concolorous above, paler below; **primary lateral veins** 10–11 pairs, arising at a 44–57° angle, convex and sometimes sunken in valleys near apex, narrowly raised below, concolorous above and below; **tertiary veins** inconspicuous above, raised below; **collective veins** arising from the 4th or 5th basal veins, 0.5–2 mm from margin; **basal veins** 5–6 pairs, 1st pair free to base, remainder coalesced 4–4.5 cm, 2nd pair coalesced to 1 cm, 3rd pair 2.5–3 cm, 4th and 5th pairs coalesced 3.5–4.5 cm, strongly narrowly raised; posterior

rib 4–4.5 cm long, completely naked, weakly curved; sinus hippocrepiform, 6.5–7.5 cm deep. INFLORESCENCES erect-spreading; **peduncle** 39.5 cm long, 5 mm diam. midway becoming noticeably tapered near apex, shallowly and obtusely sulcate, drying medium yellowish brown, matte, 2.9 times longer than spathe; **spathe** 13.5 cm long, 3.5 cm wide, oblong-elliptic, acuminate (acumen 1 cm long) hooding, coriaceous, greenish white inside and green outside, drying medium yellowish brown, matte; **spadix** sessile, 7 cm long, 9 mm diam. midway, cylindroid-fusiform, drying cylindrical, white mottled with pink, drying dark brown; **flowers** 9 per spiral, 1.7–1.9 mm long, 2.0–2.1(2.5) mm wide, lateral tepals 1.2–1.2 mm wide, inner margin broadly rounded, 2- to 3-sided, surface minutely granular, stamens not present.

Anthurium ingramii is endemic to Panama, known only from the type locality in Coclé Province at ca. 800 m elevation in a *Premontane wet forest* life zone.

The species is named in honor of American, Steve Ingram, who collected the type specimen from the cultivated plant at the Selby Botanical Garden. Steve Ingram was an employee of Selby Garden from 1990 to 1993 where he was Herbarium Collections Manager. While there he made many valuable collections from the living collection including this beautiful species that bears his name. He spent time in the field in Costa Rica and in Belize. Steve is an author and professional photographer and now lives in Swall Meadows, California. In addition to his photography projects and book writing, Steve acts as a botanical consultant on projects ranging from the Sierra to the Mojave Desert in California.

Anthurium kareniae Croat, **sp. nov.**

Type: PANAMA. Chiriquí: Alto Los Guerra, along road W of Bambito, 8°53'N, 82°37'W, 1,800–2,000 m, 13 July 1983, *Clem Hamilton & Karen Krager* 3888 (holotype, MO-3144985; isotype, PMA). Fig. 5B.

The species is a member of sect. *Calomystrum*, characterized by terrestrial habit,

short thick internodes, persistent intact cataphylls, subterete petioles, ovate-sagittate yellow-brown-drying blades with conspicuous dark punctations, a closed sinus, no more than two free basal veins and a prominent naked posterior rib as well as by the pinkish green spathe and pinkish green short-tapered spadix.

The species is closest to another new species included in this paper, *Anthurium henryi* Croat. That species differs in having blades with a narrowly parabolic sinus, conspicuously dark granular on lower blade surface, a conspicuously short-pale-lineate upper blade surface and a narrowly rounded lower midrib (rather than acutely ribbed as in *A. henryi*). *Anthurium kareniae* may also be confused with *A. roseospadix* but that species differs in having more coriaceous blades with the collective veins arising from the 2nd or 3rd pair of basal veins.

Terrestrial; **internodes** short, ca. 4–5 cm long, 2.5 cm diam.; **cataphylls** 13 cm long, 3.5 cm wide, persisting intact. LEAVES with **petioles** 66.5 cm long, 0.9 cm wide, subterete, drying broadly sulcate with obtuse margins, medium to lighter yellow-brown, matte; **geniculum** 3 cm long, darker than petiole; **blades** wide-ovate-sagittate with posterior lobes turned inward and overlapping, 35 cm long, 24.5 cm wide, widest 2.5 cm above petiolar plexus, 1.4 times longer than broad, 0.5 times as long as petiole, subcoriaceous, dark green and semiglossy above, slightly paler and weakly glossy below, drying bicolorous medium yellow-brown, weakly glossy below; **upper surface** moderately smooth, faint granulations; **lower surface** diffuse punctations, somewhat granulated; **anterior lobe** 23.5 cm long, 24.5 cm wide, margins broadly convex; **posterior lobes** 11.5 cm long, 10.5–12 cm wide, slightly overlapping when flattened; **midrib** slightly raised above, narrowly convex with a medial rib, medium reddish brown; **primary lateral veins** 4(–5) pairs, arising at a 43–47° angle, slightly raised above, narrowly rounded with medial rib below, medium reddish brown; **tertiary veins** narrowly raised above and below; **collective veins** arising

from 1st pair of basal veins, 2–8 mm from margin; antimarginal veins present; **basal veins** 7 pairs, first 2 pairs free to the base, coalesced to 3.5 cm, the 3rd pair branching off at 1.5 cm, the 4th and 7th branch off at 2.5, and the 5th and 6th branch at 3.5, narrowly rounded with medial ribs, medium reddish brown; posterior rib 2.6 cm long, naked to 2.5 cm, almost straight; sinus obovate and somewhat mitered. INFLORESCENCE erect; **peduncle** 26.5–31 cm long, 4–5 mm diam., narrowly and obtusely sulcate, drying medium yellow-brown, 3.9 times longer than spathe; **spathe** 7–7.5 cm long, 2.5 cm wide, oblong with an acumen (acumen 1–1.2 cm long), subcoriaceous, erect-spreading, pinkish green, drying yellow-brown to darker brown; **spadix** stipitate 3 mm, cylindroid-tapered, 5.5 cm long, 0.7 cm wide, pinkish green, drying dark brown; **flowers** 8–9 per spiral, 1.7–1.9 mm long, 1.6–1.9 mm wide; lateral tepals 0.9–1.0 mm wide, inner margin acute, outer margin 3-sided, surface minutely granular, anthers 0.6 mm long and 0.4 mm wide, thecae not divergent. INFRUCTESCENCE 11.0 cm long, 2.0 cm diam., bright red-orange, **berries** emergent.

Anthurium kareniae is known only from western Panama in Chiriquí Province on Alto Los Guerra at 1,800–2,200 m in a *Premontane rain forest* life zone.

The species is named in honor of Karen Krager, former employee of the Missouri Botanical Garden and wife of Clem Hamilton. Karen and Clem worked for the Flora of Panama Project at the Missouri Botanical Garden as our collectors in Panama in 1983 when the type collection was made. Karen is a professional artist, producing abstract prints and drawing inspired by natural growth forms. While at the Garden she did illustrations of plants for the Missouri Botanical Garden. Clem and Karen are now with the Holden Arboretum in Kirtland, Ohio where Clem serves as President and CEO of the arboretum.

***Anthurium laminense* Croat, sp. nov.**

PANAMA. Chiriquí: Along the road from Gualaca to Chiriquí Grande, Quebrada La Mina, 2.3 mi. N of Los

Planes, 08°41'N, 82°13'W, ca. 800 m, 24 June 1994, T. B. Croat & G. Zhu 76360 (holotype, MO-04611206; isotype, PMA). Fig. 5C.

The species is a member of sect. *Calomystrium* characterized by its epiphytic habit, short internodes, persistent intact cataphylls, terete petioles which are much longer than the blades, narrowly ovate-sagittate grayish drying abruptly acuminate blades with a hippocrepiform sinus, one pair of free basal veins, collective veins from the 1st pair of basal veins or from the primary lateral veins, 2–3 pairs of primary lateral veins, upper blade surface short pale-lineate and epunctate and dark-punctate on the lower surface as well as by the more or less fusiform spadix.

There are a number of other species of sect. *Calomystrium* from the general region which can be confused with *Anthurium laminense*, namely *A. granulineare* Croat which differs in having collective veins from the 3rd pair of basal veins and running very close to the margin of the blade as well as by having up to 4 pairs of free basal veins. *Anthurium kareniae* also differs from *A. laminense* in having yellow-brown-drying blades with less conspicuous short-pale-lineate upper surfaces and in having a closed sinus. *Anthurium churchilleorum* differs in having more broadly ovate blades with an abruptly long-acuminate apex and the upper blade surface much more conspicuously granular. *Anthurium deminutum* differs in having the collective veins arising from the 3rd pair of basal veins and by having a slender, more long-tapered spadix.

Epiphyte; **internodes** short, ca. 2 cm long, 2–2.5 cm diam.; **cataphylls** persisting intact, 16 cm long, 2.5 cm wide, medium yellow-brown. LEAVES with **petioles** 63 cm long, 7 mm diam. midway, terete, drying obtusely and broadly sulcate, drying medium brown, matte; **geniculum** 2 cm long, darker than petiole; **blades** narrowly ovate-sagittate, 40 cm long, 29 cm wide, widest 1 cm below petiolar plexus, abruptly acuminate (acumen ca. 1.5 cm long), 1.4 times longer than wide, 0.6 times longer

than petiole, papyraceous, drying medium greenish brown above and lighter greenish brown below, matte above and weakly glossy below; **upper surface** short pale-lineate, epunctate; **lower surface** granular, conspicuously dark punctate; **anterior lobe** 28 cm long, margins convex; **posterior lobes** 14–14.5 cm long, 9.5 cm wide; **midrib** convex above, narrowly convex with a weak medial rib below, dark yellowish brown below; **primary lateral veins** 2–3 pairs, arising at a 49–52° angle, narrowly convex above, broadly convex below; **tertiary veins** inconspicuous above, concolorous and weakly raised below; **collective veins** arising from the lowest primary lateral veins or the 1st basal veins, 3–4 mm from margin; antimarginal veins present; **basal veins** 6 pairs, 1st pair free to base, remainder coalesced to 6 cm, 2nd pair coalesced to 1.5 cm, 3rd and 6th pairs to 4 cm, 4th and 5th pairs to 6 cm, narrowly convex with medial ribs; posterior rib 6 cm long, naked to 4 cm; sinus hippocrepiform, 12 cm deep. INFLORESCENCES erect; **peduncle** 16.5–19 cm long, 2 mm diam. midway, obtusely and narrowly sulcate, drying dark brown, matte, 3 times longer than spathe; **spathe** 6 cm long, 2 cm wide, oblong, subcoriaceous, spreading, green, drying yellow-brown; **spadix** sessile, 5–8 cm long, 1.4–1.7 cm diam. midway, cylindrical to somewhat fusiform, drying dark brown; **flowers** 8–9 per spiral, 2.7–3.0 mm long, 3.6–4.1 mm wide; tepals 1.3–1.7 mm wide, inner margin broadly rounded, outer margin 3–4-sided, surface minutely and densely granular, stamens 0.5 mm long and 0.6 mm wide, thecae weakly divaricate.

Anthurium laminense is endemic to Panama known only from Chiriquí Province in the La Fortuna Dam area at ca. 800 m in a *Premontane wet forest* life zone.

The species is named for the type locality at the Quebrada La Mina in the area of the Fortuna Dam in Chiriquí Province.

***Anthurium lilafructum* Croat, sp. nov.**

Type: PANAMA. **Coclé:** Cerro Tigrero, 08°37'33"N, 80°41'18"W, 1,000–1,350 m,

26–28 Sep, 2001, *J. Mendieta* 17-420 (Holotype, PMA-049987). Fig. 5D.

The species is a member of sect. *Calomystrium* characterized by its epiphytic habit, persistent intact cataphylls, long-petiolate leaves, narrowly ovate-sagittate dark brown-drying acuminate blades, 5(6) pairs of basal veins, 2 pair free to the base, a short posterior rib which is naked essentially throughout, collective veins arising from the 1st or 2nd pair of basal veins, densely short pale-lineate upper surfaces, faintly long pale-lineate lower surfaces and lacking dark punctations on either surface as well as by the moderately short pedunculate inflorescence with a green, long-attenuated spreading spathe and a cylindrical spadix which is lilac-colored in fruit with early emergent narrowly acute berries.

The species appears most closely related to *A. obtusilobum* Schott which differs in having blades that are typically more triangular, often straight or concave along the margins and typically dry pale grayish brown on the upper surface, grayish red-brown on the lower surface and by having red berries.

In the *Lucid Anthurium Key* the species keys to *A. flavoviride* Engl., differing in usually having the collective veins arising from the lower basal veins; *A. globosum* Croat, differing in having a more nearly globose spadix and orange and red-orange berries and *A. riparium* Engl., differing in having the collective veins 2 mm from the margin and having a much shorter peduncle (5–6 mm long).

Epiphytic; **internodes** short, 1.5 cm diam.; **cataphylls** persisting intact. LEAVES with **petioles** 30.5–38 cm long, 4–5 mm diam, midway, narrowly and obtusely sulcate, drying medium yellowish brown, matte; **geniculum** 2–2.5 cm long, darker than petiole; **blade** narrowly ovate-sagittate, 30–33.5 cm long, 21–22 cm wide, widest 4–6 cm above the petiolar plexus, very abruptly acuminate (acumen 1 cm long), 1.4–1.5 longer than wide, 0.9–1.0 times as long as petiole, subcoriaceous, drying somewhat dark yellowish brown, paler below than above, weakly glossy

below and matte above; **upper surface** minutely granular, short-pale-lineate; **lower surface** long-pale-lineate, weakly dark-punctate, weakly dark-speckled; **anterior lobe** 25–26.5 cm long, margin convex; **posterior lobes** 8–9 cm long, 6.5–8 cm wide; **midrib** round-raised with wings above, thicker than broad with a medial wing below, concolorous above and somewhat darker below; **primary lateral veins** 4–5 pairs, arising at a 52–41° angle, narrowly convex above and thicker than broad below; **tertiary veins** inconspicuous above, narrowly convex below; **collective veins** arising from 1st or 2nd basal veins, 2–4 mm from margin, **basal veins** 5(–6) pairs, first 2 pairs free to base, the remainder coalesced to 2–2.5 cm, the 3rd branching at 1 cm, 4th and 5th at 2–2.5 cm, narrowly raised above; **posterior rib** 2–2.5 cm long, entirely naked, strongly curved; **sinus** parabolic, 5–7 cm deep. INFLORESCENCE with **peduncle** 14–16.5 cm long, 4 mm diam. midway, significantly shorter than petioles, broadly and obtusely sulcate, drying medium yellow-brown, 1.8 times longer than spathe; **spathe** oblong-elliptic with long (1.3 cm) acumen, 7.5–9 cm long, 1.5–2.2 cm wide, coriaceous, spreading, green, drying dark brown; **spadix** sessile, 9–9.5 cm long, 1.5 cm diam., subcylindrical, lilac colored, drying dark brown; **flowers** 6–7 per spiral, 3.3–3.9 mm long, 4.1–5.4 mm wide, lateral tepal 2.3–2.4 mm wide, outer margin 2- to 3-sided, inner margin broadly rounded, surface conspicuously granular and sparsely pustulate, stamens not present. INFRUCTESCENCE lilac-colored with **berries** early emergent and narrowly acute.

Anthurium lilafructum is endemic to Panama, known only from the type locality in Coclé Department at 1,000–1,350 m in a *Premontane wet forest* life zone.

The species epithet “lilafructum” comes from the Latin, (*lilacinus*) meaning lilac and (*fructus*) meaning fruit.

Anthurium luteospathum Croat, **sp. nov.** Type: PANAMA. Coclé: North of El Copé and El Petroso sawmill, along trail between Río Blanco and Continental Divide; 8°38'N, 80°36'W,

347 m, 14 Dec 1980, *K. Sytsma, W. Hahn & T. Antonio 2610* (holotype, MO-2903266). Fig. 5A.

The species is a member of sect. *Calomystrium* characterized by its epiphytic habit, short stems, persistent intact cataphylls, subterete weakly sulcate petioles which dry finely ribbed, broadly ovate dark brownish gray-drying, abruptly acuminate ovate-sagittate leaf blades with a single pair of free basal veins, 6 pair of basal veins, a naked posterior rib, 6–7 pairs of primary lateral veins, collective veins arising from the 2nd pair of basal veins and very close to the margin as well as by a moderately short-pedunculate inflorescence with a yellow spreading lanceolate spathe and purple cylindroid-tapered spadix.

Anthurium luteospathum is closest to *A. sanctifidense* Croat which differs in having the collective veins generally more remote from the margin, a less glossy blade, a green spathe and white spadix.

Epiphyte; **internodes** short, 2.5 cm diam.; **cataphylls** persisting intact, to 4 cm long, 0.5 cm wide, light yellow-brown. LEAVES with **petioles** 63 cm long, 0.5 cm diam. midway, subterete and weakly sulcate, drying narrowly and obtusely sulcate and finely ribbed, drying medium brown, matte; **geniculum** 3.5 cm long, darker than petiole; **blades** ovate-sagittate, 53 cm long, 37 cm wide, widest 0–6 cm above petiolar plexus, acuminate (acumen 1 cm long), 1.4 times longer than wide, 0.8 times as long as petiole, thinly coriaceous, bicolorous grayish brown, weakly glossy above and semiglossy below; **upper surface** conspicuously densely granular, sparsely short-pale-lineate; **lower surface** minutely and densely red speckled, not dark-dotted on either surface; **anterior lobe** 41 cm long, margins strongly convex; **posterior lobes** 14–17 cm long, 13 cm wide; **midrib** thicker than broad above, narrowly convex below, concolorous above and dark brown below; **primary lateral veins** 6–7 pairs, arising at a 46–50° angle, weakly narrowly raised above, thicker than broad below; **tertiary veins** inconspicuous above, weakly raised below, concolorous above and below;

collective veins arising from 2nd basal veins, 0–1.5 mm from margin; antimarginal veins present; **basal veins** 6 pairs, 1 pair free to base, 2nd pair coalesced to 0.5 cm, 3rd pair coalesced to 2–2.5 cm, 4th and 5th to 5 cm, 6th to 6.5 cm, narrowly convex; posterior rib 6.5 cm long, naked to 2.5 cm, weakly curved; sinus parabolic, 12 cm deep. INFLORESCENCES with peduncle 17 cm long, 3 mm diam. midway, narrowly and acutely ribbed, somewhat dark brown, matte, 2.1 times longer than spathe; **spathe** 8 cm long, 2.5 cm wide, lanceolate, coriaceous, yellow, drying medium brown; **spadix** sessile, 6.5 cm long, 7 mm diam. midway, cylindroid-tapered, blunt at apex, purple, drying dark brown; **flowers** 9–10 per spiral, 1.8–2.0 mm long, 1.7–1.8 mm wide; tepal 1.0–1.2 mm wide, inner margin weakly rounded, outer margin mostly 2-sided sometimes 3-sided, surface with sub-rounded cellular inclusions, stamens 0.4 mm long, 0.5 mm wide, thecae not divaricate.

Anthurium luteospathum is endemic to Panama, known only from the type locality in Coclé Province at somewhere between 120 and 518 m in a *Premontane wet forest* life zone.

The species is named from the Latin “luteus” (yellow) and “spatha” (spathe) referring to the yellow spathe.

***Anthurium penonomense* Croat, sp. nov.** Type: PANAMA. Coclé: Penonomé-Coclécito, 5.6 mi N of Llano Grande, along Río Cascajál, 5.6 mi N of Llano Grande, 1.4 mi N of Continental Divide, 08°46'N, 80°27'W, 150 m, 11 Sep 1987, *T. B. Croat 67479* (holotype, MO-3636346). Fig. 6B and 6C.

The species is a member of sect. *Calomystrum* characterized by its epiphytic habit, short thick internodes, long intact cataphylls persisting intact, terete petioles, narrowly ovate-sagittate, semiglossy, dark brown-drying, abruptly acuminate blades with a hippocrepiform sinus, a single pair of free basal veins, a short but well-formed posterior rib and surfaces which dry matte, sparsely granular and densely short-pale-lineate above, densely pale-low granular

below as well as by the long-pedunculate inflorescence with a narrow, acuminate-aristate green spathe and a long-tapered spadix.

Anthurium penonomense is closest to *A. sanctifidense* Croat which differs by drying darker and glossier leaves, especially on the lower surface, by having collective veins more remote from the margins, having the upper surface with more conspicuous, denser and shorter pale-lineations.

In the Lucid Anthurium Key *A. penonomense* tracks to both *A. colonense* Croat and *A. tysonii* Croat. The former differs in having leaf blades which dry grayish to blackish and while conspicuously granular have only obscure and sparse short pale lineations not conspicuous and dense as in *Anthurium penonomense*. The latter differs in having blades that are much more broadly ovate with the collective veins arising from the lower basal veins, lack short pale lineations on the upper surface and have a short, cylindroid inflorescence.

Epiphyte; **internodes** short, 2.5–3.5 cm diam.; **cataphylls** persisting intact, 28 cm long, 2.5 cm wide midway, drying medium yellow-brown, weakly glossy. LEAVES with **petioles** 57 cm long, 1.2 cm diam. midway, terete, weakly sulcate becoming narrowly and obtusely sulcate towards apex, drying pale yellow-brown near base becoming medium yellow-brown towards apex, weakly glossy; **geniculum** 3.5 cm long, somewhat darker than petiole; **blades** narrowly ovate-sagittate, 58.5 cm long, 33 cm wide, widest 8 cm above petiolar plexus, abruptly acuminate (acumen ca. 1.5 cm long), 1.8 times longer than wide, 1.0 times as long as petiole, subcoriaceous, bicolorous and semiglossy, drying somewhat dark yellow-brown above, medium yellow-brown below, semiglossy above and below; **upper surface** short-pale-lineate and minutely granular including on major veins; **lower surface** minutely pale speckled; **anterior lobe** 44.5 cm long, margin convex around the area of the petiolar plexus and the apex, straight in the middle; **posterior lobes** 15.5 cm long, 12.5 cm wide, lobes somewhat turned inward; **midrib**

thicker than broad becoming narrowly convex toward apex, narrowly convex and ribbed below, paler above and below (epidermis over the major veins loosened but not fissured near the base); **primary lateral veins** 6 pairs, arising at a 52–61° angle, drying narrowly convex above, convex below; **tertiary veins** obscure, drying convex; **collective veins** arising from 1st primary lateral veins, 5–9 mm from margin; antimarginal veins present; **basal veins** 7 pairs, 1st pair free to base, the remainder coalesced to 6 cm, 2nd pair branching off at 1.5 cm, the 3rd pair branching at 2.5 cm, 4th–7th branching at 6 cm, narrowly raised away from base; posterior rib 6 cm long, naked to 4.5 cm, thick, straight near base becoming weakly curved; sinus spatulate, 14 cm deep. INFLORESCENCE erect; **peduncle** 44 cm long, 8 mm diam. midway, broadly and obtusely sulcate, medium brown, 1.6 times longer than spathe; **spathe** erect-spreading, 27 cm long, 3 cm wide, lanceolate and caudate-acuminate (acumen 4.2 cm long), recurled, coriaceous, pale green, drying medium yellow-brown; spadix sessile, pale green, 35 cm long, 1.7 cm diam. on drying, fresh pistils pale green, acute, emergent; **flowers** 9–12 per spiral, 2.7–3.3 mm long, 3.7–3.9 mm wide, lateral tepals 2.3–2.4 mm wide, inner margin straight to somewhat broadly convex, outer margin 2-sided, surface minutely irregularly granular at high magnification, stamens not seen.

Anthurium penonomense is endemic to Panama, known only from the type locality in Coclé Province at 150 m in a *Tropical wet forest* life zone.

The species is named for the type locality in Penonomé-Coclécito in Coclé Province.

***Anthurium roubikii* Croat, sp. nov.**

Type: PANAMA. Colón: Santa Rita Ridge Road, ca. 22 km from Boyd-Roosevelt Hwy, in forest on ridges and slopes, 09°25'N, 79°40'W, 500 m, 17–18 Feb 1986, B. Hammel, G. McPherson, D. Roubik 14476 (holotype, MO-3489133–35; isotype PMA).

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

terrestrial habit, short internodes, persistent cataphylls, weakly flattened petioles, its broadly ovate, brown-drying blades with the collective veins arising from one of the lowermost basal veins as well as by its short-pedunculate inflorescence with a white spathe and spadix.

Anthurium roubikii is similar to *A. sanctifidense* Croat but that species differs by having much thinner, typically shorter cataphylls, blades with the collective veins arising from the 1st pair of basal veins or one of the primary lateral veins, usually longer peduncles (mostly 20–38 cm long) and many fewer flowers per spiral (typically fewer than 10 visible per spiral).

Terrestrial; stem woody, erect; **cataphylls** 13.7–27.7 cm long, coriaceous, intact at upper nodes, persisting at many of the lower nodes; **internodes** short, 1–3 cm diam.; **petioles** 35.3–70.1 cm long, green, subterete, barely flattened, sometimes broadly flattened adaxially; **blades** broadly ovate-cordate, 31.3–67.2 cm long, 18.5–51.0 cm wide, averaging 46.2 × 31.0 cm, 1.6 times longer than wide, 0.9 times as long as petiole, subcoriaceous, dark green and matte above, light and semiglossy green below, drying light brown, dries to brown; **anterior lobe** 27.7–52.5 cm long, margins convex; **posterior lobes** 6.8–16.2 cm long, 16.5–22.6 cm wide, sometimes overlapping; major veins moderately paler below; **basal veins** 5–7 pairs, mostly free; **midrib** rounded and paler above, acutely raised and paler below; **primary lateral veins** 8–10 pairs, arising at a 45–53° angle, narrowly rounded above, narrowly raised below; **tertiary veins** slightly raised above and below, sometimes not prominent; **collective veins** arising from one of the lowermost basal veins and 1–2(3) mm from margins. INFLORESCENCE erect; **peduncle** 5.5–8.4 cm long, 0.5–0.7 cm wide, 0.59 times as long as spathe, drying brown; **spathe** lanceolate, 9.1–16 cm long, 1.5–5 cm wide, white with brown central area outside, white with brown within; **spadix** cylindroid-tapered, 10.5–17.5 cm long, 1.0–1.7 cm wide, dirty white; **flowers** 20–22 visible per spiral, 1.4–1.5 mm long

and wide; tepals obscurely granular; inner margins broadly rounded, outer margins usually 2–3-sided; stamens exerted and held at the level of the tepals, 3 mm long, 5 mm wide, thecae circular, scarcely or not at all divaricate.

Anthurium roubikii is endemic to Panama, known only from the region of the type in Colón Province at 350–500 m in a *Tropical wet forest* life zone.

Paratypes: Panama. **Colón**: Santa Rita Ridge Road, 9–12 mi E of Transisthmian Highway on Santa Rita ridge, 09°22'00"N, 79°39'30"W, 500 m, 17 Apr 1988, *S. Thompson 4872* (MO); 21.3 km from Transisthmian, 09°24'00"N, 79°39'30"W, 350 m, 13 May 1986, *G. de Nevers, G. McPherson, H. Herrera 7739* (MO).

Note: The Thompson collection (4872) was collected ca. 11:30 AM; two beetles inside (one was collected).

Anthurium suethompsoniae Croat, **sp. nov.** Type: PANAMA. Colón: Santa Rita Ridge Road, ca. 12–26 km East of Transisthmian Highway on Santa Rita ridge, 9°20'N, 79°45'W, 500–550 m, 17–18 Apr 1988, *S. A. Thompson 4840* (holotype, MO-3609122). Fig. 6D.

The species is a member of sect. *Calomystrium* characterized by its epiphytic habit, short internodes, intact persistent cataphylls, subterete sulcate petioles, brownish drying ovate-sagittate coriaceous blades with the collective veins arising from the first basal veins, one pair of free basal veins, by the long-pedunculate inflorescence, as well as by the broadly lanceolate yellow-green spathe and cylindroid short-tapered green spadix.

Anthurium suethompsoniae is perhaps closest to *A. colonense* Croat but that species differs in having a long-tapered, much longer spadix and has the collective veins arising from the primary lateral veins. It may be confused with *Anthurium fusiforme* Croat but that species has a fusiform spadix and has collective veins arising from the upper primary lateral veins. It should also be compared with *Anthurium sanctifidense* Croat but that

species differs by having less coriaceous blades, terrestrial habitat, and blades with collective veins arising from the pair of basal veins or one of the primary lateral veins and staying close to the margins. In the **Lucid Anthurium Key** *A. suethompsoniae* also compares closely with *A. boffmannii* Schott and *A. obtusilobum* Schott but both species have the collective veins that are very close to the margin. In addition *Anthurium boffmannii* has dark-punctate blades while *A. obtusilobum* has the collective veins arising from the lowermost pair of basal veins.

Epiphytic; stem erect; **internodes** short, 2.5–3 cm diam.; **cataphylls** incomplete, at least 7.2 cm long, 1.2 cm wide, persistent, coriaceous. LEAVES with **petioles** 51 cm long, 6 mm diam. midway, green, terete, narrowly and obtusely sulcate adaxially; **geniculum** 4 cm long, conspicuously darker than petiole; **blades** broadly ovate-sagittate, 47 cm long, 35 cm wide, widest 5 cm above petiolar plexus, 1.3 times longer than broad, 0.9 times as long as petiole, coriaceous, dark green and matte above, paler and semiglossy below, drying medium yellow-brown and weakly glossy above, somewhat paler and semiglossy below; **upper surface** densely and minutely granular, faintly and densely pale short-lineate; **lower surface** weakly granular, not pale short-lineate, not dark-punctate; **anterior lobe** 31 cm long, broadly rounded on margins; **posterior lobes** 16 cm long, 14 cm wide; **midrib** convex above, narrowly convex with prominent medial rib below; **primary lateral veins** 5 pairs, arising at 51° angle, narrowly convex above, narrowly convex with medial rib below; **tertiary veins** somewhat raised and concolorous above and below; **collective veins** arising from 2nd pair of **basal veins**, 5–8 mm from margin, conspicuously looping; antimarginal veins present; basal veins 8 pairs, 2 pairs free to base, remainder coalesced to 5.5 cm, 3rd pair branching off at 2 cm, 4th and 8th pairs branching at 4 cm, 7th at 5 cm, 5th & 6th branching at 5.5 cm; posterior rib 5.5 cm long, naked 3.5 cm, weakly curved; sinus spatulate, 14 cm deep. INFLORESCENCE erect; **peduncle**

33 cm long sulcate, 7 mm wide, drying shallowly and broadly, medium brown, matte, 2.0 times longer than spathe; **spathe** 15.5 cm long, 2.0 cm wide, linear-lanceolate, coriaceous, reflexed (on live plant), yellow-green, greener toward the edges, reflexed; **spadix** sessile, 12.8 cm long, 1.5 cm diam. midway, tapered, green, drying dark brown; **flowers** 8–10 visible per spiral, rhombic, 2.2–2.7 mm long, 3.5–3.8 mm wide, tepals weakly pale-dotted, lateral tepals 1.5–1.9 mm, inner margin broadly rounded, outer margin 2-sided to weakly 3-sided, surface with pale rounded cellular inclusions, stigma ellipsoid, stamens not visible.

Anthurium suethompsoniae is endemic to Panama, known only from the type locality in Colón Province at 500–550 m in a *Tropical wet forest* life zone.

The species is named in honor of, Dr. Sue A. Thompson, a fellow aroid taxonomist who revised the Araceae of North America and spent many years at the Carnegie Museum in Pittsburgh, PA working on *Xanthosoma*. She has collected many Araceae in tropical areas including this species which bears her name.

LITERATURE CITED

- Croat, T. B. 1983. A revision of the genus *Anthurium* (Araceae) of Mexico and Central America. Part 1: Mexico and Middle America. *Ann. Missouri Bot. Gard.* 70: 211–417.
- Croat, T. B. 1986a. A revision of the genus *Anthurium* (Araceae) of Mexico and Central America. Part 2: Panama. *Monogr. Syst. Bot. Missouri Bot. Gard.* 14: 1–204.
- Croat, T. B. 1986b. The distribution of *Anthurium* (Araceae) in Mexico, Middle America and Panama. *Selbyana* 9: 94–99.
- Grayum, M. H. 1992. A Remarkable New *Anthurium* from Costa Rica. *Aroidiana* 15(1–5): 40–43.
- Haigh, A., S. J. Mayo, T. B. Croat, L. Reynolds, M. Mora Pinto, P. C. Boyce, L. Lay, J. Bogner, B. Clark, C. V. Kostelac & A. Hay. 2009. Interactive web-taxonomy for the *Araceae*:// www.cate-araceae.org on 30 October 2009.
- Holdridge, L. R., W. H. Hatheway, T. Liang & J. A. Tosi. 1971. *Forest Environments in Tropical Life Zones*. Pergamon Press, New York.