Revision of *Anthurium* Schott sect. *Leptanthurium* (Schott) Engl. (Araceae).

Xavier Delannay
Volunteer Research Associate
Missouri Botanical Garden
4344 Shaw Blvd., St. Louis, MO 63110

Thomas B. Croat
P. A. Schulze Curator
Missouri Botanical Garden
4344 Shaw Blvd., St. Louis, MO 63110

ABSTRACT

Section *Leptanthurium* (Schott) Engl. of genus *Anthurium* Schott is being reviewed and expanded from three species recognized until recently to a total of 19 species, including eight new species. The new species are *A. ellenbergii* Delannay & Croat, *A. leptos* Croat, *A. lutheri* Croat, *A. minutipustulum* Croat, *A. miritiparanaense* Croat & J. Watt, *A. raphaelense* Croat & Delannay, *A. rectinervium* Delannay & Croat and *A. rociorojasiae* Delannay & Croat. All 19 species belonging to section *Leptanthurium* are here fully described and illustrated, and a determination key is provided.

KEY WORDS

Araceae, *Anthurium*, *Leptanthurium*.

INTRODUCTION

Section *Leptanthurium* (Schott) Engl. of genus *Anthurium* Schott was described by Schott in 1860 (*Prodr. Syst. Aroid.* 441) and consisted for a long time of only one species, *Anthurium gracile* (Rudge) Schott. In his 1976 treatment of sect. *Leptanthurium*, Croat (Croat, 1976) reviewed the taxonomic history of *A. gracile* and showed how it differed from *A. friedrichstahlii* Schott that Engler had mistakenly considered a variety of *A. gracile* (Engler, 1905). *A. friedrichstahlii* has now been placed in section *Porphyrochitonium* (Schott) Engl.

A second species thought to belong to section *Leptanthurium*, *Anthurium barrieri* Croat, Scherber. & G. Ferry, was published in 2006 (Croat et al. 2006), followed by a third species, *A. muyunense* Croat in 2020 (Delannay & Croat, in press).

Following a review of *Anthurium* species exhibiting traits similar to these three *Leptanthurium* species, the authors determined that several species that had previously been assigned to other sections, particularly section *Decurrentia* Croat, actually belong to section *Leptanthurium*. The main traits considered as part of this review were the following:

- Petioles sheathed at the base, with base of sheath clasping the adjacent peduncle.
- Stems generally with short internodes, often fully covered by remnants of the cataphylls.
- Roots sometimes velamentous.
- Blades elongated, usually several times longer than wide.
- Primary lateral veins numerous, sometimes poorly visible, often interspersed with minor veins running in parallel.
- Blades usually drying medium to light grayish green, sometimes medium green or brownish green.
- Another likely character is the unique chromosome number 2n=20 known for *A. gracile*, the type species of the section but this needs to be verified for other species.

Not every species identified here necessarily exhibited all these traits, but they all showed different combinations of them, with the main trait consistent across all species being the petioles sheathed at the base (although that sheath may not always persist in older leaves).

Following this review, the authors identified 16 additional species belonging to section *Leptanthurium*, in addition to the three species mentioned above. These species are *A. debilipeltatum* Croat, *A. ellenbergii* Delannay & Croat, *A. fornicifolium* Croat, *A. huanucense* Engl., *A. leptos* Croat, *A. longegeniculatum* Engl., *A. lutheri* Croat, *A. minutipustulum* Croat, *A. miritiparanaense* Croat & J. Watt, *A. pallidiflorum* Engl., *A. raphaelense* Croat & Delannay, *A. rectinervium* Delannay & Croat, *A. rociorojasiae* Delannay & Croat, *A. sodiroanum* Engl., *A. timplowmanii* Croat and *A. vittariifolium* Engl. Seven of those species were previously assigned to other sections, while eight species are described here as new. Those new species are *A. ellenbergii* Delannay & Croat, *A. leptos* Croat, *A. lutheri* Croat, *A. minutipustulum* Croat, *A. miritiparanaense* Croat & J. Watt, *A. raphaelense* Croat & Delannay, *A. rectinervium* Delannay & Croat and *A. rociorojasiae* Delannay & Croat.

Anthurium longegeniculatum, *A. sodiroanum* and *A. timplowmanii* diverge more significantly in some of the diagnostic traits listed above, but all three have the petioles sheathed at the base and they exhibit at least some of the other characteristics of that section. They do not match the main distinguishing

characteristics of any other sections of *Anthurium* and the authors feel that their best fit at this time is in section *Leptanthurium*.

In a recent molecular study of selected species belonging to the various sections of *Anthurium* (Carlsen & Croat 2013; Carlsen & Croat 2019), Mónica M. Carlsen of the Missouri Botanical Garden found that *A. muyunense* and *A. vittariifolium* clustered with *A. gracile* in a small clade representing section *Leptanthurium*. Another *Leptanthurium* species, *A. fornicifolium*, clustered in a heterogeneous clade closely related to the *Leptanthurium* clade and may actually be also part of that clade. These findings seem to validate our placement of those species in section *Leptanthurium* using morphological traits.

Besides the morphological traits noted in this manuscript, both Carlsen & Croat papers (mentioned above) pointed out several inflorescence characters that seemed useful in the circumscription of section *Leptanthurium*. Those characters mentioned by Carlsen & Croat include:

1. Spadix thin and long

2. Flowers relatively large, ca. 3 visible per principal spiral

3. Reddish berries

Those inflorescence characters were also consistently found by the authors in most other species identified here as belonging to section *Leptanthuium*.

According to Croat & Sheffer (1983), *Anthurium gracile* was found to be unique chromosomally among the *Anthurium* species, with a polyploid series of chromosomes (2N = 20, 40, 60). It is not known whether the other species of section *Leptanthurium* have similar chromosome numbers.

All 19 species belonging to section *Leptanthurium* are fully described and illustrated here, and a determination key is provided.

TAXONOMY

Anthurium sect. *Leptanthurium* (Schott) Engl., *Monogr. Phan.* 2: 117. 1879. [*Anthurium* grex *Leptanthurium* Schott, *Prodr. Syst. Aroid.* 447. 1860]. Type: *Anthurium gracile* (Rudge) Schott, *Wiener Z. Kunst* 1829: 828. 1829 [= *Pothos gracilis* Rudge, *Pl. Guiane* 23, t. 32. 1805] (lectotype, designated by Carlsen & Croat 2019).

Epiphyte, usually erect; **caudex**[1] short to elongate, often fully covered by remnants of the cataphylls; **internodes** short to moderately short (sometimes elongated in

1 The term caudex, long used in Araceae for stem is best defined here. The term â•œcaudexâ•š is most often use with plants that have a different stemÐorphology fom angiosperm dichotyledon stem, such as palms aroids, ferns and cycads. The caudex of aroids differs from the stems of Úngiosperm families in that any part of the stem contain both roots and branch nodes so that the typical aroid stem can be endlessly be Ðubdivided with each porton being capable of growing since they have both the abilty to root and branch.

some *A. longegeniculatum* specimens); **cataphylls** persisting intact or weathering to dense fibers, sometimes deciduous; **roots** numerous, sometimes velamentous. LEAVES usually erect, sometimes pendent (*A. fornicifolium*, *A. lutheri*, *A. pallidiflorum*, *A. vittariifolium*); **petioles** often much shorter than the blade (long petioles for *A. longegeniculatum* and *A. timplowmanii*), sheathed at the base, with sheath clasping the adjacent peduncle at the base; **blades** elliptic to lanceolate, oblong-linear or linear, usually several times longer than wide (except for *A. longegeniculatum*), rounded, cuneate or attenuate at the base, rarely subcordate (*A. timplowmanii*), usually drying medium to light grayish-green, sometimes medium green or brownish green; **primary lateral veins** usually numerous and closely spaced, often obscure, usually arising at a wide angle and running straight to the margin, often interspersed with minor veins running in parallel; **collective veins** arising from the lowermost primary lateral veins, about as prominent as primary veins. INFLORESCENCES erect-spreading; **spathe** usually reflexed-spreading, linear to elliptic, usually green, sometimes yellowish or tinged violet-purple; **spadix** sessile or stipitate, thin, green or greenish yellow, sometimes yellow, pink or purplish.

Except for *Anthurium gracile* which is widespread across Central and South America (east of the Andes) from southern Mexico south to Bolivia and east to the Guianas and Brazil (Acre), the species of section *Leptanthurium* can be found only in western South America from Colombia to Peru, either on the Pacific slopes of the Andes, on the eastern slopes of the Andes or in the Amazon Basin.

KEY TO species of *Anthurium* sect. *Leptanthurium*

1. Leaves conspicuously pendent; blades very long, linear-lanceolate to linear.

    2. Species from the Pacific slopes of the Andes.

        3. Stems closely longitudinally ribbed on drying; cataphylls persisting as spreading fibers at several nodes; upper blade surface finely granular to areolate, matte, frequently pustular; primary lateral veins scarcely visible on either surface; spadix sessile or subsessile, stipe when present less than 2 mm . . . . . *A. pallidiflorum* Engl.

        3. Stems coarsely longitudinally ribbed and coarsely transversed-ribbed on drying; cataphylls deciduous, never with persisting spreading fibers; upper blade surface coarsely granular, lacking pustules; primary lateral veins clearly visible on both surfaces, prominently raised and paler than surface below; spadix stipitate typically 5–14 mm . . . . . *A. lutheri* Croat

    2. Species from the eastern slopes of the Andes or the Amazon Basin

        4. Blades linear-oblanceolate to linear, to 120 cm long, 10–60 times longer than wide; plants from low elevations (90–650 m) in the Amazon Basin from southern Colombia to northern Peru and western Brazil . . . . . *A. vittariifolium* Engl.

        4. Blades oblong-linear to narrowly oblanceolate, to 59 cm long, 9–14 times longer than wide; plants endemic to Ecuador at high elevations (500–1800 m) on the eastern slopes of the Andes . . . . . *A. fornicifolium* Croat

1. Leaves erect-spreading, never conspicuously pendent.

    5. Blades subcordate at the base; species from Huánuco Department of Peru . . . . . *A. timplowmanii* Croat

    5. Blades rounded, cuneate or attenuate at the base, never subcordate.

6. Variable species widespread across Central and South America (east of the Andes) from southern Mexico south to Bolivia and east to the Guianas and Brazil (Acre); stems short or elongated, with a dense branching mass of white velamentous roots anchoring it at the base; blades moderately thin, elliptic to narrowly oblanceolate or linear, broadest above the middle; primary lateral veins numerous and nearly obscure; infructescences pendent, with a long peduncle and bright red, globose berries . . . . . *A. gracile* (Rudge) Schott

6. Species found only in western South America; roots sometimes velamentous, but never in a dense branching mass at the base of the stem; berries usually not bright red.

7. Petioles very long, often longer than the blade, geniculum 3–5 cm long; blades ovate to ovate-elliptic, 1.5–2.5(4.4) times longer than wide; spadix long-stipitate . . . . . *A. longegeniculatum* Engl.

7. Petioles much shorter than the blade, without a long geniculum; blades elliptic to lanceolate, more than 3 times longer than wide; spadix usually not long-stipitate.

8. Species from the western slopes of the Andes.

9. Medium-sized plants with blades narrowly oblong-oblanceolate, to 34 cm long, 6.7–9.3 times longer than wide, narrowly acute at the base . . . . . *A. leptos* Croat

9. Large plants with blades oblanceolate, to 71 cm long, 3.3–4.9 times longer than wide, rounded at the base . . . . . *A. sodiroanum* Engl.

8. Species from the eastern slopes of the Andes or the Amazon Basin.

10. Blades oblong-elliptic, covered with numerous small pustules on the upper surface; spathe medium-dark green, highly tinged violet-purple on inside; spadix light green . . . . . *A. minutipustulum* Croat

10. Blades not covered with numerous small pustules on the upper surface.

11. Species from Peru.

12. Petioles very short, 3–4 cm long; blades elliptic to oblanceolate, 3.3–3.6 times longer than wide, drying medium yellow-green; species found only in Oxapampa Province of Pasco Department . . . . . *A. rociorojasiae* Delannay & Croat

12. Petioles much longer; blades more than 4 times longer than wide, never drying yellow-green.

13. Species from low elevations in the Amazon Basin in northern Loreto Department and adjacent Morona-Santiago in Ecuador; blades oblong-elliptic, long-tapering at the base, drying medium green; primary lateral veins obscure . . . . . *A. barrieri* Croat, Scherber. & G. Ferry

13. Species from higher elevations closer to the Andes.

14. Species found only in Tingo María area of Huánuco Department.

15. Petioles with a prominent geniculum forming a marked angle between the petiole and the blade; blades oblong-linear, acute and long-tapering at the base; species of high elevations at 1500–1650 m . . . . . *A. ellenbergii* Delannay & Croat

15. Petioles without a prominent geniculum forming an angle; blades lanceolate to oblong-elliptic, obtuse to rounded at the base; species found only on limestone cliffs at 675–800 m elevation . . . . . *A. debilipeltatum* Croat

14. Species ranging across northern and central Peru at the foot of the Andes; blades elliptic-oblanceolate to narrowly elliptic, acute to shortly attenuate at base . . . . . *A. huanucense* Engl.

11. Species from eastern Colombia or Ecuador.

16. Species from the Amazon Basin of Amazonas Department in eastern Colombia . . . . . *A. miritiparanaense* Croat & J. Watt

16. Species from eastern Ecuador.

17. Species from high elevations (900–2500 m) on the eastern slopes of the Andes; blade drying light to medium grayish-green; infructescence with berries pale orange or red-orange . . . . . *A. muyunense* Croat

17. Species from lower elevations in the Amazon Basin (100–900 m).

18. Species from eastern Morona-Santiago and adjacent northern Loreto in Peru; blades oblong-elliptic, long-tapering at the base, drying medium green; primary lateral veins obscure . . . . . *A. barrieri* Croat, Scherber. & G. Ferry

18. Species from Napo and Sucumbíos Provinces.

19. Species from low elevations (100 m) near Lago Agrio in Sucumbíos Province; blades coriaceous, oblanceolate, drying pale grayish-green . . . . . *A. rectinervium* Delannay & Croat

19. Species from higher elevations (200–900 m); blades thinner, elliptic to oblanceolate, drying bright green . . . . . *A. raphaelense* Croat

Species descriptions

Anthurium barrieri Croat, Scherber. & G. Ferry, *Aroideana* 29:86–90. 2006. Type: Peru. Loreto: Colonia Pebas, collected by Serge Barrier in 1980, voucher prepared 15 July 2005 from living plant Nancy # 1980.3557, *Thomas B. Croat 95424* (holotype: MO; isotypes: B, F, COL, QCNE, K, M, NCY, NY, P, US, LYJB, USM, VEN). **Figures 1–3.**

Epiphyte; **internodes** short, 1.5 cm diam.; **roots** gray to whitish, velamentous, to 16 cm long, 5–8 mm diam.; **cataphylls** 6–10.5 cm long, turning reddish brown, persisting intact, erect. LEAVES with **petioles** 6.5–16 cm long, 4–6 mm diam, sharply and deeply sulcate, dark green and matte above, slightly paler and matte below, sheathed 1/3–1/2 its length, the margins pale green; **blades** oblong-elliptic, 34–39 cm long, 5.5–8.3 cm wide, 4.1–6.2 times longer than wide, 2.4–2.8 times longer than petiole, acute and long-tapering at the base, acute and acuminate at the apex, medium green and glossy above, medium green and semiglossy below, drying medium brown or medium green; **midrib** prominently raised, weakly paler and acute to bluntly acute above, bluntly acute and paler below with an acute medial rib toward the base; **primary lateral veins** obscure on both surfaces, ca. 15–20 per side, scarcely or not at all raised, concolorous; **collective veins** moderately obscure, arising from the lowermost primary lateral veins, irregular, 3–6 mm from margin; **minor veins** obscure. INFLORESCENCE stiffly erect at anthesis; **peduncle** 18–30 cm long, 3.5–4 mm diam., medium green, semiglossy, sometimes acutely angular with several smaller ribs on either side near the apex; **spathe** medium green, weakly glossy inside, slightly glossier outside, 8.5–13 cm long, 1.2–2.0 cm wide, reflexed, the margins turned under and sometimes tinged violet-purple, narrowly long-acuminate at apex with only the midvein clearly visible, subcordate and clasping peduncle at base; **spadix** 10.5–14 cm long, (3)4–7 mm diam., sessile, narrowly tapered, pale yellow to orange, yellowish green or brownish yellow green, semiglossy; **flowers** 3–4 visible per spiral, 5–7(9) mm long, 4–6 mm wide, prominently 4-lobed; **tepals** shield-shaped, 3.1–3.5 mm wide, the inner margin broadly rounded, outer margin 4-sided, both the sides parallel and perpendicular to the spiral jaggedly sigmoid; pistils 1.3–1.5 mm long, 0.85–0.90 wide; stamens barely emergent, positioned at the margin of the tepals at anthesis, yellowish, 0.75 mm long and wide pre-anthesis, becoming 0.5 mm long and 0.75 mm post-anthesis with the thecae broadly divaricate; pollen golden-yellow. INFRUCTESCENCE spreading-pendent, to about 19 cm long, 9 mm diam. before berries emerge; **berries** orange-red, broadly obovoid, 6–8 mm long, broader in the direction of the axis, 5–7 by 7–9 mm diam., the apex often marked with cross-like ridges oriented at ca. 45° with the axis; **seeds** medium yellowish green but darker yellow-green on one end, 3.6 mm long, 2 mm wide, 1.7 mm thick, bearing a transparent, slick appendage on the chalazal end of the seed,

Figure 1. *Anthurium barrieri* Croat, Scherber. & G. Ferry (*Croat 95424*, NCY). Herbarium specimen showing petiole, leaf blade, abaxial surface, and inflorescence.

Figure 2. *Anthurium barrieri* Croat, Scherber. & G. Ferry (*Croat 87416*). Live plant showing velamentous roots, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescences.

Figure 3. *Anthurium barrieri* Croat, Scherber. & G. Ferry (*Croat 87416*). Close-up view of leaf blades, adaxial and abaxial surfaces, and inflorescence with green spathe and orange spadix.

Figure 4. *Anthurium debilipeltatum* Croat (*Plowman & Ramírez 7570*, MO-2916275). Herbarium specimen showing top of stem with fibrous cataphyll remnants, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescences.

sometimes also with a smaller appendage on the opposite end of the seed.

Anthurium barrieri is known from the Amazon Basin in Ecuador (Morona-Santiago) and northern Peru (Loreto) at 100–500 m in a *Tropical moist forest* life zone.

The species was only the second one in the section to be described (Croat et al. 2006). It is recognized by its short internodes, thick light gray roots, persistent reddish-brown cataphylls, sharply sulcate petioles, oblong-elliptic blades with more or less acute midribs and obscure primary lateral veins. The inflorescences are stiffly erect with a reflexed green spathe and a narrowly tapered yellowish spadix with large flowers and orange-red berries.

The species is related to and confused with *A. gracile* which differs in having blades typically narrower and more often oblanceolate, in having petioles obtusely flattened, not deeply and sharply sulcate, in having the midrib convex on the lower surface (never with an acute medial rib), in having inflorescences with more slender and proportionately longer peduncles that are spreading-pendent with only the spadix directly upward. In addition, the spadix of *A. gracile* is dark green and heavily tinged purplish, usually appearing brownish purple in contrast to the yellowish spadices of *A. barrieri*. The flowers of *A. gracile* are proportionately larger in relationship to the width of the spadix with about 2.5 flowers visible in any spiral. In contrast, the inflorescence of *A. barrieri* has generally 3–4 flowers visible per spiral. The flowers of *A. gracile* are rhombic, not markedly 4-sided like those of *A. barrieri* and the outer margin of the lateral tepals is 2-sided, not 4-sided and typically matte, not semiglossy. The visible portion of the pistil between the tepals is much larger in *A. gracile* with the length of the exposed pistil 1/3 the length of the flower length whereas in *A. barrieri* the total length of the exposed pistil is less than 1/3 of the length of the flower.

Additional specimens seen: ECUADOR. **Morona-Santiago:** Along road between Pto. Morona at Río Morona and Santiago, near summit of hills with broad view of Amazon basin, Km 18 from Río Morona, 02°58'43"S, 77°47'46"W, 500 m, 10 Sep. 2002, *Thomas B. Croat 87416* (MO). PERU. Cultivated at Fairchild Gardens, 24 Feb. 2007, 9 Feb. 2007, *Thomas B. Croat 98072* (MO). PERU. **Loreto:** Río Ampiyacu, forest 2 km upriver from Puca Orquilla, 03°14'00"S, 71°56'00"W, 100 m, 11 Feb. 1969, *Timothy C. Plowman 2465* (F, MO).

Anthurium debilipeltatum Croat, *Novon* 18:149–151, 2008. Type: Peru. Huanuco: Along steep cliffs W of Río Huallaga above bridge over Río Huallaga on road to airport, 09°14'S, 76°01'W, 5 Apr. 1984 , *Thomas B. Croat 57966* (holotype, MO-3189494; IT: CAS, COL, CUZ, F, CH, K, NY, QCNE, RSA, TEX, US, VEN). **Figure 4.**

Epipetric or occasionally epiphytic; **stem** less than 10 cm; **internodes** shorter than broad, ca. 2–3 mm long, 1–2 cm diam.; leaf scars obscured by cataphyll fibers; **roots** numerous, densely pubescent, elongate, blunt at apex, drying grayish brown to dark brown, 24–40 cm long, 2–4 mm diam.; **cataphylls** thin, chartaceous, 4–7 cm, acuminate at apex, drying tan, persisting as fine linear fibers with intact fragments occasionally present. LEAVES pendent to suberect; **petioles** 5–18 cm long, 1–3 mm diam., terete, drying yellowish green, inserting slightly above the leaf base, sheathed for ca. 2 cm at the base, sheath often not persistent; geniculum concolorous and thicker than petiole, 0.5–1.5 cm; **blades** lanceolate to oblong-elliptic, subcoriaceous to coriaceous, gradually acuminate at apex, obtuse to rounded at base, 13–27 x 1.5–4 cm, 6.7–8.6 times longer than wide, broadest in the lower 1/3 to 1/2, green and matte above, green and glossy below, drying bicolorous yellowish green; **midrib** weakly and narrowly raised above, convexly raised below, drying paler than surface on both sides; **primary lateral veins** 15–25 pairs, departing midrib at 30–45° angle, mostly straight to the collective vein, scarcely or not raised on either surface when fresh, drying weakly raised on both surfaces; interprimary veins almost as conspicuous as primary lateral veins when dried; minor veins visible when dried; **collective veins** arising from the lowermost primary lateral veins, 1–4 mm from margin. INFLORESCENCES erect; **peduncle** 5–19 cm long, drying ca. 1 mm diam., drying light yellowish green; **spathe** lanceolate, 2.5–5 x 0.5–0. 7 cm, acuminate at apex, reflexed, chartaceous, medium green, drying green, broadest in lower 1/3; **spadix** usually weakly tapered to cylindrical, 4.4–7.4 cm long, 2–5 mm diam. near base, 2–3 mm diam. near apex, broadest at the base, yellowish green to grayish green, drying yellowish green; stipe 3–9 mm in front, 2–5 mm in back; **flowers** square, 1.7–2.1 mm in both directions, sides straight to smoothly or jaggedly sigmoid, 4 or 5 flowers visible in principal spiral, 3 or 4 flowers visible in alternate spiral; tepals matte, lateral tepals 1–1.2 mm wide, inner margins straight to weakly convex, outer margins angled, 2-sided; **pistils** weakly exserted, drying pale green; stigma ellipsoid, 0.4–0.7 mm, drying dark brown. INFRUCTESCENCE with berries in the basal portion only; **berries** depressed-globose, 2–2.5 mm long, 3–5 mm diam., white, drying pale green, apex broadly rounded; **seeds** 2, obovoid-flattened , 2.2–2.6 mm long, 2.2–3.5 mm diam., ca. 1.5 mm thick, pale brown with white-speckled surface.

Anthuriun debilipeltatum is endemic to Peru in the Department of Huánuco, known only from the limestone cliffs in the hills east of Río Huallaga near Tingo María at 675–800 m in *Premontane wet forest* transition to *Tropical* life zone.

The species is recognized by its limestone-loving habit; short stems with short internodes; cataphylls persisting as fine, mostly disorganized pale fibers; terete petioles; yellowish green-drying, lanceolate to oblong-elliptic, gradually long-acuminate

blades with the primary lateral veins scarcely raised or not on either surface; and obtuse to rounded leaf bases that extend somewhat beyond the petiole making the blade appear weakly peltate (hence the epithet "debilipeltatum").

Additional specimens seen: PERU. **Huánuco:** On 60º rocky slope above Río Huallaga at Tingo María, 09°18'S, 76°00'W, 4 Oct. 1972, *Thomas B. Croat 21023* (MO); *Thomas B. Croat 21068* (MO); *Thomas B. Croat 21081* (MO); Distrito Rupa Rupa, Tingo María, limestone hills opposite airport, 09°18'S, 75°59'W, 700–780 m, 9 Dec. 1981, *Timothy C. Plowman, M. Ramírez R. & Phillip M. Rury 11257* (F, K, MO, USM); Dtto. Rupa Rupa, al oeste de Tingo María (Cerrito frente al aeropuerto), 680–700 m, 6 Nov. 1971, *José Schunke V. 5131* (COL, F, G, GH, IBE, NY, US); Dtto. Rupa Rupa, Tingo María and environs, limestone hills opposite airport, *Timothy C. Plowman 7570* (AAU, F, K, MO, SEL, U, USM); Dtto. Rupa Rupa, al oeste de Tingo María, cerro frente al aeropuerto, 09°18'00"S, 75°59'00"W, 700–800 m, 3 Aug. 1978, *José Schunke V. 10443* (CM, MO, USM); Jacintillo on left bank of Río Monzón, west of Tingo María, 09°11'00"S, 76°12'00"W, 750 m, 16 Apr. 1976, *Timothy C. Plowman 5900A* (GH, MO).

Anthurium ellenbergii Delannay & Croat, **sp. nov.** Type: PERU. Huánuco: Trail along Río Monzón near Río Huallaga at Tingo María, 6 Oct. 1972, *Thomas B. Croat 21271* (holotype: MO-2276073). **Figure 5.**

The species is a member of section *Leptanthurium* and is characterized by its epiphytic habit, its short stems, its grayish-green-drying oblong-linear blades laying at a marked angle from the petiole and with diffuse primary lateral veins interspersed with numerous similar minor veins, and by its small inflorescence with a green spathe and a purplish spadix.

Epiphytic; **stem** short with dense network of adventitious roots at the base; **roots** elongated and branching, drying 2–3 mm diam, drying brown or blackish; **internodes** short, 9–12 mm diam. LEAVES with **petioles** 9–11 cm long, drying 2–3 mm diam., drying pale grayish-green, sheathed for ca. 2 cm at the base, sheath often not persistent; geniculum prominent and concolorous, forming a marked angle between the petiole and the blade; **blades** oblong-linear, 33–64 cm long, 2.5–4.5 cm wide, 13–14 times longer than wide, 3–7 times longer than petiole, acute and long-tapering at the base, acute and short-acuminate at the apex, widest near the middle, drying pale grayish-green and semiglossy on both surfaces, slightly paler below; **midrib** concolorous and raised on both surfaces; **primary lateral veins** ca. 7 pairs, arising at a 30–40° angle and arching towards the apex, widely spaced, concolorous and diffuse, interspersed with multiple minor veins of similar strength running in parallel towards the margins; **collective veins** not well defined, portions of it arising at various points from the primary lateral veins. INFLORESCENCE small; **peduncle** 8.5 cm long, drying 1 mm

diam.; **spathe** ca. 4 cm long, 6 mm wide, reflexed and twisted, green; **spadix** 3.5 cm long, 4 mm diam., purplish, stipe 3 mm long; **flowers** 4 visible per spiral, 2.2–2.4 mm long, 2–2.2 mm wide; lateral tepals 0.8 mm wide, inner margins rounded, outer margins 2-sided; stamens held at level of tepals, anthers 0.35 mm long, 0.5 mm wide; thecae ovate, weakly to moderately divaricate.

Anthurium ellenbergii is endemic to Peru, found only in Huánuco Department in Tingo María area at 1500–1650 m in a *Tropical moist forest* life zone.

Anthurium ellenbergii has been confused with *A. vittariifolium* but the latter differs by its longer petioles lacking a prominent geniculum and staying co-linear with the blades (rather than forming a marked angle in the case of *A. ellenbergii*), its blades with more prominent primary lateral veins not interspersed with parallel minor veins, and by its much larger inflorescences. *Anthurium vittariifolium* also occurs at low elevations (90–650 m) across the Amazon Basin rather than only at 1500–1650 m in the Tingo María area of Huánuco Department of Peru in the case of *A. ellenbergii*.

The species is named in honor of the late German botanist-ecologist Heinz Ellenberg, born 1 August 1913 in Harburg (Elbe) and who died 2 May 1997 in Göttingen. Ellenberg studied as an undergrad in Hanover and later worked in Montpellier, France (1932) where he studied under the direction of Swiss ecologist Josias Braun-Blanquet. Later he studied at the universities in Heidelberg, Hanover and Göttingen where he obtained his Ph.D. After World War II he became a professor at the University of Hamburg (1953), later in Zurich (1958) and finally in Göttingen where he spent the rest of his career. Ellenberg was an advocate of viewing ecological systems through holistic means. He developed 9-point scales for rating European plant preferences for light, temperature, continentality (geographic region), nutrients, soil moisture, pH, and salinity. In Göttingen, he established the Neuer Botanischer Garten der Universität Göttingen. From 1982 to 1986, he served as president of the International Association for Vegetation Science (IAVS). During the 1970s Ellenberg collected plants during his studies of vegetation in Argentina, Chile, Ecuador, Peru and Brazil. He made the first collection of this species for which he is being honored in 1971 in Peru.

Paratypes: PERU. **Huánuco:** Tingo María Pucalpa, 15º WNW, 1510 m, 5 Jan. 1971, *Heinz Ellenberg 3859* (GOET, MO); Cordillera Azul, ca. 39.2 km E of Tingo María on the road to Pucallpa, 1630 m, 19 Nov. 1979, *Christopher Davidson & Josephine Jones 9359* (LAM, MO).

Anthurium fornicifolium Croat, *Willdenowia* 35: 350–352. 2005. Type: Ecuador, Morona-Santiago, Serrania de Cutucú, 800–1000 m, from a cultivated plant at Marie Selby

Botanical Gardens, #76–28–13, originally collected by Mike Madison in 1976, vouchered as *T. B. Croat 81400* (HT: MO; IT: AAU, B, CM, F, K, NY, QCA, QCNE, RSA, S, SEL, US, WU). **Figures 6–8.**

Epiphyte; **stems** short; **internodes** short, 0.9–1.2 cm diam., **roots** white, velamentous; cataphylls and old petioles persisting; **cataphylls** 5.5–7.5 cm long, persisting semi-intact, heavily tinged reddish, drying brown. LEAVES arched; **petioles** erect-spreading, 14–28 cm long, 2–3.5 mm diam., slightly thicker than broad, obtusely C-shaped, narrowly and obscurely sulcate, sheathed 10–25 % of its length, closely ensheathing peduncle, dark green, semi-glossy; sheath 2.2–10 cm long; geniculum sulcate, paler, conspicuously swollen; **blades** arcuate, 27–59 x 1.9–6.6 cm (averaging 42 x 3.7 cm), oblong-linear to narrowly oblanceolate, stiffly subcoriaceous to coriaceous, occasionally somewhat quilted above, dark green and weakly matte-subvelvety to weakly glossy above, slightly paler and weakly glossy below, narrowly acuminate at apex, narrowly acute at base, with the margins turned somewhat upward, drying medium greenish-brown; **midrib** concolorous, bluntly acute at base, more acute and thicker than broad toward apex, sometimes narrowly round-raised toward apex above, narrowly rounded to weakly raised and concolorous to slightly paler than surface below; **primary lateral veins** weakly raised to narrowly convex and concolorous on upper surface, often pleated-raised and appearing somewhat acute above, scarcely raised on lower surface, only slightly darker than surface, sometimes scarcely visible on either surface; **tertiary veins** moderately obscure on lower surface; **collective veins** 1 pair, 3–6 mm from margin, moderately obscure on both surfaces, less conspicuous than primary lateral veins. INFLORESCENCE erect or nearly so at anthesis, becoming spreading, sometimes with the spadix erect; **peduncle** 17–40 cm long at anthesis (to 50 cm long in fruit); **spathe** 2–3.6 cm x 6–8 mm, green, tinged reddish purple in age, erect-spreading, often twisted toward apex, sometimes recurled, sometimes arched inward toward spadix; **spadix** slightly tapered, 5–9 cm long, 3–5 mm diam., pink, becoming somewhat olive-green, ultimately bright yellow at anthesis; **flowers** 5–6 per spiral, 1.8–2.2 mm long and wide, the lateral margins straight to weakly sigmoid; lateral tepals 2–3-sided, 1–1.2 mm wide, weakly glossy; pistils medium green, moderately acute, weakly protruding; stamens held in tight cluster, the anthers contiguous or nearly so. Infructescence spreading-pendent; spadix dark green; **berries** orange red, obovoid, 5–7 mm long, 5–6 mm diam.

Anthurium fornicifolium is endemic to Ecuador (Morona-Santiago, Napo, Sucumbios) at 500–1800 m elevation in *Premontane wet forest* and *Premontane rain forest* life zones.

The species is characterized by its slender, long-petiolate leaves with the petiole sheath closely clasping the peduncle, and the blades and petiole together forming

Figure 5. *Anthurium ellenbergii* Delannay & Croat (*Croat 21271*, MO-2276073). Herbarium specimen showing top of stem with fibrous cataphyll remnants, petioles with prominent geniculum, leaf blades, adaxial and abaxial surfaces, and inflorescence.

Figure 6. *Anthurium fornicifolium* Croat (*Cerón & Ayala 9860*, MO-4312488). Herbarium specimen showing top of stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

Figure 7. *Anthurium fornicifolium* Croat (*Croat et al. 105647*). Live plant showing numerous velamentous roots and hanging leaves.

Figure 8. *Anthurium fornicifolium* Croat (*Croat et al. 105647*). Close-up view of leaf blades, adaxial and abaxial surfaces, and inflorescence with green spathe and bright yellow spadix.

a large arc. Additional characters are the matte-subvelvety upper blade surface with the primary lateral veins pleated to weakly quilted, the red, intact cataphylls, spadices that ultimately become bright yellow at anthesis, and the orange-red berries.

Additional specimens seen: ECUADOR. **Morona-Santiago:** Cordillera de Cutucú, W slopes, along trail from Logroino to Yaupi, 02°46'S, 78°06'W, Nov. 1976, *Michael T. Madison, E.O. Bush III & E. Wade Davis 3235* (SEL); Centro Shuar Yukutais, E side of Río Yukutais, 03°30'S, 78°10'W, 950–1020 m, 6 Nov. 1988, *Bennett & Andrade 3533* (NY); Santiago-Río Morona, 36.1 km E of Santiago, 32.9 km E of Río Yaupi, 02°58'53"S, 77°48'03"W, 514 m, 10 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 90662* (B, MO, QCNE); Cordillera de Cutucú, Centro Shuar Angel Roubi, area de bosque intervenido y pasturas, 02°32'S, 78°04'W, 1100 m, 3 Feb. 2002, *Fernando Nicolalde-Morejón, Germán Toasa, I. Vinza & V. Jimbicti 1093* (MO, QCNE); Centro Shuar Yukutais, 8 km SW of Sucua, 02°30'S, 78°08'W, 900 m, 17 Jan. 1989, *Patricia Gómez A. 548* (MO, NY). **Napo:** Parque Nacional Sumaco-Galeras, Cordillera Galleras, premontane rain forest, 00°49'S, 77°35'W, 1060 m, 26 Oct. 2006, *S. Trogisch, S. Moritz & Jürgen Homeier 204* (GOET, MO, QCNE); 20 km W of Sumaco, 15 km S of Baeza, just W of Río Cosanga, secondary forest, 00°35'S, 77°51'W, 1500 m, 6 Dec. 1986, *Marc A. Baker7300* (MO); Along road from Muyuna and water treatment plant, 3.7 km from bridge over Río Tena at New University of Tena, 00°55'49"S, 77°51'58"W, 588 m, 15 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich & Matthew Rees 105647* (MO); San Jose, ca. 3 km from Tena, 00°59'00"S, 77°49'00"W, 1 Apr. 1969, *Hólguer Lugo S. 973* (GB); Archidona Cantón, Reserva Ecologia Antisana, Communidad Shamato, entrada por km 21-Samato, 00°43'S, 77°49'W, 1700 m, 22 Apr. 1998, *Clark & al. 5056* (QCNE); Tena, 10 Oct. 1939, *E. Asplund 9216* (S); vic. Mushullacta, along Río Huayusayacu, vic. of Communidad Mushullacta, S of main Narupa-Coca Rd., 13.2 km S of main rd., 41 km E of Narupa, 00°48'S, 77°34'W, 1150–1250 m, 20 Apr. 2003, *Thomas B. Croat, Lynn P. Hannon & Noel Altamirano 87895* (MO, QCNE). Vicinity Puyo, originally collected by B. Feuerstein, Oct. 1990, *Thomas B. Croat 75251* (MO, QCNE). **Sucumbios:** Gonzalo Pizarro Cantón Parroquia Reventador, tercera linea al N de la carrentera, c. al Río Due, 00°03'N, 77°35'W, 1800 m, 23 May 1990, *Carlos E. Cerón & Ayala, Judith 9860* (MO, QCNE).

Cultivated collections. ECUADOR: **Morona-Santiago**: Cordillera de Cutucú, living collection at Selby Gardens (SEL 28–76–13), *Madison 2696* (MO, SEL); 25 km SE of Logroño, 7 Dec. 1977, *Madison 4182* (SEL); Selby 82–0565, 26 June 1991, *Ingram 1031* (MO; SEL); *Ingram 1032* (MO); 28 Jan. 1992, *Ingram 1249* (SEL).

Anthurium gracile (Rudge) Schott, *Wiener Zeitschr. Kunst, Lit. Theater and Mode* 1829, (3):828. 1829. *Pothos gracilis* Rudge, *Pl. Guian. Rar.* 23, t. 32. 1805.

Type: French Guiana, *Martin s.n.* (holotype, Herb. Rudge, BM). **Figures 9–12.**

Anthurium acuminatum Schott, *Oesterr. Bot. Wochenbl.* 5:66. 1855 [Fide Engler (1905)]

Anthurium gracile (Rudge) Lindl., *Edward's Bot. Reg.* 19: t. 1635. 1833.

Anthurium gracile (Rudge) Lindl. var. *poiteanum* (Kunth) Engl., In Martius, *Fl. Bras.* 3(2):82. 1878.

Anthurium gracile (Rudge) Engl., *Bot. Jahrb. Syst.* 25:370. 1898 [redundant transfer].

Anthurium inconditum Schott, Oesterr. Bot. Z. 8:181. 1858 [Fide Engler (1905)].

Anthurium longipes Matuda, *Soc. Bot. Mexico Bol.* 14:23. 1952, not N.E. Br., *Card. Chron.* 18: 297. 1882. Type: Belize, *Gentle 2624A* (MICH).

Anthurium macilentum Schott, *Bonplandia* 7:165. 1859 [Fide Engler (1905)].

Anthurium poiteanum Kunth. *Enum. Pl.* 3:68. 1841.

Anthurium rudgeanum Schott, *Oesterr. Bot. Wochenbl.* 5: 66. 1855.

Anthurium scolopendrinum (Dev. ex Ham.) Kunth, *Enum. Pl.* 3:68. 1841.

Pothos scolopendrinus Ham., *Prod. Plant Ind. Occ.* 16. 1825. Type: French Guiana, *Desvaux s.n.* (P).

Epiphyte, usually erect; **caudex** short to elongate, 1.5–65 cm long, 7–12 mm diam.; **internodes** short to moderately short; **cataphylls** membranaceous, reddish or brown, persisting intact or weathering to thin, pale fibers, ultimately deciduous, 2–9.5 cm long; **roots** mostly descending, whitish or reddish, fleshy, velamentous, 4–6 mm (2–3 mm dried) diam. LEAVES moderately thin, more or less erect; **petioles** distinctly broadened and sheathed to 4.5 cm at base, subterete, narrowly flattened adaxially, narrowly sulcate, slightly to moderately geniculate and nodose at apex, 10–25 cm long, ca. 3 mm diam., medium green, weakly glossy; **geniculum** not extending onto blade, ca. 5 mm long; **blades** moderately thin, broadest above the middle, elliptic to narrowly oblanceolate or linear, acuminate at apex, cuneate to attenuate at base, 6.5–54 cm long, 0.5–9 cm wide, averaging 27 x 3.7, 1.6–4.4 times as long as petioles, dark green and weakly glossy above, slightly paler and matte below, essentially concolorous, minutely granular on upper surface, smooth and dark-speckled on lower surface; **midrib** prominently raised almost to apex above, raised below; **primary lateral veins** numerous, close, nearly obscure; **collective vein** arising from base, scarcely more prominent than interprimary veins, 4–8 mm from margin. INFLORESCENCES erect-

spreading; **peduncle** terete, conspicuously thinner than to as thick as petioles, usually exceeding petioles but usually not exceeding leaves, heavily tinged with reddish, usually 25–45 cm long, 1–3 mm diam.; **spathe** membranaceous or subcoriaceous, linear to elliptic, acuminate, sometimes with an aristate prolongation up to 0.7 cm long, obtuse at base, reflexed-spreading, acumen inrolled for 1.5 cm, margins prominently rolled under, 1–11.5 cm long, 2–13 mm wide, averaging 5.1 x 0.55 cm, 1.8–18 times shorter than peduncles, green, maroon, red-violet or green heavily tinged with reddish-brown; **spadix** sessile to subsessile, long tapered, often more or less curved, green, yellow-green or purplish, matte, 0.6–14.7 cm long, 2–5 mm diam. (wider at the base); **flowers** 4-lobed, 5–5.6 mm long, 3.8–4.3 mm wide, the sides jaggedly sigmoid, 2–4 flowers visible in principal spiral, 5–6 in alternate spiral; **tepals** matte to semiglossy, densely papillate and minutely pale punctuate, 2–2.7 mm wide; **pistils** reddish, weakly raised, semiglossy, densely minutely papillate, 0.4–0.5 mm long; **stigma** exserted, button-like; **stamens** cream, emerging in irregular sequence near the base, pollen white or bright yellow. INFRUTESCENCE pendent, **peduncle** to 60 cm long; **spadix** 10–15 cm long, 1.5–2 cm wide; **berries** scattered throughout spadix, bright red, globose, 6–8 mm long, **seeds** usually 2–4, white, embedded in a very sticky, gelatinous pulp.

Anthurium gracile ranges from Mexico (Quintana Roo) to Belize (Cayo, Stann Creek, Toledo), Guatemala (Alta Verapaz, Izabal, Petén), Honduras (Atlántida, Comayagua, Distrito Central, Gracias a Dios, Olancho, Yoro), Nicaragua (Boaco, Chontales, Granada, Jinoteca, Matagalpa, Río San Juan, Rivas, Zelaya), Costa Rica (Alajuela, Cartago, Heredia, Limón, Puntarenas**)**, Panama (Bocas del Toro, Canal Area, Coclé, Darién, Panama), Colombia (Amazonas, Antioquia, Caqueta, Cauca, Chocó, Cordoba, Guainia, La Guajira, Meta, Risaralda, Valle del Cauca), Ecuador (Esmeraldas, Morona-Santiago, Napo, Pastaza, Pichincha, Sucumbios, Zamora-Chinchipe), Peru (Amazonas, Cajamarca, Cuzco, Huanuco, Junín, Loreto, Madre de Dios, Pasco, San Martín, Ucayali**)** and Bolivia (Beni, Cochabamba, La Paz, Santa Cruz), and from Venezuela (Amazonas, Apure, Aragua, Barinas, Bolívar, Carabobo, Delta Amacuro, Mérida, Miranda, Portuguesa, Tachira, Zulia), Guayana (East Demerara, Essequibo), Suriname (Brokopondo, Commewijne**,** Marowijne, Nickerie, Para, Paramaribo, Saramacca, Sipaliwini) and French Guiana (Cayenne, Saint-Laurent du Maroni) to Brazil (Acre, Amazonas, Bahia, Mato Grosso, Pará, Rondonia, São Paulo); also found in the Caribbean (Dominican Republic); at 0–3100 m elevation in *Premontane wet forest, Premontane moist forest, Montane wet forest, Subtropical moist forest, Bosque montano pluviestacional*, *Tropical wet forest, Tropical moist forest* life zones.

The species is characterized by its moderately thin, elliptic to narrowly oblanceolate or linear leaves that are broadest above the middle, its numerous

and nearly obscure primary lateral veins, its collective veins arising from the lowermost primary lateral veins and running 4–8 mm from the margin, its peduncles longer than the petioles, its linear to elliptic, reflexed-spreading spathe with margins prominently rolled under, its sessile to subsessile, long-tapered spadix, and its bright red and globose berries.

Additional specimens seen: BELIZE. **Cayo:** Slate Creek Preserve, Mountain Pine Ridge, 17°05'22"N, 88°57'10"W, 200 m, 6 Oct. 1994, *D.J. Murray 5* (MO, SEL); Gorge Creek, Cohune ridge, Gorge Creek section, Hummingbird Highway, 17°05'N, 88°36'W, 28 Apr. 1955, *Percy H. Gentle 8695* (LL). **Stann Creek:** Manatee Forest Reserve (on Mullins River), 17°03'N, 88°28'W, 246–400 m, 7 May 1994, *Raúl Rivero, Bruce & Carolyn Miller 2575* (MO, SEL); Cocoa Branch, Cockscomb Mountains, tributary of Cocoa Branch of Sittee River, 2 km due N of Victoria Peak, Premontane wet forest, 16°49'47"N, 88°37'17"W, 100–160 m, 5 June 1973–6 June 1973, *Al Gentry 7954* (MO). **Toledo:** Solomon Camp, vicinity of the junction of Richardson Creek and Bladen Branch, foothills of the Maya Mountains, 16°32'N, 88°45'W, 80–420 m, 5 Mar. 1987–12 Mar. 1987, *Gerrit Davidse & Alan E. Brant 32063* (MO); Abraham Camp, Maya Mountains, Abraham Camp, 16°19'46"N, 89°08'43"W, 27 Mar. 1977, *Boutin & Schlosser 5183* (MO); Columbia Forest Station, 0.5 mi S of Columbia Forest Station, 16°16'17"N, 89°00'59"W, 13 June 1973, *Bruce D. Vanderveen 618* (MO); *Bruce D. Vanderveen 616* (MO); *Bruce D. Vanderveen 621* (MO). BOLIVIA. **Beni:** Gral. José Ballivian, km 12 of Yucumo-Rurrenabaque, 15°05'S, 67°07'W, 700 m, 30 July 1997, *M. Kessler, J. Gonzales, K. Bach, I. Jimenez, & A. Portugal 10874* (MO); SW of km 12 Yucumo-Rurrenabaque, side of road, 15°04'S, 67°07'W, 450 m, 25 July 1997, *M. Kessler, J. Gonzales, K. Bach, I. Jimenez, & A. Portugal 10832* (MO); Vaca Diez: 3 km E of Riberalta on road to Guayaramerín, then 2 km SE on side road, 11°00'S, 66°05'W, 230 m, 7 June 1982, *James C. Solomon 7970* (MO); 20.8 km E of Riberalta on road to Guayaramerín, path on right side, 11°05'S, 65°54'W, 230 m, 25 Sep. 1981, *James C. Solomon 6432* (MO); 17 km NE from Riberalta-Guayaramerín, on the old road to Cachuela Esperana (ca. 18 km E of Riberalta), 11°03'S, 65°50'W, 230 m, 4 Sep. 1981, *James C. Solomon 6113* (MO); Riberalta-Cojija, 22 km W of Riberalta then N ca. 2 km to Lago Tumichucua, Isla Tumichucua, middle of Lago Tumichucua, 10°08'25"S, 66°10'08"W, 150 m, 14 Aug. 2000, *Thomas B. Croat, A.C. Acebey & T. Kroemer 84524* (MO); Vicinity of Riberalta, Riberalta-Guayaramerín, 21 km E of Riberalta, then 5 km N, vic. of Cachuela Esperanza, 10°56'23"S, 65°41'23"W, 175 m, 15 Aug. 2000, *Thomas B. Croat, A.C. Acebey & T. Kroemer 84545* (MO); Vicinity of Verdun, Riberalta-Guagaramirim, 44.9 km E of Riberalta (beginning at Gasolinera Natsumi), then 22.8 km N on logging road, 10°52'05"S, 65°40'25"W, 190 m, 16 Aug. 2000, *Thomas B. Croat, A.C. Acebey & T. Kroemer 84574* (MO). **Cochabamba:** Ayopaya, Río Altamachi, 16°44'11"S, 66°10'02"W, 1450 m, 16 May 2004, *E.*

Fernandez, S. Altamirano 3706 (BOLV, MO); Río Altamachi, 16°44'11"S, 66°10'02"W, 1450 m, 16 May 2004, *E. Fernandez & S. Altamirano 3706* (MO); Altamachi: Río Altamachi and Río Malpaso, colindancia de límites dentro las prov. Ayopaya y Chapare, 16°33'32"S, 66°08'29"W, 1000–1100 m, 14 Aug. 2001, *Israel G. Vargas C. 6541* (K, MO, USZ); Sequerancho, 3 km below Sequerancho, towards casa del Gringo, 16°28'30"S, 66°47'04"W, 1000 m, 21 July 2001, *Israel G. Vargas C. 6309* (MO, USZ). Carrasco, 143 km on old highway Cochabamba-Villa Tunari, side of the road, 17°07'S, 65°34'W, 1300 m, 27 Aug. 1996, *M. Kessler et al. 7830* (MO); Valle del Sajta, 17°08'S, 64°50'W, 220 m, 1 Oct. 1996, *M. Kessler et al. 8743* (MO); Entre Ríos, Dist. Tres, Sector Coop. Litoral, Isla de Bosque Amazonico de piedemonte andino, 17°11'18"S, 64°30'59"W, 280 m, 2 Apr. 2006, *O. Colque & L. Mendoza 462* (MO); Parque Nacional Carrasco, 17°23'S, 64°24'W, 720 m, 21 Sep. 1997, *Acebey 747* (LPB, MO); Parque Nacional Carrasco, S of Campamento Ichoa, 17°23'S, 64°30'W, 500 m, 12 Sep. 1997, *A. Acebey 503* (LPB, MO); Chapare, Cavernas del Repechón, PN Carrasco, on side of the road, 17°02'S, 65°26'W, 550 m, 10 Sep. 1996, *M. Kessler et al. 8350* (MO); Villa Tunari, terreno de "El Puente", pozas en la zona sud, 16°59'S, 65°35'W, 400 m, 26 July 1993, *Pierre & Claudia Ibisch 93.0541* (MO); Vicinity of Villa Tunari, along Río Espirito Santo on trail to Baja Copacabana, 16°57'S, 65°25'W, 20 Nov 1980, *Thomas B. Croat 51273* (MO); Territorio Indigena Parque Nacional Islboro-Secure, cordillera de Mosetenez, arriba de la laguna Carachupa, 16°14'S, 66°25'W, 1350 m, 30 Aug. 2003, *M. Kessler, I. Jiménez & T. Krome 13084* (MO); Territorio Indigena Parque Nacional Isiboro - Secure, community of El Carmen de la Nueva Esperanza bank of Ichoa river, at the edge of village, 16°23'S, 65°57'W, 230 m, 16 Nov. 2005, *Evert Thomas & Reynaldo Berdeja 1394* (BOLV, MO); 16°23'S, 65°57'W, 230 m, 16 Nov. 2005, *Evert Thomas & Reynaldo Berdeja 1394* (MO); Santa Isabel, 17°10'30"S, 65°48'39"W, 1640 m, 12 Dec. 2005, *S. Altamirano, E. Zurita, C. Patzi, M. Canaza & Miguel Alcazar 3014* (MO). **La Paz:** 19 km from Guanay, 1200 m, 23 Jan. 1988, *Francesca Grifo & Jim Solomon 772* (MO); Yungas, 1800 m, 1885, *Rusby 2429*; Yungas, 1800 m, 1885, *Rusby 2430*; Presidente Figueiredo, *Araujo 279X* (INPA); Abel Iturralde, Río San Antonio, 46 km Ixiamas-Anto Madidi, 13°38'S, 68°26'W, 300 m, 17 Aug. 1997, *M. Kessler, J. Gonzales, K. Bach, S. Theinert, & E. Rapp 11217* (MO); Parque Nacional Madidi, río Tuichi, arroyo Rudidi, 14°20'57"S, 67°58'15"W, 367 m, 26 Sep. 2002, *A. Fuentes, N. Paniagua, H. Cabrera & F. Torrico 5290* (HUA, LPB, USZ, MO). Bautista Saavedra, 10 km de Camata hacia Apolo, 15°13'S, 68°41'W, 1300 m, 24 June 1997, *M. Kessler et al. 10285* (MO); Madidi, Apolobamba, Pauje Yuyo, Area Natural de Manejo Integrado Apolobamba, Pauje Yuyo, aprox. 3,5 km E de la Comunidad, 15°02'34"S, 68°29'12"W, 1070 m, 27 May 2004, *F. Miranda, A. Araujo, A. Poma, A. Antezana, R. Cuevas & N. Flores, 472* (LPB, MO, USZ); Pauje Yuyo, 15°02'12"S, 68°27'26"W, 940 m, 7 Sep. 2004, *L. Cayola, A. Antezana, F. Miranda, C. Cuevas & D.*

Cuevas 1128 (LPB); Area Natural de Manejo Integrado Apolobamba, Pauje Yuyo, 1.8 km NE of the city, 15°02'19"S, 68°26'54"W, 1020 m, 8 Sep. 2004, *L. Cayola, A. Antezana, F. Miranda, C. Cuevas & D. Cuevas 1152* (LPB, MO, USZ); *L. Cayola, A. Antezana, F. Miranda, C. Cuevas & D. Cuevas 1190* (LPB, USZ); Madidi, Paujeyuyo, Area Natural de Manejo Integrado Apolobamba, Paujeyuyo, 15°02'12"S, 68°27'26"W, 940 m, 15 Nov. 2003, *A. Fuentes, L. Cayola, S. Whitehead, R. Cuevas & R. Cuevas 6154* (LPB, MO); Pauji-Yuyo, between Apolo and Charazani, 15°02'S, 68°29'W, 1450 m, 8 June 1997, *M. Kessler, J. Gonzales, K. Bach, & A. Acebey 9903* (MO); Pauji-Yuyo, between Apolo and Charazani, 15°03'S, 68°29'W, 900 m, 15 June 1997, *M. Kessler, J. Gonzales, K. Bach, & A. Acebey 10184* (MO); Franz Tamayo, cerro, 5 km above the hacienda Ubito, 14°23'S, 68°28'W, 1200 m, 19 July 1993, *M. Kessler 4003* (LPB, MO); 42 km W and 1 km N of Rurrenabaque, 14°25'S, 67°55'W, 330 m, 2 Oct. 1994, *N. Helme 230* (MO); 42 Km W and 1 Km N of Rurrenabaque, 14°25'S, 67°55'W, 15 Oct. 1994, *Helme N. 312*; Parque Nacional Madidi, refugio Chalalßn, campamento Eslabon, at other side of river, 14°27'S, 67°56'W, 350 m, 23 Apr. 2000, *Kromer T. 1083*; Madidi, Apolo, Unapa, Area Natural de Manejo Integrado Madidi, Unapa, 21 km N of Apolo, 14°32'26"S, 68°29'46"W, 1022 m, 1 Sep. 2004, *A. Fuentes & C. Aldana 6373* (LPB, MO, US); Madidi, Apolo, Arroyo Pintata, Parque Nacional Madidi, Apolo-Azariamas, Arroyo Pintata, a 495 m del campamento en direccion SE, aproximadamente a 20 minutos saliendo del camino. Parcela Temporal de Muestreo 74 (0.1 ha), 14°28'6"S, 68°32'19"W, 1011 m, 19 Feb. 2003, *L. Cayola, A. Araujo, H. Cabrera, M. Calzadilla, F. Canqui, C. Maldonado, N. Paniagua, R. Alvarez, A. Alvarez & M. Alvarez. 15* (MO, LPB); Parque Nacional Madidi, Apolo-Asariamas, Arroyo Pintata entrando hora y media desde Sipia, Parcela Permanente V, 14°27'55"S, 68°32'33"W, 880–1015 m, 26 Feb. 2003, *L. Cayola, A. Araujo, M. Calzadilla, C. Maldonado, R. Alvarez & A. Alvarez 169* (LPB, MO); Parque Nacional Madidi, camino Apolo-Azariamas, arroyo Pintata, a 785 m del campamento en direccion W subiendo por el arroyo Pintata, 14°27'55"S, 68°32'35"W, 1015 m, 24 Feb. 2003, *N. Paniagua, H. Cabrera, C. Maldonado, R. Alvarez 5614* (LPB); Madidi, Quendeque, Retamas, Parque Nacional Madidi, río Quendeque, arroyo Retama, pica hacia el norte, en dirección a la serranía de Chepite, 14°58'11"S, 67°47'41"W, 360 m, 24 Jan. 2002, *A. Fuentes, J. Cerda & S. Vidaurre 3576* (LPB, MO); Madidi, río Tuichi, arroyo Pintata, Parque Nacional Madidi, Río Tuichi, arroyo Pintata, 14°25'43"S, 68°35'16"W, 750 m, 3 Dec. 2005, *A. Araujo-M., A. Poma, P. Garagorri, S. Paredes & E. Cuevas 2550* (BOLV, LPB, MO, USZ); Parque Nacional Madidi, río Tuichi, arroyo Yarimita, 14°32'55"S, 68°41'36"W, 890 m, 30 Nov. 2005, *A. Araujo-M., A. Poma, P. Garagorri, S. Paredes & D. Chambi 2490* (LPB, MA, MO); Madidi, Chalalan, Sendero Paraba, 14°25'23"S, 67°55'26"W, 370 m, 25 Nov. 2004, *A. Araujo-M, A. Palabral, N. Flores & P. Gismondi 1101* (MO,BOV, LPB, MO, USZ); Madidi, Tuichi, Pata, 14°37'46"S, 68°40'15"W, 1460 m, 24 Nov.

2005, *A. Araujo-M., A. Poma, P. Garagorri, S. Paredes & C. Cuevas 2239* (LPB, MO, USZ); Madidi, Virgen del Rosario, Parque Nacional Madidi, Virgen del Rosario-Moxos, 14°29'12"S, 68°24'50"W, 923–975 m, 10 Nov. 2003, *L. Cayola, N. Paniagua, S. Whitehead, R. Cuevas, C. Cuevas & L. Cuevas 449* (LPB); Parque Nacional Madidi, Refugio Chalalan, Campamento Eslabon vicinity, near the river at the camp, 14°25'S, 67°55'W, 350 m, 1 May 2000, *Kromer, T. & Acebey, A. 1151* (LPB,MO); Río Recina, Agriyuyi, 12 km WSW of Asariamas, 40 km NNW of Apolo, in the valley of Río Recina, 14°21'S, 68°37'W, 700 m, 24 Sep. 1993, *N. Helme 177* (LPB, MO); Suapi: K 649613–8357884 UTM, 350 m, 24 July 2002, *Modesto Zárate, et al 1505* (MO). Inquisivi, Parque Nacional de Choquecamiri, "Lakachaka", 16°40'S, 67°20'W, 1450 m, 26 Nov. 1991, *Marko Lewis 40678* (MO); Puente Alegre, Cajuata - Siquimirani, the area where the Cajuata-Siquimirani road crosses the Río Suri. 1 km SE of Cajuata, 16°43'S, 67°10'W, 1500 m, 27 Dec. 1989, *Marko Lewis 36909* (GB, MO). Nor Yungas, 1 km up side valley, crossing bridge at San Pedro, 32.1 km S of Caranavi on road to Yolosa, 15°56'S, 67°40'W, 1000 m, 26 Mar. 1982, *James C. Solomon 7367* (MO); 32.1 km N of (below) Yolosa on road to Caranavi, 16°02'S, 67°39'W, 1000 m, 6 Oct. 1984, *James C. Solomon and L. Escobar 12497* (MO); Yolosillas, below Coroico, 16°12'S, 67°44'W, 1300 m, 7 Oct. 1995, *M. Kessler et al. 5865* (MO); Yolosilla, 16°11'S, 67°44'W, 1050 m, 21 May 1995, *M. Kessler et al. 4277* (MO); Caranavi-Yucumo, 37.6 km NE of Caranavi, 15°40'37"S, 67°29'34"W, 1508 m, 5 Aug. 2000, *Thomas B. Croat, A.C. Acebey & T. Kroemer 84269* (MO); Vicinity of Sapecho, Caranavi-Yucumo, along side road NW off main road into Serrania de Marimones to Colonia Tupiza B, 15°31'25"S, 67°18'31"W, 600–850 m, 7 Aug. 2000, *Thomas B. Croat, A.C. Acebey & T. Kroemer 84310* (MO); Parque Nacional Anmi Cotapata, Estación Biológica Tunquini, NW of Coroico, NNE of La Paz; vic. of Chairo, 23 km W of Yolosa, 16°12'S, 67°50'W, 1300–1500 m, 21 Aug. 2000, *Thomas B. Croat, A.C. Acebey & T. Kroemer 84784* (MO); De Chuspipata bajando 14 km hacia Yolosa, y entrando 5 km hacia el río Huarinillas, a la orilla alta del río Elena y base de la ladera, 1150 m, 6 Aug. 1988, *St. G. Beck 13911* (MO, LPB); Parque Nacional Cotapata, Estación Biológica de Tunquini, Estación Biológica, 16°11'S, 67°52'W, 1550 m, 16 July 2000, *T. Kromer & A. Acebey 1299* (LPB, MO); Parque Nacional Cotapata, 16°12'S, 67°51'W, 1550 m, 22 May 2000, *T. Kromer & A. Acebey 1179* (LPB,MO); Quebrada del Río Santa Bárbara, cerca de Vacante, 16°11'S, 67°41'W, 1150 m, 19 Jan. 1996, *St. G. Beck 21919* (LPB, MO); Quebrada del Río Santa Bárbara, cerca de Vacante, 16°11'S, 67°41'W, 1150 m, 19 Jan. 1996, *St. G. Beck 21918* (LPB, MO). Sud Yungas, Alto Beni Concesión de la Cooperación de San José de Popoy, 600 m, 27 Dec. 1987, *R. Seidel & M. Schulte 2243* (MO); Alto Beni, Sapecho Concesion de la Cooperativa Sapecho, Parcela I., 15°32'S, 67°20'W, 600 m, 30 Jan. 1997, *T. Krömer, A. Acebey & R. Seidel 128* (MO); Chicaloma, bajando del pueblo hacia el río Solacama, 16°27'S, 67°29'W, 1500 m, 6

Feb. 1996, *St. G. Beck 22647* (LPB, MO); Alto Beni, territorio Mosetén, parcela V, 15°27'S, 67°22'W, 1150 m, 16 Sep. 1999, *T. Krömer & A. Acebey 871* (MO, LPB); Alto Beni, Sapecho, Colonia Tupiza, Parcela III, 15°32'S, 67°18'W, 700 m, 29 Oct. 1997, *T. Krömer, A. Acebey, & R. Seidel 95* (MO); Buena Vista, Colonia Buena Vista. Barbecho, 475 m, 5 Jan. 1994, *R. Seidel & D. Vaquiata 7720* (MO). Caranavi, Caranavi-Palos Blancos, a 6.2 km ca. desde San Lorenzo a la Colonia Alto Lima, 15°48'S, 67°28'W, 1020 m, 27 Sep. 2001, *I. Jimenez & K. Bach 636* (MO); Caranavi-Palos Blancos, a 1 km ca. desde el puente sobre el río Carrasco en dirección a la colonia San Salvador, 15°48'S, 67°28'W, 880 m, 27 Sep. 2001, *I. Jimenez & K. Bach 654* (MO); Serranía Bella Vista, 44 km from Caranavi towards Sapecho, 15°40'S, 67°29'W, 1300 m, 29 Aug. 1997, *Kessler et al. 11571* (LPB). **Pando:** 13 Sep. 2000, *N. Paniagua 651* (F-2175733). Madre de Dios, Camino nuevo de Sena hacia el Río Beni unos 10 km, media hora, 12 Oct. 1991, *St. G. Beck, A. Zonta, L. Medina, G. Pardo, & M. Puri 20443* (MO); Manuripi, Luz de América - Centro Siringuero, "El Gane", 200 m, 5 Sep. 1991, *L. Vargas, I. Hinojosa, A. Perry, W. Curupi, G. Arteaga, J. Idagua, & R. Chavez 95* (MO); 12 km W of Conquista, 3 Oct. 1991, *St. G. Beck et al. 20071* (MO); Lago Bay, a black water lake formed by the Río Arroyo just upstream from its junction with Río Manuripi, 11°57'S, 68°40'W, 10 Aug. 1982, *C.R. Sperling & S. King 6565* (NY, MO); Puerto América, 11°44'S, 67°59'W, 190 m, 11 Sep. 1994, *A. Jardim 1066* (MO, USZ). **Santa Cruz:** 5 Nov. 1995, *R. Foster 13688* (F-2111268); Florida, Río Mairana, Río Mairana canyon, 3 km N of highway at Yerba Buena, 17°57'S, 64°02'W, 1150 m, 16 Dec. 1990, *Nee 40399* (NY). Ichilo, Campamento Macuñucú, Parque Nacional Amboro, along the river, 17°43'S, 63°34'W, 16 Sep. 1996, *M. Kessler et al. 8605* (LPB, MO); 1 km S of Campamento Macuñucú, 17°43'S, 63°34'W, 26 Sep. 1996, *M. Kessler et al. 8658* (LPB, MO); Campo Vibora Pozo 30, 17°05'08"S, 64°16'04"W, 270 m, 4 Sep. 1998, *Israel G. Vargas C. 5736* (USZ); Parque Nacional Amboró, along small rocky stream through tropical evergreen forest, opposite camp on Río Macuñucú, 17°48'S, 63°35'W, 550 m, 5 Dec. 1991, *M. Nee 41946* (MO); 1.5 km río above Campamento Macuñucú, Parque Nacional Amboró, 17°43'S, 63°34'W, 25 Sep. 1996, *M. Kessler et al. 8620* (LPB, MO). Velasco, Parque Nacional "Kempff Mercado", near catarata "El Encanto", 14°40'S, 60°30'W, 200 m, 26 Aug. 1993, *P. & C. Ibisch, G. Rauer & D. Rudolph 93.0649* (CM, MO); Huanchaca II, Parque Nacional Noel Kempff Mercado, near Parcela 1, 14°21'45"S, 60°44'33"W, 700 m, 12 Oct. 1996, *R. Guillén, Killeen & Solíz 4686* (MO, USZ); Parque Nacional Noel Kempff Mercado, Campamento Las Gamas, 14°48'23"S, 60°23'12"W, 825 m, 30 Oct. 1995, *P.F. Foster, P. Solíz & C. Dickinson 547* (MEXU, MO, PMA, USZ). BRAZIL. **Acre:** Cruzeiro do Sul, Along right bank of Rio Moa, about 2 km upstream from its mouth, 70°37'S, 72°37'W, 150 m, 18 Aug. 1986, *Thomas B. Croat & Arito Rosas, Jr. 62291* (MO); Cruzeiro do Sul, along Rio Moa, upstream from its mouth at Rio Juruá, vicinity of International airport, 07°38'S,

72°36'W, 7°38'S, 72°36'W, 150 m, 21 Aug. 1986, *Thomas B. Croat & Arito Rosas, Jr. 62461* (INPA, MO); Mun. Manoel Urbano, Rio Purus, Seringal Terra Nova, 09°06'44"S, 69°47'41"W, 23 Nov. 1996, *D.C. Daly et al. 9100* (NY); Mun. Plácido de Castro, Seringal Itamarati, Colocacao Porto Hedite, 11 Jan. 1995, *C. Figueiredo, I. Riveiro & M. Pardo 549* (MO); Mun. Brasiléia, Reserva Extrativista Chico Mendes, Seringal Dois Irmãos, 10°45'S, 68°20'W, 7 Nov. 1991, *L. Ferreira & L.C. Ming 142* (NY); Municipio Porto Walter, along Rio Juruá Mirim, Communidade Estremo, left bank of river, 08°12'08"S, 72°56'48"W, 230 m, 15 Nov. 2001, *Thomas B. Croat 85239* (MO); Municipio Cruzeiro do Sul, Rio Juruá Mirim, ca. 2 km N of village of Vista Alegre, coordinates at river, 08°08'03"S, 72°49'47"W, 230–240 m, 17 Nov. 2001, *Thomas B. Croat 85358* (MO); Mun. Marechal Thaumaturgo, Basin of Rio Juruá, Rio Tejo, right bank., 09°02'35"S, 72°15'59"W, 2 Dec. 2000, *Daly, D.C. et al. 10349* (NY); Cruzeiro do Sul, *Prance et al. 2923* (INPA); Mancio Lima, *Cid et al. 5074* (INPA); Rio Branco, *Cid & Nelson 2849* (INPA); *Lowrie et al. 457* (INPA). **Amazonas:** Manaus, *Costa 61* (INPA); *Costa 161* (INPA); Rio Bauana, Tefe, 03°29'S, 65°00'W, *Plowman et al. 12566* (INPA, NY); Beaba, Rio Purus, 174 km downstream from Tapaua, Igarape, 04°52'S, 62°53'W, 13 Feb. 1986, *Gottsberger G. & Doring J. 13–13286* (MO); Rio Negro, Anavilhanas Island, near Paraná do Acai at the Ilha de Tres Bocas, 02°40'S, 60°43'W, 11 June 1990, *S. Mori et al. 21278* (INPA, MO); INPA campus, Estrada do Aleixo, Manaus, 30 Nov. 1974, *A. Gentry 13020* (INPA, MO); Rio Negro, left bank, "Paraná do Jacaré", Igapó, 02°01'18"S, 61°10'25"W, 300 m, 5 July 1999, *L.G. Lohmann 319* (MO); Rio Negro, left bank, "Paranã do Jacaré", ca. 300 m NE of coordinates 02°01'18"S, 61°10'25"W, 5 July 1999, *L.G. Lohmann 319* (MO); BR-319, *Prance et al. 22927* (INPA); Manaus-Porto Velho, BR_ 319 km 270 e 275, 20 Sep. 1979, *G. Vieira et al. 21* (INPA, MO); Itapiranga: *Cid et al. 470* (INPA); Manaus: *Albuquerque 1072* (INPA); *Albuquerque 1076* (INPA); *Aluizio s.n.* (INPA); *Anderson 316* (INPA); *Coelho et al. 934* (INPA); *Coelho & Damiao 830* (INPA); *Hopkins & Hopkins 316* (INPA); *Hopkins 1519* (INPA); *Macedo 5* (INPA); *Mori et al. 20490* (INPA); Estação Biológica do INPA, Reserva Campina, Km 45 north of Manaus on road Manaus - Caracaral., 26 Dec. 1982, *T. Plowman et al. 12662* (INPA, NY); *Prance et al. 11351* (INPA); *Ribamar & Ramos 367* (INPA); *Ribeiro 1350* (INPA); *Ribeiro 1512* (INPA); *Ribeiro 1553* (INPA); *Rodrigues et al. 1983* (INPA); *Silva s.n.* (INPA); *Soares 184* (INPA); *Sothers 364* (INPA); *Sothers & Assuncao 810* (INPA); *Steward & Ramos P20215* (INPA); *Steward & Ramos P20216* (INPA); *Vicentini 521* (INPA); *Vicentini 898* (INPA); Maraa: Rio Japurá, Sitio Fortaleza, approx. 7 km NW of town of Maraá, 01°50'S, 65°38'W, 6 Dec. 1982, *T. Plowman et al. 12267* (INPA, MO); Maues: *Cid et al. 4251* (INPA); Novo Airao: *Madison et al. PFE36* (INPA); Presidente Figueiredo: *Nelson & Lima P21105* (INPA); Rio Cuieiras: *Prance et al. 17942* (INPA); *Prance et al. 14866* (INPA); Rio Cunhua, *Prance et al. 16525* (INPA); Rio Javari: N of Palmeiras

airstrip, 05°08'S, 72°49'W, 2 Aug. 1973, *E. Lleras et al. P17103* (MO, INPA, MG); Rio Urubu, *Prance et al. 3763* (INPA); Rio Xie, *Silva et al. 1364* (INPA); Santa Isabel do Rio Negro, *Madison et al. PFE248* (INPA); Sao Gabriel da Cachoeira, *Madison et al. PFE435* (INPA); *Prance et al. 15913* (INPA); *Rodrigues 970* (INPA); Tefe: *Albuque et al. 597* (INPA); *Amaral et al. 8* (INPA); *Lleras et al. P16662* (INPA); *Lleras et al. P16664* (INPA); *Lleras et al. P17505* (INPA); West shore of Lago de Tefé, 17 Feb. 1977, *G.T. Prance et al. 24462* (INPA, MO). **Bahia:** Municipio de Una, Km 8 on São José da Vitória-Una, at intersection with BR101, 34 km S of Itabuna, 100 m, 14 May 1991, *S.J. Mayo, T.S. Santos & A.J.S. Argôlo 824* (MO). **Mato Grosso:** Aripuana, *Lisboa et al. 495* (INPA); *Lisboa 548* (INPA); Mun. Pontes e Lacerda, 9 km NW of Pontes e Lacerda on BR364 to Vilhena, 15°10'S, 59°25'W, 31 Oct. 1985, *Thomas et al. 4737* (INPA, MO); Rio Aripuana: *Berg et al. P18650* (INPA); *Berg et al. P18655* (INPA); *Berg et al. P19909* (INPA); Sinop: *Ferreira et al. 6225* (INPA); *Thomas et al. 4053* (INPA). **Pará:** 14 Oct. 1957, *Edmundo Pereira 3300* (MO); Municipio de Tucuruí, 12 km N of Tucuruí on road to Cametá, 03°36'S, 49°44'W, 50 m, 21 Mar. 1980, *T. Plowman, N.A. Rosa & C.S. Rosario 9879*; Itaituba, *Amaral et al. 1342* (INPA); Miraselvas, Mun. de Capanema, Rio Quatipuru, in vicinity of Miraselvas, ca. 30 km by road W of Bragança, 01°04'S, 46°59'W, 50 m, 9 Apr. 1980, *Gerrit Davidse, N.A. Rosa, M.G. Silva & C.S. Rosario 18119* (MO); Oriximina, *Davidson & Martinelli 10384* (INPA); *Davidson & Martinelli 10613* (INPA); Tucurui, *Ramos 1156* (INPA). **Rondonia:** Ariquemes, Mineração Campo Novo BR-421 a 2 km a Oeste da Mineração Campo Novo a 120 km de Ariquemes WSW, 10°35'S 63°37'W, 16 Dec. 1979, *G. Vieira et al. 468* (INPA, MO); *Nelson P21310* (INPA); Rio Pacaas Novos: 8–20 km above mouth, 6 Aug. 1968, *Prance, G. et al. 6830* (INPA, US); Roraima, Alto Alegre, *Milliken & Bowles M232* (INPA); Serra dos Surucucus, *Prance et al. 10093* (INPA); *Prance et al. 10141* (INPA); Uaiaca, *Prance et al. 10886* (INPA). **São Paulo:** Mpio. de Iguape, Peropava, Fazenda Boa Vista, 17 Aug. 1985, *Eduardo L.M. Catharino et al. 346* (MO). CARIBBEAN. **Dominican Republic**: San Cristobal, Cordillera Central, along road from Hato Damas (Mun. San Cristobal) to Mano Matuey, 15 June 1988, *Thomas B. Croat 68572* (MO); Cordillera Central, Santo Domingo, La Cumbre, 275 m, 4 May 1929, *Ekman 12357* (S). La Vega, Santuapo - Santo Domingo, 8–15 km SE of Nonao, 18°45'N, 70°15'W, 28 May 1986, *Christenson 1507* (MO). COLOMBIA: Caño Tigre, between Caño Aguas Claras and Caño Grande, 4.5 km SW of Villavicencio, Int. del Meta, 04°07'N, 73°39'W, 500–550 m, 24 Feb. 1943, *F.R. Fosberg 20150* (MO); Municipio de Turbo, carretera Tapón del Darién, sector río León-lomas aisladas, Km 37, 20 m, 28 Feb. 1984, *Jorge Brand & Manuel González 957* (MO); Intendency of Amazonas, along the Quebrada Arara, 2 hours by boat N. of Leticia, 27 Jan. 1969, *Thomas B. Croat 7548* (MO). **Amazonas:** Río Apaporis, above mouth of Río Kananari, 00°05'N, 70°30'W, 330 m, *Schultes & Cabrera 16037* (B); Río Pacoa - Río Kananari, Soratama, 250 m, *Schultes &*

Cabrera 12719 (B); Río Miritiparana, Cano Guacaya, 00°30'S, 70°40'W, 210 m, *Schultes & Cabrera 16247* (GH); *Schultes & Cabrera 16262* (B); Corregimiento La Pedrera, Comunidad de Pto. Lago, río Miritί, 40 km de la Pedrera, 05°40'N, 76°55'W, 120 m, 20 Nov. 1994, *D. Cardenas, D. Giraldo & E. Yukuna 6031* (COAH, MO); Amacayacu, Municipio de Leticia, Parque Nacional Natural Amacayacu, Centro Administrativo Mata-matá (Inderena), 03°45'S, 70°15'W, 100 m, 6 Mar. 1991, *A. Rudas, Francisco del Aguila Joaquin & Gilberto Morán 1486* (MO); Municipio de Leticia, Parque Nacional Natural Amacayacu, Centro Administrativo Mata-matá (Inderena), 03°47'S, 70°15'W, 100 m, 12 Mar. 1991, *A. Rudas, Francisco del Aguila Joaquin & Gilberto Morán 1555* (MO); La Pedrera, Inspección de Santa Isabel, Parque Nacional Natural Cahuinarí, Estación Biológica Puerto Barbados, Zona 1, al final del estirón del Río Cahuinarí entre la Estación y el Brazuelo de Boa, en dirección 270 grados desde el río hacia el brazuelo, en zona de rebalse bajo, 01°28'S, 70°46'W, 200 m, 13 Nov. 1990, *A. Rudas, Benito & Martín Letuama 1120* (MO); Leticia, Yaguacaca, lakes to North, 8 Nov. 1968, *McDaniel 11461* (IBE). **Antioquia:** Urabá-Chigorodó-Malagón, sector de la Quebrada La Puerca y Malagón, 10 m, 24 Mar. 1986, *Renteria, E. et al. 4753* (MO, JAUM); Dabeiba, Río Chever, Mutatá-Dabeiba, 32 km SE of Mutatá, near Chever, 07°20'N, 76°35'W, 280 m, 5 Aug. 1987, *Ricardo Callejas et al. 5073* (AAU, M, MO, QCNE); Puerto Berrío, Vda Alicante, Finca el Rebaño, en la via de San Juan de Bedout-La Cabaña, 06°37'N, 74°35'W, 350–410 m, 3 Mar. 1990, *R. Callejas, F.J. Roldán & V. Maza 9326* (HUA, MO); Mutatá, Hacienda el Darién, Mutatá-Pavarandó, 150 m, 7 Mar. 1987, *R. Fonnegra et al 1844* (HUA, MO); Municipio de Nariño, carretera a Puerto Venus, 694 m, 23 Sep. 1988, *Hernando Correa 1* (HUA, MO); Carretera Tapón del Darién. sector río Leon-Lomas Aisladas. km 37, 10 m, 27 May 1984, *Jorge Brand 1195* (JAUM, MO). **Caqueta:** 14.05 km SW of Florencia, Centro Investigacion Macagual [Universidad Amazonia], 01°21'00"N, 75°39'23"W, 258 m, 28 Aug. 2007, *Thomas B. Croat & Edwin Trujillo 98191* (MO, QCNE); 28 km SE of Morelia along the road to the Río Pescado (SW of Florencia), 280 m, 10 Jan. 1974, *G. Davidse, A. Gentry & F. Llanos 5660* (MO); Sierra de Chiribiquete, a la orilla derecha de la quebrada, cerca a la cueva, 01°05'N, 72°40'W, 595 m, 24 Aug. 1992, *Palacios, P. et al. 2504* (MO). **Cauca:** Guayuyacu, 400 m, 23 July 1984, *J. Laferriere 201* (MO). **Cordoba:** Tierralta, Corregimento Santa Ana (hoy Campo Bello), Cerro Paragüillo, 460 m, 11 June 2003, *Ramiro Fonnegra G. 7909* (HUA, MO). **Guainia:** Outskirts of San Felipe, 01°47'N, 67°16'W, 120 m, 8 Apr. 1984, *Al Gentry & Bruce Stein 46472* (MO). **La Guajira:** Sierra Nevada de Sta. Marta, Vertiente río cañas, 700–1000 m, 19 Aug. 1986, *Hermes Cuadros V. & Alwyn H. Gentry 2921* (MO). **Meta:** La Macarena, Río Duda, Parque N. N. Tiniguas, Centro Internacional de Primates - Macarena, 400–500 m, 8 Aug. 1988, *R. Polanco & C. Barbosa 187* (MO); Río Duda, Parque N. Tiniguas, Centro Internacional de Primates-Macarena, 400–500 m, 8 Aug. 1988, *R. Polanco & C. Barbosa 187* (MO). **Risaralda:** La Virginia, La

Virginia - Cartago, Vereda de Calabazas, en un cafetal abandonado, ca. 1 km de la carretera destapada, ca. 12 km del ingenio de Risaralda, 900 m, 30 Mar. 1989, *Jorge E. Ramos & P. Silverstone 1907* (MO). **Valle del Cauca:** Municipio Zarzal, Hacienda El Medio (Carretera Panamericana entre La Paila y Zarzal, parte plana del Valle del Río Cauca), 950 m, 17 Jan. 1988, *Felipe A. Silverstone-Sopkin, N. Paz & R.T. González 3532* (MO); El Cerrito, Hacienda El Milagro, 4 km W of town of El Cerrito, 950 m, 22 Jan. 1992, *P. Silverstone-Sopkin et al. 6475* (MO); Zarzal, Hacienda El Medio (Carretera Panamericana entre La Paila y Zarcal, parte plana del Valle del Cauca), 975 m, 20 June 1987, *Felipe A. Silverstone-Sopkin & N. Paz 3235* (MO). COSTA RICA. **Alajuela:** Upala, Dos Ríos 10 km al Noreste del pueblo, asentamiento campesino San Gil. Siguiendo el camino de San Gil a Birmania, 10°55'48"N, 85°18'00"W, 400 m, 8 Apr. 1988, *Gerardo Herrera 1729* (MO); Upala, San José 11 km al Noreste del pueblo, asentamiento campesino Jomusa, Río Palo Quemado, 10°58'48"N, 85°06'36"W, 40 m, 14 Apr. 1988, *Gerardo Herrera 1800* (MO); San Carlos, 28 June 1985, *William A. Haber, Eric Bello C. & Barry Hammel 1797A* (MO); *William A. Haber, Eric Bello C. & Barry Hammel 1832* (MO); 22 km NE of Quesada by air, 4 km W of Muelle San Carlos, 10°27'36"N, 084°30'00"W, 9 Apr. 1983, *Ronald Liesner 14172* (MO); 10 km NNW of San Ramón by road on way to San Lorenzo, 2.5 km S of Balsa, 10°09'00"N, 84°28'48"W, 1200 m, 25 Apr. 1983, *Ronald Liesner & Emmet Judziewicz 15039* (MO); San Carlos, 3 km south of Boca de Arenal along Río San Carlos on Hacienda Boca Arenal, 10°30'00"N, 84°30'00"W, 100 m, 3 June 1986, *Barry Hammel & Greg de Nevers 15322* (MO); *Barry Hammel & Greg de Nevers 15324* (MO); Los Chiles, R.N.V.S. Caño Negro, Llanura de Guatuso, Alrededor de la Laguna Caño Negro, 10°53'24"N, 84°46'48"W, 40 m, 4 Apr. 1995, *Ronald Villalobos 126* (INB, MEXU, MO); R.N.V.S. Caño Negro, Llanura de Guatuso, 10°52'48"N, 84°46'48"W, 30 m, 8 July 1987, *Nelson Zamora & I. Chacón 1347* (CR, MO); Upala, Colombia Puntarenas, Del Salon Comunal al Río Chimuria, 200 m, 11 Nov. 1987, *G. Herrera 1217* (MO); Colonia Puntarenas, Del Salón Comunal al Río Chimuria, 1 km aguas arriba siguiendo alternamente su margen, 10°52'N, 84°28'W, 200 m, 11 Nov. 1987, *Gerardo Herrera 1215* (MO); Llanura de Guatuso, 10 km Norte de la carretera a Santa Cecilia-Upala, por el Río Pizote, Caserío Jomusa, 11°01'48"N, 85°10'48"W, 10 m, 21 May 1990, *Gerardo Herrera & Barry Hammel 3864* (CR). **Cartago:** Forested slope, vicinity of Turrialba, 09°54'00"N, 83°40'48"W, 4 Feb. 1965, *R.K. Godfrey 66241* (MO, FSU); Río Tuís, near La Suiza, 09°51'00"N, 83°36'36"W, 180 m, 4 May 1956, *L.O. Williams & A. Molina R. 19573* (MO). **Heredia:** Along "Starkey Road", 4.5 km SE of bridge at Puerto Viejo, 10°25'48"N, 83°57'36"W, 50 m, 23 July 1979, *W.D. Stevens 13307* (MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 84°00'13"W, 100 m, 31 July 1981, *Barry E. Hammel 11080* (DUKE); Finca La Selva, the OTS field

station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 84°00'13"W, 100 m, 4 May 1982, *Barry Hammel 12003* (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 84°00'13"W, 100 m, 30 July 1979, *M. H. Grayum 2142* (DUKE, MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 84°00'13"W, 100 m, 17 June 1982, *B. Hammel & J. Trainer 12917* (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 84°00'13"W, 100 m, 19 Mar. 1980, *M. H. Grayum 2706* (DUKE); Finca La Selva, the OTS Field Station on the Río Puerto Viejo just E of its junciton with the Río Sarapiqui, 10°25'53"N, 84°00'13"W, 100 m, 31 Mar. 1981, *James Folsom 9539* (DUKE); Finca La Selva, the OTS Field Station on the Río Puerto Viejo just E of its junction with the Río Sarapiqui, 10°25'53"N, 84°00'13"W, 100 m, 24 Mar. 1980, *Barry Hammel 8254* (DUKE); Finca La Selva, the OTS Field Station on the Río Puerto Viejo just E of its junction with the Río Sarapiqui, 10°25'53"N, 84°00'13"W, 100 m, 24 Mar. 1980, *Barry Hammel 8250* (DUKE); Barva, La Selva, 10°25'12"N, 84°01'12"W, 100 m, 31 Mar. 1981, *James Folsom 9533* (TEX, DUKE). **Limón:** Headwaters of Quebrada Mata de Limón, central fork, and hills between central and westernmost forks, Finca Anai, collected with Gerardo Herrera, Andrés Matute & Felipe Chavarría, 09°34'48"N, 82°39'00"W, 25–40 m, 19 Nov. 1984, *Michael Grayum 4509* (MO); Hills 2 airline km SSE of Islas Buena Vista in the Río Colorado, 14 airline km SW of Barra del Colorado, 10°40'N, 83°40'W, 10–120 m, 13–14 Sep. 1986, *Gerrit Davidse & Gerardo Herrera 31071* (MO); Margin of Laguna de Atras, between Barra del Colorado and the mouth of the Río San Juan, 10°48'N, 83°37'W, 5 m, 21 Sep. 1986, *Gerrit Davidse & Gerardo Herrera 31516* (MO); La Aurora, Guácimo, Ca. 5 km al E del pueblo, sobre el Río Sierpe, frente al puesto del P.N. Tortuguero, 10°24'N, 83°33'W, 100 m, 16 Aug. 1988, *Rafael Robles, Gerardo Herrera & Luis Flores 2069* (CR, MO); Parque Nacional Tortuguero 2 km al Sur de Tortuguero, 10°30'36"N, 83°30'00"W, 3 m, 9 Nov. 1988, *Rafael Robles 2184* (MO); Between Siquerres and the Río Pacuare, south of the railroad bridge over the Río Pacuare, 10°05'N, 83°29'W, 50–100 m, 20 Dec. 1969–22 Dec. 1969, *William C. Burger & Ronald L. Liesner 6921* (MO); Along the new road between Limón and Puerto Viejo, about 2 km north of Puerto Viejo, 09°57'N, 83°02'W, 0–10 m, 29 Nov. 1975–30 Nov. 1975, *Richard Baker & William Burger 91* (MO); 10°30'00"N, 83°47'00"W, 40 m, 21 Mar. 1978, *Christopher Davidson, Amy Kraminer, L. Middleton, and B. Rasnow 7104* (MO); Cordillera de Talamanca, Río Hitoy - Río Cerere, Reserva Biol. Hitoy Cerere 1/2 km aguas arriba de la confluencia del Río Hitoy con el Río Cerere, 09°38'24"N, 83°02'24"W, 200 m, 19 Feb. 1989, *Gerardo Herrera & Abelardo Chacón 2416* (CR, MO); Matina, P.N. Barbilla, Cuenca del Matina, Sector Colonia Puriscaleña, Sendero Cerro Azul hasta Río

Surubres, 09°59'30"N, 83°22'40"W, 300–400 m, 24 May 2000, *E. Mora 1188* (MO). Pococi, Parque Nacional Tortuguero, along Río Tortuguero upstream to northern end of Lomas de Sierpe, 10°29'24"N, 83°30'00"W, 10 m, 22 Jan. 1997, *M. H. Grayum, B. Hammel & J. Schipper 11159* (INB, MO); Talamanca, Amubri, siguiendo el camino entre Amubri y Soki, margen izquierda del Río Urén, 09°30'00"N, 82°57'36"W, 150 m, 24 June 1989, *Gerardo Herrera 2953* (MO); Cuenca del Sixaola, San Miguel, ASACODE, sendero de entrada, 09°34'25"N, 82°40'00"W, 30 m, 10 Mar. 1999, *Edgar Mora Castro 199* (MO). **Puntarenas:** Along N Fork (known locally as "Quebrada Mona") of Quebrada Bonita, Carara reserve, 09°46'48"N, 84°36'00"W, 35–40 m, 11 June 1986, *Michael H. Grayum, Pam Sleeper & Roy Sleeper 7597* (MO); Reserva Indígena Guaymí, ca. 2 km al Oeste de donde Río Pavón se junta con Río Rincón, Golfito, 08°36'36"N, 83°31'12"W, 250 m, 19 Aug. 1991, *Reinaldo Aguilar 270* (MO); Golfito, Peninsula de Osa, Puerto Jimenez, Río Nuevo, 08°31'48"N, 83°18'00"W, 0 m, 9 Sep. 1997, *Alejandro Azofeifa 406* (INB, MO). ECUADOR. *Besse et al. 32* (QCA, SEL); Selva, Shandia, 3100 m, 14 Aug. 1957, *H.G. Barclay 4854* (MO). **Morona-Santiago:** Taisha, Río Guambime, a small river situated 2–3 km E of the military camp, 02°23'S, 77°30'W, 400 m, 17 June 1980, *J. Brandbyge & Asanza 32016* (AAU); Taisha, Río Guambime, 02°23'S, 77°30'W, 400 m, 18 June 1980, *J. Brandbyge & Asanza 32050* (AAU); Pumpuentza, S-SW of the village, 02°25'S, 77°20'W, 250 m, 29 June 1980, *J. Brandbyge & Asanza 32400* (AAU); Misión Bomboiza, 03°29'S, 78°34'W, 800 m, 23 Apr. 1973, *L.B. Holm-Nielsen, S. Jeppesen, B. Løjtnant & B. Øllgaard 4217* (AAU); 10 km W of Río Zamora, 2 km S of Río Bomboiza, Mision Salesiana, 03°27'S, 78°32'W, 800 m, 8 May 1986, *Baker 6981* (NY); Gualaquiza - Nueva Tarqui, at bridge over Río Cuchupampa, 900 m, 18 Apr. 1985, *Harling & Andersson 24278* (GB); Centro Shuar Yukutais, 03°22'S, 78°25'W, 18 Apr. 1989, *Bennett & Andrade 3705* (NY); Mendez - Morona, 49 km from turnoff from Limón-Sucua Rd., 720 m, 15 Oct. 1989, *Kress et al. 89–2873* (MO); Santiago - San José de Morona, 24.0 km east of Santiago, 02°58'20"S, 77°50'52"W, 320 m, 11 Sep. 2002, *Thomas B. Croat 87468* (MO); Santiago - Río Morona, 36.1 km E of Santiago, 32.9 km E of Río Yaupi, 02°58'53"S, 77°48'03"W, 514 m, 10 July 2004, *Thomas B. Croat, Lynn P. Hannon, Greg Walhert & Tuntiak Katan Jua 90674* (MO); Shuinia Nait, small mountain ridge ca. 8 km SE of Mision Bomboiza, 03°30'S, 78°33'W, 900–1000 m, 24 Apr. 1973, *L.B. Holm-Nielsen et al. 4374* (AAU); Morona, Cordillera de Cutucú, Centro Shuar Uusuants/Transkutuku, 02°32'S, 77°54'W, 800 m, 20 Jan. 2002, *Walter Palacios, N. Jaramillo & F. Nicolalde 15667* (MO, QCNE); Cordillera de Cutucú, Centro Shuar Uunsuants/Trans Kutuku, 02°32'S, 77°56'W, 1100 m, 19 Jan. 2002, *Germán Toasa & M. Tirado 8604* (MO, QCNE); Cordillera de Cutucú, Centro Shuar Angel Roubi, 02°20'S, 78°04'W, 1150 m, 3 Feb. 2002, *Germán Toasa & F. Nicolalde 8848* (MO, QCNE). **Napo:** near Tena, 400 m, 2-11 Apr. 1935, *Y. Mexia 7191* (S); Titputini -

Lagartococha, 1953, *Fagerlind & Wibom 2426* (S); Tena, 20 Oct. 1939, *E. Asplund 9654* (S); Tena - Archidona, 9 Oct. 1939, *E. Asplund 9195* (S); *E. Asplund 9655* (S); Tena - Napo, 16 Oct. 1939, *E. Asplund 9363* (S); Misahuallí Poblacion, vic. union of Río Napo & Río Misahuallí, 600 m, *Jaramillo 3796* (AAU,QUA); Tena, 6 km along Río Pano, rainforest, 00°58'S, 77°52'W, 500 m, 12 June 1968, *L.B. Holm-Nielsen & S. Jeppesen 705* (AAU); Misahuallí, 01°03'S, 77°41'W, 500 m, 13–14 Aug 1979, *L.B. Holm-Nielsen 19334* (AAU); *L.B. Holm-Nielsen 19340* (AAU); Project of Payomino, Ministerio de Agricultura y Ganadería, 00°26'S, 77°01'W, 200 m, 25 Feb. 1980, *J. Brandbyge & Asanza 30008* (AAU); Río Cuyabeno, about 2 km upstream from Puerto Bolívar on the right margin, 00°6'S, 76°10'W, 300 m, 20 Aug. 1981, *J. Brandbyge et al. 33813* (AAU); Río Cuyabeno, opposite the outlet of the Río Tarapuia, 00°06'S, 76°10'W, 300 m, 20 Aug. 1981, *J. Brandbyge et al. 33818* (AAU); Cuyabeno Nature Reserve, Laguna Grande, 00°02'S, 76°10'W, 240 m, 9 Nov. 1982, E. *Asanza & A. S. Barfod 41130* (AAU); Cuyabeno Nature Reserve, Río Cuyabeno and Laguna Cañangueno, 00°02'S, 76°10'W, 240 m, 12 Nov. 1982, *Asanza & Barfod 41220* (AAU); At or near Laguna Grande de Cuyabeno, 00°00'N, 76°12'W, 250 m, 20–22 Jan. 1984, *S. Lægaard 51084* (MO); Río Napo below Mishauali, 01°03'S, 77°40'W, 450 m, 14–15 Dec. 1985, *S. Lægaard 55820* (MO); Río Napo, Puerto Napo path to Latas, 700 m, 04–19 Dec. 1958, *G. Harling 3540* (S); Río Payamino, 60 km W of Coca, 00°29'S, 77°12'W, 19 June 1968, *L.B. Holm-Nielsen & S. Jeppesen 815* (AAU); Cantón Orellana, Sector Huashito, 20 km al norte de Coca, Propiedad de Palmoriente, 00°20'S, 77°05'W, 250 m, 3 Nov. 1989–21 Nov. 1989, *Edgar Gudiño 119* (MO); Baeza - Lago Agrio, 72.5 km W of Lago Agrio, 1166 m, 19 Dec. 1979, *Thomas B. Croat 49540* (MO); Payamino, Reserva Florística "El Chuncho", Estación Experimental INIAP-Napo, 5 km NW of Coca, 00°30'S, 77°01'W, 250 m, 13 Dec. 1987, *Carlos E. Cerón M. & W. Palacios 3001* (MO); Payamino, Reserva Florística "El Chuncho", Estación Experimental INIAP-Napo, 5 km NW of Coca, 00°30'S, 77°01'W, 250 m, 12 Oct. 1987, *Carlos E. Cerón M. 2505* (MO); Coca-Loreto-Hollín. Sitio Huaticocha, 00°45'S, 77°29'W, 500 m, 11 Jan. 1989, *Walter Palacios & C. Iguago, F. Hurtado 3526* (MO); *Walter Palacios & C. Iguago, F. Hurtado 3533* (MO); *Walter Palacios & C. Iguago, F. Hurtado 3534* (MO); Coca-Loreto, 8 km before Loreto, 00°35'S, 77°20'W, 800 m, 8 June 1987–15 June 1987, *Walter Palacios 1628* (MO); Lago Agrio - Baeza at Km 67.5, 00°01'N, 77°19'W, 1180 m, 6 Oct. 1980, *Thomas B. Croat 50460* (MO, QCA); Archidona-Baeza, vic. Jondachi, 20.1 km N of Baeza, 5 km S of turn off to Loreto, 00°45'56"S, 77°47'33"W, 1033 m, 19 Apr. 2003, *Thomas B. Croat, Lynn P. Hannon & Noel Altamirano 87801* (MO); Vicinity of Archidona, along road to San Pablo, 1.8 km E from main plaza in Archidona, 00°57'S, 77°49'W, 945 m, 21 Apr. 2003, *Thomas B. Croat, Lynn P. Hannon & Noel Altamirano 87932* (F, MO, QCNE); Along road SE of Francisco de Orelleno (Coco) to the way to El Auca 14.6 km past bridge over Río Napo, 00°37'S, 76°40'W, 450 m, 5 Oct. 1980,

Thomas B. Croat 50388 (MO); Along road between Lago Agrio and Francisco de Orellano (Coco), 15 km N of Coco, 00°30'S, 76°56'W, 450 m, 5 Oct. 1980, *Thomas B. Croat 50413* (MO); Cotococha, about 1 km west of Venecia and 25 km east of Tena, on the south side of the Napo River, 01°03'05"S, 77°42'43"W, 450 m, 14 June 2003, *L.R. Landrum, A. Trauth-Nare & E. Gilbert 10636* (ASU, MO); "Hakuna Matata" private lodge, ca. 5 km NE of Archidona, 00°54'S, 77°51'W, 1000 m, 17 Oct. 2006, *S. Trogisch, S. Moritz & J. Homeier 112* (MO, QCNE); Along edge of Cocha, near settlement, Limoncocha, 240 m, 27 Sep. 1977, *Foster 3872* (IBE, S); Jatun Sacha, Estación Biológica Jatun Sacha, 8 km W of Misahuallí, 01°04'S, 77°36'W, 450 m, 17 Nov. 1988–21 Nov. 1988, *Carlos E. Cerón M. & Carlos Iguago 5610* (MO); Reserva Biológica Jatun Sacha, Río Napo, 8 km al E de Misahuallí, 01°04'S, 77°36'W, 450 m, 19 Mar. 1987–28 Mar. 1987, *Carlos E. Cerón M. 953* (MO); Reserva Biológica Jatun Sacha, 8 km from Puerto Misahuallí, right bank of Río Napo, 01°04'S, 77°36'W, 450 m, 4 Sep. 1987, *Carlos E. Cerón M. & Quinto curso de Biología U.C. 1974* (MO); *Carlos E. Cerón M. & Quinto curso de Biología U.C. 2077* (MO); Estación Biológica Jatun Sacha, Río Napo, 8 km E of Misahuallí, 01°04'S, 77°36'W, 450 m, 17 Feb. 1988–24 Feb. 1988, *Carlos E. Cerón 3691* (MO); Reserva Biológica Jatun Sacha, Río Napo, 8 km abajo de Misahuallí, 01°04'S, 77°36'W, 450 m, 10 Dec. 1986, *David Neill 7543* (MO); Estación Biologica Jatun Sacha, 8 km E of Misahuallí, Río Napo, 01°04'S, 77°36'W, 450 m, 7–16 Feb. 1992, *MacDougal 4874* (CM, MO); 6 km río abajo de Misahualli y 2 km al sur del Río Napo, 01°05'S, 77°39'W, 500 m, 19 Nov. 1985, *Walter Palacios, David Neill 951* (MO); Sumaco, Loreto, Comunidad 10 de Agosto, Río Pucuno, Bloque 19, línea sísmica 22, Compañía Triton, 00°44'S, 77°32'W, 1000 m, 28 Mar. 1996, *Efraín Freire & J. Cerda 319* (MO, QCNE); Yasuní, Parque Nacional Yasuní, Pozo Amo 2, 00°52'S, 76°05'W, 230 m, 9 Jan. 1988–13 Jan. 1988, *Carlos E. Cerón M. & Flavio Coello 3287* (MO); Parque Nacional Yasuní, Río Tivacuno, en unión con el Río Tiputini, 00°45'S, 76°20'W, 220 m, 1 Apr. 1988, *Flavio Coello 208* (MO); Garza Cocha, 01°05'S, 75°47'W, 200 m, 8 Apr. 1983, *Lawesson, J.E., T. Læssøe & P.M. Jørgensen 43348* (AAU); Aguarico, Reserva Etnica Huaorani, carretera y oleoducto de Maxus en construcción Km. 92–96, al norte del Río Yasun, 00°55'S, 76°09'W, 250 m, 20 Mar. 1994, *Milton Aulestia & O. Gonti 2066* (MO, QCNE); Reserva Etnica Huaorani, carretera y oleoducto de Maxus en construcción Km 92–96, al norte de Río Yasun, 00°55'S, 76°09'W, 250 m, 20 Mar. 1994, *Milton Aulestia & O. Gonti 2099* (QCNE); Reserva Etnica Huaorani, Maxus road and pipeline construction project, Kms 60–61, 00°47'S, 76°26'W, 250 m, 11 June 1994, *Nigel Pitman 252* (MO, QCNE); Reserva Etnica Huaorani, Maxus road and pipeline construction project, Kms 100–102, 00°56'S, 76°13'W, 250 m, 16 July 1994, *Nigel Pitman 596* (MO, QCNE); Reserva Etnica Huaorani, carretra y oleoducto de Maxus, Km 108, Area del SPF, 00°59'S, 76°12'W, 245 m, 11 Jan. 1995, *Milton Aulestia, G. Oucare & B. Quihuiano 2996* (CM, MO, QCNE); Reserva Etnica

Huaorani, carretera y oleoducto de Maxus, Km 108, Area del SPF, 00°59'S, 76°12'W, 237 m, 13 Jan. 1995, *Milton Aulestia & Bainca 3071* (MO, QCNE); Reserva Etnica Huaorani, carretera y oleoducto de Maxus, Km 108, Area SPF, 00°59'S, 76°12'W, 235 m, 18 Jan. 1995, *Milton Aulestia & A. Omehuat 3262* (MO, QCNE); Reserva Etnica Huaorani, carretera y oleoducto de Maxus, Km 120, 01°02'S, 76°09'W, 250 m, 15 May 1995, *Milton Aulestia 3620* (QCNE, MO); Archidona, Reserva Ecológica Antisana, Comunidad Shamato, Entrada por Km 21-Shamato, 00°43'S, 77°49'W, 1700 m, 23 Apr. 1998, *John L. Clark, E. Narvaez & T. Pauchi 5056* (MO,QCNE); Sumaco, Bosque Protector de la Comunidad de Mushullacta, 00°49'39"S, 77°33'47"W, 1200 m, 25 Feb. 2003, *Noel Altamirano 150* (MO,QCNE); La Joya de los Sachas, Yasuní, Parque Nacional Yasuní, carretera y oleoducto de Maxus en construcción. Km 13–13.8, 00°25'S, 76°37'W, 250 m, 20 Feb. 1993, *Edgar Gudiño, G. Grefa & N. Andi 2260* (MO, QCNE); Tena, Jatun Sacha, Jatun Sacha Biological Station, 01°04'S, 77°36'W, 400 m, 25 May 1985, *David Neill 6479* (MO, QCNE); **Pastaza:** Centro Oriente, Tiwaeno, Waorani, 400–500 m, *Jaramillo 3198* (AAU,QCA); Curaray, 01°22'S, 76°58'W, 250 m, 18 Mar. 1980, *L.B. Holm-Nielsen et al. 21872* (AAU); Lorocachi, Lagartococha situated about 1 hours walk SE of the military camp, 01°39'S, 75°58'W, 200 m, 1 June 1980, *J. Brandbyge & Asanza 31476* (AAU); Río Capihuari, tributary of Río Pastaza, 02°30'S, 76°50'W, 285 m, 23 July 1980, *Øllgaard, Asanza C., Brandbyge, Roth & Sperling 35108* (AAU); Oil exploration camp Chichirota, on the Río Bobonaza, 02°22'S, 76°40'W, 300 m, 26 July 1980, *Øllgaard, Asanza C., Brandbyge, Roth & Sperling 35321* (AAU); Pozo petrolero "Garza" de TENNECO, 35 km (approx.) NE of Montalvo, 01°49'S, 76°42'W, 260 m, 2 July 1989–12 July 1989, *Vlastimil Zak & S. Espinoza 4600* (MO); *Fernando Hurtado, D. Neill 1543* (MO); *Fernando Hurtado, D. Neill 1558* (MO); *Fernando Hurtado, D. Neill 1461* (MO); *Fernando Hurtado, D. Neill 1470* (MO); Comuna Shuar AMUNTAY (KAPAWI), 02°31'S, 76°48'W, 250–300 m, 15 July 1988, *Carlos E. Cerón, W. Lewis & E. Kennelly 4355* (MO); Montalvo, 0–1 km N and E of the military camp, 02°05'S, 76°58'W, 250 m, 17–19 May 1979, *B. Løjtnant & U. Molau 13493* (AAU); New road toward Canelos, leaving Puyo-Macas road at Km 8, 10 km E of turnoff, 4 km beyond Las Palmas, 01°35'S, 77°50'W, 1000 m, 5 June 1985, *Bruce A. Stein 2992* (MO); Cantón Arajuno, Campamentos temporales 9, 22 y 25, línea propuesta del oleoducto Villano-CPF por ARCO, Km 25 NW of pozo Villano 2, 01°27'S, 77°36'W, 700 m, 3 Sep. 1998–14 Sep. 1998, *Efraín Freire & L. Santi 3319* (F, MO, QCNE); Cuansha-Nalpi, at Río Bobonaza, 9 Feb 1971, *Holguer Lugo S. 1437* (GB); Montalvo, 0–1 km N and E of the military camp, 02°05'S, 76°58'W, 250 m, 17–19 May 1979, *B. Løjtnant & U. Molau 13502* (AAU, BR); Pozo Villano 2 de Arco, 2 km del pueblo de Villano, 01°25'S, 77°20'W, 400 m, 3 Dec. 1991, *Galo Tipaz, Severo Espinoza & C. Gualinga 437* (MO); Pozo petrolero Villano 2 de ARCO, Informante: Dalmacio Molina, 01°25'S, 77°20'W, 400 m, 1 Dec. 1991–18 Dec. 1991, *Fernando Hurtado 2978* (QCNE,

MO, VDB). **Sucumbios:** Reserva Faunistica Cuyabeno, Laguna Grande, 00°00'S, 76°10'W, 265 m, 1-15 Apr. 1990, *Brucculeri 40950* (AAU); 265 m, 2 Apr. 1989, *Balslev et al. 84716* (AAU); 265 m, 6 Apr. 1989, *Balslev et al. 84891* (AAU); Reserva Faunistica Cuyabeno, Laguna Grande and surroundings, including Río Cuyabeno from Pto. Bolívar to above Laguna Cañangueno, 00°00'S, 76°10'W, 265 m, 11 Mar. - 13 May 1990, *Balslev et al. 97142* (AAU); 265 m, 11 Mar. - 13 May 1990, *Balslev et al. 97189* (AAU); *Balslev et al. 97245* (AAU); Río Cuyabeno, 10 km upstream from Río Aguas Negras, 00°10'S, 75°58'W, 220 m, 15 Feb. 1980, *L.B. Holm-Nielsen et al. 21180* (AAU); *L.B. Holm-Nielsen et al. 21175A* (AAU); *L.B. Holm-Nielsen et al. 21175B* (AAU); Cantón Lago Agrio, Parroquia Dureno, Comunidad indígena Cofán-Dureno, 00°02'S, 76°42'W, 350 m, 29 Dec. 1987–31 Dec. 1987, *Carlos E. Cerón M. & Miguel Cerón 3117* (MO); Reserva Faunistica Cuyabeno, Laguna Grande and surroundings, including Río Cuyabeno from Pto. Bolívar to above Laguna Cañangueno, 00°00'S, 76°10'W, 265 m, 11 Mar. 1990, *Balslev et al. 97189* (AAU); Río Cuyabeno from outlet of Laguna Grande and 5 km upstream, 00°01'N, 76°11'W, 265 m, 2 Apr. 1989, *Balslev et al. 84716* (AAU); Laguna Cañangueno - Río Cuyabeno, Reserva Faunistica Cuyabeno, 00°01'N, 76°11'W, 265 m, 6 Apr. 1989, *Balslev et al. 84891* (AAU); Redondo Cocha - Gamitana Cocha, Río Lagarto Cocha, 2 hours upstream from Río Aguarico, 00°32'S, 75°15'W, 190 m, 12 June 1983, *Lawesson, J.E., T. Læssøe & P.M. Jørgensen 44319* (AAU, MO); Río Lagarto Cocha, vic. Redondo Cocha, 00°33'S, 75°13'W, 190 m, 16 June 1983–17 June 1983, *Lawesson, J.E., T. Læssøe & P.M. Jørgensen 44475* (AAU); Río Wai si ayá, 1.5–2 km upriver from outlet in Río Aguarico, 00°15'S, 76°21'W, 300 m, 13 Aug. 1981, *J. Brandbyge et al. 33496* (AAU); Lago Agrio, Reserva Cuyabeno, 00°00'S, 76°11'W, 230 m, 16 Nov. 1991, *Walter Palacios & Tipaz, Rubio, Gudiño, Aulestia 9059* (KRAM, KYO, L, MO); Reserva Cuyabeno, Orilla del Río Aguarico, Comunidad indígena cofán del Zábalo, 00°22'S, 75°45'W, 230 m, 21 Nov. 1991, *Walter Palacios & Tipaz, Rubio, Gudiño, Aulestia 9517* (MO); Orellana, Tiputini Biodiversity Station, 00°38'S, 76°09'W, 200 m, 12 Feb. 2002, *N. Köster, H. Kreft & M. Wimmer 946* (MO); Tiputini Biodiversity Station, 00°38'S, 76°09'W, 200 m, 2 Jan. 2002, *N. Köster, H. Kreft & M. Wimmer 558* (MO). **Zamora-Chinchipe:** Podocarpus National Park, 5 km S of Zamora, along trail from parking area to Bombuscaro Visitors Centre, 04°06'S, 78°57'W, 1000 m, 11 Nov. 2000, *R. Leimbeck, Madsen, J. E., Windeballe, B. & Rosales, C. 360* (MO); About 30 km N of Zamora, S of Guadaloupe, near the village Conchay at Río Yacuambi, 03°52'S, 78°52'W, 1000 m, 12 Nov. 2000, *R. Leimbeck, Madsen, J. E., Windeballe, B. & Rosales, C. 380* (MO); Podocarpus National Park, 1 ha study plot about 1 km SW of Bombuscaro Visitors Centre, 6 km S of Zamora, 04°06'S, 78°57'W, 1050 m, 17 Nov. 2000, *R. Leimbeck, Windeballe, B. 408* (MO); Valladolid - Río Palanda , 1500 m, *Harling & Andersson 21333* (GB); Gualaquiza-Zamora, 5 km S of El Pangui, 03°40'S, 78°36'W, 800 m, 20 Oct. 1980, *Thomas B.*

Croat 50813 (MO); Cordillera del Condor, Campamento Shaime, along Río Nangaritza, 04°20'S, 78°40'W, 900 m, 14 Feb. 1994, *H. van der Werff, B. Gray, E. Freire & M. Tirado 12991* (MO); Paquisha - Las Orchídeas, and end of river at Río Nangaritza, via Guayzimi, beginning at 15.9 km E of Zumbi and Río Zamora, then 37.3 km S of junction, 12.3 km N of Las Orchídeas, 04°08'25"S, 78°38'31"W, 886 m, 17 July 2004, *Thomas B. Croat, Lynn P. Hannon, Greg Walhert & Tuntiak Katan Jua 91414* (MO); Río Bombuscara, about 2 km E Zamora city, 900 m, 17 May 1967, *Sparre 16393* (S); Nangaritza, Parroquia Guayzimi, Campamento Militar Shaime, completo con M. Chango, V. Tapur, G. Aymard & J. Alban., 04°18'S, 78°43'W, 1050–1150 m, 24 Oct. 1991, *Carlos E. Cerón 17086* (MO); Shaimi, Alto Nangaritza, 1100 m, 7 Nov. 2004, *F. A. Werner 1327* (MO). FRENCH GUIANA. Approuague River, near Tortue Creek, ca. 300 m from the river, 25 Jan. 1967, *Oldeman 2335* (CAY); Approuague River, at entrance to Saut Mapaou and Saut Athanase, 26 Jan. 1967, *Oldeman 2357* (CAY); Montagne de Kaw, 7 May 1985, *Cremers 8684* (CAY); Piste de Paul Isnard, entre le PK 90 and Citron, 7 Nov. 1982, *Feuillet 280* (CAY); Savane et Plaine de Kaw, Montagne de Kaw, cimetière de Kaw, 04°26'N, 52°23'W, 10 m, 31 Dec. 1987, *Cremers et al. 9743* (CAY); Ferme d'acquaculture sur La Comté, 04°38'N, 52°23'W, 1 Feb. 1988, *Billiet & Jadin 4315* (BR); Piste Saint-Laurent vers Paul Isnard, près de la orique Saut Sacaba, 7 Nov. 1982, *Billiet & Jadin 1587* (BR); Rivière Comté, à proximité de la route N2, 27 Oct. 1981, *Billiet 1182* (BR, CAY); Montagnes de Kaw, Camp Caiman, 13 Nov. 1983, *Billiet & Jadin 2012* (BR, CAY); Cacao, piste de Coralie, 31 Oct. 1982, *Billiet & Jadin 1503* (BR); 1819–1821, *Poiteau s.n.* (G); Kourou, piste forestière, 20 Oct. 1981, *Billiet & Jadin 1057* (BR, CAY); Village Boni de Loca, Bassin du Maroni, Lawa, 03°50'N, 54°12'W, 18 May 1988, *M. Fleury 636* (CAY, MO); Village Boni de Loca, Bassin du Maroni sur kotokoy tabiki (petite ile en face de Loka), 03°50'N, 54°12'W, 15 Oct. 1987, *M. Fleury 482* (CAY, MO); Entre les deux premiers sauts du Marouini près d'Antecume Pata, confluent de l'lItany (Haut Maroni) et du Marouini, 8 Nov. 1977, *Cremers 4994* (CAY); Montagnes de la Trinité, Sommet Nord, 450 m, 11 Jan. 1984, *Granville et al. 5879* (CAY); Montagne de la Trinité, sommet NE, ca. 200 m in low forest along creek near camp 4, 5 Feb. 1984, *Granville 6514* (CAY); Piste de St. Elie, 6 Feb. 1984, *Foresta 510* (CAY); Fleuve Approuague, Riv. Arataye, Sauts Parare, 16 Feb. 1981, *Barrier & Feuillet 2659* (CAY); Bourg de Maripasoula, Bassin du Maroni, 03°37'N, 54°05'W, 12 May 1986, *Fleury 224* (CAY); Embouchure de la rivière Grand Tamouri (affluent du Camopi), Saut Bambaye, 13 Mar. 1974, *Granville 2092* (CAY); Montagne de la Trinité, sommet NE, 25 Jan. 1984, *Granville et al. 6287* (CAY); Montagne de la Trinité, sommet NE, ca. 350 m in high forest along trail camp 4–3, at ca. 1.5 h from camp 4, 8 Feb. 1984, *Granville et al. 6587* (CAY); Route de l'Acarouany, Bassin de la Mana, 05°34'N, 53°51'W, 9 Feb 1990, *Cremers & Hoff 11330* (CAY); Saül, 20 Nov. 1984, *Riera 926* (CAY); Savane Roche de Virginie, Bassin de

l'Approuague, 04°11'N, 52°09'W, 50 m, 10 Feb. 1991, *G. Cremers & P. Petronelli 11772* (CAY); Saut Kawene, Crique Kourcibo, Bassin du Sinnamary, 04°53'N, 53°03'W, 12 m, 4 Apr. 1990, *M. Hoff et al. 6466* (CAY); Mont Atachi Bacca, Région de l'Inini, sommet Nord-Quest, 7 km a l'Est de Gobaya Soula, environ du camp 2, 03°33'N, 53°55'W, 460 m, 8 Jan. 1989, *Granville et al. 10475* (CAY); Mont Atachi Bacca, Région de l'Inini, 7 km a l'Est de Gobaya Soula, sommet Nord-Ouest, abords du camp n. 2, 03°33'N, 53°55'W, 440 m, 12 Jan. 1989, *Granville et al. 10609* (CAY); Vicinity of Saül, along Sentier Botanique departing from Eaux Claires, along headwaters of St. Eloi River, 03°37'N, 53°12'W, 350 m, 14 Feb. 1993, *Thomas B. Croat 74231* (MO); Along road between Cayenne and Regina, off P.K. 93., 04°18'N, 52°10'W, 100–150 m, 21 Feb. 1993, *Thomas B. Croat 74304* (MO); Trois Sauts (Haut Oyapock), Saut Pakwil, 19 Nov. 1974, *Grenand 527* (CAY); Piste de Belizon, pk 29.2, 130 m, 16 Nov. 1994, *Billiet, F. et al. 6261* (BR, CAY); Crique Anne, Saut Dalles, Bassin du Sinnamary, 04°32'N, 52°53'W, 42 m, 15 Jan. 1992, *Hoff, M. 7585* (CAY); 8 July 1997, *Barrier 313* (NCY); Bassin du Ba, Route Regina, Saint Georges D.Z. 5, P.K. 43, 04°03'N, 52°01'W, 60 m, 9 Apr. 1991, *Cremers & Gautier 12093* (CAY); Bassin du Sinnamary, Saut Takari-Tante, 04°36'N, 52°56'W, 34 m, 19 Nov. 1989, *Hoff 5934* (CAY); Sinnamary, Petit Saut, 5 eme arbrissage, site de la mission Radeau des Crimes Guyane, 05°04'N, 53°03'W, 10 m, 12 Nov. 1989, *Peter A. Schäfer 9146* (CAY); Haut Oyapock, Trois Sauts, 4 Apr. 1976, *Sastre 4672* (CAY); Mont Atachi Bacca, Région de l'Inini, 5 km N du sommet principal., 03°33'N, 53°55'W, 420 m, 10 Jan. 1989, *J.J. de Granville et al. 165* (MO, CAY, MO); Montagnes des Nouragues, Bassin de l'Arataye, 04°03'N, 52°42'W, Mar. 1990, *Larpin 878* (CAY); Saül, on Route de Belizon N of Eaux Claires, 03°37'N, 53°00'W, 200–400 m, 8 Nov. 1990, *S. Mori et al. 21561* (CAY, MO, NY). **Cayenne:** Tonate - Montsinery, along road in Forest Macouria, ca. 25 km from highway D5, 04°57'N, 52°30'W, 1–30 m, 25 Oct. 1986, *Skog et al. 7050* (CAY); Sinnamary, route de l'Anse, 14 Jan. 1985, *Feuillet 1581* (B, CAY, K, P, US); Plaine de Kaw, 13 Apr. 1984, *J. Granville 6786* (CAY); PK 22 de la route de St. Elie, 6 Feb. 1977, *Cremers 4305* (CAY); Cabassou, vieille forêt secondaire de l'île de Cayenne, 24 Nov. 1978, *Prevost 402* (CAY); Piste de St. Elie, Km 21, 8 Mar. 1979, *Prevost 450* (CAY); Savane Gabrielle, 31 Jan. 1974, *Lescure 63* (CAY); *J. Granville 2832* (CAY); Tracé de la crique la Boue, appartenant a la crique Ipoucin de l'Approuague, rive gauche, 1 Mar. 1969, *Oldeman 2296* (CAY); From Belizon in Jan. 1977, 1979, *Veyret 1601* (CAY); Savane Gabrielle, 31 Jan. 1974, *Lescure 62* (CAY); Plaine de Kaw, crique Angélique, 13 Apr. 1984, *Granville 6834* (CAY, P); Fleuve Oyapock, sur la crique Armontabo à environ 6 km en amont du saut Canori, 3 Mar. 1968, *Oldeman 1489* (CAY); Montagne de Kaw, 13 May 1985, *Feuillet 2241* (CAY); Fleuve Oyapock, Saut Couyari, 9 May 1970, *Oldeman 3161* (CAY); Haut Oyapock, les Trois Sauts, 19 May 1970, *Oldeman 3262* (CAY); Saut l'Autel, 26 Sep. 1965, *Oldeman 1554* (CAY); Rive droite du Yaroupi,

environ 500 m en amont du Saut Couéki, 27 Apr. 1970, *Oldeman 3087* (CAY, MO); D.Z. de Saut Dalles, Bassin du Sinnamary, 04°33'N, 52°53'W, 60 m, 7 Jan. 1992, *Hoff, M. 7213* (CAY); D.Z. 5, Régina-St. Georges, Bassin de l'Approuague, 04°02'N, 52°01'W, 100 m, 1 Dec 1995, *J.J. Granville & G. Cremers 13189* (CAY, MO, P); Saint-Elie-Interfluve Sinnamary/Counamama, Km 15.7, camp Orstom, 05°20'N, 53°00'W, 20 Feb. 1997, *M.F. Prevost 3292* (CAY, MO); Along St. Elie Tack, (west from Km 105 N of Sinnamary), NW of Sinamary, (current end of road), W of Orstom "Ecerex" Project., 250 m, 6 July 1982, *Thomas B. Croat 53841* (MO); Camp Eugène - Bassin du Sinnamary, chablis de forêt de basse altitude, layon de bas de pente, R4, 04°51'N, 053°04'W, 80 m, 6 Feb. 1995, *G. Cremers & J.J. de Granville 13704* (MO); Mont Grand Matoury - Ile de Cayenne, 04°52'N, 52°21'W, 200 m, 10 Apr. 1995, *G. Cremers, F. Crozier, J.J. de Granville & C. Tardy 13901* (MO); Montagnes de La Trinité, Bassin de La Mana, 04°35'N, 53°21'W, 100 m, 13 Nov. 1991, *Cremers 12690* (CAY). **Saint-Laurent-du-Maroni:** Piste de Paul Isnard, entre la PK 90 et Citron, 7 Nov. 1982, *Feuillet 279* (BR, CAY); Haut Tampoc, le long du layon allant de la Crique Alice à la borne frontière N 15, 2 Apr. 1977, *Cremers 4614* (CAY); Haut Tampoc, Saut Pier Kourou, 27 Mar. 1977, *Cremers 4515* (CAY); Montagne Bellevue de l'Inini, Zone Centrale, 550 m, 29 Aug. 1985, *Granville et al. 7907* (CAY); Fleuve Grand Inini, en aval de dégrad fourmi, bord de la crique Adolphe, 140 m, 11 Aug. 1985, *Granville et al. 7420* (CAY); Logging trail off Piste de Paul Isnard, ca. 20 km SE of St. Laurent, 05°23'N, 53°58'W, 5–20 m, 20 Nov. 1986, *Skog et al. 7530* (CAY); Layon de chasse en forêt primaire, près d'Antecume Pata, confluent de l'Itany (Haut Maroni) et Marouini, 6 Nov. 1977, *Cremers 4950* (CAY); Riv. Mana, Saut Fracas, Ilots de Saut, 22 July 1981, *Cremers 7291* (CAY); Saül, vicinity of Eaux Claires, on Route de Belizón, to 2 km S of Eaux Claires, 03°37'N, 53°12'W, 200–300 m, 8 Nov. 1992, *S. Mori et al. 22852* (MO); Saül Mont Galbao Trail up to Cambrouze, 03°37'N, 53°12'W, 200–300 m, 15 Sep. 1989, *Mori et al. 20918* (NY); La Fumée Mountain Trail, 03°37'N, 53°12'W, 225 m, 22 Sep. 1989, *Mori et al. 21013* (NY). GUATEMALA. **Alta Verapaz:** Sebol, 1 km E of Sebol, 15°48'15"N, 89°55'50"W, 3 May 1964, *Elias Contreras 4605* (LL). **Izabal:** San Felipe: Punta Dos Reales - Punta de Lechuga, Shores of Lago Izabal, on side opposite San Felipe, between Punta Dos Reales and Punta de Lechuga, 15°38'14"N, 89°00'04"W, 25–50 m, 17 Apr. 1940, *Julian A. Steyermark 39615* (MO); Selempim, Selempim - Bocancha, Oberhalb von Selempim entlang des Weges nach Bocancha am Fuss der Sierra de Las Minas, 15°19'10"N, 89°24'42"W, 20–80 m, 17 Apr. 1998, *H. Förther et al. 10212* {*231*} (MO, MSB). **Petén:** Laguna Petexbatun, about 3 km south of El Escarbadero, in corozal, 16°25'51"N, 90°11'33"W, 1 Apr. 1964, *C.L. Lundell 18215* (LL). GUYANA. Kamoa River, 01°32'N, 58°50'W, 260 m, 22 Sep. 1989, *Jansen-Jacobs et al. 1763* (U); U. Demerara-Berbice River, 20–30 km SW of Torani Canal, between canal and sand hills, 05°38'N, 57°45'W, 0–25 m, 20 Apr. 1987, *J.J. Pipoly, 11718* (MO); U. Takutu - U.

Essequibo, Essequibo River, 5 km upstream from Gunn's village, 01°38'N, 58°37'W, 250 m, 1 Apr. 1994, *T.W. Henkel et al. 5401* (MO, US); Barima-Waini Region, Hossororo, near Port Kumaka via Aruka river, 07°10'07"N, 59°48'17"W, 0–100 m, 17 Apr. 2001, *T.H. Hollowell, K. David, K. Redden & A. Benjamin 481* (MO). **East Demerara:** East Coast Water Conservancy, SE of Georgetown Lamaha stop-off, 25 Nov. 1919, *Hitchcock 16870* (S). **Essequibo:** Mainstay Essequibo, *Grewal & Persaud 145* (B, U); Rewa River, near Camp 2 at foot of Spider Mountain, 220 m, 16 Sep. 1999, *Jansen-Jacobs et al. 5939* (U). HONDURAS. **Atlántida:** Campamento Quebrada Grande ca. 10 km SW of La Ceiba, at base of north slope of Pico Bonito, from camp to 2 km south of camp, Río Bonito, 15°42'N, 86°51'W, 80–140 m, 14 May 1993, *Ronald L. Liesner 26302* (MO); Base of N slope of Pico Bonito, in front of new CURLA (Centro Universitario Regional del Litoral Atlantico) camp building on Quebrada Grande, ca. 1/3 km above its confluence with the Río Bonito, ca. 10 km SW of La Ceiba, Parque Nacional Pico Bonito, 15°42'N, 86°51'W, 140 m, 8 May 1993, *Randy Evans 1545* (MO); Base of N slope of Pico Bonito, E of new CURLA (Centro Universitario Regional del Litoral Atlantico) camp building on the Quebrada Grande, ca. 1/3 km above its confluence with the Río Bonito, ca. 10 km SW of La Ceiba, Parque Nacional Pico Bonito, 15°42'N, 86°50'W, 200 m, 12 May 1993, *Randy Evans 1641* (MO); La Ceiba, Danto, 5 km. al S de Danto, sobre el Río Danto hacia el S, sobre el camino que va del poblado Danto a Las Presas del Sanaa, en el río atrás del pueblo, 15°44'35"N, 86°47'45"W, 25 m, 10 June 1985, *Oswaldo Téllez V. & E.M. Martínez S. 8835* (MO); La Ceiba, on mountain slopes and coastal plain, vicinity of La Ceiba, in gravely area in bend of stream, foothills back of La Ceiba, 15°44'58"N, 86°46'11"W, 29 July 1938, *T.G. Yuncker, J.M. Koepper & K. A. Wagner 8666* (NY, S, MO). Tela, Lancetilla, Jardín Botánica de Lancetilla, 5 km SO de Tela, Bosque húmedo subtropical, 15°44'N, 087°27'W, 0–20 m, 24 Sep. 1983, *Luis A. López 69* (MO); Jardin Botánico de Lancetilla, 3 km S de Tela, 15°44'01"N, 87°27'02"W, 10 m, 17 Sep. 1983, *Lesly Margarita Ordóñez 32* (MO). **Comayagua:** Taulabé, Yojoa, Lago de Yojoa, 14°48'N, 087°59'W, *R. Zuniga 629* (TEFH). **Distrito Central:** Tegucigalpa, 30 km NW of Tegucigalpa, 14°07'18"N, 87°25'17"W, 1600 m, 14 Sep. 1985, *Hedman 65* (TEFH). **Gracias a Dios:** Anzuelo, Río Platano Biosphere Reserve, river margin, Río Paulaya, Anzuelo, 25 May 1985, *S.G. Knees 2763* (BM). Puerto Lempira, Ahuas Bila, 200 km SO de Puerto Lempira, orilla del río Wankí, Coco o Segovia, La Mosquitia, 14°46'N, 84°45'W, 100 m, 5 May 1985–13 May 1985, *Cirilo Nelson & Guadalupe Cruz 9247* (MO, TEFH). **Olancho:** Montaña del Zapote, campamento, 14°34'31"N, 86°43'11"W, 1057 m, 8 Oct. 1979, *Roberto Andino U. 100* (MO). Catacamas, El Pastaste, Catacamas - Dulce Nombre de Culmi, 7 km al NE de El Pastaste, o a 13 km al SW de Culmi, camino a Catacamas/Culmi, 15°00'33"N, 85°37'38"W, 480 m, 31 May 1985, *Esteban M. Martínez S. & Oswaldo Téllez 12715*

(MO); Río Catacamas, slopes of Sierra de Agalto, 14°53'28"N, 85°56'00"W, 600–1400 m, 25 Feb. 1982, *Steve Blackmore & G.L.A. Heath 1900* (MO). **Yoro:** Olanchito, Las Flores, Coyoles - Las Flores, Aguan River valley, vicinity of Coyoles, near village of Las Flores, 15°31'24"N, 86°40'43"W, 180–330 m, 30 Jun 1938, *T.G. Yuncker, J.M. Koepper & K.A. Wagner 8187A* (MO, BM, NY). MEXICO. **Quintana Roo:** 8 km N of Unión, 110 km SW of Chetumal by road, 17°57'00"N, 88°52'48"W, 100 m, 7 May 1982, *Gerrit Davidse, M. Sousa S., A. Chater & E. Cabrera 20187* (MO). NICARAGUA. **Boaco:** Las Pitas, carretera a Camoapa (No.19); 12°28'N, 85°35'W, 12°28'N, 85°35'W, 400 m, 29 Aug. 1981, *Pedro P. Moreno 10635* (MO); Municipio de San José de los Remates, 12°35'N, 85°45'W, 670–700 m, 2 Oct. 1984, *Pedro P. Moreno 24850* (MO); Ca 17 km N of Camoapa, comarca San Isidro, 12°33'N, 85°31'W, 400–600 m, 17 July 1984, *D. Soza, A. Grijalva, B. Sequeira, C. Quant & M. Paguaga 108* (MO); Along Hwy 33 ca. 3.1 km N of Hwy 35 intersection, ca. 2.4 km N of Río Cañas, 12°38'N, 85°33'W, 275 m, 8 Jan. 1978, *W.D. Stevens 5846* (MO). **Chontales**: Gallery forest of the banks of Río Mico, 10 km E of Santo Tomás, 12°04'N, 85°01'W, 300 m, 6 July 1976, *D.A. Neill 549 (7396)* (MO, UCA). **Granada**: *Oersted s.n.* (MO); *Oersted s.n.* (MO). **Jinotega**: Quebrada La Esperanza, SE of Wiwilí, 13°30'N, 85°43'W, 500 m, 14 Mar. 1980, *M. Araquistain & D. Castro 1945* (MO); *M. Araquistain & D. Castro 1961* (MO); Caño Litutus, Río Bocay, river bank and along stream, 13°58'N, 85°21'W, 175 m, 9 Mar. 1980, *W.D. Stevens, J.H. Beach, J. Schal & O.M. Montiel 16693* (MO). **Matagalpa**: Santa Emilia, 17 km al norte de Matagalpa, carretera a El Tuma, 12°58'N, 85°50'W, 600–700 m, 12 Feb. 1981, *P.P. Moreno 6748* (MO); Comarca Yasica Norte, finca La Castilla, 26 km NE de la ciudad de Matagalpa, 13°00'N, 85°52'W, 600–700 m, 29 June 1980, *M. Guzmán, D. Castro & A. Montiel 224* (MO); Carretera al Tuma, Hda. " La Bonanza", 25 km NE de la ciudad de Matagalpa, 13°02'N, 85°47'W, 600 m, 9 Sep. 1980, *M. Guzmán, A. Montiel & D. Castro 795* (MO); Lower W slope of Cerro Musun, Quebrada El Jobo, a tributary of Río Paiwas, 12°55'N, 85°16'W, 300 m, 12 Feb. 1979, *W.D. Stevens 12024* (MO); Along Hwy. 5 ca. 24.6 km from Hwy. 3 intersection, ca. 8.6 km SW of Río Tuma bridge, 13°01'N, 85°47'W, 490 m, 15 Jan. 1978, *W.D. Stevens 6020* (MO); Ca. 11.7 km SW of El Tuma bridge on road to Matagalpa, 13°00'N, 85°47'W, 500 m, 3 Mar. 1981, *W.D. Stevens & P.P. Moreno 19165* (MO); San Martín, along Río Caratera, ca. 3.8 km SSE of Empalme La Dahlia, 13°07'N, 85°44'W, 530 m, 3 Mar. 1981, *W.D. Stevens & P.P. Moreno 19204* (MO); Finca la Castilla, 20 km NE of Matagalpa, 13°01'N, 85°46'W, 580–600 m, 21 Jan. 1982, *Doribel Castro 2384* (MO); Finca La Castilla, 13°01'N, 85°47'W, 550 m, 21 Jan. 1982, *D. Castro 2346* (MO); Río Yasica, 26 km S of Matagalpa on road to El Tuma, 13°02'N, 85°47'W, 400 m, 10 Mar. 1967, *A. Molina R. 20486* (MO). **Río San Juan**: Greytown, Caño Negro y Caño Pescado, 11°00'N, 83°51'W, 0–25 m, 5 Jan 1995, *Ricardo Rueda, Blas Hernández y Edith Palma 2550* (MO); El Castillo, along the Río San Juan, 11°01'N,

84°24'W, 0–50 m, 25 Mar. 1971, *J.T. Atwood 5169* (MO); Río Indio, 1.5 hours upriver from San Juan del Norte, 11°03'N, 83°45'W, 2 m, 6 Sep. 1982, *R. Riviere 225* (MO); *R. Guzmán 433* (HULE, MO). **Rivas**: Isla Ometepe, Volcán Maderas, "La Palma", 11°27'N, 85°28'W, 100–200 m, 21 Sep. 1984, *Walter Robleto 1201* (MO). **Zelaya**: Caño Montecristo, 1 km al sur del Campamento La Grupera, 11°32'N, 83°48'W, 10–20 m, 7 Feb. 1982, *P.P. Moreno & J.C. Sandino 15111* (MO); Nueva Guinea - Verdún, El Almacén, 11°40'N, 84°26'W, 220 m, 17 Aug. 1983, *James S. Miller & Juan Carlos Sandino 1132* (MO); Logging camp near Quebrada La Talolinga, 11°51'N, 84°26'W, 170 m, 19 Aug. 1983, *James S. Miller & Juan Carlos Sandino 1155* (MO); Comarca Waslala, 6.5 km al SE de Waslala, 13°16'N, 85°24'W, 520–560 m, 14 Sep. 1982, *Pedro P. Moreno 17293* (MO); 1 km de Colonia Serrano, sobre el camino a Colonia Yolaina, 11°35'N, 84°22'W, 80–100 m, 28 July 1982, *J.C. Sandino 3288* (MO); Ca. 0.3 km SW of Río Wawa ferry on road from Puerto Cabezas to Rosita, 14°06'N, 83°33'W, 5 m, 21 Apr. 1978, *W.D. Stevens 7925* (MO); Ca. 1.3 km NW of Alamikamba, 13°30'N, 84°14'W, 20 m, 25 Apr. 1978, *W.D. Stevens 8172* (MO); Between 0.3 and 1.9 km N of Limbaika, 13°29'N, 84°13'W, 8–10 m, 26 Apr. 1978, *W.D. Stevens 8254* (MO); Along new road to Mina Nueva America (leading more or less westward from ca. 14.3 km N of El Empalme on main road to Rosita), ca. 8.6 km from main road, 13°46'N, 84°29'W, 250–450 m, 27 Apr. 1978, *W.D. Stevens 8411* (MO); *W.D. Stevens 8413* (MO); Along new road between Rosita and Puerto Cabezas, ca. 15.7 km SW of Río Kukalaya, 13°58'N, 84°12'W, 50–100 m, 30 Apr. 1978, *W.D. Stevens 8505* (MO); Along Caño Majagua, 13°45'N, 85°00'W, 750–850 m, 10 Mar. 1978, *W.D. Stevens 6899* (MO); Along new road fron Siuna to Matagalpa, ca. 31.4 km beyond Río Ulí (near Waní), ca. 8.9 km beyond Rosa Grande La Balsama and near major highway construction camp, 13°36'N, 85°05'W, 100–200 m, 18 Mar. 1978, *W.D. Stevens 7522* (MO); Bonanza-Constancia, 13°58N, 84°37W, 160–360 m, 21 Feb. 1979, *W.D. Stevens 12479* (MO); Along new road to Mina Nueva America (leading more or less westward from 14.3 km N of El Empalme on main road to Rosita), ca. 7.7 km from main road, 13°46'N, 84°29'W, 250–450 m, 23 Feb. 1979, *W.D. Stevens 12718* (MO); Vicinity of plantel of Neptune Mining Company in NE part of Bonanza, 14°01'N, 84°35'W, 200–350 m, 25 Feb. 1979, *W.D. Stevens 12957* (MO); Along road between Río Ulí and Río Waní, 13°42'N, 84°51'W, 90 m, 11 Mar. 1981, *W.D. Stevens & P.P. Moreno 19686* (MO); Near Caño San Antonio, 2 km N of Kuikuinita, S of Siuna, 13°27'N, 84°54'W, 100 m, 23 May 1978, *D.A. Neill 4151* (MO); Bluefields, open jungle trail, 12°02'N, 83°46'W, 0 m, 11 Dec. 1968, *J.T. Atwood & A.D. Moore 370* (MO); Rama, 12°10'N, 84°13'W, 0–50 m, 13 Dec. 1968, *J.T. Atwood 579* (MO); Rama, 12°10'N, 84°13'W, 0–50 m, 13 Dec. 1968, *C.E. Nichols 584* (MO, MEXU); Siuna, mostly along road near airport, 13°43'N, 84°46'W, 180 m, 16 Mar. 1971, *H.K. Svenson 5100* (MO); Near Río Yaoya, 4 km S of crossing of Siuna-Rosita highway, 13°40'N, 84°42'W,

Figure 9. *Anthurium gracile* (Rudge) Schott (*Fonnegra et al. 1844*, MO-3473745). Herbarium specimen showing elongated stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescences.

Figure 10. *Anthurium gracile* (Rudge) Schott (*Croat 105660*). Live plant showing velamentous roots, petioles, leaf blades, adaxial surface, inflorescence and infructescence.

Figure 11. *Anthurium gracile* (Rudge) Schott (*Croat 105660*). Close-up view of inflorescence with green spathe tinged reddish-brown, and purplish spadix.

Figure 12. *Anthurium gracile* (Rudge) Schott (*Croat 98191*). Close-up view of infructescence with bright red berries.

Figure 13. *Anthurium huanucense* Engl. (*Hutchinson & Wright 3704*, F-1640128). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

100 m, 2 May 1978, *D.A. Neill 3807* (MO); Near Río Okonwás, 12 km E of Rosita, 13°58'N, 84°14'W, 50 m, 15 June 1978, *D.A. Neill 4444* (MO); Unnamed cerro 3 km N of Cerro Bakán, 13°39'

Cultivated Plants: ECUADOR. **Napo:** Jatun Sacha Biological Station, cultivated plants in Ishpingo Botanical Garden, 01°04'S, 77°36'W, 400 m, 1 July 1998, *David Neill & H. Vargas 11235* (MO, QCNE). FRANCE. Cultivated in Nancy Botanical Garden (Received 21 Dec 1998), 80–3-557, 27 Sep. 2000, *Thomas B. Croat 83631* (MO). GERMANY. Original locality unknown Müchen Acc. No RUAH 40577, 1979, *Josef Bogner s.n.* (MO). UNITED STATES. **California:** Cultivated in California, 1978, *Hiwan 1005* (MO); *MBG s.n.* (MO). **Florida:** Selby Gardens, cultivated as Selby 80–450, 8 Sep. 1986, *Christenson 1583* (MO). **Hawaii:** Cultivated plants of the Hawaiian Islands, O'ahu, Wahiawa Botanic Garden., 14 Apr. 1986, *Joel Lau & C. Cory 2236* (MO); Wahiawa Botanic Garden: cultivated, 14 Apr. 1986, *Lau & Cory 241* (MO). **Missouri**: Columbia, plants cultivated at the greenhouse at the U. of Missouri, these specimens form Voucher materials for plants used in experiments or teaching, source not recorded, 220 m, 19 Dec. 1980, *Dunn, D. B. 23487* (UMO 160706); Saint Louis, Missouri Botanical Garden, research greenhouse, 38°36'51"N, 90°15'33"W, 28 Oct. 2005, *G. Gust & A. Townesmith 964* (MO).

Anthurium huanucense Engl., *Pflanzenr.* IV. 23 B (Heft 23): 165. 1905. Type: PERU. Huánuco: Huamalies Province, near Monzón, 900–1000 m, 27 July 1903, *Weberbauer 3449* (HT: B). **Figure 13.**

Epiphyte; **stem** short, subterete, drying grayish, covered by the cataphylls; **roots** 1–5 mm diam., whitish to brown, velamentous, spreading to descending; **internodes** short, 0.4–0.6 cm long, 0.6–1 cm diam.; **cataphylls** (1–)5.8–7.1 cm long, 2-ribbed, triangular lanceolate, acute at apex, reddish brown to grayish brown, membranous. LEAVES erect to spreading; **petioles** 4.1–10.4 cm long, 0.1–0.3 cm diam., U-shaped, narrowly sulcate, green; sheath 1.7–3.8 cm long; geniculum 0.4–0.9 cm long; **blades** subcoriaceous, elliptic-oblanceolate to narrowly elliptic, (10.5–)14–40 cm long, (1.6–)3.3–6.5 cm wide, 4.2–7.5(–10.3) times longer than wide, widest above the middle, acute at apex, acute to shortly attenuate at base; almost concolorous on both surfaces, slightly darker and semiglossy above, matte below, drying light brownish green; **midrib** narrowly convex above, convex below; **primary lateral veins** numerous, (9–)18–24 per side, distinct from the interprimary veins, straight to the collective veins, departing midrib at 35–40(–70°) angles; **collective veins** arising at base, 0.1–0.5 cm from margins. INFLORESCENCE erect to spreading; **peduncle** 24.8–42.8 cm long, (0.1–)0.3–0.4 wide, green, terete, 4.8–6.9 times longer than the petioles; **spathe** subcoriaceous, green, persisting on fruit, reflexed, (1.6–)4.8–5.1 cm long, (0.4–)0.5–0.7 cm wide, linear-oblong, acute to apex,

rounded to base; **spadix** cylindric, sessile, ca. 10 cm long, 0.4–0.5 cm wide, green to reddish; **flowers** rhombic to 4-lobed, sides sigmoid, 3 × 3 mm; 2–3 flowers visible in the principal spiral, 3–5 flowers visible in the alternate spiral; tepals 3–sided, lateral tepals with inner margins straight to slightly convex; **pistils** ovate-elliptic; stamens 0.1 cm long; filaments flattened; anthers surrounding the stigmas at anthesis; thecae not divaricate. INFRUCTESCENCE erect; **spadix** 15.1 cm long, 0.5 cm wide, green; **berries** spherical, orange-red, 3×3 mm; seeds 2, ovoid-elliptic, 0.2 × 0.1 cm.

Anthurium huanucense is endemic to Peru, found in Amazonas, Huánuco, Junín, Pasco and San Martín Departments at 400–2160 m in *Tropical moist forest* and *Premontane moist forest* life zones.

The species is characterized by its epiphytic habit, short stems covered with cataphyll remnants, leaves with the petiole sheathed 1/3 its length and with brownish-green-drying elliptic-oblanceolate blades 4.2–7.5 times longer than wide, and by its long inflorescences with a green spathe and a green to reddish spadix.

Additional specimens seen: PERU. **Amazonas:** Bagua, along trail ca. 5 km above La Peca (15.6 km E of main plaza in Bagua), on 45–60º slopes on south side of principal stream, limestone outcrops, 05°33'S, 78°21'W, 2050–2160 m, 16 Apr. 1984, *Thomas B. Croat 58361* (MO); Bagua, summit of Abra Huahuajin Pass, along trail N from summit, first 1–2 km to 500 m alt. on west side, 05°18'06"S, 78°25'39"W, 500–800 m, 21 Jan. 1964, *Paul C. Hutchison & J. Kenneth Wright 3704* (F, MO). **Junín:** Chanchamayo Valley, 11°03'21"S, 75°19'43"W, 1500 m, Sep. 1929, *Carlos Schunke 890* (F, MO). **Pasco:** Oxapampa, Distrito Villa Rica, Localidad Centro Bocaz, bosque de cerretera, 10°38'S, 75°10'W, 1280 m, 17 Sep. 2003, *Juan Perea, Carlos Mateo, R. Francis & G. Ortiz 221* (MO). **San Martín:** Huallaga, Distrito Saposoa, a 5 km Sureste de Achamal, bosque secundario húmedo montano, 06°32'25"S, 77°24'05"W, 1400 m, 7 Aug. 2000, *Victor Quipuscoa S., S. Leiva, Díaz, Y. & M. Strarup J. 1988* (F); Mariscal Caceres, Distrito Tocache Nuevo, vicinity around Tocache, 08°11'03"S, 76°30'45"W, 400–700 m, 25 May 1975, *José Schunke V. 8590* (MO).

Anthurium leptos Croat, **sp. nov**. Type: Colombia. Chocó: Municipio San José Palmar, Vereda de Río Negro, Cerro Torrá, eastern slope of Río Negro above heliport, 2000 m, 31 Aug. 1988, *J. E. Ramos, P. Silverstone-Sopkin et al. 1679* (holotype, MO-3788755; isotype, CUVC). **Figure 14.**

The species is a member of section *Leptanthurium* characterized by its epiphytic habit, slender stems, long, persisting intact cataphylls, narrowly oblong-oblanceolate, narrowly long-acuminate grayish-drying, epunctate blades as well as by its long-pedunculate inflorescences with a yellowish spadix.

Epiphyte 35–40 cm tall; **internodes** 5–10 mm long, drying gray, moderately smooth, 5–6 mm diam.; **roots** yellowish, drying brownish, ca. 1 mm diam, to ca. 15 cm long, moderately dense; **cataphylls** 2.5–4.7 cm long, persisting thin yellowish red-brown at upper nodes, with just reddish brown basal fibers persisting lower down. LEAVES erect; **petioles** 11–15 cm long, drying 1–1.5 mm diam., sheathed at the base, green in the lower portion, pale purple-violet and subterete toward the apex; **geniculum** 7–8 mm long, drying darker and of the same thickness as shaft; **blades** narrowly oblong-oblanceolate, 19–34 cm long, 2.8–5.3 cm wide, 6.7–9.3 times longer than wide, 1.5–2.3 times longer than the petioles, narrowly long-acuminate and sharply pointed at apex, narrowly acute at base, drying medium grayish green and semiglossy above, paler and semiglossy below; **midrib** sunken and concolorous above, raised and lighter below; **primary lateral veins** 30–35 pairs, arising at a 60–80° angle and curving toward apex, sunken and concolorous above, raised and lighter below; **collective veins** arising from the lowermost primary lateral veins, 2–5 mm from margin; **minor veins** prominent below. INFLORESCENCE with **peduncle** 19.5–26 cm long; **spathe** 3.7–11 cm long, green, spreading-reflexed to spreading, oblong, narrowly long-acuminate; **spadix** 6–7 cm long, 5 mm diam., greenish yellow; flowers 4 visible per spiral, 1.6 mm long and wide; tepals conspicuously granular on magnification, lateral tepals 1 mm wide, outer margin 2-sided, inner margin broadly rounded; ovaries pale green. INFRUCTESCENCE spreading-pendent, **spadix** 4.2–10 cm long, yellow-orange, green toward the apex.

Anthurium leptos is endemic to Colombia, known only from the type locality on Cerro Torrá in SE Chocó Department at 1900–2000 m in a *Montane rain forest* life zone.

The species is similar to *Anthurium gracile* which differs by having whitish roots, blades with less conspicuous primary lateral veins, a typically much shorter, sometimes purplish brown spadix with fewer flowers per spiral and by its red, more globose berries.

The species epithet comes from the Greek "leptos" meaning slender, referring to the slender peduncle.

Paratype: COLOMBIA: **Chocó:** Municipio San José Palmar, Cerro Torrá, slope of Río Negro 1 hour below heliport, 1680–1940 m, 10 Aug. 1988, *J. E. Ramos, P. Silverstone-Sopkin et al. 1130* (MO, CUVC).

Anthurium longegeniculatum Engl. *Bot. Jahrb. Syst.* 25: 379. 1898. Type: Colombia. Cauca: La Ceja, eastern slopes of Andes of Popoyan, *Lehmann 5328* (holotype, B; isotype, F). **Figure 15.**

Terrestrial or epiphytic, stiffly erect or scandent, vine-like; **aerial roots** 1–4 per node, not very conspicuous, drying gray-

black, 5–8 cm long, weakly branched or not at all branched; **stem** to ca 30 cm long, 0.5–1.8 cm diam., reddish; **internodes** short, (3.5)5–8 mm diam., dark brown, smooth, weakly glossy to semiglossy; **cataphylls** 2.5–3.5 cm long, persisting intact as fibers, usually in mass as nest, brown to reddish brown to dark brown, marcescent. LEAVES clustered on erect stem; **petioles** sharply C-shaped to terete, sheathed at the base, medium green to pale green-brown (tinged with red), semiglossy, sometimes adaxially, (10)12–20 (45) cm long, 1.5–5 mm diam.; geniculum distinctly swollen, 3–5 cm long, 2–4 mm diam; **blades** ovate to ovate-elliptic, rarely weakly cordate, sometimes bullate, narrowly long-acuminate to almost aristate at apex, rounded at base, 9–24 cm long, 4–7(13) cm wide (averaging 13.3 x 6 cm), 1.5–2.5(4.4) times longer than wide, 0.7–1.1 times as long as the petioles, broadest below middle, bicolorous, medium to dark green, semiglossy above, paler and glossy to semiglossy below; **midrib** slightly paler, acutely raised or convex, often in valleys, more or less concolorous above, slightly raised to acutely and paler below; **primary lateral** 8–11 per side, arising from midrib at about 30°–50° angle, etched and weakly quilted above, weakly pleated-raised below, as conspicuous as the collective vein; **collective veins** arising from lower-most primary lateral vein, 2–10 mm from margin; **basal veins** 1(2) usually extends to margin up to apex; **tertiary veins** somewhat obscure above, obscure and reticulate below. INFLORESCENCE erect; **peduncle** longer than petiole, 21–53 cm long, 1.5–4 mm diam., terete**; spathe**, green to reddish (pink), heavily tinged with violet-purple, reflexed or erect-spreading; **spadix** erect, cylindroid to slightly tapered, 2.5–9.2 cm long, 2.5–3 mm diam at base, 0.2–2.5 cm diam.at apex, medium to dark green or yellow-green, semi-glossy to glossy, becoming pale orange, matte; stipe ca. 1 cm long, minutely ribbed longitudinally, green; **flowers** 4–5 visible per axil, 1.8 mm long, 1.7 mm wide; tepals drying medium brown, with small sparse pale cellular inclusions; lateral tepals 1.2–1.3 mm wide, inner margins rounded, outer margins usually 2-sided; stamens held at margins of tepals, usually in a tight contiguous cluster; anthers 0.3–0.35 mm long and wide; thecae moderately divaricate; pistils somewhat protruding.

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

The species is characterized by its slender, reddish brown internodes, its cataphylls forming a nested mass covering the internode at least at the base, its petioles sheathed at the base, its semiglossy, ovate leaf blades with a sunken midrib and moderately obscure pale round punctations on the lower surface and by its small yellow-green long-stipitate spadix.

Anthurium longegeniculatum is somewhat variable across its range. Specimens from

the Pacific side of the Andes in Ecuador and southwest Colombia tend to have elongated internodes to 20 cm long while the specimens from the east side of the Andes generally have much shorter internodes often completely covered by the remnants of the cataphylls.

Additional specimens seen: COLOMBIA. 1760–1808, *J.C.B. Mutis 61* (US). **Antioquia:** 8 km N of Yarumal, disturbed oak forest, 07°01'23"N, 75°25'23"W, 2600 m, 19 Aug. 1976, *Alwyn H. Gentry, Djaja D. Soejarto, James L. Zarucchi & Mary E. Fallen 17919* (COL, MO); Trail from Encarnación to Parque Nacional Natural Las Orquídeas, western slope of Cordillera Occidental, 06°30'N, 76°14'W, 1600–1800 m, 27 January 1979, *Alwyn H. Gentry, Enrique Rentería A. & Cruz Cecilia Estrada 24589* (COL, MO); Cordillera Occidental, 15 minute walk above end of Salgár - Las Margaritas road at Heda La Regada, moist quebrada, remnant forest, 05°58'N, 76°04'W, 200 m, 12 Jan. 1986, *Bruce A. Stein & Lucinda A. McDade 3192* (MO); Mpio. de Salgár at departmental border, Km 15 of road Salgár-El Dauro (Chocó), 05°59'N, 76°07'W, 2280 m, 29 Sep. 1987, *James L. Zarucchi, Alan E. Brant & et al. 5961* (MO); Municipios Medellín y Guarne, Parque Ecológico Piedras Blancas, 06°18'00"N, 75°29'00"W, 2300–2400 m, 13 Aug. 1994, *Ramiro Fonnegra G. & Francisco J. Roldán 4948* (CR, MO, NY); Bello, Corregimiento de San Felix, 06°20'N, 75°38'W, 2700 m, 27 Jan. 1998, *Felipe Cardona 545* (HUA, MO); Torres de Telecomunicaciones, Corregimiento San Felix, 06°20'45"N, 75°36'28"W, 3000–3100 m, 22 May 1991, *Ramiro Fonnegra G. 3736* (MO); Belmira, Alto de Sabanas, margen izquierda del Río Chico, 06°40'N, 75°50'W, 2900 m, 18 Aug. 1996, *Felipe Cardona 97* (MO); Envigado, vereda Pantanillo, Mpio. El Retiro, 4 km NE of Medellin-Las Palmas, 06°12'N, 75°40'W, 2200–2420 m, 6 Sep. 1991, *Ricardo Callejas & et al. 10327* (NY); Frontino, corregimiento Nutibara, 06°48'16"N, 76°14'51"W, 1850 m, 12 Jan. 1986, *Dario A. Sánchez S., Carlos Orrego, Stella Sylva, Gladys E. Martínez A. & Diego L. Restrepo 861* (MO); Region of Murrí, c. 13 road-km from Nutibara, forest edge east of road, collected with F.J. Roldán and I. Castaño, 06°40'N, 76°20'W, 2000 m, 9 Dec. 1988, *Gordon McPherson 13404* (MO); Corregimiento Nutibara, Vereda altp de Cuevas, Quebrada del Oso, 1900–2000 m, 23 Apr. 1991, *Ramiro Fonnegra G. & et al. 3506* (HUA); Corregimiento Nutibara, Inspección Murrf, Alto de Cuevas en la via Nutibara - La Blanquita, Finca El Palmar, sitio El Llano, 06°40'N, 76°24'W, 2080 m, 16 Feb. 1991, *Ricardo Callejas, Francisco J. Roldán & M. V. Arbeláez 10053* (HUA); Correg. Nutibara, cuenca alta del Río Cuevas, 06°48'16"N, 76°14'51"W, 2000 m, 14 July 1987, *Rubén Sánchez 1394* (MEDEL, MO); Guarne, no further locality, 06°17'00"N, 75°26'37"W, 2290 m, *Álvaro Cogollo P. & Mercedes Girón V. 95* (HUA); Vereda Piedras blancas, alrededores de la represa Piedras Blancas, 06°15'N, 75°30'W, 2290 m, 11 Feb. 1984, *Francisco J. Roldán & Jorge Brand 44* (HUA, MO); Jardín, near Jardín in south of department, Vereda Moro Amarillo, Alto de los Flores, collected with J.L. Zarucchi and F.J. Roldán, 05°30'N,

75°50'W, 2150 m, 30 Oct. 1988, *Gordon McPherson 12915* (MO); South of Jardín in southern part of department, collected with J.L. Zarucchi and F.J. Roldán., 05°30'N, 75°50'W, 2750 m, 29 Oct. 1988, *Gordon McPherson 12892* (MO); Vereda Morro Amarillo, Alto de Las Flores, ca 5 km N of Jardín, disturbed montane vegetation, 05°37'N, 75°50'W, 2050–2170 m, 30 Oct. 1988, *James L. Zarucchi, Gordon McPherson & et al. 7000* (MO); Medellín, Granja forestal Universidad Nacional, antigua carretera Medellin-Guarne, 06°17'29"N, 75°32'10"W, 1600–1700 m, 23 May 1987, *Ramiro Fonnegra G. 2226* (HUA, MO); Salgár, along road between Salgár to El Dauro (Chocó) near border with Chocó Department, montane wet forest, primary forest along streams, 05°59'N, 76°07'W, 2200 m, 25 Jan. 1990, *Thomas B. Croat 69917* (MO); Sonsón, in southern part de department, 12 road-km from Sonsón on road to Nariño, collected with F.J. Roldán, 05°40'N, 75°15'W, 2650 m, 12 Nov. 1988, *Gordon McPherson 13049* (MO); Urrao, carretera a Caicedo, 06°19'N, 76°08'W, 2000–2900 m, 12 June 1991, *Dario A. Sánchez S., A. Madrigal & V.M. Pardo 1462* (MO); On trail leading to Páramo de Frontino, in forest near finca El Quince, collected with F.J. Roldán and J. Betancur, 06°30'N, 76°10'W, 2900 m, 18 Nov. 1988, *Gordon McPherson 13114* (HUA, MO, NY); Road between Urrao and Caicedo, 18 km NE of centro of Urrao, in cañada, disturbed shady primary forest, specimen treated with ethanol, 06°23'N, 76°03'W, 2570 m, 27 Feb. 1989, *John M. MacDougal, Francisco J. Roldán & Julio C. Betancur B. 4274* (MO); Paramo de Frontino, El Río, 06°27'20"N, 76°07'14"W, 3115 m, 10 Sep. 1984, *Ramiro Londoño U., B. Garcia V. & R. Bernal 332* (MO); Páramo de Frontino, El Río, Subpáramo, 06°27'20"N, 76°07'14"W, 3115 m, 10 Sep. 1984, *Ramiro Londoño U., B. Garcia V. & R. Bernal 349* (MO); Corregimiento Encarnacion, 1 hora S del Paramo de Frontino, sitio El Río, 06°27'00"N, 76°46'00"W, 3000–3150 m, 8 Apr. 1989, *Ricardo Callejas & et al. 7852* (HUA, MO); Vereda El Chuscal, Inspeccion Jaipera, colecciones del Sitio El Morro al sitio El 15, 06°27'00"N, 76°46'00"W, 2600–3200 m, 9 Apr. 1989, *Ricardo Callejas & et al. 7887* (HUA, MO); Corregimiento Encarnacion, sitio El Río, 1 hora de camino del Paramo de Frontino, 06°27'N, 76°46'W, 3120 m, 7 Apr. 1989, *Ricardo Callejas & et al. 7762* (NY). **Boyacá:** Miraflores. m, *Zabala-Rivera & et al. 891* (UPTC). **Caldas:** "Pinares," above Salento, Cordillera Central, 2600–2800 m, 2–10 Aug. 1922, *Francis W. Pennell 9264* (PH); Riosucio, Vda. La Antioqueña, truchera Los Alpes, camino que de Riosúcio conduce a Peñas Blancas, hasta Arroyohondo, 05°31'04"N, 75°46'01"W, 2684 m, 4 Mar. 2012, *Johan Home Ramírez 331* (CUVC, MO). **Caquetá:** Along road between Florencia and Neiva by the new road, near summit of divide of Cordillera Oriental near border of Huila Department, less than 1 km from summit, 01°45'35"N, 75°46'24"W, 2200 m, 9 Nov. 2008, *Thomas B. Croat, Edwin Trujillo & Marco A. Correa M. 100489* (MO, NY). **Cauca:** Munchique, cloud forest, on trees, 02°32'00"N, 76°57'00"W, 2500 m, 21 Apr. 1939, *A.H.G. Alston 8152* (BM, MO, UC); Dense forest between La Cumbre and

Quebrada La Isla, headwaters of the Río Dinde, 02°43'23"N, 76°48'27"W, 2500 m, 28 Aug. 1944, *Earl L. Core 1112* (MO); Chisquio, forest, 02°29'00"N, 76°52'00"W, 1700 m, 7 Feb. 1940, *Erik Asplund 10694* (MO, S); In silvis densis supra Poblazon pr. Popayan, 2500 m, Mar. 1884, *F.C. Lehmann s.n.* (MO); "San Jose", San Antonio, glen in forest, 02°40'00"N, 76°52'00"W, 2400–2700 m, 28 June 1922, *Francis W. Pennell & Ellsworth P. Killip 7364* (MO, NY, PH); Km 50–55 along road above Uribe, 02°51'34"N, 76°57'02"W, 1875–2256 m, 25 Apr. 1979, *James L. Luteyn & et al. 7481* (MO, NY); km 42–47 NE of Uribe, 02°51'34"N, 76°57'02"W, 2350–2650 m, 24 Apr 1979, *James L. Luteyn & et al. 7422* (MO, NY); Moscopan, 02°14'25"N, 76°10'13"W, 2600 m, 7 Mar. 1943, *K. von Sneidern 4312* (A, MO, NY); Along road between Popayan and Munchique, Parque National Munchique, 7 km W of summit, 02°31'50"N, 77°00'23"W, 2090 m, 19 July 1997, *Thomas B. Croat & John F. Gaskin 80067* (B, CAS, CAUP, K, MO, US); El Tambo, vereda La Romelia, 02°40'13"N, 77°01'19"W, 2640 m, 20 July 1993, *Mauricio Velayos & et al. 6839* (COL, MO); Piendamo, 2100–2200 m, 23 Oct. 1968, *L.S. Espinal T. & Jorge E. Ramos 3137* (CUVC). **Chocó:** San José del Palmar, *Philip A. Silverstone-Sopkin & et al. 1664* (CUVC). **Cundinamarca:** Carpanta Biological Reserve, wet high altitude Andean cloud forest 20 km W of Junín, 04°35'N, 73°40'W, 2400–3000 m, Aug. 1990 – Dec. 1990, *A. Repizzo & Z. Calle 201* (COL, MO); Alto De San Miguel, along road SW of Sibaté toward Fusagasuga, between carretera Kms 19–24. 04°35'N, 74°20'W, 2300–2450 m, 4 Jan. 1986, *Bruce A. Stein, Lucinda A. McDade & et al. 3133* (MO); Sibate, Mun. de Sibaté, Alto del Cuchuco en la carretera Bogotá-Fusagasugá, 04°29'29"N, 74°15'38"W, 2830 m, 18 Mar. 1974, *F. Sarmiento 340* (MO). **Huila:** Ridge between drainages of Río Guarapas and Río Guachicas, just below main ridge of Cordillera Oriental, above Palestina, SW of Pitalito, open woods and edge of clearing in wet forest on top of ridge, 01°35'N, 76°16'W, 1800–1900 m, 6–7 Feb. 1943, *F.R. Fosberg 19989* (MO); Finca Merenberg, 100 km E of Popoyan, Tropical lower montane rain forest, 02°16'N, 76°12'W, 2300 m, 5 Dec. 1980, *Thomas B. Croat 51915* (COL, MO); Campoalegre, *Fany Llanos & et al. 3430* (SURCO); Suaza, 0.5 km N of frontier with Caquetá Dept., vicinity Km Post 41, 01°45'48"N, 75°46'58"W, 2156 m, 20 Sep. 2012, *Thomas B. Croat, Geneviève Ferry, David Scherberich, Edwin Trujillo & German Oyuela 103782* (COL, HUA, MO). **Nariño:** Ipiales, Correg. de La Victoria, Río San Francisco-Río Manizales, 00°40'17"N, 77°32'08"W, 2400 m, 15 Apr. 1992, *Bernardo R. Ramírez Padilla 4835* (MO, PSO); Pasto, Correg. de El Encano, Quebrada Orejuela, 01°10'00"N, 77°10'00"W, 2900 m, 29 Dec. 1991, *Bernardo R. Ramírez Padilla 4334* (MO); Correg. de El Encano, Vereda Santa Rosa, 2900 m, 18 Apr. 1992, *Ramirez, B. 4916* (PSO); Ricaurte, La Planada, 7 km above Chucunes on road between Tuquerres and Ricaurte, along trail to summit of hill behind Centro de Cientificos, 01°05'N, 78°01'W, 1780 m, 28 July 1988, *Thomas B. Croat 69634* (MO); Reserva Natural La Planada, 7 km above Chucunés (on road between Tuquerres and

Ricaurte), along Sendero La Vieja to "La Piña", virgin cloud forest, 01°06'N, 77°54'W, 2010–2060 m, 11 Mar. 1990, *Thomas B. Croat 71331* (HUA, MO). **Putumayo:** Intendencia of Putomayo, along road between Pasto and Macoa, in vicinity of Mirador, 01°12'23"N, 76°48'33"W, 1800 m, 3 Dec. 1980, *Thomas B. Croat 51788* (MO). **Risaralda:** Belen de Umbria, Cordillera Occidental, Municipio de Belén de Umbria, Vereda Santa Emilia, Parque Munifipal Natural Santa Emilia, 05°12'32"N, 75°55'15"W, 1700–2400 m, 14–17 Aug. 1999, *William G. Vargas 6469* (MO); Santuario, orillas del río San Rafael, hacienda de Molina actualmente de Carder ubicada cerca de la cascada al borde del río San Rafael, P. N. N. Tatamá, 05°03'27"N, 75°56'03"W, 7 Dec. 1989, *César E. Barbosa 6004* vereda "Las Colonias", 200 m arriba del campamento, 05°05'00"N, 75°57'00"W, 2740 m, 1 Feb. 1983, *Jorge H. Torres & et al. 1379* (COL). **Santander:** Tona, *Raúl Álvarez 29* (UIS). **Tolima:** Santa Isabel, 04°45'00"N, 75°10'00"W, 3150 m, 15 Feb. 1980, *Santiago Díaz Piedrahita & Roberto Jaramillo M. 2139* (MO, U). **Valle del Cauca:** Parque Nacional Munchique, at Km marker G1, 2 km W of summit, 02°30'38"N, 76°58'38"W, 2580 m, 19 July 1997, *Thomas B. Croat & John F. Gaskin 80049* (CAUP, MO); Buga, Finca El Diluvio, carretera Buga-El Placer a 33 km al este de Hotel Guadalajara (Buga), Cordillera Central, vertiente occidental, bosque nublado perturbado (parcialmente primario), 03°53'44"N, 76°01'21"W, 2440 m, 10 Nov. 1991, *Philip A. Silverstone-Sopkin 6439* (MO); Florida, I.P. Pueblo Nuevo, vereda Las Brisas, hacienda Los Alpes, 2500 m, 10 Oct. 1989, *Stella Sarria 415* (CUVC, MO); I.P. Pueblo Nuevo, vereda Las Bresas, hacienda Los Alpes, 2500 m, 10 Oct. 1989, *Stella Sarria 422* (CUVC); Palmira, Reserva La Sirena, margen izquierda quebrada los Cuzumbos, 04°58'43"N, 75°51'32"W, 2400–2600 m, June 1997, *Luis Fernado Prado C. & H. Berrio 402* (CUVC, MO); Caserio La Buitrera, El Arenillo a 30 km de Pueblo Nuevo, finca del senor Fanor Avenia, 22 Jan. 1990, *Stella Sarria 689* (CUVC); I.P. Tenjo, vereda La Nevera, sendero El Mirador, 2550 m, 12 Mar. 1990, *Stella Sarria 1021* (CUVC, MO). ECUADOR. 2800 m, Sep. 1974, *J. Bogner 929* (K). **Azuay:** The Eastern Cordillera, 1–8 km north of the village of Sevilla de Oro, 02°48'00"S, 78°37'00"W, 8000–9000 ft, 27 July 1945–12 Aug. 1945, *Wendell H. Camp E-4377* (MO, NY). **Cañar:** above Rivera on road to Pindilig, 02°35'00"S, 78°39'00"W, 2800 m, 9 Mar. 1985, *Gunnar Wilhelm Harling & Lennart Andersson 23021* (GB, MO). **Carchi:** Approx. 6 km above Maldonado, just below Puente de Palo, primary Montane Pluvial Forest, on steep slope and ridge crest above road, 00°54'N, 78°06'W, 2275 m, 23 May 1993, *Brad Boyle & Jason C. Bradford 1898* (MO); Ridge flanking Cerro Golondrinas above Río Verde headwaters to point of cliff at mountain top, 00°52'N, 78°07'W, 2430–2550 m, 5 Dec. 1987, *W. Scott Hoover 2359* (MO, QCA); Forest area along slope of mountain ENE of Rafael Quindí's mountain finca and above Río Verde including top of mountain which is similar in geologic format to Golondrinas Mountains, 00°52'N, 78°07'W, 1870–2400 m, 3 Dec. 1987, *W. Scott Hoover 2278* (MO);

Espejo, El Gualtal, Cerro Golondrinas Hembra, Bosque Muy húmedo Montano Bajo, bosque alto dominado por Clusia, arboles de 25 m de altura, 00°51'N, 78°08'W, 2800 m, 21 Aug. 1994, *Walter A. Palacios 12473* (CM, MO, QCNE, US); El Goaltal, Cerro Golondrinas Hembra, vegetación arbustiva (matorral) espeso sobre la cresta de la montaña, Bosque Muy húmedo Montano Bajo, 00°51'N, 78°08'W, 2600–2800 m, 20 Aug. 1994, *Walter A. Palacios 12446* (MO, QCNE); El Gualtal, Faldas de Cerro Golondrina Hembra, Bosque Muy húmedo Montano, bosque primario con árboles de 25 m de altura, 00°51'N, 78°07'W, 2450 m, 21 Aug. 1994, *Walter A. Palacios 12642* (CM, MO, NY, QCNE). **Loja:** Nudo de Sabanilla, W slope, 10 km above Yangana, on road, 04°23'00"S, 79°11'00"W, 2500 m, 3 Apr. 1985, *Gunnar Wilhelm Harling & Lennart Andersson 23583* (GB, MO, QCA); Nudo de Sabanilla, W slope on road to Yangana, disturbed forest, 04°23'00"S, 79°11'00"W, 2600 m, 6 Feb. 1985, *Gunnar Wilhelm Harling & Lennart Andersson 21704* (GB, MO, QCA); Podocarpus National Park, 1 ha sample plot N of Cajanuma Visitors Centre, Wet montane forest, 04°05'S, 79°10'W, 2800 m, 2 Nov. 2000, *R. Leimbeck & B. Windeballe 326* (MO); Podocarpus National Park, along trail from Cajanuma Visitors Centre to the Lagunas de Compadre.,Wet montane forest, 04°05'S, 79°10'W, 2900 m, 9 Nov. 2000, *R. Leimbeck & B. Windeballe 357*; Podocarpus National Park, road to Cerro Toledo, E of Yangana, Wet montane forest, 04°21'S, 79°07'W, 2500 m, 29 Nov. 2000, *R. Leimbeck, Jens E. Madsen & B. Windeballe 432*; Along road between Vilcabamba and Valladoloid, Tapichalaca Reserve, Quebrada de los Muertos, limit of Podocarpus National Park, 04°19'30"S, 79°13'30"W, 2200 m, 29 July 2004, *Thomas B. Croat 92686* (MO). **Morona-Santiago:** road Limón (General Plaza) - Gualaceo, Km 20–30 from Limón, 02°57'10"S, 78°33'39"W, 2000–2300 m, 25 Mar. 1974, *Gunnar Wilhelm Harling & Lennart Andersson 12834* (GB, MO); Gualaquiza. Campamento Achupalla, Cordillera del Cóndor, 15 km east of Gualaquiza, 03°27'S, 78°22'W, 2100 m, 24 July 1993, *Alwyn H. Gentry 80437* (MO); Limón Indanza, Cordillera del Cóndor, Cerrro Chankinias, wet cloud forest on sandstone ridge, south of Río Warintza, east of main ridge of Cordillera, 03°15'13"S, 78°19'18"W, 2500 m, 16 Dec. 2002, *David A. Neill & et al. 14170* (QCNE). **Napo:** Santa Barbara de Sucumbios, 00°22'36"N, 77°07'49"W, 2400 m, Feb. 1959, *Gunnar Wilhelm Harling 4192* (MO, S); Guagra Urcu, SW of summit, 00°28'S, 77°43'W, 3000 m, 28 Sep. 1980, *L.B. Holm-Nielsen & et al. 27479* (AAU); Guagra Urcu, pass between Río Borja and Río Suno, 00°28'S, 77°43'W, 2700 m, 27 Sep. 1980, *L.B. Holm-Nielsen & et al. 27257* (AAU); Guagra Urcu, above the pass between Río Borja and Río Suno. Montane forest, 00°28'S, 77°43'W, 2850 m, 27 Sep. 1980, *L.B. Holm-Nielsen, Jaime L. Jaramillo, Flavio Coello & Eduardo Asanza C. 27380* (AAU); Along road between Baeza and Tena ca. 45 km N of Archidona, primary forest on steep slopes, Premontane wet forest, 00°40'S, 77°42'W, 2330 m, 7 Oct. 1980, *Thomas B. Croat 50507* (MO); Along road between Baeza and Tena ca. 45 km N

of Archidona, primary forest on steep slopes, Premontane wet forest, 00°40'S, 77°42'W, 2330 m, 7 Oct. 1980, *Thomas B. Croat 50513* (MO); Along road between Baeza and Tena ca. 45 km N of Archidona, primary forest on steep slopes, Premontane wet forest, 00°40'S, 77°42'W, 2330 m, 7 Oct. 1980, *Thomas B. Croat 50506* (MO); Cordillera de Huacamayos, along road from Archidona to Baeza, 46.1 km N of Archidona, 12.2 km S of Cosanga, 34.6 km S of jct. of Baeza Road with Papallacta-Lago Agrio Road, 00°41'S, 77°53'W, 2200 m, 24 Apr. 2003, *Thomas B. Croat, Lynn P. Hannon & Noel Altamirano 88087* (MO);.**Sucumbíos:** Cartagena, Km 25 from El Carmelo on road towards La Bonita, primary, dense, mossy cloud forest, 00°37'N, 77°30'W, 2800 m, 8 Apr 1979, *B. Løjtnant, Ulf Molau & Michael T. Madison 11984* (AAU, GB, QCA). **Tungurahua:** Cordillera de Llanganates, valley of Río Sangarinas, 01°13'00"S, 78°15'00"W, 3000 m, 19 Nov. 1939, *Erik Asplund 9796* (MO, S); Baños, Parroquia Río Verde, Sector Machay, collections made on forested trail starting from Machay (Baños-Puyo road) to Río Verde, Tropical montane wet forest, 01°23'05"S, 78°16'50"W, 1800–2200 m, 24 Dec. 2000, *John L. Clark 5732* (MO, US). **Zamora-Chinchipe:** near village of Sevilla de Oro, 02°48'00"S, 78°37'00"W, 2438 m, Jul.-Sep. 1945, *Wendell H. Camp s.n.* (AAU, MO, NY); Few km east of Pass ("El Tiro") between Loja and Zamora, moist lower slope forest in moist ditch, 03°59'52"S, 79°09'27"W, 2550 m, 22 Oct. 2004, *Florian A. Werner 1247* (MO); Along road between Vilcabamba and Zumba, 33.9 km S of Vilcabamba, 48.6 km N of Palanda, 30.7 km N of Valladoloid, 98.7 km N of Zumba., 04°24'43"S, 79°09'33"W, 2254 m, 26 July 2004, *Thomas B. Croat 92277* (MO); Nangaritza, Cordillera de Nanguipa, Cerro Colorado, 8 km SSE of Nambija, 20 km ESE of Zamora, cloud forest on slopes below high ridges, quartz rock substrate, 04°07'35"S, 78°46'36"W, 2700 m, 18 Feb. 2002, *Tom Delinks 1383* (QCNE); Palanda, Parroquia Valladolid, southern slopes of the Cordillera de Sabanilla (headwaters of Río Chinchipe), Tapichalaca Reserve (Fundación Jocotoco), trail from main lodge towards antenna/main highway, cloud forest, 04°29'S, 79°07'W, 2300–2700 m, 29 May 2003, *John L. Clark 8075* (MO, QCNE, US); Parroquia Valladolid, Reserva Biologica Tapichalaca (Fundación de Conservación Jocotoco), Sendero Las Pavas (from main highway to bus stop), 04°29'45"S, 79°07'55"W, 2469 m, 1 June 2011, *John L. Clark 12404* (ECUAMZ, MO, UNA). PERU. **Cajamarca:** carretera entre Wacraruco y entrada a Succhubamba, 3500–4000 m, 17 Oct. 1986, *Camilo Díaz S. 2139* (MO); Tabaconas, El Pajonal, camino al Páramo y al Cerro Coyona, Bosque intervenido, terreno fongoso, zona de amortiguamiento del Santuario Tabaconas Namballe, 05°17'30"S, 79°16'02"W, 2250 m, 19 Nov. 1998, *José Campos de la Cruz & et al. 5751* (MO, QCNE). VENEZUELA. **Trujillo:** Paramo de Guaramacal, 20 km al E de Boconó, 09°14'N, 70°11'W, 2800–3000 m, 26 July 1984, *Gerardo Aymard & et al. 2934* (MO, PORT); Boconó, selvas nubladas de Guaramacal, 20 km al E de Boconó, 09°14'N, 70°11'W, 1900–2300 m, 7 Feb.

Figure 14. *Anthurium leptos* Croat (*Ramos et al. 1679*, MO-3788755). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

Figure 15. *Anthurium longegeniculatum* Engl. (*Sarria 1021*, MO-6716793). Herbarium specimen showing stem with cataphyll remnants, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

Figure 16. *Anthurium lutheri* Croat (*Croat 82351*, MO-4889315). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

Figure 17. *Anthurium lutheri* Croat (*Croat 84112*). Live plant showing creeping stem, petioles and leaf blades, adaxial surface.

Figure 18. *Anthurium lutheri* Croat (*Croat 84112*). Close-up view of inflorescence with green spathe and dark green spadix.

1987, *Gerardo Aymard, H. van der Werff & Nidia Cuello 5234* (MO, PORT); Mpio. Boconó, Parque Nacional Guaramacal, trail from El Cafenol (E of Mosquey) (UTM: 19–369976E; 1026628N) to Fila Los REcostaderos (UTM: 19–370258E; 1026389N), passing from "potrero" along forest margin to forest, 1790–2200 m, 12 Jun 2001, *Laurence J. Dorr 8874* (MO).

Anthurium lutheri Croat, **sp. nov.** Type: Ecuador. Esmeraldas: Lita-San Lorenzo Road, 14.2 km W. of Río Lita, 00°52'11"N, 78°27'16"W, 425 m., *Thomas B. Croat, Richard Mansell, Lynn P. Hannon & J. Whitehill 82351* (holotype, MO-4889314–315; isotypes, QCNE; COL, K, US). **Figures 16–18.**

The species is a member of section *Leptanthurium* and is characterized by its epiphytic habit, internode typically not much longer than broad (up to ca. twice as long as broad), long-petiolate leaves, sulcate to adaxially flattened petioles, stap-shaped pendent leaf, matte-subvelvety long-acuminate leaf blades, distinct sunken primary lateral veins as well as the lanceolate green spreading spathe, the prominently stipitate, dark green spadix and red berries.

Epiphyte to about 3 m; **stems** elongated, to ca 1 m or more long, appressed-climbing; **internodes** (1)2–6 cm long, 8–10(13) mm diam., glossy, dark green to gray-green, soon gray, closely transverse-fissured, drying prominently ribbed both longitudinally and transversely; **cataphylls** 5.5–10 cm long, slender, green, drying tan-white, intact or turning finely fibrous but soon deciduous. LEAVES pendent; **petioles** 12–35 cm long, dark green, weakly glossy, sharply C-shaped, sulcate to flattened adaxially with acute, erect margins, sheathed at the base; **blades** 30–83 cm long, 3.5–9.8 cm wide, 8–15 times longer than wide, gradually long-acuminate, subcoriaceous, arched along midrib with sides turned somewhat upward, dark green and subvelvety-matte above, semiglossy to weakly glossy or matte and somewhat paler below, drying grayish to greenish gray and weakly glossy above, greenish gray-brown to greenish gray and semiglossy below; **midrib** narrowly raised to acute and in deep valleys above, much thicker, narrowly round-raised, sharply acute and much paler below, drying weakly raised as a single rib in a valley, sometimes weakly 3-ribbed, becoming 1-ribbed toward the apex on upper surface, moderately paler and narrowly raised with a medial sulcus on lower surface, drying concolorous, obtusely sunken with obtusely raised marginal ribs above, narrowly raised and much paler below ; **primary lateral veins** 25–35 pairs, arising at (65)75–85° angle, etched-sunken to quilted-sunken above, narrowly raised, somewhat pleated-raised and concolorous below, drying weakly raised and concolorous above, narrowly raised and almost concolorous below, drying weakly raised and concolorous above, narrowly raised and paler below; tertiary veins visible, in part sunken above, drying prominulous below; **collective veins** weakly glossy, arising from the 2nd to 4th pair of

primary lateral veins, prominently loop-connecting primary veins, 3–10 mm from margins, about as prominent as the primary lateral veins; **upper surface** densely and finely granular; **lower surface more** sparsely and more coarsely granular. INFLORESCENCES pendent; **peduncle** 24–35 cm long, sometimes twisted and weakly to conspicuously ribbed; **spathe** erect and hooding spadix, semiglossy, green with darker veins, 4.5–8 cm long, 5–13 mm wide, directed in the same direction as peduncle; **spadix** 7.5–13 cm long, 3.5–6 mm diam, stipitate ca. 0.5–4.3 mm, the spadix proper 6.5–8 cm long, dark green, semiglossy, positioned at 45° angle to peduncle; **flowers** 3–4 per spiral, 3.5 mm long, 3 mm wide; tepals coarsely granular; lateral tepals, 1.6–1.8 mm wide, inner margins rounded, outer margins 2-sided; stamens slightly emergent at anthesis, then withdrawn slightly, anthers 0.5 mm long and wide; thecae moderately divaricate, pollen pale yellow; pistil whitish at tip. INFRUCTESCENCE to 16 cm long, drying to 1.5 cm diam.; **berries** reddish, early emergent.

Anthurium lutheri is known only from southern Colombia (Nariño Department) and northern Ecuador (Tulcan Cantón in Carchi Province and in the the Lita-San Lorenzo region in Esmeraldas) at 550–1500 m in *Tropical wet forest* and *Premontane rain forest* life zones.

Anthurium lutheri is most closely related to *A. pallidiflorum* with differs in having stems closely longitudinally ribbed on drying, cataphylls that persist as spreading pale fibers at several nodes, the upper blade surface finely granular to areolate and matte, the lower surface matte and frequently pustular, primary lateral veins that are scarcely visible on either surface, sessile or subsessile spadix (stipe when present less than 2 mm long). In contrast *A. lutheri* has stems that dry coarsely longitudinally ribbed and coarsely transversed-ribbed, has deciduous cataphylls which never persist as spreading fibers, upper blade surfaces that dry coarsely granular, have primary lateral veins that are clearly visible on both surfaces and which are prominently raised and paler than surface below as well as by having a prominently stipitate spadix.

Paratypes: COLOMBIA. **Nariño**: Junín-Barbacoas, 1.9 km NE of Junín, 01°21'N, 78°06'W, 1130 m, 27 Feb. 1992, *Croat 72428* (QCNE, MO). ECUADOR. **Carchi**: Tulcan Cantón, Reserva Indígena Awá, Communidad San Marcos, 35 km NW of El Chical, Parroquia Maldonado, 01°06'N, 78°17'W, 1500 m, 16–30 Nov. 1990, *D. Rubio et al. 954* (QCNE). **Esmeraldas**: Along road between Lita and San Lorenzo, 0.2 km E of main road along gravel road, 31.3 km N of Gasolinera San Lorenzo, 17.3 km N of Río Tulubí, 01°04'30"N, 78°39'56"W, 81 m, 17 July 2000, *Thomas B. Croat & et al. 84112* (MO); San Lorenzo Cantón, Lita-San Lorenzo Road, vic. Alto Tambo, 17.8 km NW of Lita, 2.3 km SE of railroad crossing in Alto Tambo, 00 33'53"N, 78 32'36"W, 841 m, 13 Oct. 2007, *T. Croat, M. Carlsen & D. Levin 99766* (MO,

QCNE); Lita-San Lorenzo Road, 16.6 km W of Lita, 0.5 km W of Anchayaca (campamento de construciones), 00°55'N, 78°28'W, 700 m, 20 Feb. 1992, *Thomas B. Croat 72266* (MO, QCNE,MO); Lita-San Lorenzo Road, 17.3 km E of Río Tululbí, 31.2 km E of Gasolinera San Lorenzo at E edge of San Lorenzo, 01°06'49"N, 78°39'38"W, 204 m, 7 Oct. 1999, *Thomas B. Croat, Richard Mansell, Lynn P. Hannon & Beth Owen 83129* (MO); Esmeraldas Lita, wet evergreen forest, mostly in area with recently cut trees, 00°52'N, 78°28'W, 600 m, 20 May 1987, *H. van der Werff, Calaway H. Dodson & Walter A. Palacios 9537* (MO, QCNE); Border area between Prov. Carchi and Esmeraldas, about 20 km past Lita on road Lita-Alto Tambo, 00°53'N, 78°30'W, 550 m, 25 June 1991, *H. van der Werff, Bruce Gray & Galo A. Tipaz 12007* (MO, QCNE); Lita-San Lorenzo road, 10–20 km NW of Lita, 00 55'N, 78 35'W, 800 m., 12 May 1991, *Alwyn H. Gentry, Calaway H. Dodson, Brad Boyle & Daniel Rubio 70115* (MO, QCNE); Lita-San Lorenzo Road without exact locality, 800 m., 21 Feb. 1988, *Kress et al. 88–2286* (SEL). **Imbabura:** Lita - Alto Tambo Rd., 760 m, 21 Feb. 1988, *W. John Kress, Harry E. Luther, Cheryl S. Roesel & A. Carle 88–2286* (MO, SEL); Selby 91–159, 26 June 1991, *Ingram 1030* (MO, SEL).

Anthurium minutipustulum Croat, ***sp. nov.*** Type: ECUADOR. Morona-Santiago: Cultivated Plant received from Neil Carroll, 30 Apr. 1999, *Thomas B. Croat 82936* (holotype: MO-6930904; isotypes: B, COL, K, NY, QCNE, US). **Figure 19.**

The species is a member of section *Leptanthurium* and is characterized by its sheathed petioles, grayish-green-drying narrowly elliptic blades 3–3.5 times longer than wide and covered with small pustules on the upper surface, by its numerous primary lateral veins separated by minor veins running in parallel, and by its inflorescences with a long peduncle, a spathe tinged violet-purple inside and a long sessile spadix.

Internodes short, 1.4 cm diam; **cataphylls** 6.6 cm, intact at apex, net-like reticulum. LEAVES with **petioles** 7.5–12 cm long, 4 mm diam.; sheathed for 4–5.5 cm, medium to dark green, narrow and slightly deeply sulcate; geniculum paler than petiole (light green); **blades** narrowly elliptic, 24–32 cm long, 7.5–9.5 cm wide, 3–3.5 times longer than wide, 2.4–3.5 times longer than petiole, widest near the middle, acute and slightly decurrent at the base, obtuse and short-acuminate at apex, medium to light green, subvelvety and matte above, velvety and paler below, drying medium grayish-green on both surfaces; **midrib** narrowly rounded, slightly paler in deep valley; **primary lateral veins** numerous, barely visible, arising at a 60° angle and running straight to the collective vein, separated by several minor veins running parallel to them; **collective veins** moderately visible on lower side, 2–7 mm from margin; **upper surface** covered with numerous small pustules, especially near the midrib. INFLORESCENCE with **peduncle** 28–51 cm long, 4 mm diam., erect-spreading; **spathe** reflexed, 3.5–12 cm

long, ca. 8 mm wide, medium-dark green but highly tinged violet-purple on inside; **spadix** sessile, 6–13 cm long, 4–5 mm diam., light green; **flowers** 5–6 visible per spiral, 2.1–2.3 mm long, 1.6–1.8 mm wide; tepals smooth, matte with several distinct pale cellular inclusions; lateral tepals 1.3–1.6 mm wide, inner margins rounded, pale and thin, outer margins 2–3-sided; stamens held below level of tepals, anthers 0.3 mm long, 0.6 mm wide; thecae ovate, moderately divaricate; pollen pale yellow.

Anthurium minutipustulum has been found only in eastern Ecuador in Morona-Santiago Province at 700–1000 m, probably in *Premontane moist forest* or *Premontane wet forest* life zones.

The species epithet "minutipustulum" comes from the Latin "minutus" meaning small and "pustulus" meaning pustule or blister, referring to the small pustules found on the upper blade surface.

Anthurium miritiparanaense Croat & J. Watt, **sp.nov**. Type: Colombia. Amazonas: Río Miritiparaná: Caño Guacayá. 00°30'S, 70°40'W, 213 m, 24 Apr. 1952, *Richard E. Schultes & Isidoro Cabrera 16243* (holotype, AMES). **Figure 20.**

The species is a member of section *Leptanthurium* characterized by its epiphytic erect habit, dense gray velum-covered roots, short internodes, persistent cataphyll fibers, long oblong-oblanceolate long-acuminate epunctate blades with matte areolate surfaces, as well as by the long-pedunculate inflorescence, yellowish reflexed, brown-purple-speckled spathe and stipitate purple/violet-red spadix with 2–3 flowers visible per spiral with 3–4 sided tepals.

Epiphyte; **internodes** short, 1–1.5 cm diam.; **cataphylls** 5–6 cm long, persistent as fibers, drying tan. LEAVES with **petioles** 9–13 cm long, 0.21–0.28 times as long as blades, U-shaped, ribbed; **geniculum** slightly thickened, 5–8 mm long, 3 mm diam. LEAVES erect; **blades** oblong-oblanceolate, 36–51.5 cm long, 4–5.5 cm wide, 9–10 times longer than wide, 4–6 times longer than petioles, acute and long-tapering at the base, acute and gradually long-acuminate at apex, subcoriaceous, nearly concolorous, drying matte greenish gray and matte, minutely areolate above, slightly paler and areolate-ridged below; **midrib** bluntly acute, many-ribbed above, convex and concolorous, drying weakly ribbed below; **primary laterals** 20–25 pairs, slightly prominent below, difficult to discern above, arising at 25–30°; **interprimary** veins minute, difficult to discern without magnification, concolorous; **collective veins** arising from base of blade, 3 mm from margin. INFLORESCENCE 34 cm long; **peduncle** 25 cm long, 2 mm wide, terete ribbed, slightly twisted, greenish striped short dark brown-lineate; **spathe** yellowish, speckled brownish purple, 3.8 cm long, 5 mm wide, abruptly acuminate at apex; **spadix** stipitate, purplish violet-red, drying tan, 8.6 cm long,

Figure 19. *Anthurium minutipustulum* Croat (*Croat 82936*, MO-6930904). Herbarium specimen showing petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

Figure 20. *Anthurium miritiparanense* Croat & J. Watt (*Schultes & Cabrera 16243*, AMES). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

Figure 21. *Anthurium muyunense* Croat (*Smith 2084*; WIS-256233). Herbarium specimen showing stem apex, petioles, leaf blades, adaxial and abaxial surfaces, and inflorescence.

Figure 22. *Anthurium muyunense* Croat (*Croat 78343*). Live plant showing petioles, leaf blades, adaxial surface, inflorescence and infructescence.

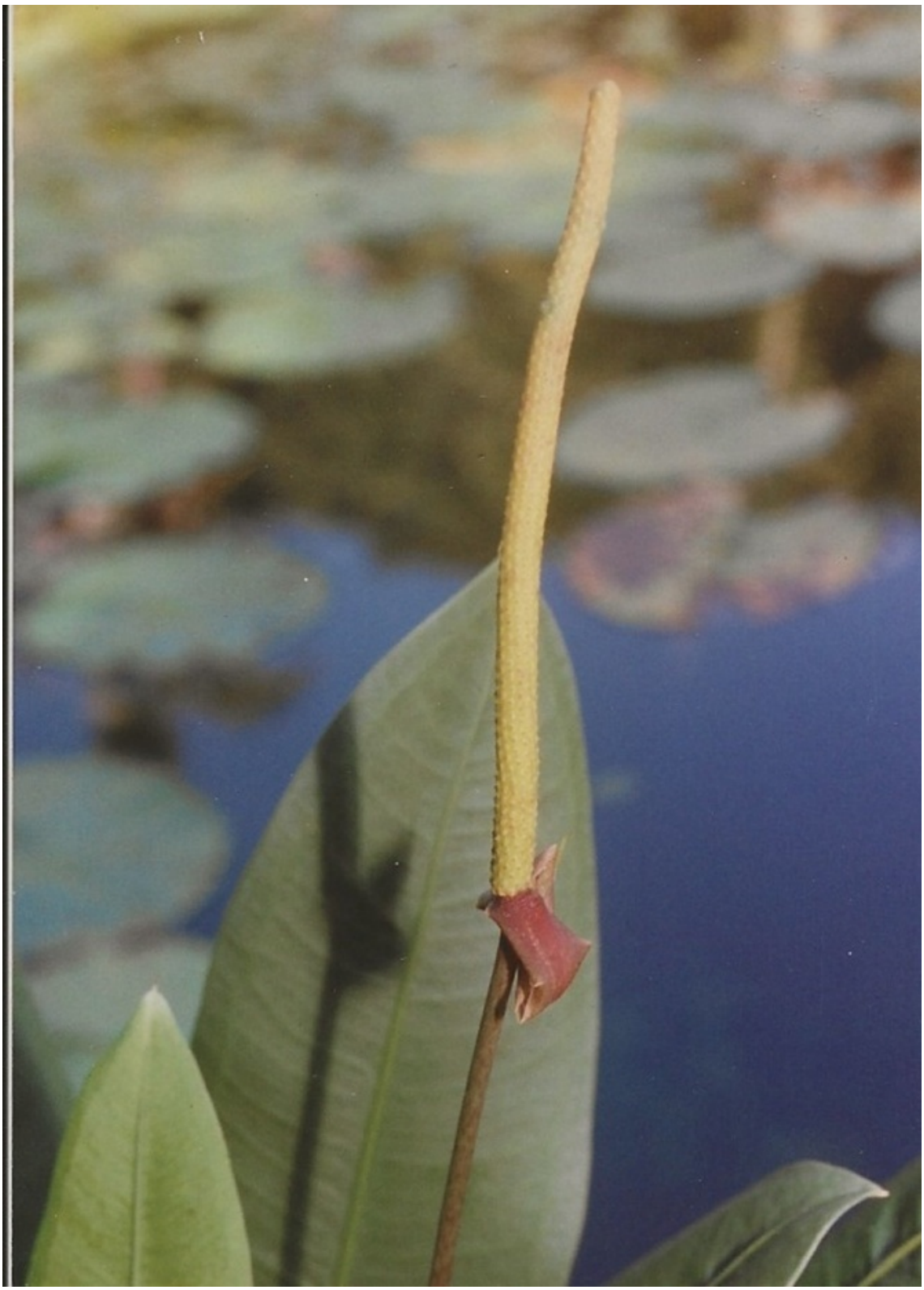

Figure 23. *Anthurium muyunense* Croat (*Croat 78343*). Close-up view of inflorescence with spathe tinged violet-purple and spadix yellowish green.

3 mm wide; **flowers** 2–3 visible per spiral, 2–3.2 mm long, 1.5–2 mm wide; lateral tepals 1.5–1.8 mm wide, inner margin rounded, outer margin equilateral shield-shaped, (3)4 sided, conspicuously granular with small irregular pale inclusions; stamens present, mostly withdrawn beneath tepals, orange-yellow, 0.5 mm long, 0.6 mm wide, thecae weakly divaricate.

Anthurium miritiparanaense is endemic to Colombia, known only from the type locality in Amazonas Department, Río Miritiparaná and Cano Guacayá, north of Río Caqueta and west of Río Taraira at 213 m in a *Tropical Moist Forest* life zone.

Anthurium miritiparanaense is most closely related to *A. gracile* (Rudge) Schott which differs by having blades which dry smoother and minutely granular on upper surface, smooth and dark-speckled on lower surface.

The plant is named for the type locality along the Río Miritiparana in south-east corner of Amazonas Department of Colombia.

Anthurium muyunense Croat, *Aroideana* (in press), Type: Ecuador. Zamora-Chinchipe: Vic. of Ecua-Corrientes copper mine development, Río Waiwaime drainage, along road to mine site 3.3 km above gate, 6.3 km E of mine headquarters, 00°34'37"S 78°25'37"W, 1308 m, 7 Apr 2006, *Thomas B. Croat 96722* (holotype: MO-4778231; isotypes: K, US). **Figures 21–23.**

Epiphyte or terrestrial on steep bank; **stems** to 30 cm long; **internodes** short, 1–2 cm diam.; **roots** velamentous; **cataphylls** 7.5–9.5 cm long, persisting intact and pale green at upper nodes, remaining fibers pale brown, persisting semi-parallel with fragments of pale epidermis; **petioles** 5–17 cm long, 4–5 mm diam., obtusely C-shaped, prominently sheathed for most their length, medium green, matte, smooth, sheath tightly incurled, the margin scarious; geniculum slightly thicker, 0.5–1.5 cm long, 5 mm diam., reddish purple; **blades** subcoriaceous, lanceolate-elliptic to lanceolate, 16–34 cm long, 4–9 cm wide, 3.6–6.4 times longer than wide, 1.6–6.4 times longer than petiole, abruptly acuminate at apex, acute at the base; dark green and matte-subvelvety above, moderately paler and matte below, drying light to medium grayish-green above, slightly lighter below; **midrib** narrowly rounded and paler below, thicker than broad and slightly darker below; **primary lateral veins** 10–12 pairs, arising at 70° angle, flattened, darker than surface to concolorous above, scarcely raised and darker below; **collective veins** about as prominent as primary lateral veins, 2–5 mm from margin; **minor veins**, including cross-veins, slightly raised upon drying, cross-veins oblique. INFLORESCENCES pendent-arching; **peduncle** 14–50 cm long, 2.5–5 mm diam., medium green, weakly glossy; **spathe** reflexed-spreading, recurved, 5–10 cm long, 0.5–1.2 cm wide, weakly

glossy inside, semiglossy outside, green, often tinged violet-purple with minute greenish speckles, drying brown; **spadix** 12–26 cm long, 5–7 mm diam., pale green or yellowish green, matte; **flowers** 3–3.3 mm long, 2–2.5 mm wide; stamens held at surface of tepals, 0.5 mm long, 0.7 mm wide; thecae ovoid, moderately divaricate. INFRUCTESCENCE with **spadix** 26.5 cm long, 1–2.7 cm diam. with berries emerging (spadix proper to 7 mm diam.); **berries** early-emergent, pale orange or red-orange, obovoid, 4–6 mm long, rounded at the apex.

Anthurium muyunense ranges along the Amazon Basin from Ecuador (Morona-Santiago, Napo, Pastaza, Zamora-Chinchipe) to northern Peru (Amazonas, Cajamarca) at 500–2500 m, in *Premontane rain forest*, *Premontane wet forest* and *Montane wet forest, Subtropical moist forest* and *Lower montane moist forest* life zones.

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

Additional specimens seen: ECUADOR. **Morona-Santiago:** Along road between Sucua and Méndez (Santiago de Méndez), 02°41'00"S, 78°19'00"W, 850 m, June 1994, *B. Feuerstein 15* (MO); Road from Plan del Milagro to 10–15 km past San Juan Bosco, moderate to highly disturbed cloud forest, 03°05'S, 78°40'W, 1470 m, 1 June 1989, *James F. Smith 2084* (QCA); Cordillera del Cóndor, valle del Río Coangos, Río Tsurim entre los Centros Shuar de Numpatkain y Banderas, 03°20'44"S, 78°14'08"W, 1100 m, Oct. 1999, *Patricio Fuentes, Juan C. Ronquillo & A. Tankamash 1140* (MO, QCNE); Cultivated Plants at Dewey Fisk's, collected by Neill Carroll, 20 Sep. 2003, *Thomas B. Croat 90036* (MO, QCNE); Cultivated Plants (Aroid Show, 2001), received from Dewey Fisk 4/1/02, collected by Neill Carroll, 26 Sep. 2001, *Thomas B. Croat 84930* (MO, QCNE); Along road from Patuca to Santiago, Cordillera de Cutucú, 11.4 km E from Patuca turnoff on Macas-Limón road, 5.1 km E of Patuca, 02°46'30"S, 78°07'00"W, 944 m, 9 July 2004, *Thomas B. Croat, Lynn P. Hannon, Gregory A. Wahlert & Tuntiak Katan 90600* (MO, QCNE); Gualaquiza, Cordillera del Cóndor, Valle del Río Quimi, bosque alterado y potreros, orillas del Río Quimi, 03°30'24"S, 78°25'35"W, 1090 m, 13 Dec. 2000, *M. Cuascota & Grupo Post-Grado MO-QCNE 297* (MO, QCNE); Morona, Parr. Sinae, Caserio Musap, Comunidad Shuar Musap, 02°15'S, 77°33'W, 1150–1500 m, 8 Oct. 1996, *Consuelo Montalvo A., Carlos E. Cerón, Darwin Rivadeneira & Edmundo Silva 43* (QAP); Palora, Río Amundaló, Colonia Tarqui, 01°41'S, 78°01'W, 970 m, 10 Apr. 1998, *Carlos E. Cerón, Tatiana Dávila, Miguel Joya, S. Silva & M. Chávez 35687* (QAP); Along the road from the main Puyo-Macas Road to Palora, departing main Puyo-Macas Road 38 km SSE of Puyo, 9.8 km from

main road, remnant forest in pasture, 01°44'40"S, 77°54'49"W, 1336 m, 20 Aug. 2002, *Thomas B. Croat & Lynn P. Hannon 86671* (MO, QCNE); Along road between Palora and Llushín, departing main Palora-San Vincente de Tarqui Road, 8.7 km NW of Palora, 3.4 km S of Río Amundalo, 2.1 km E on road to Llushín, 01°41'46"S, 78°01'21"W, 922 m, 25 Aug. 2002, *Thomas B. Croat & Lynn P. Hannon 86949* (MO, CNE); Palora, Carretera Pastaza-Palora, Bosque muy Húmedo Premontano, bosque secundario, borde de carretera, 01°35'S, 78°05'W, 1060 m, 6 July 1991*, Edgar Gudiño, S. Flores & Velasco, A. 1504* (MO, QCNE); Along road between Gualaquiza and Indanza, 8.1 km N of Tucumbatza, 50 km S of Indanza, 03°12'50"S, 78°33'39"W, 1400 m, 8 Sep. 2002, *Thomas B. Croat 87261* (MO, QCNE); Sucua-Majoles Road, collected by B. Feuerstein in June 1994 (L. Hannon 94/100), 20 Apr. 2005, *Thomas B. Croat 95411* (MO). **Napo:** Along road from Tena, past Muyuna to end of road, where bridge over Río Tena is under construction, disturbed area in vicinity of bridge, ca 2 km W of Muyuna, ca 5.7 km W of Tena , 00°56'S, 77°51'W, 500 m, 1 May 1984, *Thomas B. Croat 58848A* (MO, QCA); Along road from Muyuna (near Tena) to municipal water plant, 2.3 km W of bridge over Río Tena near new university, 00°56'21"S, 77°51'58"W, 611 m, 15 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich & M. Rees 105654* (MO, QCNE); Archidona, Bosque Protector de la Comunidad de Mushullacta, Bosque pluvial premontano, suelo de roca calcárea, 00°49'39"S, 77°33'47"W, 1200 m, 25 Feb. 2003, *Noel Altamirano 210* (MO, QCNE), Oeste de la ciudad del Macas, 02°18'S, 78°07'W, 1160 m, 25 Feb. 1986, *Marc A. Baker 6634* (NY); Horse trail Macas-Riobamba, ca. 7 km NW of General Proaño, 1100 m, 30 Mar. 1974, *Gunnar Wilhelm Harling & Lennart Andersson 13040* (GB, MO); 31 km N of Yangzatza, 03°55'S, 78°46'W, 1000 m, 19 Oct. 1980, *Thomas B. Croat 50783* (MO, QCA); Campamento La Playa, road consruction camp, 23 km SE of San Juan Bosco, 03°15'57"S, 78°23'23", 1050 m, 28 Jan. 1981, *Alwyn H. Gentry, Carmen Bonifaz B. & Jorge Loor C. 30751* (MO, SEL); Along road between Gualaquiza and Zamora, 5 km S of El Pangui, premontane wet forest, 03°40'S, 78°36'W, 800 m, 20 Oct. 1980, *Thomas B. Croat 50813* (MO, QCA); Received from Neil Carroll, Bluffton Gardens, North Carolina; collected originally in Ecuador: Napo: Cordillera Galeras, along road between Archidona-Tena Road and Coca; Río Jondachi (Río Hollín), cultivated at Missouri Botanical Garden, 00°50'S, 77°42'W, 600–900 m, *Thomas B. Croat 78343* (MO, QCNE). **Pastaza:** Mera, 01°28'00"S, 78°06'00"W, 1100 m, 25 May - 6 June 1968, *Gunnar Wilhelm Harling & et al. 9731* (GB, MO); Along road between Palora and Paroquia San Francisco de Tarquí, 1.1 km S of Río Amundalo Bridge., 01°45'12"S, 78°03'55"W - 01°45'12"S, 78°03'09"W, 1118 m, 9 Oct. 2007, *Thomas B. Croat, Monica Carlsen & Dan Levin 99583* (MO, QCNE); Shell, 01°30'S, 78°04'W, 1200 m, 30 Jan. 1994, *Xavier Cornejo S. & Carmen Bonifaz B. 1450* (GUAY); *Xavier Cornejo S. & Carmen Bonifaz B. 1478* (GUAY); Along road from Puyo to Macas, ca 33 km S of Puyo, 24.9

km S of Veracruz, 16 km S of Escuela Fiscal Cotopaxi, disturbed primary forest, 01°38'S, 77°52'W, 900 m, 3 May 1984, *Thomas B. Croat 58962* (MO, QCA). **Zamora-Chinchipe:** Cordillera del Condór, Shaimi, SE de Campamento Militar, márgen derecha de Río Nangaritza, 04°18'S, 78°43'W, 950 m, 27 Oct. 1991, *Walter A. Palacios, I. Vargas & Efraín Freire 8762* (MO, QCNE); Along road to Romerillao Alto from Zamora, 19.1 km E of Río Bombuscaro in Zamora, 6.3 km E of La Pituca, 04°10'04"S, 78°56'10"W, 1203 m, 20 July 2004, *Thomas B. Croat 91538* (MO, QCNE); Chinchipe, 04°52'00"S, 79°09'00"W, 1993, *J. Bogner 2737* (MO); Parque Nacional Podocarpus, Guardería Río Bombuscaro, Bosque húmedo pre-montano, 04°04'S, 78°57'W, 1100 m, 13 Nov. 1991, *Mario Larrea, Ricardo Viteri & López, L. 41* (QCA); Road from Loja to Zamora, Km 45–51, 1400–1600 m, 20 Nov. 1961, *Calaway H. Dodson & L.B. Thien 1427* (MO), Between Loja and Zamora, coll. 1974 by George Kennedy s.n., cult. at SEL, M.T. Madison 5511 (SEL). PERU. **Amazonas:** Bagua, Jan. 1877, *M. Vidal-Sénège 4779* (P); *M. Vidal-Sénège 4784* (P). **Cajamarca:** San José de Lourdes, Crucero, bosque secundario con relictos de bosque primario, 05°04'12"S, 78°56'07"W, 1000–1100 m, 2 Feb. 1999, *José Campos de la Cruz & et al. 5995* (AAU, B, CAS, GH, MO, QCNE, USM).

Anthurium pallidiflorum Engl., *Bot. Jarhb. Syst.* 25: 395. 1898. Type: Ecuador. Pichincha: Río Peripa, near San Miguel de los Colorados, *Sodiro s.n.* (B). **Figures 24–25.**

Anthurium annulatum Sodiro, *Anal. Univ. Centr. Ecuador* 15 (108): 5. 1901. Type: Ecuador. Cotopaxi: Angamarca, Nov. 1900, *Sodiro s.n.* (G, Q, QPLS).

Anthurium lorifolium Sodiro, *Anal. Univ. Centr. Ecuador* 15 (108): 5. 1901. Type: Ecuador. Santo Domingo de los Colorados, Aug. 1885, *Sodiro s.n.* (Q).

Anthurium spruceanum Engl., *Pflanzenr.* IV. 23B (Heft 37): 109. 1905. Type: Ecuador. Chimborazo, July 1860, *Spruce s.n.* (K).

Epiphyte; **stems** to 1 m long; **internodes** 5–10 mm long; **cataphylls** 4–16 cm long, green, promptly weathering to persistent long, pale fibers. LEAVES with **petioles** 11–40 cm long, 3 mm diam., subterete, narrowly and obtusely sulcate, sheathed 7–8 cm; geniculum 6–16 mm long, paler than the remainder; **blades** pendent, strap-shaped, moderately coriaceous, 31–105 cm long, 5.5–13 cm wide (7–8 times longer than wide), acuminate at apex, rounded at base, dark green and velvety above with glandular punctations, slightly paler and matte beneath; **midrib** convex and paler above, sometimes cream-colored, slightly paler and more prominently raised beneath; **primary lateral veins** faint and poorly visible, 40–46 pairs, departing at an angle of 35–40°, obtusely pleated-raised above, flat below; **tertiary veins** not evident; **collective**

veins arising from the lowermost primary lateral veins, sometimes with a secondary collective vein which soon merges with the margin, 6–14 mm from the margin; antimarginal vein present, ca. 1 mm from the margin. INFLORESCENCE erect to erect-spreading; **peduncle** 13–26 cm long, equaling or shorter than the petioles; **spathe** linear-lanceolate, membranaceous, 4–12 cm long, 1–1.5 cm wide, pale green, acuminate at apex, the margins meeting at an acute angle at the base; **spadix** pinkish, 5–10 cm long, 4–7 mm diam., stipitate 2–3 mm; **flowers** rhombic, 1.6–1.9 mm diam., 7–10 visible per spiral; lateral tepals 0.8–1.6 mm wide, inner margin broadly rounded to nearly straight; stamens 1.3 mm long; anthers yellowish. INFRUCTESCENCE to 26 cm long, pendent; **berries** ellipsoid, red-carmine in apical half, white at the base, maturing simultaneously throughout the length of the spadix; pericarp with a few raphides, mesocarp mucilaginous, translucent; **seeds** green, discoidal, 3.5–5 mm long, 1 per locule.

Anthurium pallidiflorum is endemic to Ecuador, occurring only on the western slopes of the Andes at 20–1500 m elevation in *Tropical moist forest*, *Tropical wet forest* and *Premontane wet forest* life zones.

The species is characterized by its epiphytic habit, pendent leaves with sheathed petioles and strap-shaped velvety blades with 40–46 pairs of faint primary lateral veins, inflorescences with a pale green spathe and a pinkish spadix, and by its pendent infructescences with red berries.

Additional specimens seen: ECUADOR. In tropical forests near San Miguel, Aug. 1875, *L. Sodiro s.n.* (US); Near San Miguel de los Colorados., July 1875, *L. Sodiro 15* (MO); In silv. reg. Aregomarca, 01°07'00"S, 78°56'00"W, Nov. 1900, *L. Sodiro 11* (MO); Km 170–175, 300 m, 10 Sep. 1949, *M. Acosta-Solis 13886* (F); Cultivated at MO, *Mary E. Fallen 1979* (CM, MO). **Bolívar:** 800–1000 m, 14 Oct. 1943, *M. Acosta-Solis 6373* (F); Clementina Farms, Cerro Samama, 5.7 km S and W of main Pueblo-Viejo-Caluma Road, 5.2 km W from bridge over Río Pita, (turnoff is 6.3 km E from Potosí), 01°38'51"S, 79°19'52"W, 371–600 m, 14 Aug. 2004, *Thomas B. Croat, Geneviève Ferry & Christopher Davidson 93332* (MO). **Chimborazo:** Univ. of Calif. Botanical Gard., Berkeley Accession No. 58.776–1, lithophytic or epiphytic in upper section of the jungle shortly before reaching the arid-dry slopes of Huigra, canyon of Río Chanchan between Naranjapata and Olimpo., 800–1000 m, *C.K. Horich s.n.* (MO, UC); 1000 m, July 1860, *Richard Spruce s.n.* (MO). **Cotopaxi:** ca. 40 mi. E of Quevedo, 00°56'19"S, 79°02'00"W, 15 Sep., *Amy J. Gilmartin 808* (MO, US); Tenefuerste, Río Pilalo, Km 52–53, Quevado, Latacunga, 00°52'42"S, 79°05'16"W, 750–1300 m, 7 Feb. 1982, *Calaway H. Dodson & Alwyn H. Gentry 12176* (MO); 3 km E of El Palmar on Quevedo-Latacunga road, 00°52'10"S, 79°06'40"W, 800 m, 5 Apr. 1980, *Calaway H. Dodson & Alwyn H. Gentry 10264* (MO); Quevedo-Latacunga, Km 57., 00°52'18"S, 79°06'41"W, 700 m, 28 Feb. 1995, *Michael Schwerdtfeger 22807* (MO); Along road between Quevedo and Latacunga, 55.5 km

from Quevedo, and 23.5 km E of La Maná, on forested slopes above river, 00°53'S, 79°04'W, 930–950 m, 10 Oct. 1983, *Thomas B. Croat 57025* (MO); La Maná, along road between Guayacan (13.1 km N of La Mana) and Montenuevo (N of Pucayacu), at end of road which branches to the right 23.6 km from Guayacan, in vicinity of Escuela Quindigua, 10.7 km beyond the junction in road to Escuela Quindigua., 00°39'S, 79°05'W, 1480–1530 m, 9 Apr. 1992, *Thomas B. Croat 73797* (MO, SEL). **Esmeraldas:** Río Cayapa, Zapallo Grande, 00°48'N, 78°54'W, 200 m, 11 Oct. 1983, *A.S. Barfod & et al. 48106* (AAU); 200 m, 11–15 Oct. 1983, *A.S. Barfod & et al. 48106* (AAU); San Miguel, Limones, Sector Río Grande, Comunidad Corriente Grande, 1 km al este del poblado, Bosque muy húmedo Tropical, bosque alterado, 00°45'N, 78°47'W, 350 m, 22 Nov. 1992, *Galo A. Tipaz, P. Méndez & Homero Vargas 2291* (MO, QCNE); Eloy Alfaro, Comuna de Corriente Grande (río Chimbagal, afluente del Cayapas), 00°41'N, 78°50'W, 150–200 m, 8 Aug. 1993, *A.P. Yanez, M. Chapiro & M. de la Cruz Añapa 1444* (CAS, MO, QCNE); Quinindé, Bilsa Biological Station, Montañas de Mache, 35 km W of Quinindé, 5 km W of Santa Isabel, Premontane Wet Forest, mature forest near la casa de papaya, 00°21'N, 79°44'W, 400–600 m, 18 May 1995, *John L. Clark & Claire Watt 918* (MO, QCNE); Bilsa Biological Station, Montañas de Mache, 35 km W of Quinindé, 5 km W of Santa Isabel, Premontane Wet Forest, mature forest near la casa de papaya, 00°21'N, 79°44'W, 400–600 m, 18 May 1995, *John L. Clark & Claire Watt 917* (MO, QCNE); Bilsa Biological Station, 00°21'00"N, 79°42'00"W, 450–650 m, Nov. 2006, *Nils Köster & A. Schnell 2153* (BONN, MO, QCA, QCNE). **Guayas:** Naranjal, Reserva Ecológica Manglares – Churute, Cumbre del Cerro Pancho Diablo, topografía colinado, suelo rocoso, muy húmedo, Transectos de 50 x 2 m x 5 (0.05 ha), 02°27'S, 79°35'W, 700 m, 31 Dec. 1991, *Carlos E. Cerón 17871* (MO). **Los Ríos:** Cerro Samana, SE of Potosí, SW of Caluma, South of Río Pita, vicinity of village of Pita, between Pita and Escuela 18 de Deciembre, 01°38'44"S 079°19'58"W - 01°39'38"S 079°39'38"W, 164– 400 m, 18 Mar. 2006, Thomas B. Croat, Christopher Davidson & Sharon R. Christoph 96087 (MO, QCNE). Río Palenque Field Station, halfway between Quevedo and Santo Domingo de Los Colorados, 00°35'00"S, 79°22'00"W, 200 m, 21 Feb. 1974, *Alwyn H. Gentry 10104* (MO, RPSC, SEL); La Corina, 20 km E of Patricia Pilar, 6 km E of La Centinela, border with Pichincha, 00°38'00"S, 79°16'00"W, 430 m, 29 Sep. 1979, *Alwyn H. Gentry & Eugene Schupp 26681* (MO); Hacienda Clementina, 01°22'00"S, 79°52'00"W, 20 m, 17 Feb. 1967, *Benkt Sparre 14482* (MO, S); Hacienda Monica, 12 km E of San Carlos, 01°07'03"S, 79°20'13"W, 180 m, 3 Nov. 1966, *Benkt Sparre 19404* (MO, S); Hacienda Monica, 12 km E of San Carlos, secondary monsoon forest, 01°07'03"S, 79°20'13"W, 180 m, 3 Nov 1966, *Benkt Sparre 19403* (MO, S); Hacienda Clementina, 01°22'00"S, 79°00'52"W, 150 m, 27 Jan. 1947, *Gunnar Wilhelm Harling 195* (MO, S); Trail from Destacamento Pita to La Torre, 01°38'S, 79°19'W, 400–600 m, 29 Feb. 1996, *Hennig*

Knudsen 539 (S); Río Palenque Biological Station, received from Mary Fallen, May 1980, 250 m, *Thomas B. Croat 81405* (MO, WU); Centro Scientifico Río Palenque, along trails W of laboratory and in vicinity of laboratory clearing, 00°35'00"S, 79°22'00"W, 210–250 m, 31 Aug. 1976, *Thomas B. Croat 38665* (MO); Cerro Samana, SE of Potosí, SW of Caluma, South of Río Pita, vicinity of village of Pita, between Pita and Escuela 18 de Deciembre, 01°38'44"S, 79°19'58"W - 01°39'38"S, 79°39'38"W, 164–400 m, 18 Mar. 2006, *Thomas B. Croat, Christopher Davidson & Sharon R. Christoph 96078* (MO); Hcda. Clementina, Cerro Guineales, 01°40'S, 79°21'W, 50 m, 22 Mar. 1996, *Xavier Cornejo S. & Carmen Bonifaz B. 4882* (GUAY, MO). **Pichincha:** Alluriquin, at confluence between Río Alluriquin and Río Toáchi, tropical rain forest, 00°19'00"S, 78°59'00"W, 600 m, 14 Mar. 1967, *Benkt Sparre 14803* (MO, S); Reserva ENDESA, c. 6 km WNW of P. Vicente Maldonado, mature rain forest, 00°05'00"N, 79°02'00"W, 800 m, 25 Mar. 1985, *Gunnar Wilhelm Harling & Lennart Andersson 23332* (GB, MO); Reserva de ENDESA, Km 113 along Quito-Pto. Quito road, primary forest and reserve surroundings, 00°05'N, 79°02'W, 800–1000 m, 16 Nov. 1989–17 Nov 1989, *James L. Luteyn & Finn Borchsenius 13361* (MO, NY); Carretera Quito-Puerto Quito, Km 113, 10 km al Norte de la carretera principal, bosque virgen y alrededores de la reserva, 00°05'N, 79°02'W, 800 m, 28 Feb. 1984, *Jimena Rodríguez 255* (MO); Along N bank of river 3 km W of Alluriquín, 00°19'01"S, 79°00'15"W, 800 m, 20 Oct. 1981, *Lasse Werling & Søren Leth-Nissen 497* (MO, NY, QCA); Carretera Quito-Puerto Quito, Km 113, 10 km al norte de la carretera principal, bosque virgen y alrededores de la reserva, 00°05'N, 79°02'W, 800 m, 17 Feb. 1984, *Rodríguez 182A* (MO); Carretera Quito-Puerto Quito, Km 113, 10 km al Norte de la carretera principal, bosque virgen y alrededores de la reserva, 00°05'N, 79°02'W, 800 m, 17 Feb. 1984, *Rodríguez, Jimena 169* (MO); 8 Oct. 1983, *Thomas B. Croat 56964A* (MO); Along old road to Quito from Alluriquin via Chiriboga, 2–3 km from main Aloag-Sta Domingo de los Colorados road, 00°18'13"S, 78°54'30"W, 890–1010 m, 08 Oct 1983, *Thomas B. Croat 56965* (MO, QCA); Vicinity Hotel Tinalandia S of hwy. between Santo Domingo de los Colorados & Aloag, along Río Toachi, 9.6 km E of Santo Domingo de los Colorados, 00°16'S, 79°07'W, 600 m, 2 Apr. 1983, *Thomas B. Croat 55671* (MO); Along Río Blanco across the river from Valla Hermosa 3 km S of Km 24 on Santa Domingo-Esmeraldas Highway, Tropical moist forest, 00°05'S, 79°15'W, 250 m, 14 Oct. 1980, *Thomas B. Croat 50686* (AAU, B, CM, F, GB, K, M, MEXU, MO, NY, QCA, QCNE, US); Atlanta Botanical Garden 94–0887, forest behind Hotel Tinalandia, June 1997, *Thomas B. Croat 79595* (MO, WU); Along old road to Quito from Alluriquin via Chiriboga, 2–3 km from main Aloag-Sta Domingo de los Colorados road, 00°18'13"S, 78°54'30"W, 890–1010 m, 8 Oct. 1983, *Thomas B. Croat 56964* (AAU, B, CAS, MO, SEL); Reserva Endesa, about 8 km North of Km. 113 on Quito-Pto. Quito Highway, vicinity of Río Cabayales, 00°05'N, 79°02'W, 700 m, 16 July

Figure 24. *Anthurium pallidiflorum* Engl. (*Croat 96087*). Live plant showing creeping stem, petioles, hanging leaf blades, adaxial surface, and infructescence.

Figure 25. *Anthurium pallidiflorum* Engl. (*Croat 96087*). Close-up view of infructescence with red berries.

Figure 26. *Anthurium raphaelense* Croat & Delannay (*Croat 61246*, MO-3689157). Herbarium specimen showing petioles, leaf blades, adaxial and abaxial surfaces, inflorescence and infructescence.

Figure 27. *Anthurium raphaelense* Croat & Delannay (*Croat 75240*). Live plant showing petioles and leaf blades, adaxial surface.

Figure 28. *Anthurium raphaelense* Croat & Delannay (*Croat 75240*). Close-up view of inflorescence with green spathe and yellow-green spadix.

1986, *Thomas B. Croat & Jimena Rodríguez 61510* (MO); Reserva Guaycuyacu near border with Imbabura Province, along Río Guaycuyacu on road from Cielo-Verde to Santa Rosa, near junction of Río Guaycuyacu and Río Guayabamba, 00°13'N, 78°55'W, 500 m, 10 Feb. 2005, *Thomas B. Croat, Christopher Davidson & Sharon R. Christoph 94450* (MO); Above Río Pilaton, 00°19'00"S, 78°57'00"W, 762 m, 18 Feb. 1988, *W. John Kress 88–2250* (MO, SEL, US); Quito, Reserva Río Guaycuyacu, near confluence of Río Guaycuyacu and Río Guayabamba, Premontane Wet Forest., 00°13'N, 78°55'W, 700 m, 11 Apr. 1998, *John L. Clark & et al. 4966* (MO, QCNE); Santo Domingo de Los Colorados, Santo Domingo de los Colorados, 00°16'S, 79°14'W, 600 m, 18 Feb. 1989, *Carlos E. Cerón & Gladys Benavides 6228* (MO); 00°00'09"S, 79°22'53"W, 140 m, Apr. 1999, *Gladys Benavides & et al. 487*; 00°09'34"S, 78°28'43"W, 250 m, 18 Mar. 1999, *Gladys Benavides & V. Calazacón 429*; Along road between Santo Domingo and Aloag at Río Lelia, 4 km W of Alluriquín, 00°18'S, 78°48'W, 10 Apr. 1992, *Thomas B. Croat 73838* (AAU, GB, MO, S). UNITED STATES. **California:** San Francisco, cultivated plants received from Golden Gate Conservatory, San Francisco, 17 Oct. 2005, *Thomas B. Croat 95655* (MO); **Florida:** Cultivated plants received from Murline Lydon, Dover, Florida, 10 Nov. 2003, *Thomas B. Croat 90113* (MO); **Missouri:** Saint Louis City, 36°37'55"N, 92°52'33"W, 30 Dec. 2008, *Thomas B. Croat 101143* (MO).

Anthurium raphaelense Croat & Delannay, **sp. nov.** Type: Ecuador. Sucumbíos: Cultivated plant, Missouri Botanical Garden living collection 2011–1718, collected in Lago Agrio, 00°05'20"N, 76°52'09"W, Aug. 1991, *Thomas B. Croat 75240* (holotype: MO-6045103, 6451893; isotypes: K, QCNE). **Figures 26–28.**

The species is a member of section *Leptanthurium* and is characterized by its short stem, acuminate cataphylls with a long apiculate apex, persisting intact, short, pale roots, elliptic blades which are semiglossy on both surfaces and dry green to yellowish green, green linear spathe, green elongate spadix which is prominently tapered at the apex, and by dark purple berries borne in the basal portion. Distinct for the species are its petioles which are thicker than broad, rounded to weakly 1-ribbed abaxially, and sheathed throughout with the sheath free-ending and rounded to bluntly acute at apex.

Epiphytic; **stem** short and thickish, to 5 cm long, leaf scars obscured by cataphylls; **internodes** smooth, much shorter than broad, ca. 1–1.5 cm diam., light green; **roots** moderately numerous and dense, spreading or descending, whitish green, usually smooth, sometimes short-pubescent, short and thickish, tapered at base, 0.3–4.5 cm long, 2.5–4 mm diam.; **cataphylls** subcoriaceous, membranous at margins, 1-ribbed, 5–9 cm long, light green with dark green medial rib, apex acuminate with subapical apiculum, drying brown,

persisting intact at upper nodes. LEAVES rosulate, spreading; **petioles** 4–8 (15) cm long, 3–6 mm diam., thicker than broad, surface pale speckled, flattened adaxially with the margins raised, rounded to weakly ribbed near the geniculum abaxially; **geniculum** thicker and paler than petiole, 1-ribbed abaxially, 0.7–1.2 cm long, sheathed 50–100% its length, sheath with hyaline margins, free-ending, bluntly acute or rounded at base; **blades** subcoriaceous, elliptic to oblanceolate, (13.5) 17–41 cm long, 7–9.3 cm wide, 2.4–4.4 times longer than wide, 4.2–5.1 times longer than petiole, acuminate and apiculate at apex (the acumen down-turned), narrowly acute at base, broadest at or above middle, the margins broadly undulate; upper surface matte to semiglossy, usually green, lower surface semiglossy above, conspicuously paler below, both surfaces drying bright green to very brownish; **midrib** convexly raised, becoming higher than broad and eventually acutely raised above, drying convexly raised; sharply and acutely raised, slightly paler than surface, drying acutely to convexly raised below; **primary lateral veins** 13–21 pairs, departing midrib at 50–75° angle, +/- straight, weakly ascending to the collective vein, flat at midrib, becoming sunken toward the collective vein, weakly raised below, drying weakly raised above and below; interprimary veins almost as conspicuous as primary lateral veins, numerous, weakly visible above and below, drying weakly raised on both surfaces; **tertiary veins** drying prominulous; **collective veins** arising from or near the base, sunken above, raised below, more prominent than primary lateral veins, drying equally as prominent than primary lateral veins, 3–9 mm from margin; INFLORESCENCES erect to erect-spreading; **peduncle** 19.5–38 cm long, ca. 3 mm diam., 3–5 times as long as petioles, medium green, 1 to multi-ribbed; **spathe** spreading-reflexed, subcoriaceous, medium green, linear, 4.5 cm long, 1 cm wide, inserted at ca. 40° angle on peduncle, the apex acute to acuminate, the base obtuse to cordate; **spadix** yellow-green to medium green, sessile, elongate, curved, long-tapered, 8–11 cm long, 3–4 mm diam. near base, 2–3 mm diam. near apex; **flowers** 4-lobed, 2.5–3 mm long, 2.2–2.5 mm wide, the sides jaggedly sigmoid, 2–4 flowers visible in principal spiral, 3–6 flowers visible in alternate spiral; tepals semiglossy to matte, densely and minutely punctate, lateral tepals 1.5–1.6 mm wide, the inner margins convex, the outer margins 3–4-sided; pistils obscured pre-anthesis, emergent post-anthesis, glossy, papillate, medium green; stigma circular, concave; stamens emerging in slow progression, barely emerging above level of tepals then retracting, held in circle around pistil; filaments thick, translucent; anthers white, 0.5 mm long, 0.6 mm wide; thecae, 0.3–0.4 mm wide, not divaricate; pollen yellow fading to white. INFRUCTESCENCE erect; spathe persisting, tightly rolled under; spadix 18 cm long, 1–1.5 cm diam., bearing **berries** in the basal portion only, tepals dark green purplish at edges; berries dark purple, obovoid, apex acute, sometimes beaked, 7–8.6 mm long, 5–6 mm diam.; pericarp with raphide cells; mesocarp fluffy and foamy,

white slightly sweet; seeds 1, pale yellow, oblong, 4–4.2 mm long, 2–2.1 mm diam., 1.6–1.8 mm thick, with a transparent, sticky appendage at one end.

Anthurium raphaelense is known from the eastern slopes of Ecuador (Morona-Santiago, Napo, Sucumbios) at 200–925 m in *Tropical moist forest* and *Tropical wet forest* life zones.

Anthurium raphaelense resembles *A. muyunense* but the latter differs by its thicker and more coriaceous blades drying paler green and its primary lateral veins prominently sunken above, making the blade appear almost bullate.

Paratypes: ECUADOR. **Napo:** Baeza-Lago Agrio, San Raphael Falls, 00°05'59"S, 77°10'00"W, ca. 800 m, originally collected by J. Williford, Dec. 1984, *Thomas B. Croat 61246* (AAU, B, MO, NY, QCA, QCNE, S, US); Cerro Antisana, 3 mi. SW of Tena, 00°30'S, 78°00'W , 666 m, 26 Aug. 1960, *Peter J. Grubb 1443* (K); Along road from Tena, past Muyuna to end of road, where bridge over Río Tena is under construction, disturbed area in vicinity of bridge, ca 2 km W of Muyuna, ca 5.7 km W of Tena , 00°56'S, 77°51'W, 500 m, 1 May 1984, *Thomas B. Croat 58848* (MO, QCA); Cantón Archidona, carretera Hollín-Loreto, entre Avila y Loreto, Huiruno, comunidad Quichua, Bosque muy húmedo Tropical, entre bosque primario y chacras, 00°43'S, 77°19'W, 450 m, 29 Nov. 1989, *Carlos E. Cerón 7863* (MO, QCNE); Along road from Muyuna (near Tena) to municipal water plant, 2.3 km W of bridge over Río Tena near new university, 00°56'21"S, 77°51'58"W, 611 m, 15 Jan. 2015, *Thomas B. Croat, Geneviève Ferry, David Scherberich & M. Rees 105654* (MO, QCNE); 2 km S of Sachas near Río Blanco, 200 m, 5 July 1983, *Hodgson 1582* (K, MO); Along road between Coca (San Francisco de Orellana) and the Baeza-Tena road, via Loreto and Hollín, 82.5 km W of Río Payamino, 6 km W of Juticocha, 28.3 km W of Loreto, 58 km E of Tena-Baeza Highway, 00°48'S, 77°31'W, 925 m, 2 Mar. 1992, *Thomas B. Croat 72612* (MO, QCNE); Yasuní National Park, Maxus road and pipeline under construction, Km 2., disturbed forest, red soils and undulating hills, 00°26'S, 76°35'W, 250 m, 7 June 1994, *Nigel Pitman 182* (MO, QCNE). **Sucumbíos:** Vicinity of Lago Agrio, along S side of lake, ca 5 km NW of town, 00°05'N, 76°55'W, 280 m, 29 Apr. 1984, *Thomas B. Croat 58688* (MO, QCA).

Anthurium rectinervium Delannay & Croat, **sp. nov.** Type: ECUADOR. Sucumbíos: Cantón Putumayo, Río Aguarico, town of Dureno, 00°05'N, 76°42'W, 100 m, 1 Aug. 1975, *Timothy C. Plowman, Charles J. Sheviak & E. Wade Davis 4049* (holotype: GH; isotype: MO). **Figures 29–30.**

The species is a member of section *Leptanthurium* and is characterized by its epiphytic habit, short stems with short internodes, short petioles sheathed for more than half their length, pale grayish-green-drying oblanceolate blades widest above the

middle, numerous primary lateral veins separated by multiple minor veins, and by its elongated inflorescences with a long peduncle, a narrow light green spathe and a narrow brownish spadix.

Epiphyte; **stems** short, densely covered with adventitious roots; **roots** drying 2 mm diam., pale brown; **internodes** short, 1 cm diam. LEAVES with **petioles** 5.5–9 cm long, 3–4 mm diam., sheathed 3–5 cm, drying pale grayish-green; **blades** coriaceous, oblanceolate, 35–44.5 cm long, 6–8 cm wide, 4.5–7.5 times longer than wide, 5–6.6 times longer than petioles, widest above the middle, long-attenuate and somewhat decurrent at the base, obtuse and long-acuminate at the apex, drying pale grayish-green and semiglossy above, concolorous and glossy below; **midrib** narrowly raised and concolorous above, rounded and slightly paler below; **primary lateral veins** numerous, arising at a 70–80° angle and running straight to the margin, drying somewhat prominent and concolorous on both surfaces, separated by minor veins running in parallel; **collective veins** arising from the lowermost primary lateral veins, 1–7 mm from margin. INFLORESCENCE elongate; **peduncle** 39–49 cm long, drying 2 mm diam.; **spathe** reflexed, very narrow, 4.5–8 cm long, 3 mm wide at the base and tapering towards the apex, long-acuminate, light green; **spadix** sessile, ca. 10 cm long, 3 mm diam. near the base, 2 mm diam. near the apex, brownish or mustard-colored; **flowers** 3 visible per spiral, 1.8–2 mm long, 1.3–1.6 mm wide; lateral tepals 0.8–1 mm wide, inner margins rounded, outer margins 2–3-sided; stamens held at level of tepals, anthers 0.2 mm long, 0.5 mm wide; thecae narrowly ovate, moderately divaricate. INFRUCTESCENCE not seen.

Anthurium rectinervium is endemic to Ecuador, found only in the Lago Agrio area of Sucumbíos Province at 100 m is a *Tropical moist forest* life zone.

Anthurium rectinervium was first confused with *A. raphaelense*, but the latter differs by its darker green, elliptic blades widest near the middle and its less numerous, more diffuse primary lateral veins not separated by minor veins running in parallel.

The species name comes from the Latin "rectus" meaning "straight" and "nervus" meaning "vein", referring to the primary lateral veins and minor veins running straight to the margin.

Paratype: ECUADOR. **Sucumbíos:** Cultivated plant, Atlanta Botanical Garden living collection 93–1424, collected in Lago Agrio, received 8 Aug. 1996, *Thomas B. Croat 78411* (MO).

Anthurium rociorojasiae Delannay & Croat, ***sp. nov.*** Type: PERU. Pasco: Distrito Oxapampa, Comunidad Nativa Alto Lagarto-Convento (Reserva Comunal Yanesha), 10°08'04"S, 75°22'06"W, 500 m, 30 Sep. 2013, *Rocío Rojas & Gregorio*

Ortíz 9492 (holotype, MO-6716780; isotype, HOXA). **Figure 31.**

The species is a member of section *Leptanthurium* and is characterized by its epiphytic habit, its stems with very short internodes, its petioles sheathed for their whole length, its medium-yellow-green-drying blades long-tapering at the base, its numerous primary lateral veins interspersed with interprimary and minor veins running in parallel, and by its inflorescences with a very long peduncle and a long cylindrical spadix.

Epiphyte; **internodes** very short, 2 cm diam.; **roots** velamentous; **cataphylls** 6.5 cm long, 1.5 cm wide at the base, semi-persistent. LEAVES erect; **petioles** 3–4 cm long, 3 mm diam, drying medium green, sheathed their whole length; sheath thin, drying medium brown; **blades** elliptic to oblanceolate, 21–23 cm long, 5.5–7 cm wide, 3.3–3.6 times longer than wide, 5.7–7 times longer than petiole, obtuse and short-acuminate at the apex, acute and long-tapering at the base, widest at or above the middle, drying glossy and medium yellow-green on both sides; **midrib** flat to slightly raised above, rounded below, concolorous on both sides; **primary lateral veins** 20–22 pairs, arising at a 50–60° angle, interspersed with interprimary and minor veins running in parallel; **collective veins** arising from the lowermost primary lateral veins, 2–5 mm from margin. INFLORESCENCE erect; **peduncle** longer than the leaves, 35–37 cm long, drying 2 mm diam.; **spathe** deflexed, 4–5.5 cm long, ca. 5 mm wide, green tinged brown; **spadix** 6.5–12 cm long, 3–6 mm diam., cylindrical and tapering at the apex; **flowers** 4–5 visible per principal spiral, 1.7 mm long, 1.8 mm wide; tepals drying dark brown, with thick sparse pale cellular inclusions; lateral tepals 0.9–1.1 mm wide, inner margins rounded, outer margins usually 4-sided, sometimes 2-sided; stamens weakly emergent above tepals; anthers 0.4–0.5 mm long and wide; thecae moderately divaricate; pistils not at all protruding, stigma 0.3 mm long, oval. INFRUCTESCENCE with **berries** ovoid, 3.2–3.6 mm long on drying, color unknown; **seeds** 2.2 mm long, 1.6 mm wide, ca. 1 mm thick.

Anthurium rociorojasiae is endemic to Peru, found so far only in Oxapampa district of Pasco department at 500 m in a *Tropical moist forest* life zone.

Anthurium rociorojasiae resembles *A. muyunense*, but it differs from that species by its shorter petioles and its blades long-tapering at the base and drying yellowish green (rather than grayish green for *A. muyunense*). It also occurs only in Oxapampa Province of Peru, a long way away from the normal range of *A. muyunense* in Ecuador and northern Peru.

The species is named in honor of Peruvian botanist Rocío Rojas, wife of Rodolfo Vasquez, who collected the type and only known specimen. Rocío obtained her undergraduate degree and worked for the Herbario Selva Central (HOXA) in

Figure 29. *Anthurium rectinervium* Delannay & Croat (*Plowman et al. 4049*, GH). Herbarium specimen showing stem, petioles, leaf blades, adaxial and abaxial surfaces and truncated inflorescence.

Figure 30. *Anthurium rectinervium* Delannay & Croat (*Croat 78411*, MO-5030039). Herbarium specimen showing petioles, leaf blades, adaxial and abaxial surfaces and full-length inflorescence.

Figure 31. *Anthurium rociorojasiae* Delannay & Croat (*Rojas & Ortíz 9492*, MO-6716780). Herbarium specimen showing top stem, petioles, leaf blades, adaxial and abaxial surfaces and inflorescence.

Figure 32. *Anthurium sodiroanum* Engl. (*Croat 83898*). Live plant showing stem, petioles, leaf blades, adaxial surface, and inflorescence.

Figure 33. *Anthurium sodiroanum* Engl. (*Croat 83898*). Close-up view of leaf blade, adaxial surface, and inflorescence wkith green spathe and green spadix.

Oxapampa. She obtained her postgraduate degree from the Universidad Nacional de la Amazonía Peruana in Iquitos, Perú (UNAP) and has been co-author of four books dealing with Peruvian plants. Rocío has been a very good and active collector who has discovered many new species.

Anthurium sodiroanum Engl., *Bot. Jarhb. Syst.* 25: 412. 1898. Type: Ecuador. Pichincha: San Miguel de los Colorados, 380 m, Aug. 1875, *Sodiro s.n.* (B). **Figures 32–33.**

Epiphyte; **internodes** 1–3 cm long, 1–2 cm diam., medium to dark green and glossy, becoming gray; **cataphylls** promptly deciduous. LEAVES with **petioles** 12–28 cm long, 4–5 mm diam., obtusely somewhat flattened adaxially, medium green, weakly glossy; sheathed at the base, sheath 4–6 cm long; **blades** subcoriaceous, oblanceolate, 37–71 cm long, 11–16 cm wide, 3.3–4.9 times longer than wide, 2.5–3.5 times longer than petiole, widest above the middle, rounded at the base, obtuse and long-acuminate at the apex, weakly glossy and medium to dark green above, slightly paler and semiglossy below, drying medium grayish-green above, slightly lighter below; **midrib** narrowly raised and slightly paler above, narrowly raised, thicker and slightly paler below; **primary lateral veins** 16–20 pairs, arising at a 40–55° angle, prominent, quilted-sunken above, appearing etched above, narrowly convex and pleated below; **tertiary veins** moderately obscure. INFLORESCENCE erect-spreading; **peduncle** 18–41 cm long, 2–3 mm diam.; **spathe** reflexed, 7–10 cm long, 1.3–2.2 cm wide, long-acuminate, green, glossy outside, matte within; **spadix** stipitate 6–20 mm, 5–12 cm long, 6.5–13 mm diam., medium to dark green, moderately glossy; **flowers** 4 visible per spiral, 3–3.4 mm long, 3–3.2 mm wide; tepals lumpy, often with a few large cellular inclusions; lateral tepals 1.2–1.4 mm wide, inner margin rounded, outer margin 3–4-sided. INFRUCTESCENCE with **spadix** to 21 cm long, 1.8 cm diam.; **berries** yellow.

Anthurium sodiroanum ranges from Colombia (Antioquia, Chocó, Valle del Cauca) to Ecuador (Carchi, Esmeraldas, Los Ríos, Pichincha) on the western slopes of the Andes at 50–1750 m in *Tropical moist forest*, *Tropical wet forest*, *Premontane moist forest* and *Premontane wet forest* life zones.

The species is characterized by its epiphytic habit; short internodes; short petioles sheathed at the base; grayish-green-drying oblanceolate blades rounded at the base, widest above the middle and 3.3–4.9 times longer than wide; and by its inflorescences with a green spathe and a green spadix.

Additional specimens seen: COLOMBIA. **Antioquia:** Alto de Cuevas, 10 km W of Blanquita, 12 km W of Nutibara, cloud forest, Transect 10, 06°48'12"N, 76°20'38"W, 1710 m, 4 Mar. 1992, *Alwyn H. Gentry, César E. Barbosa & Dairon Cárdenas L. 76133* (FMB, MO); Mpio. de Frontino, Km 17 of road Nutibara-Murrí, disturbed

wet/very wet montane vegetation on hillside across from road, 06°45'N, 76°24'W, 1750 m, 24 Sep. 1987, *James L. Zarucchi 5767* (HUA, MO); *James L. Zarucchi, Alan E. Brant & et al. 5711* (HUA, MO); Mutatá, 3 km WSW of Mutatá along road to Pavarandogrande, disturbed primary forest, 07°13'N, 76°26'W, 170 m, 27 Mar. 1987, *James L. Zarucchi, Julio C. Betancur B. & et al. 5069* (HUA, MO); N of Hacienda El Darién, 07°14'51"N, 76°26'21"W, 28 July 1978, *Ramiro Fonnegra G. & Enrique Rentería A. 947* (HUA, MO); Urrao, Las Orquídeas, Vereda Calles, Parque Nacional Natural Las Orquídeas, Quebrada Honda, Inventario Permanente de bosque húmedo premontano, en el filo al NW de La Cabaña Calles, Parcela W, subparcelas W 2-W 3, 06°29'N, 76°14'W, 1300 m, 8 Dec. 1992, *John James Pipoly, III, Álvaro Cogollo P., Dairon Cárdenas L., M. Villa, O. Álvarez & L. Velez 16764* (MO). **Chocó:** 31 km E of Quibdo, ca. 14 km E of Tutunendo, tropical pluvial forest on steep rocky slopes, near Chocó Village of Veintuna, 05°44'00"N, 76°25'00"W, 300–450 m, 14 June 1982, *Alwyn H. Gentry & Jorge Brand 36914* (JAUM, MO). **Valle del Cauca:** Buenaventura. community of San Isidro, 03°59'N, 76°57'W, 230 m, 15 Nov. 1979–6 Dec. 1979, *Jan van Rooden & S.M.C. Topper 282* (COL). ECUADOR. *Anonymous s.n.* (MO); **Carchi:** Tulcán, Parroquia Chical, Sector Gualpi medio, Reserva Indígena Awá, sendero a San Marcos al norte de la casa comunal, Bosque muy húmedo Premontano, bosque primario, 01°02'N, 78°16'W, 1000 m, 23 May 1992–27 May 1992, *Galo A. Tipaz, Carlos Quelal & G. Cantincuz 1086* (MO, QCNE). **Esmeraldas:** Reserva Etnica y Forestal Awá - Mataje, 01°17'N, 78°43'W, 400 m, 15 Mar. 1988, *Concepción Rodríguez-Jiménez 730* (HUA, QCA); Along road between Lita and San Lorenzo, 36.6 km SE of Gasolinera San Lorenzo, 12.6 km NW of Río Tulubí, 1.7 km SE of El Durango, 01°03'01"N, 78°38'00"W, 204 m, 18 July 2000, *Thomas B. Croat 84145* (K, MO, QCA); Along road to Río Tulubí from main San Lorenzo-Lita hwy., 33.0 km E of Gasolinera San Lorenzo at edge of San Lorenzo, along Río San José, 1.1 km N of main hwy, 01°04'44"N, 78°38'59"W, 59 m, 12 July 2000, *Thomas B. Croat & et al. 83902* (MO); Along road to Río Tulubí from main San Lorenzo-Lita hwy, 33.0 km E of Gasolinera San Lorenzo at edge of San Lorenzo, along Río San José, 1.1 km N of main hwy, 01°04'44"N, 78°38'59"W, 59 m, 12 July 2000, *Thomas B. Croat & et al. 83898* (AAU, MO); Further along trail to Río Mataje (beginning at point where collecting ended previous day), Awá encampment from Río Palaví encampment, back to trail in forest area, 01°07'N, 78°37'W, 200–230 m, 11 Feb 1988, *W. Scott Hoover 3976* (MO, QCA); Reserva Cotacachi-Cayapas, Charco Vicente, Bosque muy húmedo tropical, 00°39'N, 78°55'W, 50 m, 8 May 1998, *Xavier Cornejo S. & Carmen Bonifaz B. 6309* (GUAY, MO); Eloy Alfaro, Reserva Ecológica Cotacachi-Cayapas, Charco Vicente, Río San Miguel, afluente del Río Cayapas, bosque primario, Parcela Permanente y vegetación circundante, 00°43'N, 78°53'W, 150 m, 6 Sep. 1993–9 Sep. 1993, *Walter A. Palacios & Milton Tirado 11316* (MO, NY, QCNE); Quinindé, Sector

Cristóbal Colón, Terrenos de la Sra. Emma Revilla, a 10 km de Cristóbal Colón, Bosque Húmedo Tropical, bosque primario, 00°30'N, 79°10'W, 625 m, 15 Mar 2004, *Homero Vargas, Edwin Narváez, A. Moreira, J. Celi & L. Lewinsohn 4597* (MO, QCNE); San Lorenzo, Parroquia Ricaurte, Centro Pambilar, Bosque Pluvial Tropical, bosque primario, 01°08'N, 78°36'W, 500 m, 21 Jan. 1993, *Carlos Aulestia & Milton Aulestia 951* (MO); Reserva Etnica Awá, Centro Guadualito, Bosque húmedo Tropical, 01°15'N, 78°40'W, 80 m, 20 July 1992–29 July 1992, *Carlos Aulestia, Galo A. Tipaz, Delgado, Luisa & Lao, Guillermo 285* (MO); Reserva Etnica Awá, Centro Guadualito, Bosque húmedo Tropical, 01°15'N, 78°40'W, 80 m, 20 July 1992–29 July 1992, *Carlos Aulestia, Galo A. Tipaz, Delgado, Luisa & Lao, Guillermo 230* (MO). **Los Ríos:** Collections from path following ridge line at El Centinela at crest of Montanas de Ila on road from Patricia Pilar to 24 de Mayo at km 12, Patricia Pilar is at Km 45 on road from Sto. Domingo to Quevedo, Pros. Los Rios or Pichincha, 00°37'00"S, 79°18'00"W, 600 m, 13 Feb. 1982, *Calaway H. Dodson & Alwyn H. Gentry 12423* (MO, SEL); Along entrance road, Río Palenque Field Station, 00°35'00"S, 79°22'00"W, 220 m, 3 July 1979, *Mary E. Fallen 797* (MO, SEL); Quevedo, Cerro Centinela, Montañas de Ila, 10 km al este de Patricia Pilar, Bosque muy húmedo Tropical, bosque primario, 00°37'S, 79°48'W, 500 m, 19 June 1991, *Walter A. Palacios & Efraín Freire 7442* (MO); *Walter A. Palacios & Efraín Freire 7460* (MO). **Pichincha:** On road from Patricia Pilar to 24 de Mayo at Km 12, Patricia Pilar is at Km 45 on road from Sto. Domingo to Quevedo, 00°37'00"S, 79°18'00"W, 600 m, 15 July 1979, *Calaway H. Dodson & et al. 8416* (MO, SEL); Collections from path following ridge line at El Centinela at crest of Montanas de Lla on road from Patricia Pilar to 24 de Mayo at km 12, Patricia Pilar is at Km 45 on road from Sto. Domingo to Quevedo, 00°37'S, 79°18'W, 600 m, 2 Oct. 1979, *Calaway H. Dodson & et al. 8683* (MO, SEL); Cerro Centinela, el Mirador, a 12 km al este de Patricia Pilar y Centro Científico Río Palenque, Bosque muy húmedo Tropical, vestigios de bosque primario, 00°37'S, 79°18'W, 540 m, 3 June 1990, *Daniel Rubio & W. S. Alverson 403* (CM, MO); Centinela, 12 km E of Patricia Pilar, 00°32'00"S, 79°11'00"W, 600 m, Jan. 1979, *Elizabeth L. Besse & et al. 1243* (MO, SEL); ca. 10 km SE of Patricia Pilar along road to Corina, 00°37'00"S, 79°18'00"W, 700 m, 20 July 1981, *John W. Gillespie 40* (MO, QCA); ca. 10 km SE of Patricia Pilar, road to Corina, 00°37'00"S, 79°18'00"W, 700 m, 20 July 1981, *Lynn J. Gillespie 39* (DAV, MO); Ca. 6–8 km N of Alvaro Pérez Intriago (Km 113, Quito-La Independencia hwy.), along tributary of Río Guayllabamb., 00°10'N, 79°03'W, 600 m, 7 Apr. 1989, *Michael H. Grayum, Nelson Zamora & Ángel Gómez 9347* (MO); 12 km E of Patricia Pilar, 00°37'00"S, 79°18'00"W, 600 m, 11 May 1978, *Michael T. Madison 4242* (MO, SEL); 12 km east of Patricia Pilar, 00°37'00"S, 79°18'00"W, 650 m, 9 Apr. 1977, *Michael T. Madison 3829* (MO, SEL); 12 km east of Patricia Pilar, 00°37'00"S, 79°18'00"W, 650 m, 9 Apr. 1977, *Michael T. Madison 3827* (MO, SEL); At La Centinela, 29.5 km W of Patricio

Pilar (on highway S of Santa Domingo de Los Colorados), Premontane wet forest?, 00°31'S, 79°06'W, 450–475 m, 13 Oct. 1980, *Thomas B. Croat 50671* (MO); Santo Domingo de Los Colorados, vicinity of El Centinela, 0.2 km past Escuela Mixta El Centinela, along trail to left of road, exactly 13 km E from main Santo Domingo-Quevedo Highway in Patricia Pilar, 00°32'S, 79°11'W, 1000 m, 14 Mar 1992, *Thomas B. Croat 73031* (MO).

Cultivated plants: UNITED STATES. **Florida:** received from Murline Lydon, Dover, Florida, 10 Nov. 2003, *Thomas B. Croat 90147* (MO).

Anthurium timplowmanii Croat, Novon 18(2): 161–163. 2008. Type: Peru. Huanuco: Leoncio Prado, vic. of Tingo María, Río Patay Rondos, Cuevas de Gucharo Parque Nacional de Tingo María, 09°21'S, 76°12'W, 650 m, 4 Apr. 1984, *Thomas B. Croat 57920* (HT: MO; IT: B, COL, CUZ, F, K, M, NY, RSA, SEL, US, VEN). **Figures 34–36.**

Epiphyte to lithophyte; stem short, 8–10 cm; **internodes** 3–5 mm, 8–10 mm diam.; **cataphylls** ca. 2 cm, persisting as pale brown to brown fibers. LEAVES with **petioles** erect, 9.2–32.8 cm long, (1–)3–5 mm diam., terete, rigid, drying light olive-green, striate; geniculum 1–2 cm long; **blades** narrowly ovate, subcordate, (7.5–)14.5–29.5 cm long, (3–)6.3–11.5 cm wide, 2.4–2.66 times longer than wide, 0.6–1.1 times as long as petiole, broadest near base, narrowly acuminate at apex, acumen 1.8–3 cm, subcordate at base, drying medium green on both sides; **anterior lobe** (7.3–)13–27 cm long, margins entire and semi-crisped; **posterior lobes** overlapping, drying subcoriaceous, 0.2–3 cm, up to 5.4 cm wide, rounded at apex, directed at 141°–150°; **sinus** non-existent due to posterior lobe overlap; **midrib** drying slightly raised, diminishing toward apex adaxially and abaxially, drying light yellowish green adaxially, drying light yellow abaxially; **primary lateral veins** numerous, 23–27 pairs, not obvious when fresh, weakly raised adaxially, flat and obscure, much paler, prominulous on drying abaxially, arising from midrib at ca. 90° midway, spreading almost straight or weakly arcuate to the margin, to ca. 45° toward apex, and ca. 45° toward the base, but soon reflexed and forming a broad sigmoid curve toward the margin; **basal veins** 3 pairs, all free to base, drying inconspicuous; **interprimary veins** less prominent than primary lateral veins; **collective veins** arising from the 2nd basal vein, as prominent as primary lateral veins, 2–7 mm from margin; **upper surface** light olive-green, drying matte; **lower surface** dark olive-green, drying semi-glossy. INFLORESCENCE erect; **peduncle** erect, 5.7–27.5 cm, drying 1–2 mm diam., terete, ca. 1/2 as long as petiole, drying light yellowish green; **spathe** erect-spreading, inserted at ca. 70°, 3–7.5 cm long, 4–10 mm wide, lanceolate, subcoriaceous, green, drying light yellowish brown, narrowly long-

Figure 34. *Anthurium timplowmanii* Croat (*Croat 57920*, MO-6681669). Herbarium specimen showing petioles and leaf blades, adaxial and abaxial surfaces.

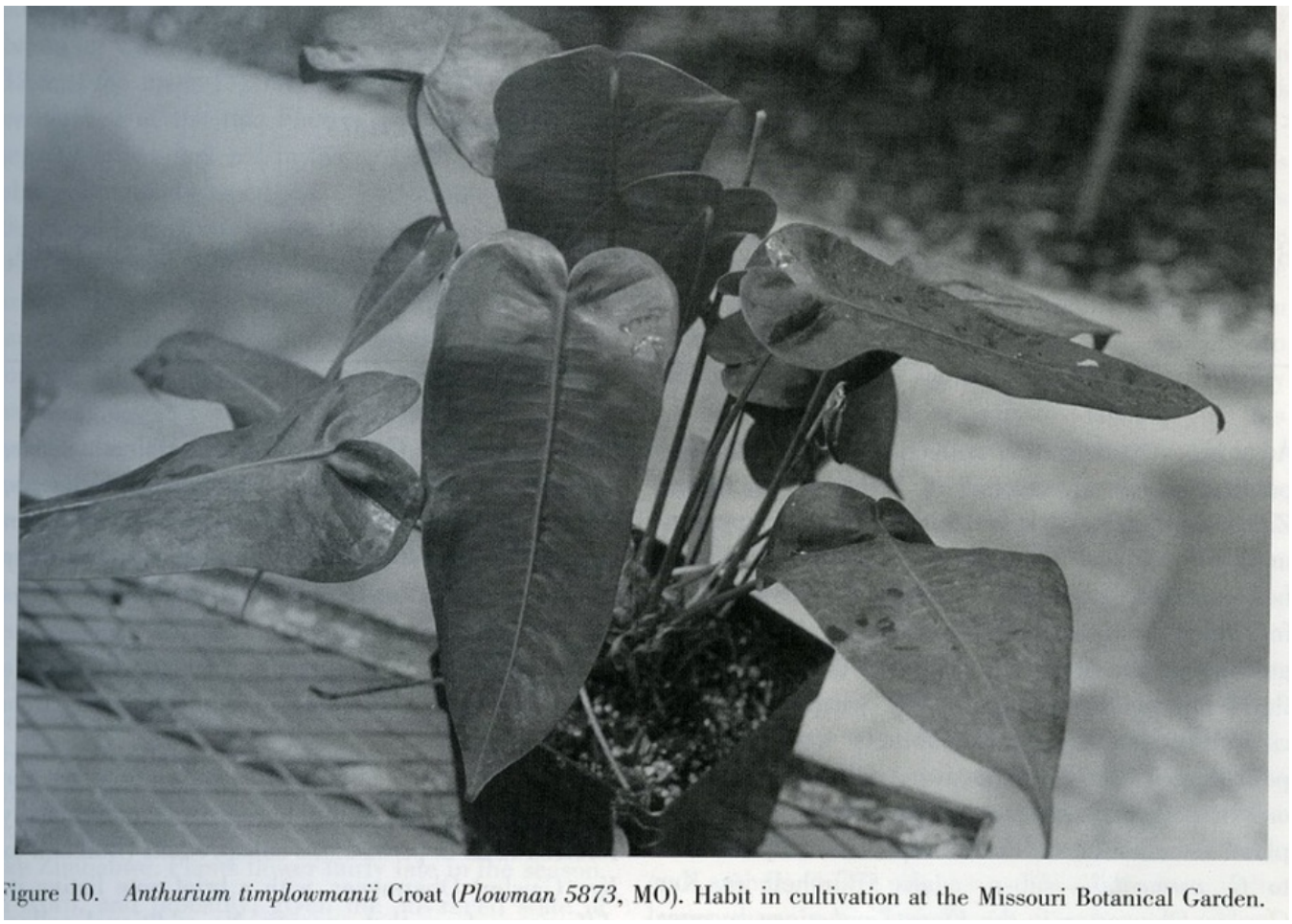

Figure 10. *Anthurium timplowmanii* Croat (*Plowman 5873*, MO). Habit in cultivation at the Missouri Botanical Garden.

Figure 35. *Anthurium timplowmanii* Croat (*Plowman 5873*). Live plant showing petioles and leaf blades, adaxial surface.

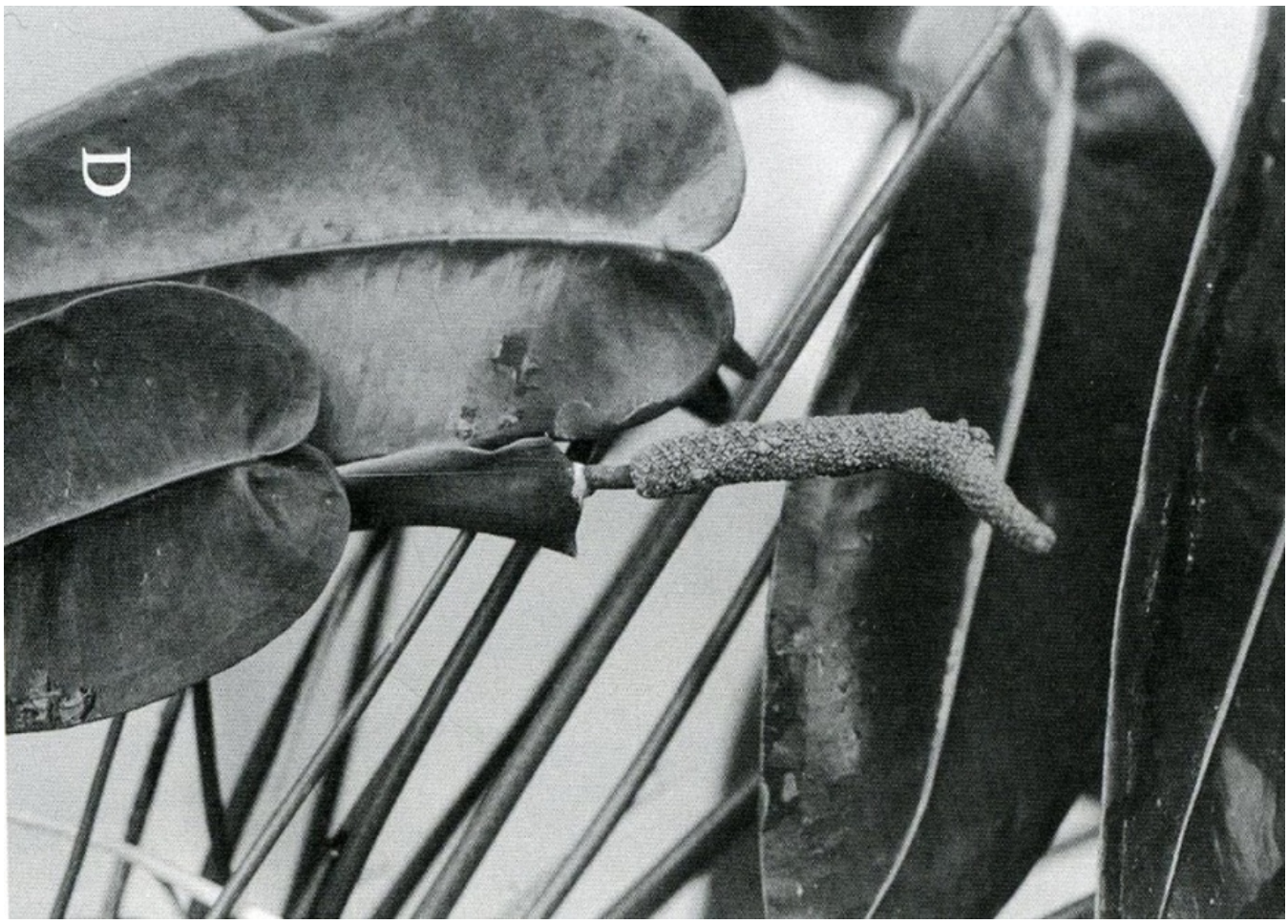

Figure 36. *Anthurium timplowmanii* Croat (*Plowman 5873*). Close-up view of leaf blades, adaxial and abaxial surfaces and inflorescence.

Figure 37. *Anthurium vittariifolium* Engl. (uncollected). Live plant showing long hanging leaf blades, adaxial and abaxial surfaces.

Figure 38. *Anthurium vittariifolium* Engl. (*Croat 97447*). Live plant showing petioles, leaf blades, adaxial and abaxial surfaces and inflorescence.

Figure 39. *Anthurium vittariifolium* Engl. (*Croat 97447*). Close-up view of inflorescence with yellow spadix

acuminate at apex, acumen 7–8 mm long, acute at base, the margins meeting at ca. 60° angle, 4/5 to as long as spadix; **stipe** 4–6 mm long in front, 1–1.6 mm in back; **spadix** erect, subcylindric, 2.7–7.1 cm long, 2–3 mm diam. at apex, 2.5–3 mm diam. at base, 13–24 times longer than wide, yellowish green to blue-green or brown, drying light yellowish brown, held at ca. 180°; **flowers** square to rhombic, 1.8–2.1 mm long, 1.9–2.5 mm wide, drying light brown, 5 to 6 flowers visible in the principal spiral, 3 to 4 flowers visible in the alternate spiral; tepals matte, almost erect against pistil on drying, lateral tepals outer margins broadly triangular, inner margins broadly rounded, sometimes drying concave; pistils drying paler; stigma slit-like, drying pale.

Anthurium timplowmanii is endemic to Peru, known only from the Department of Huánuco, Province of Leoncio Prado at 650–900 m in a *Premontane wet forest* life zone.

The species is characterized by its narrowly ovate, subcordate blades with overlapping posterior lobes and especially by its many primary lateral veins and its bluish green, subcylindric spadix and green lanceolate spathe.

Additional specimens seen: PERU. **Huánuco:** Leoncio Prado, Río Monzón, Cueva de las Lechuzas, 700–800 m, 27 June 1979, Plowman 5747B (GH, SEL); Rupa Rupa, Calpar Bella, Cueva de los Hauriños, Río Monzón, 09°18'00"S, 75°59'00"W, 700–900 m, *Schunke 9487* (MO); valley of Río Huallaga, along steep banks of Río Monzón near bridge over Río Patay Rondos, Tingo María–Monzón, 09°17'S, 76°05'W, 650 m, 2 June 1998, *Thomas B. Croat & Mary Sizemore 81611* (MO, USM); Río Monzón, near Bellam, hills to the W of Cueva de las Lechuzas, 700–850 m, 11 Apr. 1976, *Timothy C. Plowman 5873* (GH, MO, SEL, USM); *Timothy C. Plowman 5747* cultivated at Selby Gardens, *Madison 5502* (SEL 69–1976–2).

Anthurium vittariifolium Engl., Pflanzenr. IV, 23B (Heft 23): 88. 1905 Type: *Ule 5624*, Brazil, July 1901 (B). **Figures 37–39.**

Pendent epiphyte; **stems** usually short, up to 15 cm long, **internodes** broader than long, 1–1.2 cm diam, green; **roots** many, turned downward ca 4 mm diam, white, scurfy; **cataphylls** 3 cm long, coriaceous, 1 rib, brown, semi-intact and narrowly acute at apex, often splitting into fibers below, the fibers usually fine, persistent, reddish to yellowish brown. LEAVES arching-pendent; **petioles** 4–29 cm long (averaging 11.8 cm), 3–4 mm diam, terete to subterete, weakly and obtusely flattened adaxially, narrowly and obscurely sulcate, sometimes sub-D-shaped with bluntly acute lateral margins, a convex adaxial surface and a blunt medial rounded rib abaxially, dark green, same color as the blades, faintly and minutely pale-speckled; geniculum moderately thicker than the rest of the petiole, slightly darker, 1 cm long; **blades** linear-oblanceolate to linear, 19–120 cm long, 1.7–5.7 cm wide (averaging 64 x 3.4

cm), 10.3–59 times longer than broad (averaging 21.1 times longer), 2.7–12.9 times longer than petiole (averaging 6.3 times as long), subcoriaceous to coriaceous, acute to long acuminate at apex, acute to narrowly rounded at base, dark green, velvety-matte on both surfaces or matte and subvelvety above and matte and slightly paler below; **midrib** on upper surface acutely raised or flat with sharp medial ridge, matte, concolorous or paler than blade, obtusely raised or convex at base, soon becoming acute (almost knife-like) toward apex; lower surface raised, thicker than broad at base, becoming convex, then flattening toward apex, angled and slightly paler or concolorous; **primary lateral veins** 14–21 pairs, scarcely more prominent than the interprimary veins, those in the lower 1/3 of blade particularly difficult to discern, scarcely raised and concolorous above, more or less flat and darker than the surface and obscure below; **collective veins** raising from at or near the base, about equal to primary lateral veins on upper surface, more prominent than primary lateral veins and slightly darker below; **tertiary veins** sometimes weakly visible above, not visible on fresh leaves, surface minutely pale-speckled below on magnification. INFLORESCENCE spreading-pendent; **peduncle** terete, 10–59 cm long, (averaging 31 cm), 3.3–9.4 times longer than spathe (averaging 5.5 times), 2–4 mm diam, mottled throughout with purple dots and dashes or green with red or maroon striations; **spathe** 3.3–10.5 cm long, 0.5–1.4 cm wide, (averaging 6 x 0.88 cm), oblong-lanceolate with margins rolled under, 6.5 cm long, 12 mm diam, membranaceous, stiffly reflexed-spreading, inserted at 180° on peduncle, apex obtuse, acumen apiculate, base subcordate, somewhat twisted or curled, subcoriaceous, medium green and semiglossy or matte on outside, so densely mottled purple as to appear almost dull red to solid purple or light green with maroon striations outside and inside, the margins rolled under in basal 1/2, sharply acuminate at apex or gray speckled with pink; **stipe** about as wide as the spadix, 3 mm long in front, 1–2 mm long in back, swollen, reddish; **spadix** 5.4–19.5 cm long (averaging 11.6 cm), 4 mm diam at base, 2–3 mm diam near apex, arching, tapered, curved, brownish yellow when immature, becoming yellowish green to yellow or green turning red or purplish or golden–yellow becoming cream-colored, or creamy yellow, tinged red; **flowers** 3 mm long parallel to axis, 2–2.5 mm wide perpendicular to axis, sides jaggedly S-curved, parallel and perpendicular to spiral, 4 flowers per principal spiral; pistil red; stigma ovoid slit; tepals glossy, 4.2–4.3 mm long, 3.3–3.5 mm wide, the sides jaggedly sigmoid; lateral tepals shield-shaped, the outer margins 3–4-sided, inner margins broadly rounded and like those of the alternate tepals, tinged purplish near the edge; pistils, the exposed portion at the apex, 0.5 mm long, 0.3 mm wide, purplish or yellow-green or maroon claro; stigma ellipsoid, raised above the surface of the pistil, with a weak slit, 0.5 mm long, 0.3 mm wide, dark; stamens included after anthesis, held well below the surface of the tepals; filaments 1.5 mm long, 0.9 mm wide, purple in the apical 1/2; anthers 0.2–0.3 mm long, 0.5–0.8 mm wide; thecae ovate,

broadly divaricate. INFRUCTESCENCE pendent, pinkish, **berries** subglobose, ca 5 mm diam, cream-tinged, pink or orange.

Anthurium vittariifolium ranges from Colombia (Amazonas) to Ecuador (Pastaza, Sucumbíos), Peru (Amazonas, Loreto) and Brazil (Acre), at 90–650 m in a *Tropical moist forest* life zone.

The species is characterized by its arching-pendent leaves with medium-brown-drying linear-oblanceolate to linear blades 10–59 times longer than wide, its 14–21 pairs of primary lateral veins scarcely more prominent than the interprimary veins, and its spreading-pendent inflorescences with a long peduncle mottled with purple dots and a green or densely-mottled purple spathe.

Additional specimens seen: BRAZIL: July 1901, *E. Ule 5624* (MO). **Acre**: Mun. Bujari, Basin of Rio Purus, 8 Mar. 1997, *D.C. Daly et al. 9335* (NY); Basin of Rio Purus, Rio Antimari, Floresta Estadual do Antimari, upstream from FUNTAC station, 09°24'40"S, 68°07'26"W, 12 Mar. 1997, *D.C. Daly et al. 9504* (NY); Mun. Tarauacá, Basin of Rio Juruá, 26 Nov. 1995, *D.C. Daly et al. 8823* (NY); Mun. Tarauacá, Basin of Rio Juruá, 21 Nov. 1995, *D.C. Daly et al. 8662* (NY); Tarauacá, Bacia de Rio Juruá, Rio Muru, Seringal Vitória Velha, Colocação, Estrema margem direita "Restinga" (floresta de terra firme em terraço alto), 08°27'37"S, 70°50'44"W, 27 Sep. 1994, *M. Silveira, R.S. Saraiva & L. Lima 929* (MO). **Minas Gerais**: 17 km S of São João Grande and 37 km S of Itaobim along Highway BR-116, Caatinga, 580 m, 29 Mar. 1976, *Davidse et al. 11541* (MO); Fazenda S. Marco, Teófilo Otoni, zona calcárea, 29 June 1968, *R. P. Belem 3778* (MO, NY). COLOMBIA. **Amazonas**: Quebrada El Engaño, plano de inundación de la quebrada El Engaño (aguas claras), en bosque mod. alto, 00°50'S, 71°50'W, 28 Nov. 1991, *J. Duivenvoorden et al. 1860* (MO). ECUADOR. **Morona-Santiago**: Centro Shuar Yukutais, 8 km SW of Sucua, 02°30'S, 78°08'W, 900 m, 17 Jan. 1989, *P. Andrade 548* (MO, NY). **Pastaza**: Río Bufeo, northern tributary of Río Bobonaza, partly on periodically flooded ground, 02°20'S, 76°40'W, 300 m, 19 July 1980, *Øllgaard et al. 34800* (AAU, MO). **Sucumbios**: Río Lagarto Cocha, near Redondo Cocha, black water inundated forest, water level very high, 00°35'S, 75°15'W, 190 m, 15 June 1983, *J.E. Lawesson et al. 44427* (AAU). PERU. **Amazonas**: Condorcanqui, Río Santiago, monte virgin, 1 km. atras de la comunidad de Caterpiza, trocha de metayar, banda este de la Quebrada Caterpiza, 180 m, 30 Oct. 1979, *Huashikat 1139* (MO). **Loreto**: Dec 1980, *Vasquez B. s.n.* (MO); Balsapuerto (lower Río Huallaga basin), dense forest, 150–350 m, 28 Aug 1929–30 Aug 1929, *Killip & A.C. Smith 28693* (US); Río Amazonas, downstream from Leticia, Colombia, cultivated as *Berg et al. s.n.*, Selby 91–0458, 31 Mar. 1992, *Ingram 1403* (MO); Alto Amazonas, Andoas, campamento petrolero, Río Pastaza, NO de Dtto, Iquitos, bosque primario, 02°55'S, 76°25'W, 210 m, 21 Nov. 1980, *Vásquez & N. Jaramillo 864* (MO); Dtto. Manseriche, Pongo de Manseriche,

bosque primario, 04°26'01"S, 77°34'18"W, 650 m, 25 Nov. 1997, *R. Rojas, Peña & M. Correa 643* (MO); Maynas Dtto Iquitos, Río Momón, en orilla inundable, monte bajo, hasta la comunidad de San Andréas, 100 m, 27 Nov 1997, *Rimachi 12205* (IBE, MO); Dtto. Iquitos, Río Momón, del caserio de San Andres hasta el caserio de Santa Rosa, en terreno arcilloso, 20 Feb. 1986, *Rimachi 8170* (IBE); Dtto Iquitos, Río Momón, (trib. Río Nanay), Balcón a Santa Rosa, riverine forest subj. to inundation., 90 m, 18 Aug. 1987, *McDaniel & Rimachi 29486* (IBE); Dtto. Iquitos, Río Amazonas, Río Sucusari, Explorana Camp across the river from Veradera Indiana, *Croat 61157* (MO); Dtto Iquitos, Río Momón, (Tributary of Río Nanay, above Río Bellavista), shoreline forest freq. inundated, 19 Apr. 1976, *Rimachi 2164* (IBE, MO); Momoncillo - lower Río Momón, tributary of Río Nanay, Iquitos, primary lowland rainforest along the river but away from the immediate river bank, 30 Nov. 1979, *J. Jones & C. Davidson 9518* (LAM, MO); Iquitos, Río Momón, 3 km from Río Nanay y 2 m km a la quebrada de Mononcillo, 28 Mar. 1976, *J. Revilla s.n.* (MO).

Cultivated plants: Seed from Dewey Fisk, 23 Sep. 2005, *Thomas B. Croat 97447* (MO). AUSTRALIA. Cultivated at Missouri Botanical Garden-Source Peter Tsang, *P. Tsang 3* (MO). **Queensland**: Cultivated plants from Australia, 2 Sep. 1981, *Croat 52710* (MO).

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