

## Araceae of the Flora of La Planada, Nariño Department, Colombia (Part 2)

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### ABSTRACT

The Flora of the La Planada Reserve located in the Nariño Department, Colombia, contains 71 taxa of Araceae with 37 taxa, including one variety, new to science, *Anthurium benavidesae* Croat, *A. bernalii* Croat, *A. chucunesense* Croat, *A. gerberrae* Croat, *A. gracilistipum* Croat, *A. herrerae* Croat & P. Huang, *A. keatingii* Croat, *A. lakei* Croat & P. Huang, *A. lancea* Sodiro var. *ecostatum* Croat, *A. melampyri* Croat, *A. nestorpazii* Croat & P. Huang, *A. pazii* Croat, *A. pendulispadix* Croat, *A. planadense* Croat, *A. protrudens* Croat, *A. restrepoae* Croat, *A. ricaurtense* Croat, *A. terracola* Croat, *Chlorospatha bogneri* Croat & L. P. Hannon, *C. planadensis* Croat & L. P. Hannon, *C. ricaurtensis* Croat & L. P. Hannon, *Monstera planadensis* Croat, *Philodendron aurantispadix* Croat, *P. fibrosum* Sodiro ex. Croat, *P. nariñoense* Croat, *P. planadense* Croat, *P. prominulinervium* Croat, *P. pubuangii* Croat, *P. verrucapetiolum* Croat, *Rhodospatha herrerae* Croat & P. Huang, *Stenospermation benavidesae* Croat, *S. gentryi* Croat, *S. laevis* Croat, *S. longispadix* Croat, *S. olgae* Croat, *Xanthosoma*

*herrererae* Croat & P. Huang. In addition, one species, *Anthurium martae* Croat & Castaño Rubiano, has achieved new status.

### KEY WORDS

Araceae, Colombia, La Planada, Nariño Department, new species.

### INTRODUCTION

The La Planada, a 3,200 hectare biological reserve in the Municipio of Ricaurte in Nariño Dept. of Colombia, is located at 01°08'N, 77°04'W. The Reserve was established with the assistance of the World Wildlife Fund in 1982 to promote conservation and appropriate community development in the region. It is operated by the Fundación para Educación Superior and is regularly used by Colombian and foreign graduate students and researchers. The Reserve is mapped with the Holdridge Life Zone System as *Premontane wet forest* and ranges in elevation from 1,300–2,100 m. Most of the collections in this study were made in the vicinity of the main camp and its associated trails at elevations between 1,700–

1,900 m so additional species are likely to turn up in time as trails are made further into the Reserve. The forest canopy at La Planada is relatively low, with trees mostly less than 20 m tall. The understory vegetation is even denser than that at Bajo Calima, and a much larger percentage of the species occur in rotting debris that has accumulated on the ground. In contrast to Bajo Calima, which is generally quite hot, the temperature at La Planada is substantially cooler, with temperatures averaging 12° to 22° Celsius. Though mornings are usually clear, rains generally begin by late afternoon, as at Bajo Calima, and continue through the night. Average annual precipitation is more than 4,430 mm. Although rainfall is rarely heavy, the region is often beset with cloudy and rainy conditions that may persist for weeks at a time. The soil perhaps never dries out.

The generic representation of the La Planada Reserve is *Anthurium* with 43 taxa,

*Chlorospatha*, 3 species, *Monstera*, 2 species, *Philodendron*, 11 species, *Rhodospatha*, 2 species, *Stenospermation*, 9 species and *Xanthosoma* with 3 species. The percentage of novelties is high with 43% of the species considered new to science. The rate of endemism is high with 9 species endemic to La Planada or the immediate area around La Planada. In addition the 9 unnamed species (5 *Anthurium* and 4 *Stenospermation*) are likely to also be endemic to the region. Some common aroid genera are notably missing altogether, including *Caladium*, *Dieffenbachia*, *Homalomena* and *Spathiphyllum*. It is interesting to note that the flora of this montane area is so distinct from the lowland aroid flora that not a single species at the La Planada Reserve is present in the aroid florulas of Bajo Calima (Croat et al., 2006, 2007, 2008) near Buenaventura in Valle Dept. and located at elevations near sea level.

#### KEY TO GENERA OF ARACEAE IN LA PLANADA

1. Spadix uniform; flowers hermaphroditic (both sexes present in each flower).
  2. Plants terrestrial.
    3. Leaf blades with conspicuous reticulate venation; spathe persistent, typically even into fruiting condition. . . . . *Anthurium*
    3. Leaf blades usually with strictly parallel venation; spathe usually deciduous immediately after anthesis (persisting in *Stenospermation gentryi*).
      4. Primary lateral veins lacking or at least very inconspicuous; interprimary veins and minor veins sometimes present but not in descending order of magnitude. . . . . *Stenospermation*
      4. Primary lateral veins prominent and with a descending order of interprimary veins present between each pair of primary lateral veins. . . . . *Rhodospatha*
  2. Plants epiphytic or hemiepiphytic.
    5. Blades lacking prominent primary lateral veins. . . . . *Stenospermation*
    5. Blades with prominent primary lateral veins.
      6. Spathe persistent; berries prominently emerging from the fruiting spadix. . . . . *Anthurium*
      6. Spathe usually deciduous; berries not conspicuously emergent, merely loosening and falling free.
        7. Blades banana-like, usually oblong-elliptic, entire and not perforated; seeds cochleate . . . . . *Rhodospatha*
        7. Blades typically perforate or pinnately lobed, rarely oblong-elliptic but then usually not at all banana-like; seeds large, subglobose. . . . . *Monstera*
1. Spadix divided into male and female portions.
  8. Plants terrestrial.
    9. Stems caulescent, typically with a conspicuous, erect stem.

10. Blades thin with reticulate venation, milky sap and with several collective veins along the margin of the blade.
11. Peduncle slender, often very elongated and contained usually within petiolar sheath at anthesis; spathe slender without a well developed spathe tube. . . . . ***Chlorospatha***
11. Peduncle thick, short, not sheathed for most of its length in petiolar sheath; spathe typically stout with a thickened spathe tube that is usually constricted at apex and well differentiated from the spathe blade. . . . . ***Xanthosoma***
9. Stems a creeping rhizome; sap smelling of anise or turpentine; pistils many and closely compacted. . . . . ***Philodendron***
8. Plants epiphytic or hemiepiphytic, vegetative parts usually lacking milky sap; blades usually subcoriaceous with parallel venation; spathe persistent intact after anthesis. INFRUCTESCENCE a berry, usually with many small, more or less elongated whitish or tan seeds. . . . . ***Philodendron***

The genus *Anthurium* was treated in part 1, published in *Aroideana* 32: 30–122. 2009.

***Chlorospatha*** Engler in *Gartenflora* 27: 97 (1878).

Terrestrial, evergreen herbs, 0.3–2 m tall; stem erect or decumbent; sap milky or transparent, rarely pink; bulbils absent or produced randomly along its length, solitary, rarely in clusters of 2–6; **internodes** usually as long as or slightly longer than wide (1–2 cm long), usually glabrous; **cataphylls** marcescent and persistent or quickly to ultimately deciduous. LEAVES long-petiole; **petioles** lacking a geniculum, as long as or longer than blades, usually glabrous, sheathed 1/4–3/4 or sometimes nearly throughout; free portion terete to D- or U-shaped; **blades** oblong, ovate or ovate-elliptic, rounded or acute at the base and occasionally inequilateral, or simple and cordate, sagittate, subsagittate, hastate or subhastate or variously divided and trifid or pedatifid, auriculate or not, or compound and trisect or pedatisect; venation colocalisoid, occasionally reticulate; **midrib** usually glabrous, raised on lower surface; **primary lateral veins** pinnate; **basal veins** coalesced into posterior rib; **minor veins** glabrous or sometimes pubescent on lower surface. INFLORESCENCES terminal (appearing axillary), usually emitting sweet fragrance at anthesis, 2–8 (–10) per sympo-

dium; **peduncle** usually longer than spathe, much shorter than to slightly longer than petiole; **spathe** surrounding spadix, weakly or not at all constricted between tube and blade, opening narrowly or broadly 2/3 to almost its entire length at anthesis or only  $\pm$  broadly on blade portion, narrowly to broadly funnel-shaped or tubular; spathe tube hiding most or all of sterile staminate portions of spadix, persisting in fruit; spathe blade  $\pm$  erect or weakly to prominently cucullate, ultimately deciduous after anther dehiscence; **spadix** monoecious, contained within spathe, sessile or stipitate, entirely or in part adnate to spathe at base, usually 1/2 or more of length of pistillate portion, divided into pistillate portion at base and fertile male portion at apex, separated by sterile male portion; pistillate portion densely to laxly flowered, 1–6 flowers across axis; stamens fused into synandria; thecae dehiscing by terminal pores or longitudinal slits; synandria 2–6-androus (usually 3–4); pollen in tetrads, female flowers unipistillate, (1–)2–4-locular; ovules 3–14 in plurilocular ovaries, 8–20 in unilocular ovaries, 1–2 (–3)-seriate or disorganized, rarely 3–4-seriate, extremely short to conspicuously longer than ovary; stigma brush-like. INFRUCTESCENCES with **berries** exposed by re-opening spathe, depressed-globose, seeds 3–25 per berry, chromosomes:  $2n = 26$ . Taxa 71 (70 species, 1 variety), Costa Rica and Panama in Central America; Colombia and Ecuador in South America at 0–3,000 m elevation.

**KEY TO SPECIES OF *CHLOROSPATHA*  
IN LA PLANADA**

1. Leaf blades cordate to cordulate at base; leaf blades minutely rugose. . . . . *C. bogneri* Croat & L. P. Hannon
1. Leaf blades sagittate or subhastate at base; leaf blades smooth, not at all rugose.
  2. Petiole sheathed ca. 2/3 of its length, with the sheath free-ending; leaf blade sagittate; posterior lobes directed toward base or weakly outward (at least upon drying); posterior lobes narrow, more than 2 times longer than wide; peduncle less than 38 cm long. . . . . *C. ricaurtensis* Croat & L. P. Hannon
  2. Petiole sheathed only 1/3 of its length, with the sheath decurrent; leaf blade subsagittate; posterior lobes directed  $\pm$  outward (at least upon drying); posterior lobes broad, less than 1.8 times longer than wide; peduncle more than 48 cm long. . . . . *C. planadensis* Croat & L. P. Hannon

***Chlorospatha bogneri*** Croat & L. P. Hannon, **sp. nov.** Type: COLOMBIA. Nariño: La Planada, on trails "La Vieja" and "La Piña", NW of the Science Center, 1,850–2,050 m, 01°09'40"N, 77°58'78"W, 8 June 1996, *J. Bittner* 2493 (holotype, MO-05053495; isotype, PSO).

Internodia 1.5–3 cm  $\times$  3–9 mm; petiolus 10–23 cm longus, vaginata 8–22.5 cm; lamina ovata vel ovata-sagittata vel subtruncata ad basim, 10–18 cm longa, 5–9.2 cm lata; nervis basalibus 1–2 utroque; spatha 8 cm longa, tubo ca. 6 mm diam.; spadix ca. 6.8 cm longus.

Terrestrial herb, to 1.2 m tall (all measurements made from dried material); **stem** caulescent, decumbent, to 34 cm long; sap milky; **internodes** 1.5–3 cm long, 3–9 mm diam., weakly glossy, dark green, occasionally violet-tinged, drying matte, dark brown to blackish brown; **cataphylls**

deciduous, 6–16 cm long, ca. 1 cm wide, obtuse with acumen at the apex, dark green, drying matte, dark brown to blackish brown. LEAVES 2–7, erect-spreading; **petiole** (10–) 20–38 cm long (averaging 26 cm), 3–7 mm diam. near the base, frequently minutely many-ribbed near the apex, rarely entirely minutely crispy-puberulent or in part only near the apex and otherwise minutely puberulent, matte, dark green, occasionally violet-tinged, drying matte, dark blackish brown, sheathed 8–22.5 cm, more than 3/4 of to almost its entire length (rarely slightly less than 3/4), free-ending at the apex, frequently prominently so, the margins inrolled; free portion 2–3.5 mm diam., terete, sharply V-sulcate; **blades** erect-spreading, sagittate or ovate-sagittate, subcordate to cordulate or nearly truncate at the base, 10–22 cm long, 5–13 cm wide (averaging 17  $\times$  8.5 cm), (1.3–) 1.7–2.1 times longer than wide, usually weakly broader across the anterior lobe than at the base (measured tip to tip across the posterior lobes), 1–1.4 times wider, occasionally with one or both margins weakly to moderately constricted in the area of petiole attachment, moderately thin, glabrous, moderately to prominently bicolorous; upper surface minutely rugose, matte, markedly dark green, drying matte, dark blackish brown, rarely weakly greenish; lower surface reticulate, matte, paler, drying weakly glossy, occasionally semiglossy, weakly to moderately paler; **anterior lobe** 9–16 cm long, 4.5–9.2 cm wide, 1.6–1.8 (–3.5) times longer than wide, (3.3–) 3.6–4 times longer than the posterior lobes, weakly to moderately acuminate at the apex, broadest at or below the middle, symmetrical to weakly inequilateral; **posterior lobes** 2.5–4.5 cm long, 2.5–3.8 cm wide, 1–1.2 times longer than wide, usually as wide as long, acute to bluntly acute at the apex, occasionally narrowly rounded, broadest at the base, markedly inequilateral, the inner side narrower, weakly obtuse to straight toward the base, briefly attenuate and decurrent onto the petiole; outer side (2.1–) 3.2–4.4 times wider than the inner side midway, convex toward the base; all orders of



Fig. 35. a. *Chlorospatha bogneri* Croat & L. P. Hannon. (Croat 69556). a. Habit. b–d. *Chlorospatha ricaurtensis* Croat & L. P. Hannon. (Croat 71405). b. Habit. c. Leaf blade, adaxial surface. d. Inflorescence.

**venation** narrowly sunken on the upper surface, prominently raised on the lower surface, minutely puberulent to rarely crispy-puberulent, darker than the surface, drying raised, concolorous to weakly paler than the surface; **midrib** round-raised, obtusely minutely many-ribbed on the lower surface; **basal veins** 1–2 pairs coalesced into a prominent posterior rib or loosely coalesced, with 4–5 branching off, 3 acroscopic, 1–2 basiscopic, the first free to the base, 3–4 fused into a short **posterior rib** 1–2 cm long; **primary lateral veins** 4–6 pairs, arising at 30–60°, most acutely toward the apex, weakly to moderately arcuate, occasionally straight, round-raised on the lower surface; collective veins 3 pairs, the innermost arising from one of the lowermost lateral veins on the inner side of the posterior lobe, loop-connected with all preceding lateral veins, irregular, 3–14 mm from the margin, frequently markedly remote from the margin (relative to blade size). INFLORESCENCES erect, 1–2 per axil; **peduncle** held within the sheath, 21–25 cm long, 2–3 mm diam., as long as or longer than the petiole, pale green, drying matte to weakly glossy, dark brown; **spathe** erect, ca. 8 cm long, cuspidate at the apex, weakly or not at all constricted above the tube; spathe tube pale green on the outer surface, ca. 4 cm long, ca. 6 mm diam., drying matte, medium-dark brown on the outer surface, weakly glossy, weakly paler on the inner surface, densely pale punctiform; spathe blade white, ca. 4 cm long, ca. 6 mm diam., opening broadly at anthesis (to 1.3 cm wide), drying matte, medium-dark brown on the outer surface, weakly glossy, weakly paler on the inner surface, weakly and densely pale-punctiform; **spadix** erect, ca. 6.8 cm long, weakly stipitate 1–1.5 mm diam., adnate to the spathe ca. 1.9 cm at the base, along the stipe and to slightly more than 1/2 of the length of the pistillate portion; pistillate portion green, 3.1 cm long, 3 mm diam., weakly wider than thick, broadest above the middle; fertile staminate portion bright orange, 2.6 cm long, 4 mm diam., bluntly acute at the apex, broadest just above the base, weakly

tapering, drying medium-dark orangish brown; sterile staminate portion color not known, ca. 1.1 cm long, 2.5–3.5 mm diam., broadest at the apex, drying medium orangish brown; pistils weakly coherent, ca. 3 across the axis (viewed from above), ca. 1.5 mm long; ovaries cylindrical, 0.8–1 mm long, 2–2.5 mm diam., drying medium-dark brown; style mantle-like, green, ca. 0.5 mm long, 1.5–2 mm diam., comprising ca. 1/3 (possibly less) of the length of the pistil, thin, granular, briefly attenuate medially, the margins free, weakly broader than the ovary apex, frequently weakly coherent with the margins of adjacent styles, drying pale to medium-dark tan; stigma 0.5–0.7 mm diam., weakly elevated on and weakly broader than the the narrowed portion of the style (upon drying); synandria bright orange, 1–1.2 mm long, 2–2.2 mm diam., coherent, truncate, 3–4 lobed, 3–4-angrous, drying medium-dark orangish brown; synandrodia 0.5–0.7 mm long, 1–1.5 mm diam., weakly coherent, truncate, subprismatic, in 6 whorls. INFRUCTESCENCES medium green, ca. 5 cm long, ca. 7 mm diam., drying matte, medium-dark brown on the outer surface, moderately paler on the inner surface; **berries** 2–3.5 mm diam., drying tan.

*Chlorospatha bogneri* is known only from La Planada Reserve in Nariño Department on the Pacific slope in southern Colombia, at 1,700–2,050 m in *Premontane wet forest* and *Premontane rain forest* life zones. It would be expected to occur along the border in northern Ecuador.

A member of sect. *Occidentalis*, this species is a striking plant with leaf blades very dark green and minutely rugose on the upper surface, with all orders of venation prominently raised and puberulent on the lower surface, also darker than the surface. It is also distinguished by the petiole sheath which comprises 3/4 to nearly the entire length of the petiole and is free-ending at the apex, conspicuously so when in flower. Commensurate with such extensive sheathing is the long peduncle which is as long as or longer than the petiole, a condition infrequently encountered in *Chlorospatha*.

The bright orange fertile staminate spadix is known in only 4 other species in the genus.

*Chlorospatha bogneri* is perhaps most closely related to *C. besseae* which shares a bright orange fertile staminate spadix. That species differs in being a larger plant with leaf blades moderately smooth on the upper surface, posterior lobes rounded to narrowly rounded at apex, the lower blade surface with only the major and secondary venation narrowly raised with a narrow band of minute granulations bordering the veins, as well as in having smooth petioles that are sheathed only 3/4 their length with the sheath decurrent at apex. In contrast, *C. bogneri* has the leaf blades bullate on the upper surface, pointed posterior lobes, narrowly raised tertiary venation, lacks minute granulation along the veins and has finely ridged petioles that are 3/4 to fully as long as petioles and free-ending at apex. In addition, *C. besseae* differs in having proportionately much shorter peduncles, only ca. 2/3 the length of the petioles, a sessile spadix that is adnate most or all of the length of the pistillate portion, green styles and the sterile staminate portion of the spadix is short and densely flowered, with the synandrodia in only 2–3 whorls (rarely 4). In contrast, *C. bogneri* has the peduncles equal to or longer than the petioles, a weakly stipitate spadix that is adnate to the spathe ca. 1/2 of the length of the pistillate portion, has a rose-colored style and has the sterile staminate portion of the spadix twice as long as *C. besseae* with the synandrodia and laxly arranged in 6 whorls.

The two species are possibly closely related. Only 5 species have bright orange synandria and all occur in the frontier region along the border between Colombia and Ecuador, on the western slopes of the Andes: *C. besseae*, *C. bogneri*, *C. dodsonii*, *C. litensis* and *C. mansellii*. Only *C. dodsonii* is widespread (in Ecuador).

**Paratypes:** COLOMBIA. **Nariño:** Barba-coas, Reserva Natural Río Nambí, Corregimiento Altaquer, Vereda El barro, Río Nambí, 01°18'N, 78°08'W, 1,325 m, 2 Dec 1993, *Betancur, J. et al.* 4346 (MO); La Planada, Sendero "La Vieja" and "La Pisa",

01°09'40"N, 77°58'78"W, 1,850–2,050 m, 8 Jun 1996, *Bittner* 2493 (MO, PSO); Entre quebrada El Basal y el mirador Sendero, 01°10'18"N, 78°00'09"W, 1950 m, 26 Mar 1997, *G. Herrera C. & Bittner* 9538 (MO); San Isidro, Las Cruces, Cabeceras Hondon, 01°10'18"N, 78°00'09"W, 1,600 m, 4 Jun 1997, *G. Herrera C. & Bittner* 9657 (MO); La Posada, 01°05'N, 78°01'W, 1,780 m, 26 Jul 1988, *Croat* 69556 (K, MO, PSO); 01°10'N, 77°58'W, 1,800 m, 24 Jul 1986, *Gentry et al.* 55072 (MO); 1,800 m, 15 Nov 1993, *Restrepo* 743 (MO). ECUADOR. **Carchi:** El Chical-El Carmen departing main El Chical-Peñas Blancas Road, 3.8 km S of main road, 00°59'01"N, 78°11'37"W, 1,300 m, 9 Aug 2004, *Croat & G. Ferry* 93121 (MO).

***Chlorospatha planadensis*** Croat & L. P. Hannon, **sp. nov.** Type: COLOMBIA. Nariño: La Planada, 7 km from Chucunés, 1,800 m, 01°10'N, 77°58'W, 1 Nov 1987, *O. de Benavides* 8686 (holotype, MO-3656423; isotype, PSO).

Internodia (2–)3.5–8 cm longa, 1.7 cm diam.; petiolus 66–77 cm longus, vaginata 28–29 cm; lamina subhastata, late triangularis, 31–33.5 × 23–27 cm; nervis basalibus 5 utroque; spatha 12 cm longa, tubus atropurpureus, ca. 5.2 cm × ca. 5 mm.

Terrestrial or hemiepiphytic herb; **stem** caulescent, decumbent, with remnants of old cataphylls persisting intact along its length; sap milky; **internodes** (2–) 3.5–8 cm long, 1.7 cm diam., semiglossy, medium green, occasionally weakly violet-tinged, drying matte to weakly glossy, dark green to blackish green (all measurements made from dried material); **cataphylls** marcescent, 10–33 cm long, 1–2 cm wide, obtuse and confluent with a subapical apiculum at the apex, 1-ribbed abaxially, drying weakly glossy to semiglossy, medium-dark reddish brown. LEAVES 1–3, erect-spreading; **petiole** (21–) 60–77 cm long (averaging 66 cm), ca. 1.5 cm diam. near the base, terete, only weakly angular at apex, 3–8 mm diam. midway, glabrous, solid green or purple (especially near base,

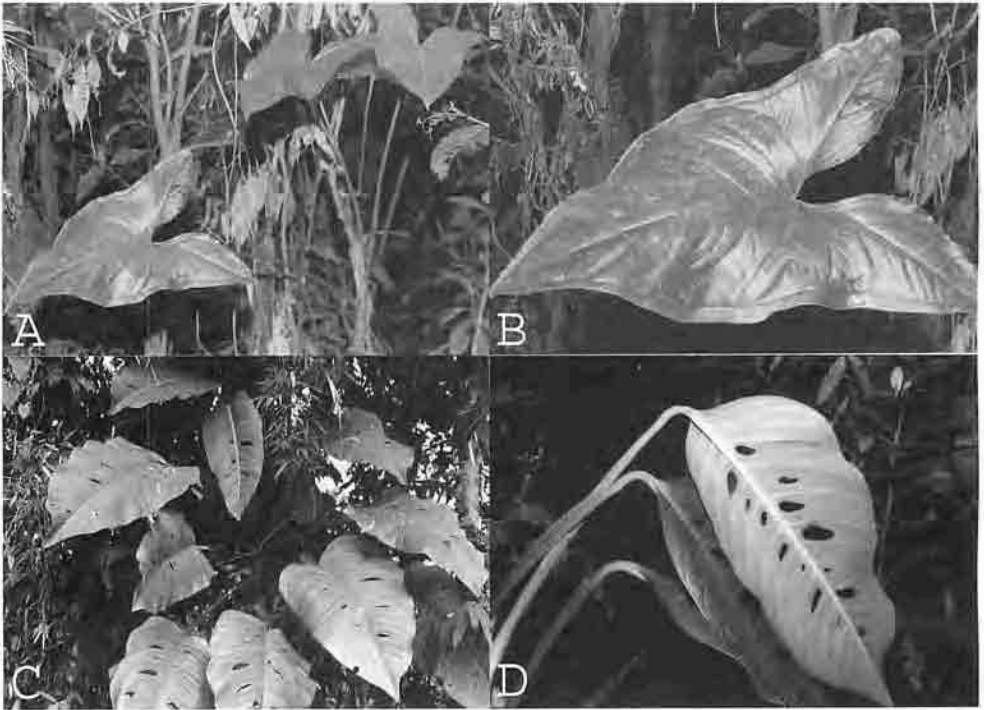


Fig. 36. a–b. *Chlorospatha planadensis* Croat & L. P. Hannon. (Croat 69558). a. Habit. b. Leaf blade, adaxial surface. c–d. *Monstera adansonii* var. *laniiata* (Schott) Madison. c. Habit. (Croat 69633). d. Leaf blade, abaxial surface. (Croat 71407).

striate at least at times, drying weakly glossy to semiglossy, dark brown, sheathed 28–29 cm, slightly more than 1/3 of its length, sheath decurrent at the apex; free portion 4–7 mm diam. midway, terete, obtusely angular at the apex; **blades** subhastate, broadly triangular, 27–41 cm long, 19–27 cm wide (averaging 34 × 21.9 cm), 1.1–1.3 times longer than wide, 0.4–0.8 times length of petioles, broadest at the base, ca. 1.5 times wider at the base than across the anterior lobe (measured tip to tip across the posterior lobes), thinly coriaceous, glabrous, moderately to prominently bicolorous; upper surface broadly quilted, semiglossy, dark green, almost black-green, drying weakly glossy to semiglossy, brownish green; lower surface medium green, semiglossy, drying semiglossy to glossy, weakly to moderately paler; **anterior lobe** 19–28 cm long, 13–19 cm wide, 1.2–1.3 times longer than wide, 1.4–1.6 times longer than the poste-

rior lobes, weakly acuminate at the apex, broadest at or near the base, symmetrical to weakly inequilateral, occasionally with one side ca. 1 cm wider than the opposite side; **posterior lobes** strongly divergent, 13–20 cm long, (5–) 8.5–11 cm wide, 1.4–1.7 times longer than wide, narrowly rounded at the apex, broadest at the base, weakly inequilateral, the inner side narrower, obtuse to broadly convex toward the base, moderately attenuate and decurrent onto the petiole or possibly occasionally onto the posterior rib; outer side 1.3–1.4 times wider than the inner side midway, straight to weakly concave or weakly convex toward the base; **midrib** and major venation deeply sunken on the upper surface, round-raised and slightly paler on the lower surface, drying weakly raised to weakly collapsed, weakly darker than the surface; **basal veins** 5 pairs coalesced into a prominent posterior rib; **primary lateral veins** deeply and narrowly sunken and



concolorous above, prominently convex to round-raised below, 5 pairs, arising at 40–60°, most acutely toward the apex, weakly to moderately arcuate; **tertiary veins** in part sunken on the upper surface, raised on the lower surface, darker than the surface, drying weakly prominulous, weakly darker than the surface; reticulate veins visible, flat on the lower surface, darker than the surface, drying in part visible, distinct, concolorous; **collective veins** 3 pairs, the innermost arising from one of the lateral veins on the inner side of the posterior lobe, loop-connected with all preceding lateral veins, weakly irregular, usually moderately remote from the margin, 5–12 mm from the margin, **minor veins** conspicuous, weakly raised above, flat and darker than surface below. INFLORESCENCES erect, 1–2 per axil; peduncle held within the sheath, 27–49 cm long, 3–5 mm diam., medium green; **spathe** to 12 cm long, spathe tube tinged purple on outside of tube, dark violet or purple on inside, ca. 5.2 cm long, ca. 5 mm diam.; spathe blade medium green on back, paler green inside; lanceolate, 8–13 cm long, 2.5–3 cm wide on tube, 1.5–2 cm wide on blade; possibly dark purple; **spadix** erect, sessile, adnate to the spathe ca. 4 cm at the base, the entire length of the pistillate portion; to 12 cm long, 4–8 mm diam.; the pistillate portion ca. 4 cm long, ca. 5 mm diam., pale yellow-green, weakly ovate, broader than base of staminate portion, to 2 cm long, 5–10 mm diam. near base, tapered to 8 mm diam. at apex; fertile staminate portion creamy white, tapered, to 6 cm long, 6 mm diam. at base, tapered to 3 mm diam. at apex, broadest near base but narrowed at very base, drying dark reddish brown; sterile staminate portion mostly narrower than both the pistillate and the fertile staminate portions, to 4 cm long, (2.5–) 4–9 mm diam. at base, quickly tapering to 4 mm diam. for most of length, broadest near the apex, drying medium-dark to dark reddish brown; pistils weakly coherent, ca. 4 across the axis (viewed from above), ca. 2 mm long; ovaries subglobose, ca. 1 mm long, ca. 2–2.2 mm diam.; style mantle-like, ca. 0.8–1 mm long, 2 mm diam., comprising ca.

1/2 of the length of the pistil, thin, granular, narrowly attenuate medially, the margins free, broadly spreading, much broader than the ovary apex, coherent with margins of adjacent styles, drying dark reddish brown; stigma ca. 0.3–0.8 mm diam., prominent, elevated and broader than the narrowed portion of the style, drying dark reddish brown, occasionally paler; synandria cream-colored or white, 1–1.3 mm long, 1.5 mm diam., or 2 mm × 1 mm diam. and elongated in the direction of the axis, coherent, truncate, 3–4-lobed, 3–4-androus, drying dark reddish brown; synandrodia occasionally ca. 1 mm diam. (in basal whorl), otherwise 1.5–2 mm × 3 mm diam. and elongated in the direction of the axis, coherent, truncate, subprismatic, in 3–5 whorls. INFRUCTESCENCES not seen.

*Chlorospatha planadensis* is known only from the western slopes of the Cordillera Occidental, at La Planada Reserve, Colombia (Nariño), at 1,780–1,800 m, in *Premontane wet forest* life zone. It would be expected to occur elsewhere in the department and southward into northern Ecuador.

This species is a member of sect. *Occidentalis*, and it is distinguished by its markedly long internodes (to 8 cm), its broadly triangular and subhastate leaf blades, with the posterior lobes broad, 1.4–1.7 times longer than wide and with little or no constriction in the area of petiole attachment. *Chlorospatha planadensis* is unusual in the genus in having a petiole sheathed only ca. 1/3 of its length (28–29 cm), combined with a long peduncle. The peduncle is usually only slightly longer than the sheath in *Chlorospatha*. The inflorescence of *C. planadensis* is assumed to be large, the spathe tube being 5.2 cm long and dark violet to purple on both surfaces. A spathe blade was not examined, but label notes indicate that it too is possibly dark purple.

*Chlorospatha planadensis* is similar to *C. ricaurtensis* but that species differs in being more frequently hemiepiphytic with shorter internodes (to 1.5 cm long), in having sagittate leaf blades with 3 pairs of primary lateral veins and narrow posterior lobes that are 2.2–3 times longer than wide,

petioles sheathed ca. 2/3 of their length, with the sheath free-ending as well as by having shorter peduncles (23–31 cm long), longer spathe tubes (6.5–7 cm long versus 5.2 cm long in *C. planadensis*), a longer staminate spadix (1.5–1.8 cm versus ca. 1 cm long for *C. planadensis*) and a style that is briefly attenuate medially and appressed to the ovary. In addition the synandria of *C. ricauartensis* are 5–6-androus a condition rare in *Chlorospatha* (versus 3–4-androus from *C. planadensis*).

Only the type specimen is fertile, with only a partial inflorescence available for examination. A sterile specimen of *Benavides 11253* (MO, PSO) was examined, but the label notes indicate that the spathe is purple and the spadix white, therefore it accords well with this species, in most respects.

*Paratypes*: COLOMBIA. **Nariño**: Ricaurte, La Planada, 01°10'N, 77°58'W, 17 Jan 1990, *Benavides 11253* (MO, PSO); Borde Pilapí, 1,800 m, 12 Nov 1993, *C. Restrepo 667* (MO); Trail above La Posada, 01°05'N, 78°01'W, 1,780 m, 26 Jul 1988, *Croat 69558* (B, COL, HUA, K, MO, PSO, US).

***Chlorospatha ricauartensis*** Croat & L. P. Hannon, **sp. nov.** Type: COLOMBIA. Nariño: La Planada, 7 km above Chucunés, on Túquerres-Ricaurte Rd., along La Rosa-Potrero de Hermogenes trail, 1,800–1,850 m, 01°06'N, 77°53'W, 13 Mar 1990, *Croat 71405* (holotype, MO-3789359; isotype, PSO).

Internodia 1–1.5 cm longa, 1.5–2.3 cm diam.; petiolus 36–49 cm longus, vaginata 21–31 cm; lamina sagittata, 24–25 × 13 cm; nervis basalibus 4–6 utroque; inflorescentia 3 in quoque axilla; spatha ca. 12.5–13 cm longa, cum tubo 7 mm diam.; spadix 11.5–12 cm longus.

Terrestrial herb; **stem** caulescent, elongate, with remnants of old leaf bases and cataphylls persisting intact; **internodes** 1–1.5 cm long, 1.5–2.3 cm diam., semiglossy, medium green, drying matte to weakly glossy, dark greenish brown (all measurements made from dried material); **cata-**

**phylls** marcescent, 20–24 cm long, ca. 1.5 cm wide, cuspidate at the apex. **LEAVES** 2–5, erect-spreading; **petiole** 36–49 cm long (averaging 45 cm), ca. 1 cm diam. near the base, medium green, purple-tinged, most prominently so toward the base; sheathed 21–31 cm, ca. 2/3 of its length, sheath free-ending at the apex; free portion ca. 3 mm diam. midway, obtusely angular; **blades** sagittate, weakly subshate on drying, 24–25 cm long, 13 cm wide, 1.8–1.9 times longer than wide, 0.5–0.6 times length of the petioles, broadest at the base, 1.3–1.7 times wider at the base than across anterior lobe (measured tip to tip across the posterior lobes), thinly coriaceous, glabrous, moderately bicolorous; upper surface semiglossy, dark green, drying semiglossy, dark brownish green; lower surface semiglossy, drying weakly glossy, in part semiglossy, moderately paler; **anterior lobe** 14–14.2 cm long, 7.5–10 cm wide, 1.4–1.9 times longer than wide, 1.1–1.4 times longer than the posterior lobes, abruptly acuminate at the apex, broadest at or below the middle, moderately inequilateral, with one side 1 cm wider; **posterior lobes** 10–12.5 cm long, 4–4.5 cm wide, 2.2–3 times longer than wide, narrowly rounded at the apex, broadest at or below the middle, symmetrical midway, the inner side broadly convex toward the base, briefly to moderately attenuate onto the posterior rib; outer side straight toward the base; **midrib** sunken on the upper surface, paler than the surface, round-raised on the lower surface, paler than the surface, drying raised, conspicuously darker than the surface; **basal veins** 4–6 pairs coalesced into a prominent posterior rib; **posterior rib** naked 1.0–1.2 cm per side; **primary lateral veins** 3 pairs, arising irregularly at 35–50°, entirely strongly arcuate, occasionally in part irregularly ascending, narrowly sunken on the upper surface, paler than the surface toward the base, round-raised on the lower surface, paler than the surface, drying weakly raised and collapsed, prominently darker than the surface; **secondary veins** in part obtusely sunken on the upper surface, raised on the lower surface, drying

weakly raised, weakly to moderately darker than the surface; tertiary veins visible, distinct on the lower surface, darker than the surface, drying distinct, in part weakly prominulous, otherwise flat, weakly darker than the surface; reticulate veins obscure; **collective veins** 3 pairs, the innermost arising from one of the lowermost lateral veins on the inner side of the posterior lobe, regular, 3–7 mm from the margin. INFLORESCENCES erect, to 3 per axil; **peduncle** held within the sheath, 23–31 cm long, 3–4 mm diam.; **spathe** erect, 12.5–13 cm long, apex not known, not constricted above the tube; spathe tube deeply purple-tinged on the outer surface, dark purple on the inner surface, 6.5–7 cm long, 7 mm diam., drying matte, dark reddish brown on the outer surface, weakly glossy on the inner surface; spathe blade greenish cream, weakly purple-tinged, narrowly and most prominently so along the outer margin toward the base, ca. 6 cm long, 7 mm diam., drying matte, dark brown on the outer surface, semiglossy on the inner surface, marcescent, erect after anthesis; **spadix** erect, 11.5–12 cm long, sessile, adnate to the spathe 4.5–5 cm at the base, ca. 1 cm less than the length of the pistillate portion; pistillate portion 5.5–6 cm long, ca. 4 mm diam.; fertile staminate portion ca. 5 cm long, 4–5 mm diam., narrowly rounded at the apex, broadest midway, drying dark reddish brown; sterile staminate portion ca. 1.5–1.8 cm long, 4 mm diam., cylindrical, drying dark blackish brown; pistils weakly coherent, 4 mm across the axis (viewed from above), ca. 2 mm long; ovary subglobose, ca. 1 mm long, 2–2.5 mm diam., drying tan; style mantle-like, 0.8–1 mm long, 1.5–2.5 mm diam., comprising ca. 1/3 of the length of the pistil, thin, granular, briefly narrowly attenuate medially, appressed to the ovary, the margins free, weakly broader than the ovary apex, weakly coherent with the margins of adjacent styles, drying medium-dark to dark reddish brown; stigma 0.3–0.5 mm diam., elevated and weakly wider than the narrowed portion of the style, drying medium to dark brown; synandria ca. 1 mm long, 2–2.2 mm ×

1 mm diam., elongated in the direction of the axis, coherent, truncate, irregularly (4–) 5–6-lobed, (4–) 5–6-androus (mostly 5), drying dark reddish brown; synandrodia 1–1.5 mm long, 0.5–1 mm × 2.5–3 mm diam., markedly elongated in the direction of the axis, deeply, irregularly lobed, coherent and truncate at the apex and abruptly narrowing below in apical 2 whorls, otherwise 1–6 branched, the branches broadest and obtusely truncate at the apex, narrowing below, in 7 whorls. INFRUCESCENCES not seen.

*Chlorospatha ricaurtensis* is known only from the La Planada Reserve, on the western slopes of the Cordillera Occidental, Colombia (Nariño), at 1,800–1,850 m, in *Premontane wet forest*. It would be expected to occur elsewhere in the Department and southward into Ecuador, possibly northward into Cauca Dept. *C. ricaurtensis* is terrestrial and was collected in a pasture.

This species is a member of sect. *Occidentalalis*, and it is distinguished by its sagittate, semiglossy, dark green leaf blades, with the midrib and major venation paler on both surfaces and by its narrow posterior lobes which are long relative to the anterior lobe, the latter only 1.1–1.4 times longer than the posterior lobes. The species is also distinguished by its purple-tinged petiole sheathed 2/3 of its length, with the sheath free-ending, and by its large inflorescence, to 13 cm long, with the spathe tube deeply purple-tinged on the outer surface and dark purple on the inner surface, and the blade purple-tinged, greenish cream. The synandria are unusual in the genus in being 5–6-androus. The sterile staminate spadix is unusually long, 1.5–1.8 cm long, with the synandrodia mostly several-branched and densely arranged. *Chlorospatha ricaurtensis* could be most easily confused with *C. planadensis*, with which it is sympatric. Both species have semiglossy leaf blades, semiglossy, medium green internodes and purple spathe tubes. *Chlorospatha ricaurtensis* is strictly terrestrial, having been collected in a pasture, with short internodes (to 1.5 cm long) and sagittate leaf blades with 3 pairs of primary lateral veins and narrow posterior lobes (2.2–3 times longer than wide).

*Chlorospatha planadensis* differs in being frequently hemiepiphytic, with long internodes (3.5–8 cm long) and subhastate blades with 5 pairs of primary lateral veins and broad posterior lobes (1.4–1.7 times longer than wide). The petiole of *C. ricaurtensis* is sheathed ca. 2/3 of its length, with the sheath free-ending, and the peduncle is 23–31 cm long. In *C. planadensis* the petiole is sheathed only 1/3 of its length, with the sheath decurrent and the peduncle much longer, 49 cm long. The inflorescence of *C. planadensis* is possibly smaller, with the tube 5.2 cm long vs. 6.5–7 cm long in *C. ricaurtensis*. The sterile staminate spadix of *C. ricaurtensis* is unusually long (1.5–1.8 cm) and the flowers mostly branched, whereas this portion is short in *C. planadensis* and the synandrodia are subprismatic. The style of *C. ricaurtensis* is briefly attenuate medially and appressed to the ovary, comprising ca. 1/3 of the length of the pistil, thus differing from *C. planadensis* in which the style is long-attenuate and broadly spreading, not appressed to the ovary, comprising ca. 1/2 of the length of the pistil. The synandria of *C. ricaurtensis* are 5–6-androus vs. 3–4-androus in *C. planadensis*.

*Chlorospatha ricaurtensis* could possibly be confused with 2 species, *C. giraldoi* and *C. noramurphyae*, both from Valle Dept., in the vicinity of Cali, on the eastern and western slopes of the Cordillera Occidental, at similar elevations. *C. ricaurtensis* has sagittate leaf blades which dry semiglossy on the upper surface, with the posterior lobes directed toward the base, and only 3 pairs of primary lateral veins. The other 2 species differ in having subhastate leaf blades which dry matte on the upper surface, with either 6 or 5–7 pairs of primary lateral veins. The spathes of *C. giraldoi* and *C. noramurphyae* are respectively pale yellow or red, differing from *C. ricaurtensis* which has a purple tube and weakly purple-tinged, greenish cream blade. The pistils of *C. ricaurtensis* are densely arranged, with the style only briefly narrowly attenuate and comprising ca. 1/3 of the length of the pistil. *Chlorospatha noramurphyae* and *C. giraldoi* have the pistils laxly arranged and the style longer, more prominently attenuate, comprising ca. 1/2 of

the length of the pistil. The synandria of *C. ricaurtensis* are 5–6-androus vs. 3–4 androus in the other 2 species. Both *C. noramurphyae* and *C. giraldoi* appear to be species confined to primary cloud forest, with the latter species being occasionally hemiepiphytic, with long internodes, 2–3.5 cm long vs. 1–1.5 cm long in *C. ricaurtensis*, which was collected in a pasture.

*Benavides 694* (MO), consists of only a stem and a small inflorescence with a short peduncle. However, the spathe tube is dark purple with the spathe blade white and the proportions of the 3 portions of the spadix and the flower morphology appear to accord with *C. ricaurtensis*. The synandria are similar to the unusual synandria of *C. ricaurtensis* in being somewhat elongate on the axis and irregularly lobed. These appear to be mostly 4 androus and are reported as yellowish, whereas *C. ricaurtensis* is uncommon in *Chlorospatha* in being 5–6 androus. The color of the synandria is not known in *C. ricaurtensis*.

*Paratypes*: COLOMBIA. **Nariño**: La Planada San Isidro, Las Cruces, Cabeceras Hondon atras de quebradas que va a Corcuél, 01°10'18"N, 78°00'09"W, 1,600 m, *G. Herrera & Bittner 9658* (MO, PSO); 2,900 m, 28 Nov 1976, *Benavides 694* (MO); Along Sendero La Rosa to Potrero de Hermógenes, 01°06'N, 77°53'W, 1,800–1,850 m, 13 Mar 1990, *Croat 71405* (MO, PSO).

*Monstera* Adanson, *Fam. Plantas* 2: 470. (1763).

Appressed hemiepiphytic climbers or vines; **juvenile plants** terrestrial with elongate internodes and mostly ovate blades, greatly modified when climbing, sometimes tightly appressed to climbed surface (shingle leaves); **preadult plants** with shorter internodes, usually climbing or pendent, the result of branching or reversion to preadult phase from adult foliage; **adult plants** usually appressed climbers with short **internodes**, sometimes scandent; **caudices** often somewhat flattened on one side, densely rooting at the nodes, usually on the flattened surface only; **roots** usually slender; **petioles**

amplexicaule, sheathed 1/6 to throughout; sheath persistent or deciduous; **blades** membranaceous to coriaceous, mostly ovate to oblong-elliptic, often oblique and inequilateral, entire or pinnatifid, frequently fenestrate in 1–4 series per side; **midrib** sunken above, raised below; **primary lateral veins** sunken above, prominently raised and whitish below; **interprimary veins** straight or branched especially toward the margins; **tertiary veins** distinct; INFLORESCENCES much shorter than the leaves, 1–several per axil; **peduncle** shorter or longer than the spathe; **spathe** deciduous, coriaceous, cavi-form, orbicular to naviculiform, usually white to pinkish or yellowish; **spadix** sessile, white to yellow, cylindroid, usually sterile at the base. Flowers densely aggregated in several spirals, perfect, naked, protogynous; stamens 4, extrorse, the pollen emerging in viscid threads; pistils oblong, prismatic, truncate at apex; style conical, the stigma linear, curved or straight. INFRUCTESCENCE green, white, yellow or orange, the stylar portion of the **berries** deciduous to expose the seeds; seeds globose to oblong, the raphe S-shaped by curvature of the seed in development; testa brown and soft, the embryo macropodial, green or blue. Species ca. 60, C. Mexico to Brazil and Bolivia.

#### KEY TO SPECIES OF *MONSTERA*

1. Internodes long, to 20 cm; blades thinly coriaceous, to 45 cm long, 22 cm wide; 10–12 primary lateral veins per side; flowering spadix less than 13 cm long; fruiting spadix less than 17 cm long. . . . . *M. adansonii*  
Schott v. *laniata* (Schott) Madison
1. Internodes generally short; blades moderately coriaceous, to 60 cm long, 34 cm wide; 22–25 primary lateral veins per side; flowering spadix more than 15 cm long; fruiting spadix more than 20 cm long . . . . .  
. . . . . *M. planadensis* Croat

***Monstera adansonii*** Schott var. ***laniata*** (Schott) Madison, *Contr. Gray Herb.*

207: 38. 1977. Type: COSTA RICA, Candelarta, *Oersted 15795* (C; isotype B).

Loosely climbing hemiepiphyte or appressed epiphyte; **internodes** to 20 cm long, 1.6–1.9 cm diam., medium to dark green, minutely or densely pale-speckled, semiglossy; **petioles** (20–) 25–48 cm long (averaging 32.7 cm), 6–9 mm diam. at middle, sharply to broadly V-sulcate (especially in free portion), colored as internodes, matte; sheath erect or incurled on younger plants, with one side erect, one side incurled on older plants; geniculum sharply V-sulcate; **blades** oblong-elliptic, oblique, acuminate at apex, obtuse to rounded at base, 22–46 cm long, 10–22 (–33) cm wide (averaging 37 × 19 cm), (1.4–) 1.7–2.3 times longer than broad, 1–1.3 times longer than the petioles, broadest 1/3–1/2 of distance from base to apex, subcoriaceous to thinly coriaceous; upper surface dark green and semiglossy to moderately glossy; lower surface slightly paler and weakly glossy; **midrib** narrowly sunken and slightly discolored along margin above, thicker than broad and much paler below; **primary lateral veins** 10–12 per side, narrowly sunken above, convex and paler below; **interprimary veins** weakly raised below, moderately obscure; **tertiary veins** few, mostly continuous to margin, darker than surface; INFLORESCENCES not seen.

*Monstera adansonii* v. *laniata* is wide-ranging in the Neotropics, extending from Nicaragua to Panama and Colombia and east to Curacao, Tobago, Venezuela, the Guianas and south to Ecuador, northeastern Peru and Brazil, at elevations of 0–1,800 m, primarily below 700 m, in *Tropical dry forest*, *Tropical moist forest*, *Tropical wet forest* and *Premontane wet forest* life zones. At La Planada, this species is apparently widespread, having been collected along the trail above La Posada, on the flat, swampy area south of Sendero Natural, in the primary forest and margins of old pasture along Sendero La Vieja, and along Sendero La Rosa to Potrero de Hermogenes.



Fig. 37. a–b. *Monstera planadensis* Croat. (Croat 69596). a. Habit. b. Inflorescence with spathe fallen (post-anthesis). c–d. *Philodendron beniteziae* Croat. (Croat 71193). c. Habit. d. Leaf blade, adaxial surface.

A member of sect. *Monstera*, this species is characterized by its elongated speckled internodes, sharply V-sulcate petioles, oblong-elliptic, moderately thin, mostly perforated blades.

It is distinguished from the only other species at La Planada by having longer internodes, thinner leaves with smaller blades (less than 45 cm long) and smaller inflorescences with flowering spadices less than 13 cm long and infructescences less than 17 cm long whereas *M. planadensis* has inflorescences with spadices more than 15 cm long and infructescences more than 20 cm long.

One specimen (Croat 69559) is particularly interesting as it dries much lighter than the other material from La Planada. This may represent a new species, although there is not enough material to make a definite determination.

*Additional specimens examined:* COLOMBIA. **Nariño:** Ricaurte, La Planada,

7 km above Chucunés on road between Tuquerres and Ricaurte, flat, swampy plain S of Sendero Natural, 01°05'N, 78°01'W, 1,780 m, 28 Jul 1988, *Croat 69633* (MO, PSO); Tuquerres-Ricaurte, 01°06'N, 77°54'W, 1,780–1,850 m, 7 Mar 1990, *Croat 71175* (COL, CUV, HUA, K, MO, PSO); Sendero La Rosa to Potrero de Hermógenes, 01°06'N, 77°53'W, 1,800–1,850 m, 13 Mar 1990, *Croat 71407* (MO, PSO); La Posada, 01°05'N, 78°01'W, 1,780 m, 26 Jul 1988, *69559* (COL, CUV, MO, PMA, PSO, QCA, US); 01°05'N, 78°01'W, 1,780 m, 27 Jul 1988, *69604* (MO, PSO). ECUADOR. **Carchi:** Awá Indigenous Territory, Community of Gualpí Alto SSE of Don Froilan's house, 01°01'N, 78°18'W, 825 m, 18 Dec 1995, *Alonso Ortiz, E. Loachamin, Ademelio, Ignacio & Aurencio Nastacuz 787* (MO).

***Monstera planadensis* Croat, sp. nov.**  
Type: COLOMBIA. Nariño: La Planada

Reserve, 7 km above Chucunés on road between Tuquerres and Ricaurte, primary cloud forest along trail above La Posada, 01°05'N, 78°01'W, 1,780 m, 27 Jul, 1988, *Croat 69596* (holotype, MO-3641835; isotypes, PSO).

*Internodia brevia*, 6 cm diam.; petiolus 28–53 cm longus, vaginata ad geniculum; lamina ovata-oblonga, (30–) 55–60 cm longa, (19–) 29–34 cm lata, nervis primaries lateralibus 22–25 utroque; spadix 20–23 (–30) cm longus, 3.7–4.5 cm diam.

Hemiepiphyte climber, often appressed; **internodes** short, to 6 cm diam.; **petioles** 28–53 cm long (averaging 45 cm), 6–11 cm diam. at middle, sheathed throughout much of length, minutely speckled, drying dark brown to blackened, finely ribbed; **sheath** erect, the margins often deciduous; geniculum sharply sulcate; **blades** ovate-oblong, acute to apiculate at apex, slightly oblique and weakly subcordate at base, (30–) 55–60 cm long, (19–) 29–34 cm wide (averaging 57 × 31 cm), 1.5–1.8 times longer than wide, 1.2–2 times longer than the petioles, broadest near 1/3 of distance from base to apex, entire and eperforate to perforate with holes ellipsoid, 0.6 mm to 6.5 cm long, 0.4–1.3 cm wide, inequilateral, one side 1–2 cm wider, moderately coriaceous, semiglossy on both surfaces, slightly bicolorous, dark green above, slightly paler below, drying semiglossy, dark brown to dark gray-brown above, yellow-brown below; surfaces with tertiary veins prominent on both surfaces with oblique cross-veins extending throughout most of the distance from the midrib to the margin; **sinus** to 2 cm deep; **midrib** flat and slightly paler above, thicker than broad and moderately paler below, drying sunken and concolorous above, convex and finely ribbed below; **primary lateral veins** arising at an acute angle, arising at 60–80 (–100)° angle, 22–25 per side, 3–5 of these clustered in the lower 1 cm from the base, narrowly sunken above, prominently convex and creamy-white below, drying scarcely raised and slightly paler above, convex, paler and minutely ridged irregularly below. INFLORESCENCES 1 per axil;

**peduncle** 28–34 cm long, 5–7 mm diam. at middle; **spathe** deciduous; **spadix** 20–23 (–30) cm long, 3.7–4.5 cm diam., whitish at anthesis; pistils 3–5 mm diam., the style pale brown, the stigma oblong, 0.7–0.8 mm long. INFRUCTESCENCES with **berries** greenish white.

*Monstera planadensis* is endemic to the type locality at La Planada (from which it gets its name) at 1,750 to 1,780 m elevation in *Premontane wet forest*. In La Planada, this species was seen as an adult on only two occasions, the first along the ridge at the end of the trail up the slope above La Posada (near the edge of the forest at the beginning of the second parcel of forest beyond the first pasture).

This species is a member of sect. *Monstera* and is characterized by its thick stems, its thickly coriaceous, entire to minutely perforate and lacking regularly pinnately lobes blades, and by having a flowering spadix more than 15 cm long and 2.5–4.5 cm diam.

It is closest to *M. standleyana* G.S. Bunting but that species differs in having more prominently perforated blades and even sometimes pinnately lobed margins (when not lacking perforations) and the blade surfaces are also comparatively smooth upon drying and lacking the prominently raised tertiary veins. In addition, *M. standleyanum* has proportionately shorter spadices, less than 19 cm long and less than 6 times longer than wide versus more than 7 times longer than wide. *Monstera planadensis* may also be confused with *M. adansonii* Schott var. *laniata* (Schott) Madison, but that species generally has a much smaller spadix and somewhat smaller blades.

*Paratypes*: COLOMBIA. **Nariño**: Ricaurte, La Planada Reserve, *Benavides 8930* (COL, MO, PSA); Salazar Finca, 01°08'N, 77°58'W; 1,750 m, 29 Nov 1981, *Gentry et al. 35189* (COL, MO); 01°09'37"N, 77°59'13"W, *G. Herrera 9200* (PSO).

*Philodendron* Schott in *Wiener Z. Kunst* 1829 (3): 780. (1829).

Appressed hemiepiphytic climbers or vines, less frequently terrestrial, rarely true epiphytes; sap usually tanniniferous, drying dark, rarely with latex, drying white; **caudices** densely rooted at nodes; **juvenile plants** usually terrestrial and scandent, the **petioles** conspicuously sheathed; **adult plants** with **internodes** short to elongate, sometimes flattened on one side; **cataphylls** unribbed or variously ribbed, persistent or deciduous, remaining intact or more usually weathered to fibers; **petioles** short or more usually elongate, usually sheathed only at base (except sect. *Pteromischum*), variously shaped in cross-section, firm or spongy; **blades** simple and entire, ovate to oblong or elliptic or variously divided, trisect, palmatisect or pinnatifid; **midrib** raised or sunken above, raised below; **primary lateral veins** conspicuous, spreading to the margins, not forming collective veins, the lowermost primary lateral veins often coalesced on cordate blades, the **posterior rib**, naked with the sinus or not; **interprimary veins** sometime present; **minor veins** conspicuous or obscure, usually fine and closely parallel; **cross-veins** sometimes visible; laticifers sometimes appearing like veins; INFLORESCENCES 1–several per axil, much shorter than the leaves; **peduncles** shorter or

longer than the spathe; **spathe** convolute at base, persistent, usually coriaceous, frequently colorful, often bicolorous on outside, less frequently so within, typically somewhat constricted above the tube, opening widely at anthesis, then reclosing and persisting in fruit; **spadix** divided into pistillate and staminate portions, each with unisexual flowers; pistillate portion basal, usually much shorter than the staminate portion, usually greenish; staminate portion clavate, white, usually somewhat constricted above the sterile staminate portion (at base). Flowers naked, closely aggregated in several spirals; staminate flowers consisting of 2–6 sessile stamens united into a synandrium truncate at apex and usually irregularly 4–5-sided; thecae oblong or linear, emarginate at the base, each opening by short slits; pistils ovoid to obovoid, 2-several-celled; ovules 1 to several to numerous per locule, orthotropous or half anatropous, ascending on moderately long funicles; stigma sessile, funnel-shaped or brush-like and hemispherical to lobulate. INFRUCTESCENCES with **berries** cylindroid, exposed by the re-opening of the spathe; seeds few to many per berry, oblong to elipsoid or ovoid-oblong; the testa rather thick, striate-costate; endosperm present. Species ca. 700, Central Mexico to Argentina.

### KEY TO SPECIES OF *PHILODENDRON*

1. Leaf blades oblong to oblong-elliptic, more than 2.5 times longer than wide, lacking well-developed posterior lobes.
  2. Petiole strongly winged throughout much of its length, attached around the entire circumference of the stem; cataphylls lacking . . . . . *P. beniteziae* Croat
  2. Petioles not strongly winged throughout much of its length, sheathed usually only near base, attached to one side of the stem. . . . . *P. oligospermum* Engler
1. Leaf blades ovate to ovate-triangular, usually less than 2.5 times longer than broad, usually with well-developed posterior lobes.
  3. Cataphylls sharply D-shaped or 2-ribbed.
    4. Petioles terete to obtusely somewhat flattened adaxially.
      5. Petioles pale-streaked but otherwise smooth.
      6. Internodes short, to 4 cm diam.
      7. Blades semiglossy to glossy on lower surface.
        8. Leaf blades with minor veins prominently elevated and with prominent cross-veins visible on lower surface. . . . . *P. prominulinervium* Croat
        8. Leaf blades lacking prominently raised minor veins or cross-veins on lower surface . . . . . *P. pogonocaulum* Madison



7. Blades matte and whitish to pale green on lower surface, drying greenish to pale brown. . . . . *P. hebetatum* Croat
6. Internodes long (to 10 cm long), to 1.7 cm diam.
9. Stems drying with conspicuous transverse fissures; major veins on lower surface drying darker than the surface; minor veins drying prominulous and interspersed with rather sinuous secretory canals and abundant cross-veins as well as a sparse assortment of prominent granules; inflorescences 2 per axil with peduncles 8.5–11 cm long; pistil drying with a whitish densely warty style and a blackened, sessile button-shaped stigma. . . . .  
. . . . . *P. aurantispadix* Croat
9. Stems drying with acute folds but positioned in the direction of the axis, not at all transverse-fissured; major veins on lower surface drying paler than surface; minor veins drying not at all raised, but instead with prominent sunken undulations, lacking any sign of secretory canals, cross-veins or sparse granulations, instead the surface minutely and densely granular upon magnification; inflorescences 5 per axil with peduncle 8.5–11.5 cm long; pistil drying blackened medially with a prominently irregular margin and with the stigma stalked to ca. 0.4 mm upon drying. . . . .  
. . . . . *P. pubuangii* Croat
5. Petioles densely and conspicuously warty throughout; juvenile with trichomes near apex. . . . . *P. verrucapetiolum* Croat
4. Petioles acutely D-shaped. . . . . *P. prominulinervium* Croat
3. Cataphylls unribbed.
10. Petioles densely warty or with hair-like trichomes at least near the apex.
11. Petioles merely densely warty or with trichomes primarily near apex, usually on juveniles or preadults. . . . . *P. verrucapetiolum* Croat
11. Petioles with conspicuous trichomes on all stages of plant. . . . .  
. . . . . *P. fibrosum* Sodiro ex Croat
10. Petioles essentially smooth.
12. Blades velvety above or at least not semiglossy above. . . . .  
. . . . . *P. narinoense* Croat
12. Blades semiglossy to glossy above. . . . . *P. planadense* Croat

***Philodendron aurantispadix*** Croat, **sp. nov.** Type: COLOMBIA. Nariño: La Planada, 7 km above Chucunés, on road between Tuquerres and Ricaurte, along the trail to Pialapi, past the entrance to La Planada Field Station, *T. B. Croat 71304* (holotype, MO-3828511–2, 4340762; isotypes, B, COL, K, PSO, US).

Internodia usque 10 cm longa, 3.5 cm diam.; cataphylla decida; petiolus 26–43 cm longus, 4–7 mm diam. ad medium, obtusus applanatus; lamina subcoriacea, late ovata, cordata, 26–39 cm longa, 21–34 cm lata; nervis primariis lateralibus 7–10 utroque;

inflorescentia 5 in quoque axilla; spatha 3–4 cm longa, 4–7 mm diam., tubo extus pallide verde, intus albo; lamina alba; spadix 4.0–4.5 cm. longus, 6–7 mm diam., staminatus, pallide aurantiacus, ax clero aurantiaco.

Terrestrial or hemiepiphytic; **internodes** on juvenile dark green, semiglossy, soon transversely fissured, becoming gray to brown, 3–8 cm long, 9–17 mm diam.; on adult, to 10 cm long, 3.5 cm diam., brown and coarsely fissured transversely; **cataphylls** green, tinged red with two sharp, low ridges, deciduous; **petioles** 26–43 cm long (averaging 34 cm), 4–7 mm diam. at middle, obtusely flattened laterally, sometimes conspicuously so, almost twice as



Fig. 38. a-d. *Philodendron aurantispadix* Croat, (Croat 71304). a. Habit. b. Leaf blade, adaxial surface. c. Stem showing cataphylls, base of petioles and inflorescence. d. Inflorescence.

wide as thick, medium green, weakly glossy, densely striate, often tinged maroon at apex; **blades** broadly ovate, acuminate at apex, cordate at base, 26–39 cm long, 21–34 cm wide (averaging  $33.5 \times 27$  cm), 1.1–1.4 times longer than broad, 0.7–1.1 times length of the petioles, broadest near point of petiole attachment, subcoriaceous, moderately bicolorous, semiglossy; **anterior lobe** 22–28 cm long; **posterior lobes** 8–15 cm long, 10–17 cm wide, directed weakly inward; **sinus** spatulate, 5–13 cm deep, 3–6 cm wide; **midrib** flat and paler above, convex and dark maroon-purple below; **basal veins** 7–8 pairs, 3–4 pairs free to base; **posterior rib** naked only for first 1–2 cm; **primary lateral veins** 7–10 per side, departing midrib at  $45^\circ$ – $75^\circ$  angles, deeply sunken above, round-raised and dark maroon-purple below; **minor veins** few, moderately obscure; INFLORESCENCES 5 per axil; **peduncle** 2–3 cm long, 1–2 mm diam., pale green; **spathe** 3–4 cm long, 4–7 mm diam. (unopened); tube white inside, pale green outside; blade white inside, white, tinged greenish toward base outside; **spadix** 4.0–4.5 cm long; pistillate portion yellow-green, 1.5–1.7 cm long, 6–7 mm diam.; staminate portion pale orange (inner core bright orange in cross-section), 2.6–2.8 cm long, 8–9 mm diam. at base, 6–7 mm diam. at apex; sterile staminate portion indistinguishable from fertile staminate portion (on dried material); staminate flowers 1.1–2.0 mm long, 0.7–1.1 mm wide; pistils 1.4–1.8 mm long, 1.0–1.2 mm diam.; stigma 0.3–0.4 mm diam.; locules 5 per ovary; ovules 0.9–1.0 mm long, 1 per locule; placentation basal.

*Philodendron aurantispadix* is endemic to the type locality at La Planada at 1,700 to 1,850 m elevation in *Premontane wet forest*. It has been collected twice at La Planada, once along the trail to Pialapí, past the entrance to La Planada Field Station and once in a location not specifically known.

The species is a member of subgen. *Philodendron* sect. *Macrobelium*, subsect. *Oligocarpidium* and is characterized by its hemiepiphytic scandent habit with internodes longer than wide and drying light

brown and closely transverse-fissured stems, sharply 2-ribbed deciduous cataphylls, the obtusely flattened petioles, the ovate-sagittate blades brown-drying blade and by the cluster of small inflorescences with the staminate spadices pale orange.

*Philodendron aurantispadix* is similar to *P. verrucapetiolum*, but differs from that species in having closely transversely fissured dried stems, more widely spaced primary lateral veins, smooth petiole apices and more or less smooth midribs. It is further distinguished by its small inflorescences in clusters and its pale orange staminate portion of the spadix, hence the name *P. aurantispadix*.

*Paratypes*: COLOMBIA. **Nariño**: Barba-coas, Corregimiento Altaquer, Vereda El Barro, Reserva Natural Río Nambí,  $00^\circ 18' N$ ,  $78^\circ 08' W$ , 1,325 m, 4 Dec 1993, *J. Betancur et al.* 4497 (MO); Ricaurte, La Planada, 7 km above Chucunés on road between Tuquerres and Ricaurte, trail above La Posada,  $01^\circ 05' N$ ,  $78^\circ 01' W$ , 1,780 m, 26 Jul 1988, *Croat* 69577 (MO, PSO); Transect 6,  $01^\circ 10' N$ ,  $77^\circ 58' W$ , 1,800 m, 24 Jul 1986, *Gentry & Benavides* 55010 (MO);  $01^\circ 10' N$ ,  $77^\circ 58' W$ , 1,800 m, 2 Nov 1987, *Benavides* 8796 (COL, MO);  $01^\circ 09' 37'' N$ ,  $77^\circ 59' 13'' W$ , *G. Herrera* 9186 (PSO).

***Philodendron beniteziae*** Croat, in *Croat & Lambert, Aroideana* 9:84. 1986. Type: VENEZUELA. Tachira: Quebrada El Líbano, Dtto. Junín, more or less 800 m, 29 Mar 1972, *Benítez de Rojas* 1241 (holotype, MY-2696; isotype, F).

Scandent hemiepiphyte to 2.5 (–4) m; internodes (1–) 1.5–6 (–8) cm long; 5–7 mm diam., moderately smooth, drying green and smooth, striate, matte, bearing a few short roots on the flowering branches; **petiole** sheathing stems, 6–19 cm long (averaging 11.7 cm), 0.5–0.75 times as long as blades, sheathed throughout or nearly so, the free portion to 1.5 cm long; **blades** narrowly oblong-elliptic, to oblong-oblan-ceolate, 12–25 (–34) cm long, 4.3–6.5 (–9) cm wide (averaging  $18.3 \times 5.8$ ), 2.4–3.7

(–4) times longer than broad, 0.6–1.9 (–2.6) times longer than the petioles, narrowly acuminate at apex, acute at base, drying green; **midrib** sunken above, narrowly raised below; **primary lateral veins** not well defined, (7–) 9–13 pairs, obscure above, weakly visible on lower surface upon drying; interprimary veins about as conspicuous as the primary lateral veins; minor veins weakly visible, drying weakly wrinkled; margins drying minutely revolute. INFLORESCENCE solitary, drying reddish brown; peduncle 1–2.2 cm long, less than 3 mm diam.; spathe tube oblong-elliptic, to 1.7 cm diam. (dried); spathe blade white; pistillate spadix 1.4–3.5 cm long, ca. 1.5 cm diam.; stigmas drying conspicuously bowl-shaped, brown, 0.7–0.9 mm diam., staminate spadix ca. ca. 3.5 cm long; **berries** not seen.

*Philodendron beniteziae* ranges from Colombia (Antioquia, Chocó, Nariño, Santander, Valle del Cauca), Ecuador (Carchi, Cotopaxi, Pichincha) to Venezuela (Tachira), at elevations of 1,600–2,060 m, in *Premontane rain forest* and *Premontane wet forest*.

A member of sect *Pteromischum*, *P. beniteziae* is characterized by a slender green striate stem, small narrow, conspicuously acuminate blades with an inconspicuous petiolar sheath extending nearly to the apex. It is the only known species in sect. *Pteromischum* at La Planada and thus is distinguished from all other species of *Philodendron* by its nearly fully sheathed petioles.

*Additional specimens examined*: COLOMBIA. **Nariño**: Ricaurte, La Planada, 7 km above Chucunés on road between Tuquerres and Ricaurte, along trail to summit of hill behind Centro de Científicos, 01°05'N, 78°01'W, 1,780 m, 28 Jul 1988, *Croat 69660* (HUA, MO, PSO); Sendero La Vieja, 01°06'N, 77°54'W, 1,780–1,850 m, 8 Mar 1990, *Croat 71193* (MO, PSO). ECUADOR. **Carchi**: Up small mountain SW of Rafael Quindís finca along small stream and descending mountain trail, 00°52'N, 78°08'W, 1,930–2,100 m, 28 Nov 1987, *W. S. Hoover & S. Wormley 1856* (MO, QCA); Mountain E and NE, forest area along slope

of mountain ENE of Rafael Quindís's mountain finca and above Río Verde, 00°52'N, 78°07'W, 1,870–2,400 m, 03 Dec 1987, *W. S. Hoover 2277* (MO); Trail from Rafael Quindís mountain finca above Río Verde, 00°52'N, 78°08'W, 1,600 m, 27 Nov 1987, *W. S. Hoover & S. Wormley 1767* (MO); Ridge to NE of Rafael Quindís mountain finca, 00°52'N, 78°08'W, 2,000 m, 29 Nov 1987, *2035* (MO); Vicinity of Maldonado; 1,500–1,900 m, 15 Apr 1977, *M. T. Madison 3881* (MO, QCA, SEL).

***Philodendron fibrosum*** Sodiro ex. Croat, **sp. nov.** Type: ECUADOR. Carchi. Along road from Tandayapa to Nono, 2.6 km from Tandayapa, 1,772 m, 00°00'09"N, 78°39'47"W, 14 Feb 2005, *Croat 94659* (holotype, MO-04779503–04; isotypes, B, COL, GB, K, NY, QCNE, US).

*Internodia brevia* vel ad 6–20 cm longa, 1.5–5.0 cm diam.; cataphylla ecostata, squamatus; petiolus 35–76 (–98) cm longus, 7–17 mm diam. ad medium; lamina lata ovata vel rotundata, 29–72 cm longa, 27–57 cm lata; nervis basales 9–11 utroque, pro parte liber ad basim; nervis lateralis primariis 6–8 utroque; spatha atroviridis, squamosa, 12–19 cm longis; tubus marroninus intus; spadix 10–13 cm longus.

Epiphytic often appressed-climbing, sometimes terrestrial; stems to more than 1 m long; **internodes** short, or 6–20 cm long, 1.5–5.0 cm diam., densely, minutely and irregularly transverse-ridged, yellow-brown, scurfy and brown to reddish or reddish brown, drying light brown, 6–20 cm long when juvenile; **cataphylls** to 32 cm long, 6.3 cm diam. at base, reddish, densely yellowish green, densely scaly, unribbed often reddish, marcescent, persisting for a time as loose fibers at upper nodes finally deciduous; **petioles** 35–76 (–98) cm long (averaging 49 cm), 7–17 mm diam. at middle, to 1.6 times longer than blades when young, about equaling blades on adults, purplish, terete to subterete, obtusely flattened toward apex, minutely warty, densely and minutely transverse-fissured finely wrinkled transversely, with



Fig. 39. a–d. *Philodendron fibrosum* Sodiro ex. Croat. a & c. (Croat 69578). a. Habit. b. Leaf blades, adaxial surface. (Croat 61628). c. Stem showing petioles with conspicuous trichomes and leaf blade, abaxial surface. d. Inflorescence showing inflorescence at anthesis with protruding spathe and spadix. (Croat 72141).

low, irregular, thin erect ridges, densely to sparsely setose-scaly throughout (the scales greenish, mostly 4–8 mm long, flattened, branched with lacinate to erose margins); **blades** broadly ovate to almost rounded, acuminate at apex, cordate at base, 29–72 cm long, 27–57 cm wide (averaging 50.5 × 43.7 cm), equally as broad as long to 1.3 times longer than broad, 0.9–1.3 times length of the petioles, broadest above point of petiole attachment, subcoriaceous to thinly coriaceous; upper surface solid dark green, and semiglossy to matte-subvelvety to velvety above; lower surface moderately to much paler and semiglossy, not marked with purple, drying greenish to olive-gray above, yellowish brown to yellowish green below; **anterior lobe** 20–51 cm long; **posterior lobes** 12–28 cm long, 10–23 cm wide, directed inward; **sinus** usually closed, 10–23 cm deep, 0.5–1 cm wide; **basal veins** 9–11 pair, mostly part free to the base; **midrib** flat and slightly paler at base above, deeply sunken toward apex, slightly paler above, convex to narrowly rounded and paler paler, matte below; **primary lateral veins** 6–8 pairs, departing midrib at 40°–45° angle, ascending to margin, weakly and deeply and narrowly sunken and slightly paler to concolorous above, convex to round-raised and paler or darker, matte below; **interprimary veins** indistinct; **minor veins** weakly raised, distinct, drying wrinkled toward the margins; both the primary and interprimary veins densely granular-puberulent on lower surface; cross-veins distinct on drying, especially below. INFLORESCENCES (1–) 2(–3) per axil; **peduncles** purple or reddish violet, becoming brick red, 9–14 (–25) cm long, 4–10 mm diam. brownish, the surface of the peduncles and lower part of the spathe tube covered with minute, more or less reniform and erose scales over surface, these interspersed with longer hairlike green scales, especially toward the apex; **spathe** dark green tinged reddish outside, densely scaly or setose, 12–19 cm long; spathe tube heavily tinged purplish on outside, deep maroon to dark violet-purple throughout inside, 4–6 cm long, 15–22 (–3.2) mm diam. (to 4 cm diam. post-

anthesis); spathe blade lanceolate, cherry red on lower 2/3 to white at tip on inside; **spadix** 10–13 cm long; the pistillate portion with flowers pale green to creamy, cylindroid, 4–5 cm long, 11–14 mm diam.; staminate portion tapered, 6–7 cm long, 9–13 mm diam. just above base, tapered to 3–5 mm diam. at apex, broadest near base; sterile staminate portion constricted in the middle, to 2 cm long, 8–9 mm diam. at base, 4–6 mm diam. at middle, 6–8 mm diam. at apex; pistils 1.6 mm long, 1.0–1.1 mm diam.; stigmas 0.9–1.0 mm wide, 0.2 mm thick, about as broad as the ovary, densely papillate-bristly, ovules 9–10 per locule, affixed to the axis of the locule near the base, 0.1 mm long, about as long as the funicle. INFRUCTESCENCES considerably swollen at base, with spathe closed; **fruiting spadix** to 16 cm long; pistillate portion 8 cm long, 3 cm diam.

*Philodendron fibrosum* ranges from southern Colombia (Cauca, Nariño) to central Ecuador (Carchi, Cotopaxi, Imbabura, Pichincha), at elevations of 900–2,200 m, primarily at 1,200–1,800 m, in *Lower montane moist forest*, *Lower montane rain forest* and *Premontane wet forest* life zones. At La Planada the species is moderately common in all areas of the Reserve.

This species is a member of subgen. *Philodendron* sect. *Philodendron* subsect. *Acropodium* and is distinguished by its densely setose-scaly stems, petioles and inflorescences, and the nearly rounded subcoriaceous blades with most of the basal veins free to the base.

*Philodendron fibrosum* is most closely related to *P. verrucosum* with which it has long been confused. That species differs in having thinner, more narrowly ovate blades which are typically tinged purplish in the areas between the primary lateral veins on the lower surface and typically have several of the basal veins coalesced with a more conspicuous posterior rib.

The species was recognized and named by Luis Sodiro during his work in Ecuador but it was never published by him. Curiously Sodiro described no *Philodendron* species despite the fact that most of

the species he would have seen at the time were actually undescribed.

**Paratypes:** COLOMBIA. **Cauca:** along road between Popayán and Juntas via Viente de Julio Popayán, 17 km W of summit, 02°31'18"N, 077°01'56"W, 1,280 m, 19 Jul 1997, *Croat & John F. Gaskin 80098* (CAUP, MO). Trail to El Hondón beginning at Quebrada El Tejón, 01°06'N, 77°53'W, 1,800 m, 19 Mar 1990, *Croat 71578* (K, MO, PSO); La Posada, 01°05'N, 78°01'W, 1,780 m, 26 Jul 1988, *69578* (MBM, MO, NY, PSO); Altaquer-Tumaco, Río Nambí, 7 km W of Altaquer, 01°18'N, 78°04'W, 1,100–1,130 m, 20 Mar 1990, *71586* (MO, PSO); Forest, 1,300 m, 18 Apr 1941, *Kjell von Sneidern A593* (GH); Sendero La Vieja, 01°06'N, 77°54'W, 1,780–1,850 m, 7 Mar 1990, *Croat 71174A* (MO, PSO); 01°10'N, 77°58'W, 1,800 m, 14 Nov 1987, *Benavides 8883* (MO); Transect 9, 01°10'N, 77°58'W, 1,800 m, 25 Jul 1986, *Gentry et al. 55105* (MO); 01°05'N, 78°01'W, 1,800 m, 21 Dec 1987, *Gentry et al. 59683* (MO). ECUADOR. **Carchi:** Along road between El Chical and Peñas Blancas (on route to Tobar Donoso), vicinity of Quebrada Peñas Blancas, 6.6 km W of El Chical, 00°56'59"N, 078°14'24"W, 1,000 m, 7 Aug 2004, *Croat & G. Ferry 92999* (AAU, MO); Vicinity of El Chical, along road to El Carmen, departing main El Chical-Peñas Blancas Rd., 0.5 km from bridge over El Chical, 3.6–4.6 km up road to El Carmen, 00°55'19"N, 078°21'14"W, 1,435–1,503 m, 17 Feb 2005, *94757* (MO); Vicinity of Peñas Blancas, 6.6 km N of El Chical along trail to Tobar Donoso, 00°58'38"N, 078°11'53"W, 1,100 m, 18 Feb 2005, *94923* (MO); Chical, 00°56'N, 078°11'W, 1,200–1,250 m, 4 Aug 1983, *Thompson & John E. Rawlins 967* (MO). **Cotopaxi:** Along road between Quevedo & El Corazón, 63.4 km SE of Quevedo, 6 km NW of El Corazón, 1°07'S, 79°07'W, 1,030 m, 4 Apr 1983, *Croat 55769* (AAU, GB, MO); Tenefuerste, Río Pilalo, km 52–53, Quevedo-Latacunga, 750–900 m, 19 Jul 1982, *C.H. Dodson & A. Embree 13458* (MO, SEL); La Mana, Guayacan-Monteneuro, along road between Guayacan (13.1 km N of La Maná) and Monteneuro (N of Pucayacu), 0°39'S, 79°05'W, 1,480–1,530 m, 9 Apr 1992, *Croat*

*73771* (MO, QCNE). **Imbabura:** Along road from Apuela to Plaza Gutierrez, 5.3 Km NE of Apuela, 00°21'04"N, 078°29'47"W, 1,911 m, 29 Apr 2003, *Croat & L. P. Hannon 88291* (MO, Q, QAP, QCA); Along road from Selva Alegre to Otovalo, along steep cliff near waterfall on W side of road near junction in main Apuela-Otovalo Road to Selva Alegre, 00°16'36"N, 078°31'56"W, 1,661 m, 1 May 2003, *Croat & L. P. Hannon 88424* (MO); Cotacachi, Hda. La Florida, 00°23'N, 78°28'W, 1,900–2,500 m, 28 Aug 1992, *Aida Alvarez & R. Castro 649* (QCNE, MEXU, MO, US); Napo, Quijos, 28 mi. E of Baeza, before Salado, 5,300 ft., 29 Jul 1974, *T. Plowman, C. Sheviak & E.W. Davis 3925* (GH). **Pichincha:** 11 km W of Tandapi, trail along Chictoa River, tributary of Río Pilatón, 1,350–1,550 m, 26 Oct 1974, *Gentry et al. 12119* (MO, S); Along road between Pacto and Nuevo Azuay, 2.3 km North of Paraiso, 15.3 km N of Pacto, 0°11'N, 78°45'W, 1,320 m, 21 Jul 1986, *Croat 61628* (MO); Reseva El Pahuma, 00°01'30"N, 078°38'00"W, 1,955 m, 18 Jun 1996, *G. L. Webster et al. 31616* (MO); Road from Calacalí to Tandayapa, at Km 22, 00°01'03"N, 078°36'25"W, 1,000 m, 20 Jul 1998, *Croat & J. Whitehill 82732* (AAU, GB, MO, S, USM); Along lower part of Quito-Chiroboga-Santa Domingo Rd. near junction of Río Pilatón and Río Toachi, along trail leading up onto slope NW of bridge, 00°18'30"S, 078°53'00"W, 1,100 m, 23 Jul 1998, *Croat 82859* (AAU, GB, MO); Along road between Nono and Nanegal NW of Quito, 8 km NW of Nanegalito, 1,280 m, 4 Sep 1976, *38886* (MO); Near the Maquipucuna Reserve, at the road to Maquipucuna Lodge, 00°07'N, 078°38'W, 1,200 m, 22 Oct 2000, *Leimbeck R. & Windeballe B. 305* (AAU); Along road from Santo Domingo de los Colorados and Alóag, ca. 14 km W of Alóag, 00°26'54"S, 078°42'44"W, 2,250 m, 1 Aug 2004, *Croat & G. Ferry 92854* (MO); Road Aloag-Santo Domingo, Tandápi, 1,500 m, 11 Feb 1967, *Benkt Sparre 14369* (S); Along road between Nono and Nanegal at Km marker 64 between Nanegalito and Tanayapa, 1,490 m, 4 Sep 1976, *Croat 38904* (MO); Along route from Quito to Santo Domingo de los Colorados, between San Juan and La Palma via Chiriboga, 2 km NE of

La Palma, 930 m, 2 Sep 1976, *Croat 38741* (MO); Maquipucuna Reserve, 6.7 km NE of Nanegalito–Nanegal Road, 00°06'58"N, 078°38'05"W, 1,200–1,387 m, 12 Mar 2006, *Croat et al. 95766* (MO); Along road and trail from Maquipucuna Lodge to Ecologe Santa Lucia, 2 km N of Maquipucuna Entrance, 00°07'19"N, 078°37'06"W, 1,400 m, 15 Mar 2006, *95967* (MO); Along road from Pacto to Miguel de los Bancos, 8.8 km S of Pacto, 00°09'21"N, 078°49'11"W, 1,674 m, 6 Sep 2007, *Croat & G. Ferry 98364* (MO); Along old road from Mindo to Tandayapa 00°01'36"S, 078°44'56"W, 1,741 m, 16 Oct 2007, *Croat, Monica Carlsen & Dan Levin 100008* (MO); Reserva Orquideologica Pahuma, sector frente a los armadillos, 00°01'11"N, 078°38'53"W, 2,190 m, 25 Aug 2007, *Ceron et al. 60616* (MO); Chiriboga, 0°16'S, 78°44'W, 1,600–1,800 m, 12 Mar 1990, *G. Benavides & R. Torres 72* (MO); *G. Benavides & Anacely Laroña 97* (MO); Maquipucuna, 5 km E of Nanegal, Transect 4, 00°7'N, 78°37'W, 1,550 m, 10 Feb 1991, *Gentry & Renato Valencia 73146* (MO, QCNE); Reserva Florística Ecologica Río Guajalito, Quito–Santo Domingo Rd., Km 59 de la carretera antigua Quito–Sto. Domingo de los Colorados, 00°13'53"S, 078°48'10"W, 1,800–2,200 m, 10 Feb 1992, *J. Jaramillo & E. Grijalva 14646* (NY); 1,800–2,200 m, 17 Jan 1992, *J. Jaramillo & E. Grijalva 14567* (NY); Reserva Forestal La Favorita, 2.4 km from main Quito–Chiriboga–Santo Domingo Road, 0°12'S, 78°47'W, 1,800–1,830 m, 15 Feb 1992, *Croat 72141* (MO); Reserva Natural Río Guajalito, Quito–Santo Domingo, along main entrance, 3.5 km from hwy., 0°13'53"S, 78°48'10"W, 1,800 m, 9 Feb 1992, *72059* (MO); Tandayapa on road between Nono and Nanegal, 1,600 m, 11 Aug 1955, *Erik Asplund 17247* (S). Mejia, 1,750–2,000 m, Jun 1999, *G. Benavides, Filito Nazareno y Guido Reyes 507* (MO); Quito–Santo Domingo Rd., Km 92, 1,300–1,350 m, 8 Jul 1979, *Fallen, M. et al. 826* (SEL); Calacali, Reserva Orquideologica Pahuma, 00°01'36"N, 078°37'54"W, 1,800–2,420 m, 6 Aug 2006, *C.E. Ceron M. & Carmita I. Reyes 57634* (MO); Reserva Maquipucuna, ridge W of Río Tulambi, ca. 4.5 km airline SE of Nanegal, 00°07'5"N,

78°38'5"W, 1,300 m, 15 Sep 1989, *Webster et al. 27599* (DAV); Nanegalito, N peak of Cerro de Sosa, ca. 6 km SE of Nanegal, 00°7'N, 78°38'W, 1,750–1,800 m, 10 Jul 1990, *Webster et al. 28074* (MO); San Miguel de los Bancos: Nanegalito–Mindó Road, 16.5 km SSW of Nanegalito, 00°01'14"S, 078°24'23"W, 1,500 m, 21 Jul 1998, *Croat 82776* (MO).

***Philodendron hebetatum*** Croat, *Ann. Missouri Bot. Gard.* 84(3): 455–458. 1997. Type: PANAMA. Coclé: vicinity el Valle de Antón, at forested flat area near Finca Macarenita at La Mesa, 800 m, 8°36'N, 80°07'W, 6 Jul 1994, *Croat & Zhu 76693* (holotype, MO-4619514–5; isotypes, B, CAS, COL, CR, F, K, NY, PMA, US).

Hemiepiphytic; stem appressed-climbing; **internodes** short, semiglossy, 1–4 cm long, 1.5–2.5 cm diam., longer than broad, green to gray-green, drying yellow-brown; **roots** moderately numerous per node, drying dark brown, ridged; **cataphylls** 12–35 cm long, unribbed, sometimes sharply 1-ribbed near apex (sharply 2-ribbed in South America), medium green, drying light to medium brown, persisting semi-intact at upper nodes, then deciduous with large patches of yellow-brown periderm remaining intact; **petioles** 27–75 cm long (averaging 49.6 cm), 0.8–1.8 cm diam., more or less terete, obtusely flattened adaxially, spongy (in South America), dark green to gray-green, surface semiglossy to matte, transversely fissured near apex, drying pale yellow-brown. LEAVES erect-spreading; **blades** ovate-triangular, abruptly acuminate at apex, cordate-sagittate at base, 24–63 cm long, 19–44 cm wide (averaging 40.7 × 31.9 cm), 1.1–2.3 times longer than wide, 0.7–1.2 times length of the petioles, equal to or longer than the petioles, subcoriaceous, margins concave, broadly undulate; upper surface semiglossy, dark green, drying conspicuously yellow-brown, semiglossy; lower surface opaque whitish, matte, paler; **anterior lobe** 19.5–49.5 cm long, 14.5–42 cm wide (1.9–3.6 times longer than posterior lobes); **posterior lobes** 7.1–



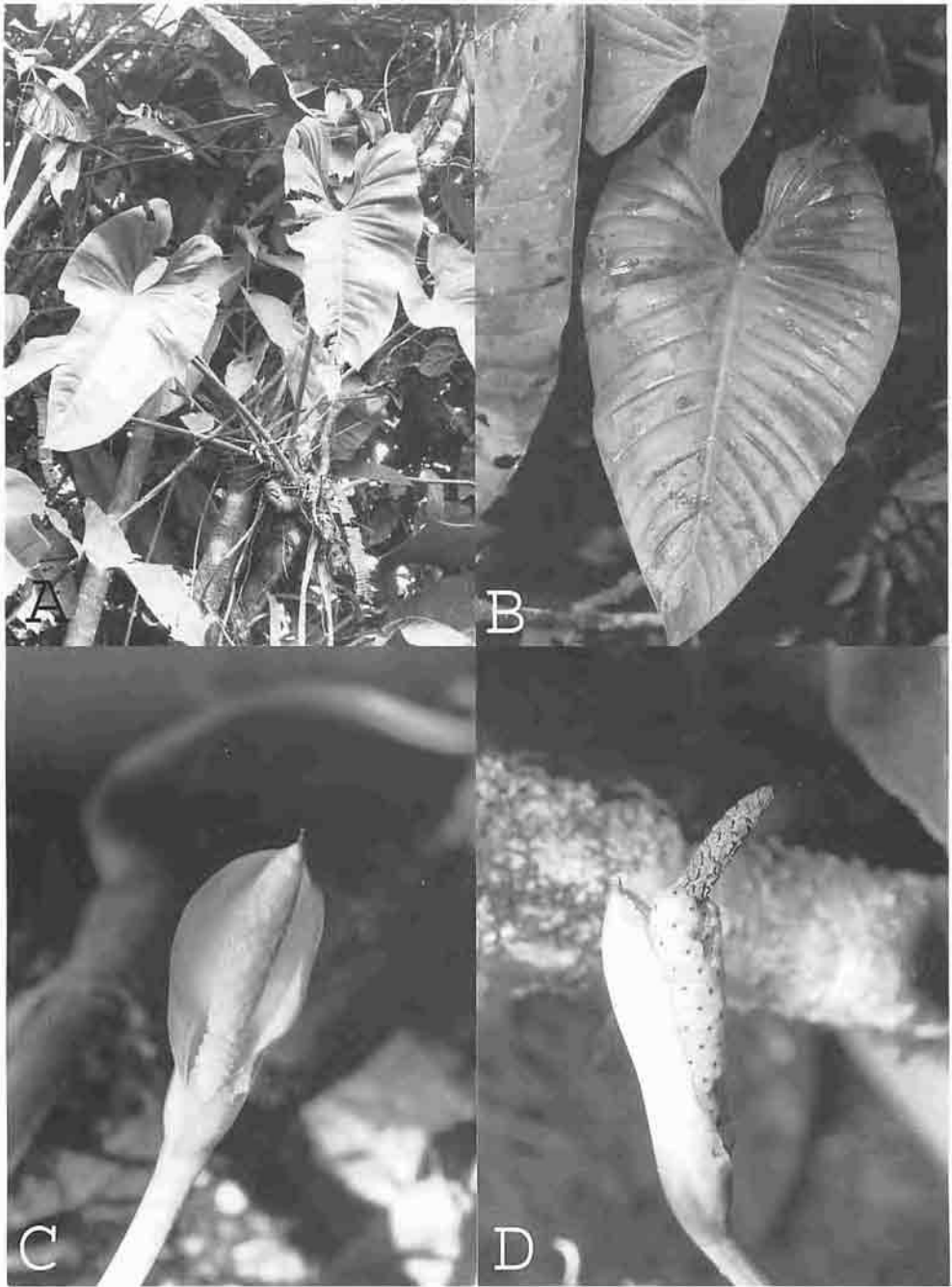


Fig. 40. a–b, *Philodendron bebetatum* Croat. (Croat 48688). a. Habit. b. Leaf blade, adaxial surface. c–d. *Philodendron oligospermum* Engl. c. Inflorescence showing spathe and spadix. (Croat 6956!). d. Infructescence showing spathe and spadix. (Croat 69597).



Fig. 41. a. *Philodendron hebetatum* Croat. (Croat 69561). a. Inflorescences. b–d. *Philodendron planadense* Croat. b–c. (Croat 69581). b. Habit. c. Habit. d. Stem showing base of petioles and inflorescences. (Croat 69620).

20.2 cm long, 7.3–20.5 cm wide, obtuse to rounded; **midrib** broadly concave, paler than surface above, thicker than broad, weakly glossy, darker than surface below; **basal veins** 6 per side, with 1–2 free to base, second and third veins coalesced ca. 3 cm; **posterior rib** naked for 2.5–3.5 cm long; primary lateral veins 6–11 per side, departing midrib at a 35°–50° angles, weakly sunken above, convex and darker than surface below; **minor veins** moderately distinct, fine, intermittent below, arising from both the midrib and primary lateral veins. INFLORESCENCES 1–5 per axil; **peduncle** 4–11 mm diam., white-lineate to coarsely white-streaked toward apex and on spathe base; **spathe** 11–17.5 cm long, 2–3.5 cm diam. (1.3–3.1 times longer than peduncle), white-speckled, semiglossy, constricted above the tube, 9–11 mm diam. at constriction; spathe blade

red and white-speckled inside; spathe tube oblong-ellipsoid, 4–7 cm long, usually dark green or sometimes purple to violet-purple to red or pinkish outside, reddish to pale violet-purple inside; **spadix** white, cylindrical, 12.9–16.6 cm long, broadest near the base, constricted near the middle; pistillate portion whitish, cylindrical to ovoid, 3.8–8.9 cm long, 7–16 mm diam.; staminate portion 9.3–13.4 cm long; fertile staminate portion cylindrical, 8–13 mm diam., broadest at the base, narrower than pistillate and sterile portions; sterile staminate portion as broad as or narrower than the pistillate portion, 1–1.3 cm diam.; **pistils** 2.1–4 (–5.8) mm long, 1.2–2.6 mm diam.; **ovary** (4–) 5–8-locular, with axile placentation; ovules 10–20 per locule, 0.2 mm long, funicle 0.1 mm long; stigma subdiscoid, 1–1.5 mm diam., 0.2–0.5 mm thick. INFRUCTESCENCES with **berries** white, with purple stigmas; seeds 8–11 mm long, 2–3 mm diam.

*Philodendron bebetatum* ranges from Panama to Colombia (Antioquia, Cauca, Chocó, Nariño, Risaralda, Valle del Cauca) and Ecuador (Carchi, Esmeraldas, Pichincha) along the Pacific coast, at 0 to 1,880 m elevation in *Premontane wet forest*, *Tropical wet forest* and *Premontane rain forest* life zones. It is to be expected in adjacent Costa Rica. In Panama, most collections have been made at or less than 1,400 m, rarely to about 1,630 m.

A member of sect. *Philodendron*, subsect. *Philodendron* ser. *Impolita*, this species is characterized by its generally appressed-climbing hemiepiphytic habit, short internodes, usually unribbed, semi-intact persistent cataphylls with large patches of yellow-brown epidermis remaining intact, petioles equaling or exceeding the blade in length and drying conspicuously yellow-brown and smooth (thus clearly demarcated from the blade), and markedly bicolorous, narrowly ovate-triangular blades usually concave along the margin and matte and whitish on the lower surface.

The petioles of *P. bebetatum* are variable, being typically terete to obtusely D-shaped in Central America but sharply C-shaped to sharply D-shaped with acute to bluntly raised lateral margins in South America. South American populations also have the major leaf veins drying yellowish to pale red versus dark red in Central America. It is possible that the South American elements may ultimately prove to be at least subspecifically distinct.

*Philodendron bebetatum* is similar to *P. strictum*, which differs by its usually terrestrial habit, more or less reclining stems, and broadly ovate blades. Both species have pale, matte lower blade surfaces, yellow-brown drying petioles, and cataphylls with persistent patches of intact, yellowish brown epidermis. The lower blade surface in both species is covered with a wax-like substance, and dries with a fine reticulate pattern (areolate at 7× or higher magnification). In Panama, where both species occur together along the Fortuna Dam Road, *P. strictum* tends to

occur at higher elevations than *P. bebetatum*.

In La Planada, this species is known only from two specimens, *Gentry 35088* and *Croat 48668*. The *Gentry 35088* collection differs from typical *P. bebetatum* in its weakly glossy lower blade surface, but it remains the same as typical *P. bebetatum* in its vague cross-veins and secretory canals on lower blade surface.

*Additional specimens seen:* COLOMBIA.

**Nariño:** Junín-Barbacoas, along road between Junín and Barbacoas, 1.9 km NE of Junín, 01°21'N, 78°6'W, 1,130 m, 27 Feb 1992, *Croat 72425A* (CM, MO, PSO); Ricaurte, La Planada, Salazar Finca 7 km above Ricaurte, Transect 1, 01°08'N, 77°58'W, 1,750 m, 28 Nov 1981, *Gentry 35088* (COL); 01°06'N, 77°53'W, 1,700 m, 10 Mar 1990, *Croat 48668* (MO, PSO); Río Ñambí, Altaquer-Junín, 01°18'N, 78°04'W, 1,100 m, 21 Mar 1990, *71666* (MO, PSO). ECUADOR. **Carchi:** Río San Juan Valley, 4-hour walk below Chical, at Ortiz Ranch between Peñas Blancas and El Pailón, known locally as Goaltal, N-facing slope below ridge crest above Río San Juan, 00°49'N, 78°09'W, 1,230–1,250 m, 10 June 1993, *B. Boyle et al. 2119* (MO); *2126* (MO); El Pailon, ca. 45 km below Maldonado, 800 m, 1 Dec 1979, *M. Madison & L. Besse 7230* (K, SEL, US); 800 m, 26 Nov 1979, *7025* (K, SEL). Mira, Parroquia, Jijon Y Camaño, Agua Amarilla, 00°49'N, 78°07'W, 1,700–2,300 m, 8 Jul 2003, *J. L. Clark & E. Folleco 8513* (MO, QCNE, US). Tulcan, Tobar Donoso, Sector Sabalera, Reserva Indígena Awá, 01°00'N, 78°24'W, 650–1,000 m, 19 Jun–28 1992, *Galo Tipaz et al. 1298* (MO); *1462* (MO).

***Philodendron nariñoense*** Croat, **sp. nov.** Type: COLOMBIA. Nariño: La Planada, 7 km above Chucunés on the road between Tuquerres and Ricaurte, Sendero Vieja, along ridge top in direction of La Pina, *Croat 71217* (holotype, MO-4340761; isotypes, B, COL, K, NY, PSO, QCNE, US).

Internodia 3–20 cm longa, ad 0.3 cm diam.; cataphylla 12–16 cm longa, persis-



Fig. 42. a–d. *Philodendron narinoense* Croat. (Croat 71217). a. Habit. b. Leaf blade, adaxial surface. c. Stem showing cataphylls. d. Herbarium specimen.

tens semi-intactum; petiolus (35–) 46–55 cm longus; lamina anguste ovato-triangularis, cordato-sagittata, (26–) 40–46 cm longa, 12–25 cm lata; lobulas posterioribus 9–18 cm longa, 7–12 cm lata; nervis basales 4–7 utroque; nervis primariis lateralis 10–12 utroque; inflorescentia 1–2 per quoque axila; pedunculus 14–15 cm longus; spatha 13–14.5 cm longa, tubo atomarroninis extus et intus.

Hemiepiphytic vine or occasionally terrestrial; **internodes** elongate, 3–20 cm long, but much shorter on plant high on tree, to 3 cm diam., weakly glossy, dark green with sparse, coarse, short whitish streaks, especially at upper end; **cataphylls** yellow-green or green, sometimes tinged red, unribbed on younger plants, becoming sharply D-shaped, margins briefly flaring or prominently erect, 12–16 cm long, persisting semi-intact at upper nodes, soon decaying to thin, pale fibers; **juvenile petioles** 25–35 cm long, 2–3 mm diam.; **petioles** (35–) 46–55 cm long (averaging 53 cm), 3–5 mm diam. at middle, terete above base, with an obtuse medial rib beyond middle, or obtusely flattened adaxially; **juvenile blades** 17–28 cm long, 7–13 cm wide, with anterior lobe 15–20 cm long, 6–12 cm wide, with posterior lobes often unequal, 2–10 cm long, 3–5 cm wide, usually directed outward, with sinus 2–7 cm deep; **adult blades** narrowly ovate-triangular, narrowly acuminate at apex, cordate-sagittate at base, (26–) 40–46 cm long, 12–25 cm wide (averaging 46 × 23 cm), 1.7–2.3 times longer than broad, 0.7–1.0 times length of the petioles, broadest near point of petiole attachment, subcoriaceous to thinly coriaceous; upper surface dark green and matte-velvety; lower surface slightly to moderately paler and semiglossy to moderately glossy; **anterior lobe** (18–) 27–36 cm long; **posterior lobes** often markedly unequal, 9–18 cm long, 7–12 cm wide, directed outward or inward on adult plants; **sinus** parabolic to spatulate, occasionally V-shaped, 8–18 cm deep, 4–7 cm wide; **midrib** sunken or flat and paler green above, convex and paler below; **basal veins** 4–7 pair, 1–3 pair free to base, the remainder coalesced for 2–8 cm, narrowly

sunken above, convex below; **posterior rib** naked for 1–4 cm; **primary lateral veins** 10–12 per side, departing midrib at 70°–90° angles, concave to narrowly sunken and concolorous above, round-raised to convex and matte below; **minor veins** visible but moderately obscure; INFLORESCENCES 1–2 per axil; **peduncle** white 14–15 cm long, 4–6 mm diam. on drying; **spathe** 13–14.5 cm long, 3 cm diam. furled, flattening to ca. 5 cm wide, the dark maroon on tube (both surfaces); blade flattening to 6 cm wide, green tinged maroon on blade yellow-green at tip and along open margin, otherwise heavily tinged maroon, inner surface reddish-violet except at apex, whitish at apex; **spadix** 10.7–11.5 cm long, pistillate portion, pale green, 2.1–3.7 cm long in front, ca. 1.3–2 cm long in back, 1.2 cm diam. midway; staminate portion 5.5–7.4 cm long, sterile staminate portion 0.7–2.2 cm long, 0.7–1.1 cm diam.; staminate flowers 0.9–1.2 mm long, 0.8–1.5 mm wide; sterile staminate flowers 1.5–2.2 mm long, 0.6–1.1 mm wide; pistils 1.1–1.2 mm long, 0.6–0.7 mm diam.; locules 4 per ovary; ovule 16–20 per locule.

*Philodendron narinoense* is known only from the type locality Colombia (Nariño) and adjacent place Ecuador (Carchi), at elevations of 1,780–2,275, in *Premontane wet forest* life zone. It is apparently moderately common at La Planada, having been collected in the area of regrowth forest along the trail leading up to the ridge from La Posada and along Sendero Vieja, along the ridge top in the direction of La Pina.

This species is a member of sect. *Philodendron* subsect. *Philodendron*, ser. *Fibrosa* Croat. It can be distinguished by its scandent habit, moderately elongate internodes (sometimes even on plants in flower), persistent cataphyll fibers, obtusely somewhat flattened petioles, moderately small ovate-triangular velvety leaf blades and 1–2 moderately long-pedunculate spathe with a maroon spathe tube (both inside and outside).

There are no other species at La Planada or elsewhere with which this species would be easily confused.

This species gets its name from its type locality Nariño.

*Paratypes*: COLOMBIA. **Nariño**: Ricaurte, La Planada, Sendero La Piña, 01°10'18"N, 78°00'09"W, 1,850 m, 13 Feb 1997, *G. Herrera & Bittner 9376* (MO); Trail above La Posada, 01°05'N, 78°01'W, 1,780 m, 26 Jul 1988, *Croat 69584* (MO, PSO). ECUADOR. **Carchi**: ca. 6 km above Maldonado, just below Puente de Palo, 00°54'N, 78°06'W, 2,275 m, 23 May 1993, *B. Boyle & J. Bradford 1896* (MO); 1915 (MO).

***Philodendron oligospermum*** Engler, *Bot. Jahrb. Syst.* 37: 132. 1905. Type: ECUADOR. Sodiro s.n. (B); Epitype: Ecuador. Pichincha: Valley of Nane-gal, *Sodiro 5* (holotype, B; epitype, G).

Epiphytic or hemiepiphytic vine; **inter-nodes** dark green, becoming gray, weakly glossy to semiglossy, 2–15 cm long, 1.5–1.8 cm diam., drying with a thin, loose, tan epidermal layer; **cataphylls** green, tinged reddish, moderately thin, unribbed to bluntly 1-ribbed, to 5 cm long, drying red-brown, deciduous; **petioles** 5–12 cm long (averaging 8.9 cm), 4–6 mm diam. at middle, erect-spreading, obtusely much flattened adaxially; **blades** ovate, ovate-elliptic, oblong-elliptic, or oblong, acuminate at apex, acute, obtuse, broadly rounded, truncate, or even weakly cordate at base, 19–39 cm long, 6–15 cm wide (averaging 27.9 × 10 cm), 2.6–3.0 times longer than broad, 3.2–4.3 times longer than the petioles, surfaces semiglossy, moderately bicolorous, subcoriaceous; **anterior lobes** 16–35 cm long, **posterior lobes** not equal, to 3.5 cm long, 4–5 cm wide; **midrib** flat to obtusely and weakly sunken and scarcely to slightly paler above, narrowly rounded to thicker than broad and darker below; **primary lateral veins** 6–8 per side, weakly and narrowly sunken above, weakly convex and darker below; **minor veins** obscurely visible; INFLORESCENCES to 5 per axil; **peduncle** 3–8.5 cm long, 1–2 mm diam., green; **spathe** 4–6 cm long; spathe tube light green to whitish inside, medium green outside; spathe blade

white inside, tinged red near apex (post-anthesis), pale green to white outside; **spadix** 3–4 cm long, cylindroid; pistillate portion medium green, 2.0–2.5 cm long, 3–5 mm diam.; staminate portion white or pale reddish to pink at anthesis, 2.5–3.0 cm long, 4–5 mm diam.; pistils 2.8 mm long, 1.8–2.4 mm diam.; style about as wide as the pistil, quadrangular to rounded or pentagonal, the margins thicker and raised, the center sunken with the medial stigma button-shaped, 0.4 mm diam.; ovules 1 per locule with basal placentation; seeds 1.9–2 mm long, 0.8 mm diam., appearing to be attached to the lower surface of the style, terete in cross-section, light brown, moderately smooth.

*Philodendron oligospermum* ranges from southern Colombia (Huila, Nariño, Valle del Cauca) to central Ecuador (Bolívar, Cañar, Carchi, Chimborazo, Cotopaxi, El Oro, Imbabura, Manabí, Zamora-Chinchi-pe, Pichincha) and Peru (Huanuco), at elevations of 250–2,200 m, primarily above 1,400 m, in *Tropical dry forest*, *Premontane wet forest*, *Lower montane dry forest*, *Lower montane moist forest*, *Lower montane wet forest*, and *Montane moist forest* life zones.

This species is a member of sect. *Macrob- elium*, subsect. *Glossophyllum*, ser. *Glos- sophyllum* and is characterized by its internodes usually longer than wide, un- ribbed to bluntly 1-ribbed, deciduous cataphylls, obtusely much flattened peti- oles, usually somewhat elongate blades which are quite variable in shape through- out its range and by the clusters of up to five, mostly small, mostly greenish inflo- rescences per axil.

*Philodendron oligospermum* is apparent- ly highly variable, consisting of an entire range of colors and shapes ranging throughout the Reserve. At La Planada, there is a group of narrow-bladed, black- drying specimens, and a smaller group of specimens with broader, yellow-drying, often ovate-cordate blades. *Philodendron lehmannii* and *P. chimboanum* are both quite similar to this species and may not be distinct from it, although they dry olive and red, respectively, compared to the yellow



Fig. 43. a-d. *Philodendron oligospermum* Engl. a & d. (Croat 69597). a. Habit. b-c. (Croat 69561). b. Habit. c. Leaf blade, adaxial surface. d. Inflorescences.



to brown to black color in which this species dries. All seem to be quite variable, so it is difficult to determine exactly what constitutes each species.

It is clear that the collection Engler was referring to in the original publication was a near sterile specimen with a partial post-anthesis inflorescence. Since the specimen at Geneva is in much better condition, I have declared it an epitype.

*Additional specimens examined:* COLOMBIA. **Nariño:** Leiva, Plan del Oso, W de la cabecera municipal, 2,200 m, 31 Aug 1991, *B.R. Ramírez P. 4067* (MO, PSO); Ricaurte Cantón, Patia Valley, 1906, *F.C. Lehmann 381* (K); La Planada, 01°10'N, 77°58'W, 16 Jan 1990, *Benavides 11087* (MO, PSO); 1,800 m, 2 Nov 1987, *8805* (MO, PSO); Valley of Río Guiza; road from El Espino to Tumaco; ca. 4 km W of Ricaurte, 01°15'N, 78°05'W, 1,000 m, 8 Dec 1988, *B. Hammel 17160* (MO); La Pisa, 01°09'40"N, 77°58'78"W, 1,850–2,050 m, 8 Jun 1996, *Bittner 2489* (MO, PSO); La Posada, 01°05'N, 78°01'W, 1,780 m, 26 Jul 1988, *Croat 69561B* (MO, PSO); *69561A* (MO, PSO); Trail to Pialapi, 01°10'N, 77°55'W, 1,800–1,900 m, 6 Aug 1990, *Luteyn & D. Stella Sylva S. 13869* (MO); 01°09'37"N, 77°59'13"W, *G. Herrera 9118* (PSO); 01°09'37"N, 77°59'13"W, *9338* (PSO); 1,800 m, 5 Apr 1992, *Restrepo 529* (MO); *702* (MO); *664* (MO); *802* (MO); 01°05'N, 78°01'W, 1,780 m, 26 Jul 1988, *Croat 69561* (AAU, B, CAS, CM, F, IBE, JBG, K, MEXU, MO, NY, PSO, QCA, SEL, TEX, US, VBD, WU, Z); 01°05'N, 78°01'W, 1,780 m, 27 Jul 1988, *69597* (B, COL, CLVC, F, HUA, K, M, MO, NY, PSO, UB, US); 01°10'N, 77°58'W, 1,800 m, 1 Nov 1987, *Benavides 8697* (MO); Trayecto San Isidro-La Planada, 01°10'N, 77°58'W, 1,500–1,800 m, 13 Feb 1988, *9288* (MO); 1,800 m, 13 Nov 1993, *Restrepo 702* (MO); *529* (MO); *664* (MO); *802* (MO); 01°05'N, 78°01'W, 1,800 m, 22 Dec 1987, *Gentry & P. Keating 59708* (MO); 1,800–1,850 m, 4 Jan 1988, *60346* (MO); Pialapi, 01°09'37"N, 77°59'13"W, 1,800 m, 2 Aug 1992, *Nestor Paz 306* (CLVC, PSO). ECUADOR. **Carchi:** Trail from Chical to Maldonado, along Río San Juan, 1,250–1,400 m, 26 Sep 1979,

*Gentry & G. Schupp 26602* (MO, SEL, WU); 2.6 km from Tandayapa, 00°00'09"N, 78°39'47"W, 1,772 m, 14 Feb 2005, *Croat, C. & S. Davidson 94655* (MO); 23.5 km E of El Chical, 2.9 km W of Chilma Alto, 5.2 km W of Bellavista, 00°52'N, 78°03'W, 2,800 m, 19 Feb 2004, *Croat, C. & S. Davidson 95014* (MO); El Pailon, ca. 45 km below Maldonado along path to Tobar Donoso, 800 m, 27 Nov 1979, *Madison & L. Besse 7077* (QCA); Vicinity of Maldonado, 1,500–1,900 m, 15 Apr 1977, *Madison 3916* (SEL); Environs of Chical, 12 km below Maldonado on the Río San Juan, 01°04'N, 78°17'W, 1,200 m, 30 May 1978, *Madison et al. 4834* (F, KEW); Chical, Environs of Chical, 12 km below Maldonado on the Río San Juan, 01°04'N, 78°17'W, 1,200 m, 30 May 1978, *Madison et al. 4744* (SEL); Espejo, Faldas del Cerro Golondrinas Hembra, 00°51'N, 78°07'W, 2,300–2,400 m, 20 Aug 1994, *W. Palacios 12770* (K, MO, QCNE, RSA, US); Las Juntas-El Corazon, 00°48'N, 78°09'W, 1,500–1,600 m, 18 Aug 1994, *W. Palacios 12409* (K, MO, QCNE); El Gualtal, Faldas de Cerro Golondrina Hembra, 00°51'N, 78°07'W, 2,450 m, 21 Aug 1994, *W. Palacios 12615* (MO, QCNE); Guatal, Mirador de las Golondrinas 00°49'40"N, 78°07'47"W, 1,600–1,900 m, 7 Jul 2003, *J. L. Clark & E. Folleco 8485* (MO, QCNE, US); Mira, N of Carmen, road to Chical, 00°51'N, 78°13'W, 2,000–2,200 m, 10 Feb 1992, *W. Palacios et al. 9829* (MO); El Carmen, Cerro Golondrinas, 00°50'N, 78°11'W, 2,000–2,400 m, 18–25 Aug 1994, *Milton Tirado. P. Fuentes, R. Zurita & L. Chamorro 1176* (QCNE, MO); Tulcan, Arriba de Maldonado, Frontera con Colombia, Sitio Chilmá, 00°51'N, 78°02'W, 2,000 m, 20 May 1991, *W. Palacios & D. Rubio 7215* (MO); *7303* (CAS, MO); *7368* (MO).

***Philodendron planadense* Croat, sp. nov.** Type: COLOMBIA. Nariño: La Planada, 7 km above Chucunés on the road between Tuquerres and Ricaurte, on trail above La Posada, *T.B. Croat 69581* (holotype, MO-3636023–5; isotypes, 10 (B, COL, CLVC, F, GB, HUA, K, M, NY, QCNE, PSO, S, SEL, UB, US).



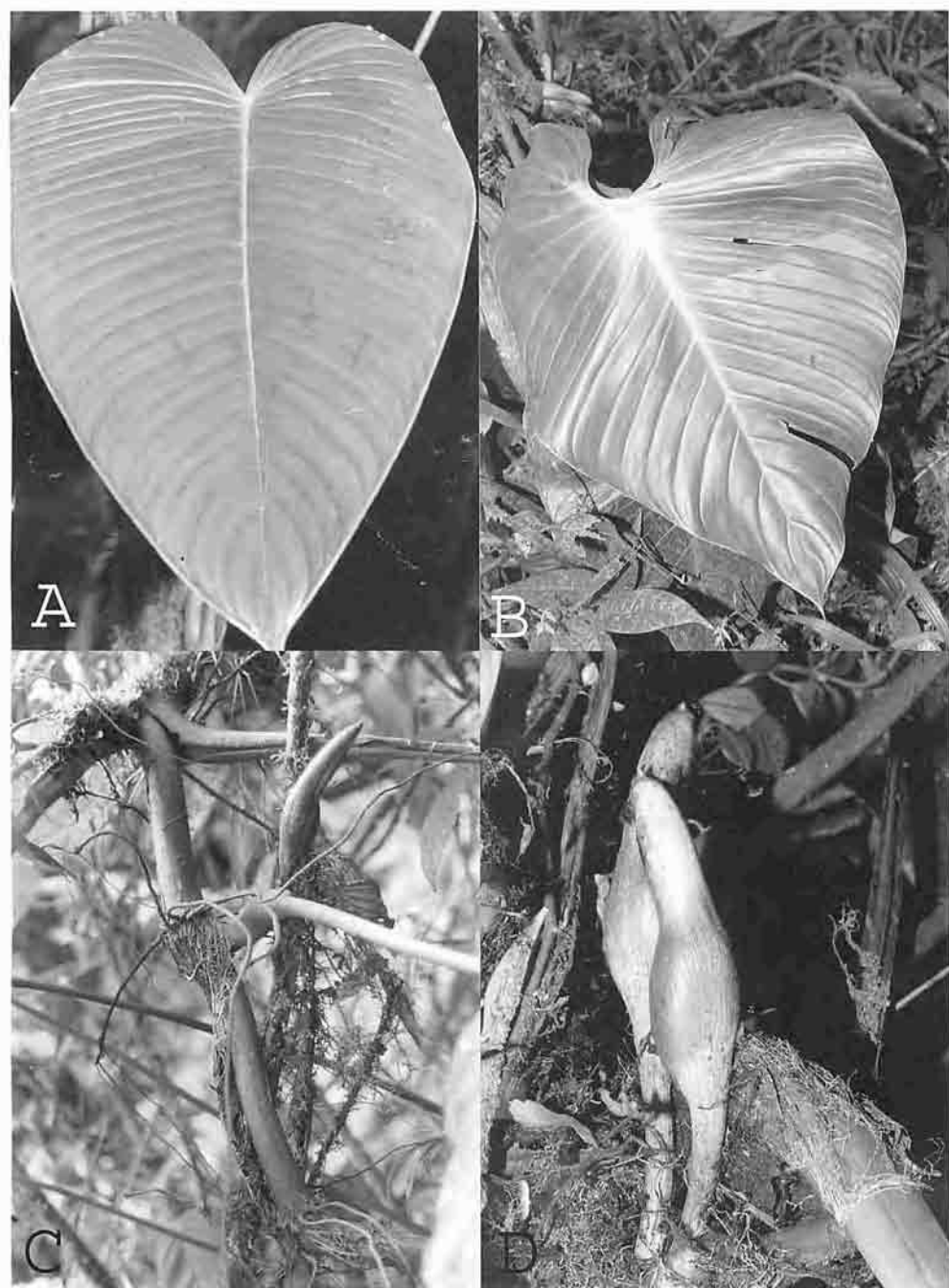


Fig. 44. a. *Philodendron planadense* Croat. (Croat 69581). a. Leaf blade, adaxial surface. b–d. *Philodendron pogonocaule* Madison. (Croat 69594). b. Leaf blade adaxial surface. c. Stem showing cataphylls, base of petioles and inflorescence. d. Inflorescences.

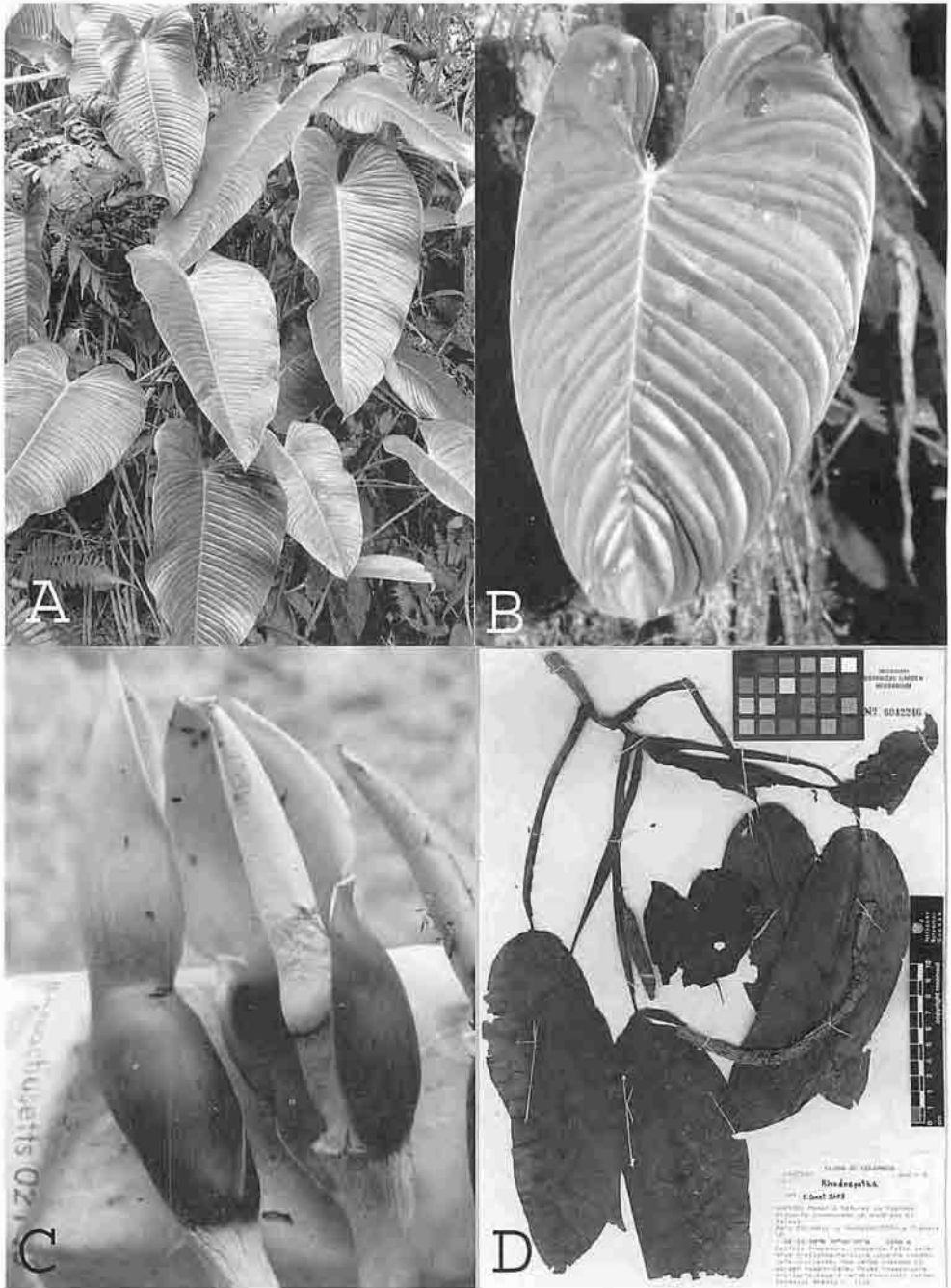


Fig. 45. a. *Philodendron planadense* Croat. (Croat 69620). a. Habit. b–c. *Philodendron verrucapetiolum* Croat. b. Leaf blade, adaxial surface. (Croat 71332). c. Inflorescence showing spathe and spadix. (Croat 71581). d. *Rhodospatha berrerae* Croat & P. Huang. (Herrera 9513). d. Herbarium specimen.

Internodia 5–17 cm longa; cataphylla ecostata, plerumque decidua; petiolus 48–75 cm longus, 4-mm diam. ad medium, teres; lamina ovata, cordata, 33–51 cm longa, 23–36 cm lata; nervis primariis lateralibus 17–21 utroque; inflorescentia 4 in quoque axilla; spatha 11.2–14 cm longa, 1.5–2 cm diam., extus virella, intus marro-nina; spadix 10–13 cm longus, 9–11 mm latus.

Epiphytic or hemiepiphytic vine; **inter-nodes** short or elongate, 5–17 cm long, 3.0 cm diam., medium green, glossy, with short white streaks at apex of new node (white striate at apex), becoming promptly gray-green, gray-brown to brown and semiglossy; **cataphylls** green, sometimes reddish or tinged red, dashed with white streaks, unribbed, deciduous or persisting intact at upper nodes; **petioles** 48–75 cm long (averaging 63 cm), 4–7 mm diam. at middle, erect-spreading, terete, moderately firm, medium green, faintly whitish striped (striate), semiglossy; **blades** ovate to weakly acuminate at apex, cordate at base, 33–51 cm long, 23–36 cm wide (averaging  $28.7 \times 45.8 \times$  cm), 1.2–1.8 times longer than broad, 0.6–0.9 times length of the petioles, convex at margins; surfaces semi-glossy to glossy, somewhat to moderately bicolorous, subcoriaceous; **anterior lobe** 25–43 cm long; **posterior lobes** 9–16 cm long, 8–15 cm wide, directed slightly inward, sometimes somewhat unequal on the two sides; **sinus** narrowly parabolic to spatulate, 7–11 cm deep, 4–7 wide; **midrib** obtusely 1-ribbed or convex, and much paler above, narrowly rounded to convex and slightly paler below; **basal veins** 6–9 pairs, more or less free to base, quilted-sunken above, convex and slightly paler below; **primary lateral veins** 17–21 per side, departing midrib at  $60^\circ$ – $90^\circ$  angles, ascending to margin, narrowly quilted sunken above, convex and slightly paler below; **minor veins** few, moderately visible to moderately obscure. INFLORESCENCES erect to spreading, 4 per axil; **peduncle** 6–7 cm long, 2–3 mm diam. at middle, medium green to greenish white, conspicuously pale striate, elongating to 11.5 cm long, flattening to 1.1 cm wide in

fruit; **spathe** medium green to greenish white, paler toward apex, and conspicuously striate outside, dark maroon within with whitish lines, heavily tinged toward the apex, except at the tip, 11.2–14 cm long, flattened to 2.5 cm wide; tube 5–6 cm long, 1.5–2 cm diam.; blade 1–1.6 cm wide; **spadix** 10–13 cm long; pistillate portion pale green, 3.2–4.8 cm long on front, 2.1–4.0 cm long on back, 9–11 mm diam.; staminate portion 5.5–6.5 cm long, 6–8 mm diam.; sterile staminate portion 1.1–1.4 cm long, 0.9–1.2 mm diam.; staminate flowers 1.6–2.3 mm long, 1.2–1.7 mm wide; sterile staminate flowers 1.5–1.8 mm long, 1.1–1.3 mm wide; pistils 2.4–3.0 mm long, 1.2–2.1 mm diam.; locules 5–6 per ovary; ovules 1 per locule, 0.8–1.0 mm long, 0.3–0.4 mm wide. INFRUCTESCENCES to 16 cm long, 3 cm diam.; seeds 1.2 mm long, 0.6–0.8 mm diam., dark yellow-brown, minutely granular, semiglossy, with a broad nipple at one end.

*Philodendron planadense* is known from the type locality near La Planada (hence the name *P. planadense*), Colombia (Nariño), and also adjacent Ecuador (Carchi), at elevations of 1,750–2,265 m, in *Premon-tane wet forest* life zone. Apparently uncommon at La Planada, this species was collected in the regrowth forest along the trail above La Posada and in the swampy old pasture area south of the Sendero Natural, as well as in other sites not specifically described.

This species is a member of subgen. *Philodendron* sect. *Macrobelyium*, subsect. *Glossophyllum* (Schott) Croat, ser. *Ovata* Croat, and is recognized by its often scandent habit, terete petioles which are finely striate and ovate-cordate leaf blades with rounded to narrowly rounded posterior lobes with numerous basal veins which are mostly free to the base, by the numerous quilted-sunken primary lateral veins and by the inflorescences which are usually greenish white outside and maroon within the tube.

*Philodendron planadense* is probably closest to *P. melanonervia* but that species has broadly ovate blades and fewer pairs of basal veins.



Fig. 46. a. *Philodendron pogonocaula* Madison, (Croat 69594). a. Habit. b–d. *Philodendron pubuangii* Croat. (Herrera 9339). b. Herbarium specimen. c. Fresh unmounted specimen showing leaf blade both surfaces and inflorescence. d. Inflorescence.

A collection *Bittner* 2650 is different from other specimens in its relatively matte surface of leaf blade, but it fits this species in other characters.

**Paratypes:** COLOMBIA. **Nariño:** Ricaurte, La Planada, near La Posada, 01°09'37"N, 77°59'13"W, 1,850 m, 18 Jul 1996, *Bittner* 2650 (MO); El Mar-La Calladita, 01°10'N, 77°58'W, 1,500–1,800 m, 30 Apr 1988, *Benavides* 9645 (MO); 25 Sep 1989, 10766 (MO); 8982 (K, MO); 01°05'N, 78°01'W, 1,780 m, 28 Jul 1988, *Croat* 69620 (MO, PSO); Transect 9, 01°10'N, 77°58'W, 1,800 m, 25 Jul 1986, *Gentry et al.* 55115 (MO, PSO, US); 01°10'N, 77°58'W, 2,148 m, 7 Mar 1999, *G. Herrera & Bittner* 9416 (MO); ECUADOR. **Carchi:** Río San Juan Valley, 4 hr walk below Chical, at Ortiz ranch between Peñas Blancas and El Pailón, N-facing slope below ridge crest above Río San Juan, 00°49'N, 78°09'W, 1,230–1,250 m, 10 June 1993, *B. Boyle et al.* 2118 (MO); Cerro Golondrinas, Upper Río

Gualpí headwaters, 00°50'N, 78°13'W, 2,250–2,265 m, 15–20 Jul 1993, *B. Boyle et al.* 2185 (MO); Cerro Golondrinas, 00°53'N, 78°10'W, 1,740–1,780 m, 24 Apr–2 May 1993, *B. Boyle & L. Dalmau* 1733 (MO).

***Philodendron pogonocaula*** Madison, *Selbyana* 2(1): 23. 1977. Type: ECUADOR. Los Ríos, Río Palenque Science Center, km 56 along road between Quevedo and Santo Domingo, 15–220 m, Mar 1977, *Dodson* 6669 (holotype, SEL; isotypes: MO-2471619, RPSC).

Epiphytic, often appressed; **internodes** short on adults, 2–4.5 cm diam., (2–6 cm long on younger plants), dark green, semiglossy; **cataphylls** 12–37 cm long, medium to dark green to reddish (at least at base), and unribbed when young, sharply D-shaped to sharply 2-ribbed as an adult, soon dark red-brown, persisting

semi-intact, fibrous at base, at first mushy, finally as pale fibers; **petioles** (10-) 28-80 cm long (averaging 54.5 cm), 4-7 mm diam.; terete to obtusely flattened adaxially or obtusely 3-ribbed toward apex adaxially, dark to medium green, matte, closely pale-striate to conspicuously pale-streaked, conspicuous; **blades** ovate-cordate to narrowly ovate-cordate, acuminate at apex, subcordate to cordate at base, (20-) 29-65 cm long, 18-40 cm wide (averaging 51.5 × 30 cm), 1.4-1.9 times longer than broad, 0.7-1.3 times length of the petioles, broadest at or slightly above point of petiole attachment, slightly to moderately bicolorous, subcoriaceous; upper surface dark green and matte to velvety; lower surface yellow-green, slightly paler and weakly to moderately glossy; **anterior lobe** (17-) 28-45 cm long; **posterior lobes** (5-) 3-20 cm long, (9-) 14-20 cm wide, directed slightly inward; **sinus** parabolic to spatulate, (5-) 8-14 cm deep, 4-8 cm wide; **midrib** flat to broadly sulcate or broadly convex (*Croat 73786*) and scarcely to moderately paler above, bluntly acute, narrowly rounded, or convex and much darker below; **basal veins** 5-8 pair, weakly coalesced (primarily on older blades) for up to 7 cm; **posterior rib** naked for first 1-4 cm; **primary lateral veins** 7-9 per side, departing midrib at 55°-75° angles, ascending to margin, paler, obtusely to narrowly and conspicuously sunken above, convex to nearly round-raised, matte and much darker below; **minor veins** moderately obscure to moderately visible, fine, close. INFLORESCENCES erect to erect-spreading, 1-2 (-4) per axil; **peduncle** 9-12 (-20) cm long, 4-6 mm diam., pale green to whitish, coarsely striate; **spathe** erect, 8-12 cm long, narrowly acuminate at apex, white (pale green-streaked at base) greenish on back side, maroon on front side; spathe tube ovoid, 4-5 cm long, 2-2.5 cm diam. greenish white and glossy at anthesis inside, becoming maroonish post-anthesis (except whitish along margins), brownish maroon outside post-anthesis; spathe blade white suffused with maroon at base; **spadix** with pistillate portion pale green, 2.3-3.5 cm long, 1.1-1.3 cm diam.; stami-

nate portion 5.2-5.7 cm long, 1.2-1.4 cm diam. at widest, 0.9-1.0 cm diam. at constriction; sterile staminate 1.2-1.6 cm long; sterile staminate flowers 1.8-3.2 mm long, irregular in shape; pistils (post-anthesis) 5 mm long, 2.3-3.5 mm diam.; locules 3.3 mm long, 5 per ovary; ovules 2.2 mm long, 7-12 per locule with axile placentation. INFRUCTESCENCES with spathe to 20 cm long, the tube to 4.5 cm diam.; **berries** greenish white; seeds 2 mm long, constricted near apex, tan, finely ridged longitudinally.

*Philodendron pogonocaula* ranges from Colombia (Nariño) to Ecuador (Cañar, Cotopaxi, El Oro, Esmeraldas, Los Ríos, Manabí, Pichincha), at elevations of 60-1,950 m, in *Premontane dry forest*, *Premontane moist forest*, *Premontane wet forest* and *Tropical moist forest*. In La Planada, the species is occasionally seen along the ridge at the end of the trail above La Posada and along the Sendero Natural.

The species is a member of subgen, *Philodendron*, subsect. *Philodendron* ser. *Fibrosa* and it can be recognized by its moderately short, thick internodes, subterete to obtusely somewhat flattened petioles, large blades with obscure minor veins below and by its pale, persistent cataphyll fibers.

*Philodendron pogonocaula* differs from *P. wallisii* Regel in having coalesced basal veins. *P. rubrocinctum* Engler shares a similar blade, but differs in having scaly petioles. This species also resembles another new species *P. melanoneveia*, which differs in having intact and deciduous cataphylls.

A collection from near Ricaurte at 1,000 m elevation (*Hammel 17177*) is similar to the specimens at La Planada. It has a blade of similar size and shape but it differs in having a terete petiole, the midrib white on upper surface and with the primary lateral veins drying lighter than the surface below with the minor veins more conspicuous and somewhat wrinkled upon drying. Probably it constitutes another species.

*Additional specimens examined:* COLOMBIA. **Nariño:** 16 km S of Barbacoas, 01°33'N, 78°08'W, 550 m, 21 Nov 1986, *B. Hammel & R. Bernal 15791* (MO); Ricaurte, La Planada, Sendero Al Rondon,

01°09'37"N, 77°59'13"W, 1,850–1,950 m, 19 Jun 1996, *Bittner et al. 2516* (MO, PSO); Transect 2, 01°08'N, 77°58'W, 1,750 m, 28 Nov 1981, *Gentry 35123* (COL, MO); 01°09'37"N, 77°59'13"W, *Ramírez 1639* (PSO); 01°09'37"N, 77°59'13"W, *G. Herrera 9655* (PSO); Cordillera Occidental, 1,800 m, 17 Jun 1989, *M.L. Mondragón 089* (MO); La Posada, 01°05'N, 78°01'W, 1,780 m, 27 Jul 1988, *Croat 69594* (B, COL, K, MO, PSO, US); *69612* (MO, PSO, US); Transect 6, 01°10'N, 77°58'W, 1,800 m, 24 Jul 1986, *Gentry & Benavides 55022* (MO); 01°10'N, 77°58'W, 1,800 m, 14 Nov 1987, *Benavides 8880* (MO); 6–12 km SW of La Planada, 01°04'N, 78°02'W, 1,750–1,800 m, 5 Jan 1988, *Gentry et al. 60416* (MO).

***Philodendron prominulinervium*** Croat, **sp. nov.** Type: COLOMBIA. Nariño: La Planada, 7 km above Chucunés, on road between Tuquerres and Ricaurte, along Sendero La Rosa to Potrero de Hermogenes, *Croat 71385* (holotype, MO-3789353; isotypes, K, PSO, US).

Internodia 1–20 cm longa, 2.1–2.8 cm diam.; cataphylla 26–28 cm longa, acute D-formata; petiolus (43–)60–86 cm longus, 9–13 mm diam., D-formatus; lamina ovato-triangularis, cordata, 40–56 cm longa, 25–44 cm lata; nervis primariis lateralalibus 5–8 utroque; inflorescentia 1 in quoque axilla; spadix 3.6–4.0 cm long, 10–14 mm diam., erectus.

Terrestrial or hemiepiphytic; **internodes** 1–20 cm long, 2.1–2.8 cm diam., dark green, becoming brown, glossy, somewhat flattened on one side with 2 blunt to moderately acute ribs; **cataphylls** 26–28 cm long, medium green, moderately soft and acutely D-shaped, the margins weakly raised, persisting semi-intact at uppermost nodes, as a few fibers lower on stem; **petioles** (43–)60–86 cm long (averaging 72.5 cm), 9–13 mm diam. at middle, erect to erect-spreading, acutely D-shaped near apex, bluntly so further down, medium green, weakly glossy, sparsely and inconspicuously dark-lineate; **blades** ovate-triangular, broadly acuminate at apex, conspicuously cordate at base, 40–56 cm long, 25–44 cm

wide (averaging 47 × 34.3 cm), 1.2–1.6 times longer than broad, 0.5–0.8 times length of the petioles, broadest near point of petiole attachment; upper surface dark green with a somewhat velvety sheen, lower surface slightly to moderately paler and semiglossy; **anterior lobe** 31–39 cm long, moderately thin to thinly coriaceous; **posterior lobes** 14–22 cm long, 10–15 cm wide, directed very slightly inward; **sinus** spatulate, 11–16 cm deep, 4–10 cm wide; **midrib** broadly concave and slightly paler above, narrowly rounded and slightly paler below; **basal veins** 8–10 pair, first 3 free to base, others coalesced, narrowly sunken and concolorous above, round-raised and paler below; **posterior rib** naked for 2–3 cm; **primary lateral veins** 5–8 per side, departing midrib at 45°–60° angles, ascending to margin, narrowly sunken and concolorous above, round-raised and paler below; **minor veins** weakly raised above, moderately distinct. INFLORESCENCES 1 per axil; **peduncle** 6–8 cm long, 3–5 mm diam., medium green, semiglossy, sparsely short white streaked near apex; **spathe tube** maroon inside, dark maroon-burgundy outside, ellipsoid, 5–6 cm long, 16–21 mm diam.; **spathe blade** maroon inside, tinged reddish on outside, 4–7 cm long, 1.5–2.5 cm wide; **spadix** erect; pistillate portion tapered, 3.6–4.0 cm long, 10–14 mm diam.; staminate portion cylindroid, 3–3.9 cm long, 7–12 mm diam.; sterile staminate portion ellipsoid, 1.5–1.9 cm long, 10–11 mm diam.; staminate flowers 0.8–1.5 mm long, 1.1–1.4 mm wide; sterile staminate flowers 2.2–3.0 mm long, 1.2–1.4 mm wide; pistils 2.4–2.7 mm long, 1.4–1.8 mm wide; stigma 0.4–0.6 mm diam.; locules 5 per ovary; ovules 16–20 per locule, in 2 series, 3–5 mm long. INFRUCTESCENCES erect; **peduncle** to 10 cm long, 10 mm diam.; **spathe tube** 7 cm long, to 3.5 cm diam.

*Philodendron prominulinervium* is endemic to Colombia (Nariño), at elevations of 1,700–1,900 m, in *Premontane wet forest* life zone. This species has been seen several times at La Planada, including in the regrowth forest on the trail above “La Posada and along Sendero La Rosa to Potrero de Hermogenes.

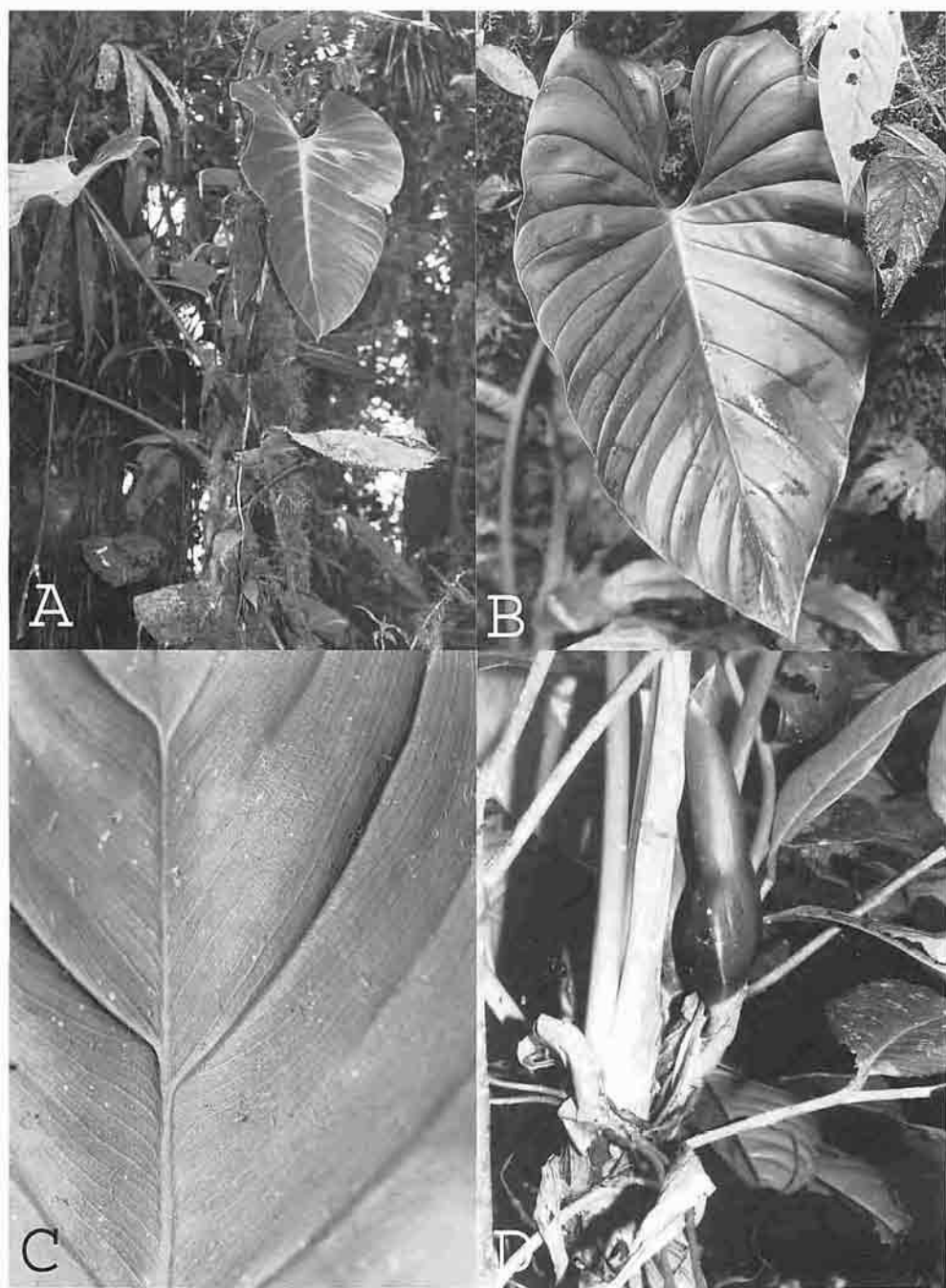


Fig. 47. a-d. *Philodendron prominulinervium* Croat. (Croat 69580). a. Habit. b. Leaf blade, adaxial surface. c. Detail of leaf blade surface showing prominent venation. d. Inflorescence.



This species is a member of subgen. *Philodendron*, sect. *Philodendron*, subsect. *Macrolonchium*, and is characterized by its scandent habit, dark green, ovate-triangular blades, but especially by the minor veins which are weakly raised on the upper surface (hence the name *P. prominulinervium*). Also characteristic are the solitary inflorescences with the spathe tube maroon on both surfaces.

This new species keys in the *Lucid key* to *Philodendron* (Mora-P *et al.*, 2008) to several species: *P. nanegalense*, *P. ornatum*, *P. pogonocaule* and *P. sagittifolium*. *Philodendron prominulinervium* differs from *P. nanegalense* and *P. ornatum* in having a smooth, non glandular petiole apex. *Philodendron pogonocaulis* which also occurs at La Planada, differs in having prominently raised minor veins and cross-veins. *Philodendron sagittifolium* differs in having thick, deciduous cataphylls and petioles which have purplish violet spots.

*Paratypes*: COLOMBIA. **Nariño**: Ricaurte, La Planada Reserve, 01°10'N, 77°58'W, 1,700–1,900 m, 18 Jan 1990, *Benavides 11342* (MO, PSO); 1 km al oeste de la estación, siguiendo el sendero al Hondón, 01°09'55"N, 77°58'44"W, 1,850 m, *G. Herrera C. & Bittner 9188* (MO); Parcela 1, 01°09'26"N, 77°58'44"W, 1,850 m, 11 Feb 1997, *Bittner 2732* (MO); La Posada, 01°05'N, 78°01'W, 1,780 m, 26 Jul 1988, *Croat 69580* (COL, CUVC, HUA, K, MO, PSO); Quebradas, El Ma-La Calladita, 01°10'N, 77°58'W, 1,500–1,800 m, 29 Apr 1988, *Benavides 9547* (MO); 1,800 m, 1 Nov 1987, *8689* (MO); 01°05'N, 78°01'W, 1,800–1,850 m, 4 Jan 1988, *Gentry et al. 60380* (MO).

***Philodendron pubuangii* Croat, sp. nov.**

Type: COLOMBIA. **Nariño**: La Planada Sendero Las Cruces, 2 km siguiendo el caril divisorio, 01°10'18"N, 78°00'09"W, 1,820 m, *G. Herrera 9339* (holotype, MO-5198152; isotype, PSO).

Internodia plus longior quam late, ad 3 cm long, in siccis 1.5–2 diam.; cataphyllae deciduae; petiolus 28–32 cm longus, 4–8 mm diam., subteres; lamina ovato-sagit-

tata, 30–37.5 cm longa, 20–24 cm lata; primariis lateralibus 5–8 utroque; inflorescentia 5, spathe 5.4–5.8 cm longa, albidus per anthesin, rubicundus.

Hemiphytic vine, the ends of the stem hanging down; sap brown; cataphylls deciduous; **internodes** longer than broad, to 3 cm long, epidermis gray-brown, weakly glossy, smooth, drying 1.5–2 diam., conspicuously and acutely folded, yellow-brown, matte; **petiole** 28–32 cm long (averaging 30 cm), 4–8 mm diam., at middle, subterete, obtusely and shallowly sulcate, drying dark brown, 4–8 mm diam., matte, finely ridged, sheathed 6–7 cm at base and partially enclosing the peduncles; **blades** narrowly ovate-sagittate, 30–37.5 cm long, 20–24 cm wide (averaging 34 × 22 cm), 1.4–1.5 times longer than wide, 1.0–1.2 times longer than petioles, dark green and semiglossy above, slightly paler and semiglossy below; **anterior lobe** 24–29.5 cm long, the margins drying undulate; **posterior lobes** 10–11.5 cm long, 7–8.5 wide, directed toward base; **sinus** hippocrepiform to narrowly V-shaped, 8–9 cm deep, 6–6.7 cm wide; **basal veins** 5–6 per side, the 1st and sometimes the 2nd free to the base, the 2nd (–3rd) coalesced 2–3 cm; **posterior ribs** naked 2.5–3.5 cm along the margin; **major veins** drying more or less flattened, paler than surface above, more prominently raised and prominently ridged, paler below; **primary lateral veins** 5–9 per side, arising mostly at an acute angle, spreading at 45–60° angle; interprimary veins present and not markedly less distinct than primary lateral veins; minor veins drying not at all raised, but instead with prominent sunken undulations, lacking any sign of secretory canals or cross-veins and with the surface densely rather than sparsely granular on magnification. INFLORESCENCES 5 per axil with **peduncle** medium green, 8.5–11.5 cm long, 5–6 mm diam.; **spathe** 5.4–5.8 cm long, greenish white at anthesis, the spathe tube becoming red, the spathe blade pale, almost orange; **pistils** 1.4–1.5 mm long, with style drying blackened medially with a prominently irregular margin and with the stigma stalked to ca. 0.4 mm on drying;



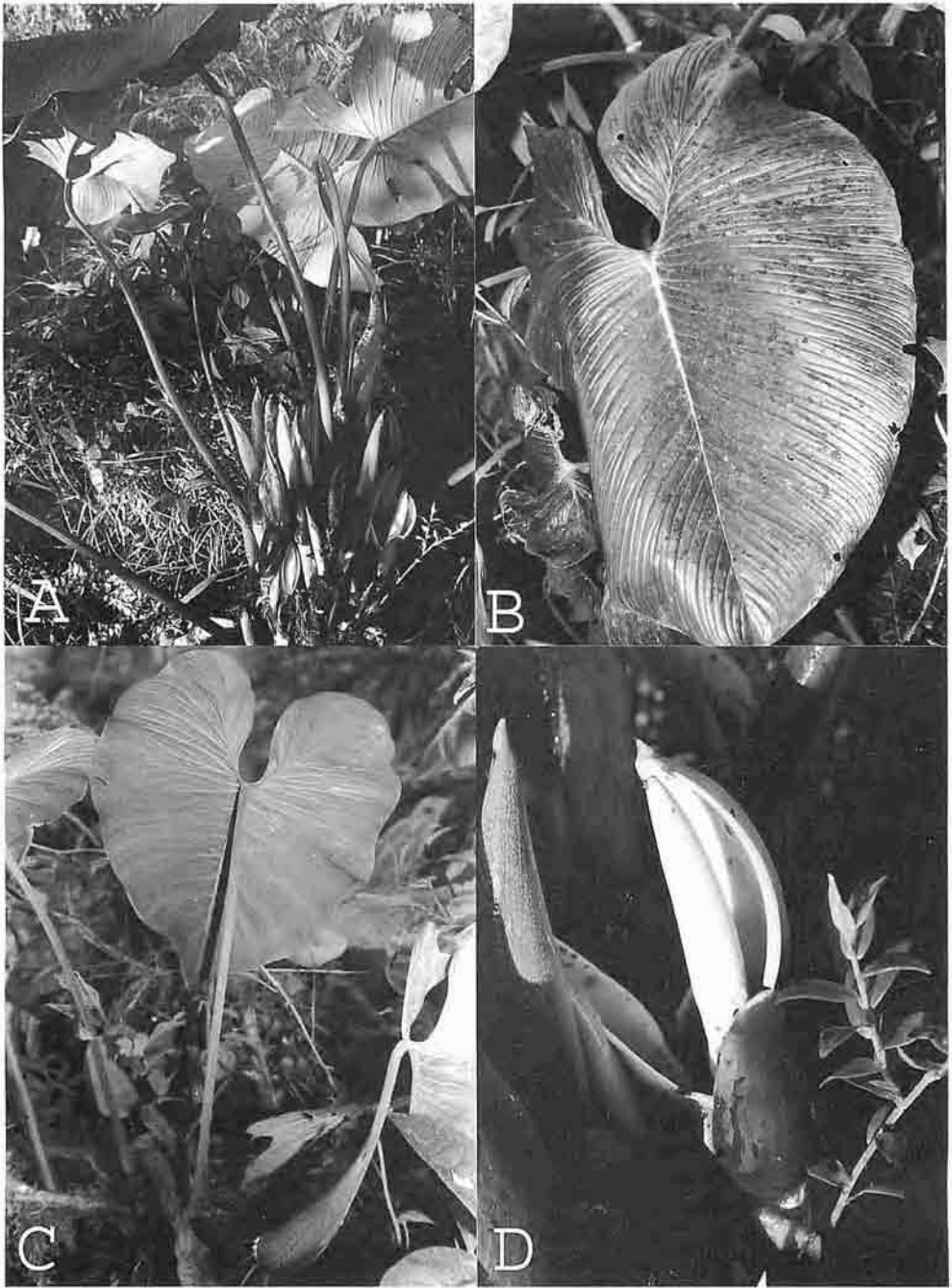


Fig. 48. a–d. *Philodendron verrucapetiolum* Croat. a. (Croat 71581). a. Habit. b–c. (Croat 71332). b. Leaf blade, adaxial surface. c. Stem showing petiole and leaf blade, abaxial surface. d. Inflorescence showing spathe and spadix. (Croat 69672).

ovary ca. 1.2 mm long, 4–5-locular, ovules 0.4 mm long, 1 per locule, with basal placentation.

*Philodendron pubuangii* is now known only from the type locality of La Planada, in Colombia (Nariño), at elevations of 1,820–1,850 m, in *Premontane wet forest* life zone.

The species is a member of subgen. *Philodendron*, sect. *Macrobellium*, subsect. *Oligocarpidium* and is characterized by its hemiepiphytic scandent habit, the pale brown-drying stems with conspicuous transverse fissures, and internodes longer than wide, subterete petioles, ovate-sagittate, brown-drying blades and especially by the clusters of small inflorescences.

*Philodendron pubuangii* is easily confused with *P. aurantispadix* which shares similar habit, light brown-drying stems, blades of similar shape and size, but the two species differ by the characters in the key. The latter species differs in having stems drying with conspicuous transverse fissures, has major veins on lower surface drying darker than the surface, minor veins drying prominulous and interspersed with rather sinuous secretory canals and abundant cross-veins as well as a sparse assortment of prominent granules. In addition the inflorescence has peduncles 8.5–11 cm long and with the pistils drying with a whitish densely warty style and a blackened, sessile button-shaped stigma.

The species is named in honor of Pu Huang, my co-author of this study, who pointed out the discrepancy of this species with *P. aurantispadix*. Pu is a graduate student from China who is attending Washington University. He asked to work with me on one of his standard rotations which is expected of all students at Washington University. It is always a pleasure to work with these students because they are always bright and industrious.

*Paratype*: COLOMBIA. **Nariño**: Ricaurte, La Planada Sendero Las Cruces, 2 km oeste, siguiendo el carril, 01°10'18"N, 78°00'09"W, 1,850 m, *G. Herrera & Bittner 9353* (MO).

***Philodendron verrucapetiolum*** Croat, **sp. nov.** Type: COLOMBIA. Nariño: La Planada, 7 km above Chucunés, on

road between Tuquerres and Ricaurte, along trail to El Hondon, beginning at Quebrade El Tejon, *Croat 71581* (holotype, MO-3789388-90; isotypes, B, COL, F, GB, HUA, K, NY, PSO, US, VEN).

Internodia brevia, usque 7 cm diam.; cataphylla lentiter 2-costata, 5–12 cm long; petiolus 32–89 cm longus, 5–8 mm diam., obtuse D-formatus aut complanatus adaxialiter, asper, verrucatus superficie; lamina ovato-cordata, 46–69 cm longa, 34–48 cm lata; nervis primariis lateralibus 7–10 utroque; inflorescentia 1–6 in quoque axilla; spatha erecta, 12–17 cm longa, 5–7 cm lata, tubo vinaceo ver purpureo, lamina extus flava-iridis, intus alba; spadix 10–14 cm long.

Terrestrial, hemiepiphytic, or epiphytic; **stems** to 6 m high in trees; **internodes** on juvenile to 30 cm long, 0.5–2.5 cm diam., semiglossy, tinged reddish, turning red or purplish with white streaks, with epidermis transversely fissured and sometimes peeling; on adult stems short, to 7 cm diam., brown, matte, drying semiglossy, pale yellow-brown with deep longitudinal ridges and sometimes also close transverse fissures; **cataphylls** on juvenile plants unribbed or very weakly 2-ribbed, 5–12 cm long, red to maroon, persisting as loose fibers at upper nodes, adult cataphylls to sharply 2-ribbed, 20–35 cm long, green, heavily tinged red, persisting semi-intact at upper nodes, turning mushy with gelatinous ooze, persisting as a reticulum of light brown fibers below; **juvenile petioles** 8–25 cm long, 1–1.5 mm diam., terete or very weakly flattened adaxially, short green-lineate, purple, with green trichomes or scaly, especially toward apex; **juvenile blades** thinly coriaceous, ovate-cordate, nearly caudate at apex, dark green and semiglossy on upper surface, slightly paler green to dark maroon on lower surface, 13–19 cm long, 8–12 cm wide; **preadult internodes** 6–20 cm long; **petioles** 32–89 cm long (averaging 64.5 cm), 5–8 mm diam. at middle, 1.2–1.6 times longer than blades, erect-spreading, densely warty and often conspicuously scaly in the distal 1/4,

sometimes warty almost throughout, rarely almost smooth, obtusely D-shaped or obtusely flattened adaxially, with obtuse medial rib, medium to dark green, matte, finely striate-lineate and asperous, firm, moderately brittle, drying reddish brown and matte, closely ribbed; **blades** broadly ovate-cordate, narrowly acuminate to caudate at apex, cordate at base, 46–69 cm long, 34–48 cm wide (averaging  $53 \times 47$  cm), 1.3–1.5 times longer than broad, 0.6–0.9 times length of the petioles, broadest near point of petiole attachment, subcoriaceous; dark green and matte to semiglossy above, moderately paler and weakly glossy to semiglossy below; surfaces drying from dark brown above, moderately paler and reddish brown below; **anterior lobe** 23.5–47 cm long, the margins broadly rounded; **posterior lobes** 17–26 cm long, 12.5–16.5 cm wide, directed toward base then inward; **sinus** spatulate to closed, 17–22 cm deep; **midrib** broadly sunken and paler above, convex to nearly round-raised and paler or tinged maroon (generally on younger plants) below; **basal veins** 8–11 pairs, 1st and 2nd free to base, the remainder evenly branched off of a more or less straight posterior rib, 5–6 acroscopic, 4–5 basisopic, alternating with interprimary veins only slightly less prominent; **posterior rib** very prominent, naked 2.5–6.5 cm; **primary lateral veins** 7–10 per side, departing midrib at  $45^\circ$ – $75^\circ$  angles, ascending to margin, deeply quilted-sunken or narrowly sunken and sometimes slightly paler above, almost round-raised and paler or occasionally maroon tinged (younger plants) below; **interprimary veins** nearly as prominent as primary lateral veins, especially on lower surface; **minor veins** obscurely to moderately visible; minor veins ranging from granular to weakly puberulent on lower surface. INFLORESCENCES 1–6 per axil; **peduncle** 7–12 cm long, 4–9 mm diam. at middle, white on lower 1/2, pale green above, coarsely whitish streaked onto base of tube; **spathe** 12–17 cm long, 1.5–2 cm diam. on tube, erect, coriaceous, semiglossy, glabrous; spathe tube deep burgundy within, dark purple outside, 5–7 cm long, 2–3.5 cm diam.; spathe blade

broadly lanceolate, broadly acuminate at apex, white inside, at least at tip, often tinged reddish violet on base of blade pale yellow-green outside, at least at tip, often tinged dark purple at base; **spadix** 10–14 cm long; pistillate portion cylindroid, 2.1–3.1 cm long, 11–14 mm diam.; staminate portion tapered, 6–8 cm long, 10–12 mm diam. at base, 6–8 mm diam. at apex, moderately tapered at apex; sterile staminate portion broadest at base, narrowest near apex, 2.5–3.5 cm long, 12–14 mm diam. at base, 8–11 mm diam. near apex; staminate flowers 1.1–1.3 mm long, 1.0–1.2 mm wide, irregularly shaped; sterile staminate flowers 2.7–3.2 mm long, 0.9–1.6 mm wide, irregularly shaped; pistils 3.0–3.2 mm long, 1.1–1.3 mm diam.; stigma 1.1–1.3 mm diam.; locules 5 per ovary; ovules 0.1–0.2 mm long, numerous in each locule.

*Philodendron verrucapetiolum* ranges from Colombia (Nariño) to adjacent Ecuador (Carchi), at 1,780–2,010 m in *Premontane wet forest*. At La Planada, this species is apparently relatively frequent and widespread, having been collected near the summit of the hill above La Posada in the small patch of forest between the two pastured areas, along the trail to El Hondón beginning at Quebrade El Tejon, in virgin cloud forest along Sendero La Vieja, and along the trail to the summit of the hill behind the Centro de Científicos.

*Philodendron verrucapetiolum* is a member of subgen. *Philodendron*, sect. *Philodendron*, subsect. *Achyropodium* and is distinguished by its long thick internodes in the juvenile and preadult plants, the shorter, very thick internodes on the adult plants, its obtusely flattened petioles which are warty on adults, having trichomes on juveniles and some preadults, and its puberulent veins, which are present on all forms of the species. These warts are the basis for the name selected for this species.

The species is most closely related to *P. nanegalense* Engl. from Central Ecuador on the western slopes of Volcán Picincha at elevations between 1,482 m and 2,182 m but that species differs in having conspicuously scaly, rather than glabrous cataphylls.

*Paratypes*: COLOMBIA. **Nariño**: Ricaurte, La Planada, 7 km above Chucunés on road between Tuquerres and Ricaurte, along trail to summit of hill behind Centro de Científicos, 01°05'N, 78°01'W, 1,780 m, 28 Jul 1988, *Croat 69639* (MO, PSO); Along road between Altaquer and Tumaco, Río Nambí, 6 km W of Altaquer, 01°18'N 78°04'W, 1,100–1,130 m, 20 Mar 1990, *71629* (MO, PSO); 01°10'18"N, 78°00'09"W, 2,148 m, 11 Mar 1999, *G. Herrera C. & Bittner 9441* (MO); Sendero La Vieja to "La Piña"; 01°06'N, 77°54'W, 2,010–2,060 m, 11 Mar 1990, *Croat 71332* (CUVC, GH, M, MO, PSO, QCNE, SEL, VEN); La Posada, 01°05'N, 78°01'W, 1,780 m, 27 Jul 1988, *Croat 69672* (MO, PSO). ECUADOR. **Carchi**: Río San Juan Valley, 4 hr walk below Chical, at Ortiz ranch between Peñas Blancas and El Pailón, 00°49'N, 78°09'W, 1,230–1,250 m, 10 Jun 1993, *B. Boyle et al. 1997* (MO).

**Rhodospatha** Poeppig in Poeppig & Endlicher., *Nov. Gen. & Sp.* 3: 91. (1845). Appressed epiphytic climber or sometimes terrestrial, rooting at the nodes; **juvenile plants** terrestrial, with long internodes; **preadult plants** with increasingly longer internodes; **adult plants** with **internodes** short, unbranched to branched; terrestrial plants with the STEMS reclining in age. LEAVES spiral or distichous, erect-spread-ing; **petioles** about equaling the blades, amplexicaule at base, sheathed throughout much of their length, geniculate at apex; the sheath persistent or deciduous; **blades** oblong to oblong-elliptic, typically drying dark, rarely pale green, slightly unequal at the base, sometimes slightly inequilateral; **midrib** sunken above, prominently raised below; **primary lateral veins** numerous, usually closely spaced, spreading nearly straight or slightly arcuate to the margins, lacking collective veins; **interprimary veins** numerous, typically much less conspicuous than primary lateral veins. INFLORESCENCE erect, much shorter than the leaves; **peduncle** short, longer or shorter than the spathe; **spathe** broadly ovate or oblong-ovate, abruptly cuspidate, moderately coriaceous, longitudinally veined, typically white or pink, soon deciduous; **spadix** sessile or stipitate, cylindroid,

slightly tapered toward apex or toward both ends, densely many-flowered. Flowers naked, perfect or rarely with only pistillate flowers at the base, arranged in a series of spirals; stamens 4, the filaments broad, complanate, narrowed to the slender, acuminate connective; anthers rather broad, the thecae ellipsoid, longer than the connective, dehiscent by lateral slits; ovary 4-angled, 2-celled, the ovules several or numerous per cell, amphitropous; style thicker than the ovary, the stigma usually slit-like with or without a weakly raised rim, persisting in fruit. INFRUCTESCENCES with **berries** small, cylindric-prismatic, truncate, usually not colorful, 10–12 seeded; seeds attached by short funicles, ventrically imbricate, rounded-reniform, lentiform, the testa minutely verruculose. Species 60, from S. Mexico to the Guianas, Brazil, and Bolivia.

#### KEY TO SPECIES OF RHODOSPATHA IN LA PLANADA

1. Petioles 21–41 cm long, sheathed to the geniculum; blades elliptic, 30–50 cm long, 15–25 cm wide, 1.8–2.4 times longer than broad; primary lateral veins very numerous, mostly 50–80 per side, 3–8 mm apart; peduncle 15–20 cm long; spathe 13 cm long, spadix 10–14 cm long. . . . .  
. . . . . *R. densinervia* Engl.
1. Petioles 14–17 cm long, sheathed to within 1–2 cm of geniculum; blades oblong-elliptic, 20–22 cm long, 7–8 cm wide, 2.5–3.1 times longer than wide; primary lateral veins 10–12 pairs; peduncle ca. 10 cm, 2–3 mm diam.; spathe less than 8 cm long; spadix less than 6 cm long. . . . .  
. . . . . *R. herrerae* Croat & P. Huang

**Rhodospatha densinervia** Engl. & K. Krause, *Das Pflanzr.* IV. 23b: 93. 1908. Type: ECUADOR. Without exact locality. *Sodirol s.n.* (holotype, B).

*R. macrophylla* Sodiro, *Anales Univ. Centr.* Ecuador 22(162): 275. 1908. Type: ECUA-

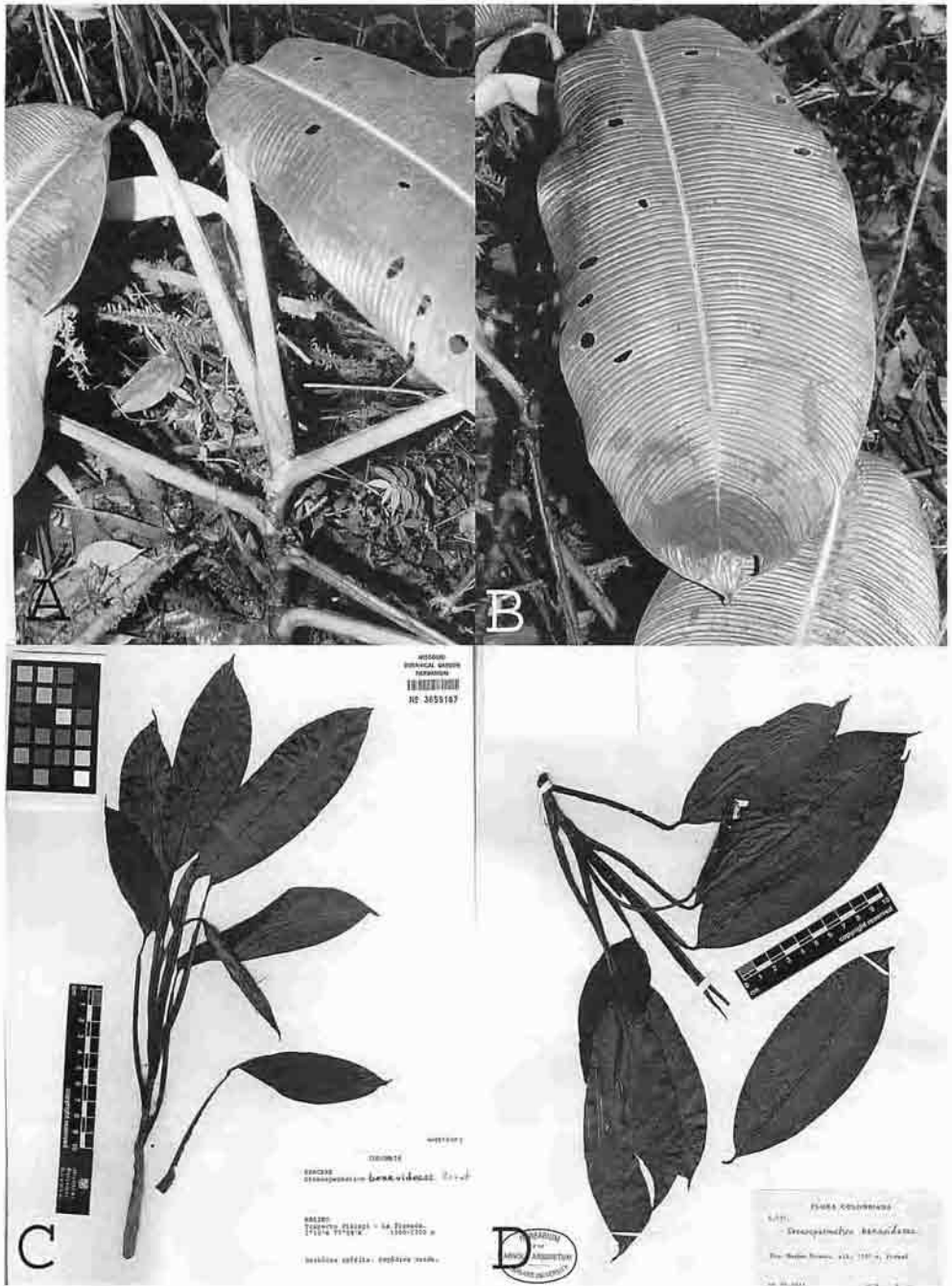


Fig. 49. a–b. *Rhodospatha densinervis* Engl. & K. Krause. (Croat 69560). a. Habit. b. Leaf blade, adaxial surface. c–d. *Stenospermation benavidesae* Croat. c. Herbarium specimen. (Benavides 10147). d. Herbarium specimen. (Kjell von Sneidern 595).

DOR: Esmeraldas, Sep. 1904, *Sodiño s.n.* (lectotype, QPLS).

Appressed epiphyte or sometimes terrestrial; STEMS mostly 1.5–2 m long; **internodes** short near the apex, longer than broad lower down on the stems, usually 4–10 cm long, 2–2.3 (–3) cm diam., dark brown, semiglossy on young stems, soon becoming scurfy, minutely transverse-fissured, drying reddish brown and deeply sulcate; **petioles** 21–41 cm long (averaging 37 cm), sheathed to the geniculum; sheath deciduous or with the margins fibrous to semi-intact with fragments of epidermis persisting, the margins sometimes incurled; geniculum sharply sulcate with the margins thin and undulate; **blades** elliptic, abruptly acuminate at apex, acute to obtuse or rounded but weakly attenuate at the base, 30–50 cm long, 15–25 cm wide (averaging 44 × 23 cm), 1.8–2.4 times longer than broad, (1.0–) 1.2–1.5 times longer than the petioles, broadest at the middle or below the middle, nearly equilateral to moderately inequilateral, one side 1–3.0 cm wider, subcoriaceous, dark green and semiglossy above, much paler and matte below; **midrib** much paler and sunken and marginally discolorous above, thicker than broad and slightly paler below; **primary lateral veins** very numerous, mostly 50–80 per side, 3–8 mm apart, arising often at an acute angle then spreading 70°–95° angles then weakly curved toward the margin, narrowly sunken and weakly quilted above, convex, and slightly paler beneath; **interprimary veins** sometimes almost as prominent as the primary lateral veins, darker than surface, usually 1 or 2 (sometimes 3, rarely none); **minor veins** usually 1, sometimes 2 between adjacent primaries and the interprimaries; surface minutely reddish brown dotted, sometimes appearing pale-speckled; INFLORESCENCES solitary, erect; **peduncle** 15–20 cm long, drying ca. 6 mm diam.; **spathe** boat-shaped, to 13 cm long, acute at apex, drying dark brown; **spadix** gray to greenish gray, matte, sessile, 10–14 cm long, drying 14–19 mm diam. Flowers 16–20 per spiral, 1.3–1.5 mm × 1.0–1.3 mm diam.; irregularly trapezoidal to

irregularly 6-sided, often with the sides perpendicular to the spirals gradually sigmoid with two opposite corners of the spiral acute and the alternate corners broadly rounded, the surface matte, with a thin, fine, frost-like epidermis; stigma ellipsoid, 0.8–1.0 mm long, 0.3–0.4 mm wide, prominently raised and darker than the surface of the pistil; stamens with anthers 0.8–1.0 mm long, 0.5–0.9 mm wide, thecae not at all divaricate. INFRUCTESCENCES to ca. 2 cm diam. and 20 cm long; seeds, round, only slightly flattened, dark brown, 1 mm diam.

*Rhodospatha densinervia* ranges along the Pacific slope of the Andes from southern Colombia (Antioquia, Chocó, Nariño) to Ecuador (Carchi, El Oro, Pichincha, Zamora-Chinchipec) and Peru (Cajamarca), at elevations from 700 to 2,780 m, primarily 1,400–2,200 m, in *Premontane moist forest* and *Premontane wet forest* life zones.

This species is distinguished by being an appressed hemiepiphyte with elliptic blades averaging 1.8 times longer than wide (ranging 1.6–2 times longer than broad) and petioles about as long as the blades, averaging 1.1 times longer than the blades (ranging 0.96–1.7 times length of the blades). In addition the lower blade surfaces of the typical variety are smooth at high magnifications and are either minutely speckled with reddish brown or are reddish brown with white speckles. The spadices on all material examined were sessile, though Engler reported the species to have a shortly stipitate (to 8 mm) spadix.

*Rhodospatha densinervia* is most closely related to *R. ovatifolium* from Costa Rica and western Panama. The latter differs in being consistently terrestrial, typically with well developed stilt roots, ovate blades which average 1.5 times longer than broad (ranging from 1.4–1.8 times longer than broad) and is minutely granular at high magnifications without any reddish brown or white speckling. In addition, *R. ovatifolium* has a spadix that is distinctly stipitate.

A sterile collection in Chocó Department (*Croat 55931*) collected at 480 m on the road between Bolívar and Quibdó may also be *R. densinervia*. However, it was a

terrestrial plant with internodes short and to 3 cm diam. whereas the stems of typical material of *R. densinervia* have internodes longer than broad. *R. densinervia* may be confused with *R. dammeri* Sodiro which is apparently endemic to Ecuador. It has blades of similar shape and also has numerous primary lateral veins but differs in having a prominently caudate-acuminate spathe. If *R. dammeri* proves to be synonymous with *R. densinervia*, it would ensure the separation of the two varieties of *R. densinervia* at the specific level because the spathe of *var. ovatifolia* is merely acute at the apex.

*Additional specimens examined:* COLOMBIA. **Nariño:** Junín-Barbacoas, along road between Junín and Barbacoas, 18.1 km NE of Junín, 01°21'N, 78°06'W, 940 m, 27 Feb 1992, *Croat 72441* (CUVC, HUA, MO, PSO, SEL); Ricaurte, La Planada, 01°10'N, 77°58'W, 16 Jan 1990, *Benavides 11148* (MO); 01°09'37"N, 77°59'13"W, *G. Herrera 9163* (PSO); Altaquer, Río Nambí, 6 km W of Altaquer, 01°18'N, 78°04'W, 1,100–1,130 m, 20 Mar 1990, *Croat 71631* (AAU, B, CAS, F, MEXU, MO, PSO, SEL); Quebrada El Balsal, 01°10'18"N, 78°00'09"W, 2,148 m, 19 Mar 1997, *G. Herrera & Bittner 9506* (MO); La Posada, 01°05'N, 78°01'W, 1,780 m, 26 Jul 1988, *Croat 69560* (CM, MO, PSO, US); 01°10'N, 77°58'W, 1,800 m, 13 Dec 1987, *Benavides 9074* (MO); Trayecto San Isidro-La Planada, 01°10'N, 77°58'W, 1,500–1,800 m, 13 Feb 1988, *9282* (MO). ECUADOR. **Carchi:** Along unfinished road from El Chical to El Carmen, departing main El Chical–Peñas Blancas Road, 0.6 km W of bridge over Río Chical, 4.9 km S of jct. with main road, 00°59'01"N, 78°11'37"W, 1,350 m, 9 Aug 2004, *Croat & G. Ferry 93101* (MO). Mira. Norte del Carmen. Camino a Chical, 00°51'N, 78°13'W, 2,000–2,200 m, 10 Feb 1992, *W. Palacios et al. 9827* (MO, QCNE); Tulcan, Reserva Etnica Awá, Parroquia El Chical, Sector Gualpí Medio, Río Canumbí, 01°02'N, 78°15'W, 1,150 m, 19–28 Feb 1993, *A. Grijalva et al. 499* (MO, QCNE).

***Rhodospatha berrerae*** Croat & P. Huang, **sp. nov.** Type: COLOMBIA.

Nariño: Ricaurte Cantón, Reserval Natural La Planada, along unnamed tributary of Quebrada El Balsal, 01°10'18"N, 78°00'09"W, 2,148 m, 21 Mar 1997, *G. Herrera & Bittner 9513* (holotype, MO-6042246; isotype, PSO).

Internodia 0.7–2.5 cm long, ca. 0.7 cm diam.; petiolus 14–17 cm longus, 0.2–0.5 cm diam., vaginata ad geniculum; lamina oblongo-elliptica, 20–22 cm longa, 7–8 cm lata, nervis primariis lateralibus 10–12 utroque; spatha 8.7 cm longa, 10.2 cm lata; spadix cylindroid, stipitata ca. 1.2 cm, 5.8 cm longus, ca. 1.1 cm diam., lilacinus.

Epiphytic; **internodes** short, 0.7–2.5 cm long, ca. 0.7 cm diam. and brownish gray and semiglossy, drying yellow to brown, glossy, closely and acutely irregularly ridged; **petioles** 14–17 cm long (averaging 16.3 cm), 0.2–0.5 cm diam., sheathed to the geniculum, the apex narrowly attenuated or sometimes inconspicuously ending abruptly, the geniculum sharply, drying dark brown, matte; young petioles bright pinkish brown; **blades** oblong-elliptic, weakly acuminate at apex, rounded to obtuse and weakly inequilateral at base, 20–22 cm long, 7–8 cm wide (averaging 21 × 7.5 cm), 2.5–3.1 times longer than wide, 1.3–1.6 times longer than the petioles, inequilateral, one side 6–8 mm wider, subcoriaceous; dark green and matte on upper surface with a pinkish brown margin, drying dark brown and matte, pinkish brown and semiglossy on lower surface, drying dark yellow-brown and weakly glossy; **midrib** narrowly sunken and drying relatively concolorous to weakly paler on upper surface, raised, convex, narrowly rounded and relatively paler on lower surface; basal veins lacking; **primary lateral veins** 10–12 pairs, weakly raised and drying concolorous and undulated on the upper surface, narrowly raised and drying slightly paler and undulated on the lower surface, arising at 65–70° angle near the base to 35–45° near the apex, slightly more prominent than the visible interprimary lateral veins. INFLORESCENCES erect, axillary; **peduncle** ca. 10 cm, 2–3 mm diam., ca. 1.1 times longer than

spathe, drying dark brown matte; **spathe** broader than long, greenish, rounded and long-apiculate at apex, 8.7 cm long, 10.2 cm wide (the apiculum to 1.5 cm long, drying to 1.5 mm diam.; **spadix** cylindroid, stipitate 1.2 cm, 5.8 cm long, ca. 1.1 cm diam. Flowers lilac, 1.7–2 mm long, 1.4–1.8 mm wide upon drying, style grayish, stigma 0.7–0.8 mm long, narrowly elliptic. **Berries** unknown.

*Rhodospatha herrerae* is known only from the type locality at La Planada in Nariño Department of Colombia in *Premontane wet forest* at 2,148 m elevation.

The species is characterized by its scandent habit, internodes longer than broad and drying yellowish brown, semiglossy and closely ridged, fully sheathed petiole with an attenuate sheath apex, small narrowly ovate-elliptic dark-brown drying inequilateral blades and markedly apiculate spathe with a lilac-colored, cylindroid spadix.

The species is closest to *Rhodospatha acosta-solisii* from the Andes of southern Ecuador and northern Peru (based on *C. Diaz et. al. 4232 (MO)*). That species differs in having blades that are less inequilateral, more acute at the base, drying yellowish brown and semiglossy, rather than matte, on the lower surface, a shorter peduncle (to 5.7 cm long) and a spadix that is orange rather than lilac.

**Stenospermatum** Schott, *Gen. Aroid. t.* 70: (1858).

Epiphytic or rarely terrestrial; **caudices** rooting at the nodes, short or moderately elongate, slender to stout. LEAVES disti-

chous; **petioles** moderately long, prominently sheathed, geniculate at apex; **blades** oblong to oblong-elliptic or lanceolate, moderately coriaceous to subcoriaceous; **midrib** narrowly sunken on upper surface, often marginally discolorous, prominently raised on the lower surface; **primary lateral veins** inconspicuous, often scarcely visible, scarcely more prominent than the primary lateral veins when dried, often drying weakly raised and appearing numerous, straight or weakly arcuate to the margin and not forming a collective vein. INFLORESCENCES erect, shorter than the leaves, the **peduncle** usually cernuous near apex, later erect; **spathe** usually white, moderately coriaceous to coriaceous, promptly deciduous, usually naviculiform and cuspidate at the apex, convolute or nearly so at base; **spadix** sessile or stipitate, usually uniform, white. Flowers perfect and naked; stamens 4, the filaments complanate, abruptly narrowed at apex into a slender connective, about as long at the ovary but never exerted; anthers with thecae oblong-ovoid, acute, dehiscent by lateral slits that do not reach the base of the cell; ovary obpyramidal to prismatic, truncate at apex, 2-celled, ovules four or more per cell, collateral, anatropous; style short, thicker than the ovary, stigma linear-oblong, slightly raised. INFRACTESCENCES with fruits scarcely enlarged from the pistils, baccate, obovoid; seeds 3 or more per cell, clavate-cylindric, slender, with a thick testa; endosperm copious. Species probably more than 200, mostly undescribed. Guatemala to Bolivia.

**KEY TO SPECIES OF STENOSPERMATUM IN LA PLANADA (FOR LIVING OR FRESH SPECIMENS)**

1. Blades matte on upper surface, sometimes velvety.
  2. Blades mostly 32–40 cm long and 10–15 cm wide, matte but not velvety above. . . . . *S. longispadix* Croat
  2. Blades less than 30 cm long and 8 cm wide, conspicuously to somewhat velvety above.
  3. Primary lateral veins raised above, all the minor veins markedly raised and obvious to the touch on both the fresh and dried blades; blades appearing somewhat velvety above; petioles not sulcate; internodes 1.5–1.7 cm diam. . . . . *S. longifolium* Engler



3. Primary lateral veins visible but not raised above; minor veins not markedly raised; blades slightly velvety above or merely matte; petioles at least somewhat sulcate; internodes 3–6 cm long, typically less than 1 cm diam.
4. Petioles fully sheathed to the geniculum; stems drying tan, closely and conspicuously ridged. . . . . *S. benavidesae* Croat
4. Petioles sheathed to about 3/4 their length but usually ending well short of the geniculum (except on those blades subtending the inflorescence); stems drying dark reddish brown, ribbed to moderately smooth (weakly and finely ribbed in *S. olgae*). . . . . *S. laevis* Croat
5. Stems drying smooth, semiglossy and almost blackened; minor veins drying scarcely or not at all raised, oblique cross-veins lacking; spadix yellow.
5. Stems drying finely ribbed, matte, reddish brown; minor veins prominently raised with conspicuous oblique cross-veins; spadix yellow. . . . . *S. olgae* Croat
1. Blades semiglossy to glossy on upper surface, never velvety.
6. Blades matte on lower surface. . . . . *S. sp. unknown #1*
6. Blades glossy to semiglossy on lower surface.
7. Spathe persisting, dark reddish brown; petiole usually deeply and sharply sulcate above the sheath; internodes to 13 mm diam. . . . . *S. gentryi* Croat
7. Spathe promptly deciduous; petiole terete or narrowly and obtusely sulcate; internodes less than 9 mm diam.
8. Petiole with the unsheathed part at apex very short (less than 2 cm long). . . . . *S. sp. unknown #2*
8. Petiole with the unsheathed part at apex elongate (6–10 cm long).
9. Blades 11.5–12.5 cm long, drying gray-green to green; veins on the upper surface drying raised (can be easily detected with a scratching fingernail); inflorescences unknown. . . . . *S. sp. unknown #3*
9. Blades 18.5–19.5 cm long, drying dark brown to dark yellow-brown; veins on the upper surface drying flattened, smooth, not evident; inflorescence with spadix golden-yellow. . . . . *S. sp. unknown #4*

**KEY TO SPECIES OF *STENOSPERMATION* IN LA PLANADA  
(FOR DRIED SPECIMENS)**

1. Blades typically more than 30 cm long and 9.5 cm wide.
2. Blades with veins on the upper surface prominently and acutely raised on both fresh and dried blade surfaces. . . . . *S. longifolium* Engl.
2. Blades with veins scarcely or not at all raised on the upper surface on fresh blades and not markedly raised even upon drying.
3. Petiole sheathed to the geniculum or occasionally to within 3 cm of geniculum; blades drying mostly blackened. . . . . *S. longispadix* Croat
3. Petioles sheathed in lower 1/3–1/2 of blade; blades drying brownish. . . . . *S. sp. unknown #1*
1. Blades typically less than 25 cm long and less than 8.5 cm wide.
4. Spathe persisting after anthesis. . . . . *S. gentryi* Croat
4. Spathe deciduous after anthesis (or not known).
5. Blades with veins on the upper surface prominently and acutely raised on both fresh and dried blade surfaces. . . . . *S. longifolium* Engl.
5. Blades with veins scarcely or not at all raised on the upper surface on fresh blades and not markedly raised even upon drying.

6. Stem drying dark brown and prominently ridged longitudinally; petioles sheathed generally 2/3–3/4 their length.
  7. Dried internodes 10 mm diam. . . . . *S. sp. unknown #4*
  7. Dried internodes 5 mm diam.
    8. Stems drying purplish brown, somewhat glossy; internodes frequently more than 3 cm long; blades with the upper surface moderately smooth to the touch; spathe 4.5–9.3 cm long; spadix stipitate 7–13 mm, stipe 1–1.3 mm diam. . . . . *S. laevis* Croat
    8. Stems drying light brownish tan, matte, finely ridged longitudinally upon drying and often with close transverse fissures, mostly less than 3 cm long; blades drying with the upper surface asperous to the touch (owing to the raised minor veins); spathe 11 cm long; spadix sessile, >2 mm diam. . . . . *S. olgae* Croat
    9. Petiole with the unsheathed part at apex very short (less than 2 cm long). . . . . *S. sp. unknown #2*
    9. Petiole with the unsheathed part at apex elongate (6–10 cm long).
      10. Blades 11.5–12.5 cm long, drying gray-green to green; veins on the upper surface drying raised (can be easily detected with a scratching fingernail); inflorescences unknown. . . . . *S. sp. unknown #3*
      10. Blades 18.5–19.5 cm long, drying dark brown to dark yellow-brown; veins on the upper surface drying flattened, smooth, not evident; inflorescence with spadix golden-yellow. . . . . *S. sp. unknown #4*
  6. Stem drying grayish or pale grayish yellow, sometimes transversely fissured; petioles sheathed to nearer the apex, to within 1–2 cm from apex (except for *S. sp. unknown # 3* which have the free portion 10–12.3 cm long).
    11. Petioles sheathed to within 1–2 cm from base of blade.
      12. Leaf blades 3–3.6 times longer than wide; drying dark brown . . . . . *S. benavidesae* Croat
      12. Leaf blades 2.6–2.7 times longer than wide, drying medium yellow-brown. . . . . *S. sp. unknown #2*
    11. Petioles sheathed to 10–12.3 cm from base of blade. . . . . *S. sp. unknown #3*

***Stenospermatium benavidesae*** Croat, **sp. nov.** Type: COLOMBIA: Nariño: Trayecto Pialapi–La Planada, 01°10'N, 77°58'W, 1,300–1,700 m, 23 Jul, 1988, *O. de Benavides 10147* (holotype, MO-3659230; isotype, PSO).

Internodia 1.2–3 cm longa, in sicco 5–7 mm diam.; petiolus 9–12.5 cm longus; lamina anguste oblongo-elliptica vel oblongo-oblancoolata, (9.5–) 13–19 cm longa, (2.6–) 3.8–5.2 cm lata; spathe virellus albus, 9 cm longa, 1 cm lata; spadix brevi stipitatus 2 mm, 5–5.8 cm longus, 5.5 mm diam.

Epiphytic vine; cataphylls lacking; **internodes** 1.2–3 cm long, drying 5–7 mm diam., pale yellowish brown, matte, closely and finely longitudinally ridged and closely transverse-fissured lower down the stem; **petioles** slender, 9–12.5 cm long (averaging 10.7), 3–4 mm diam.) counting the sheath at the broadest portion, sheathed to the geniculum and gradually tapered to the apex, drying dark brown, finely ribbed on the sheath, the geniculum 0.8–1.5 cm long, shrunken on drying, ca. 1 mm diam.; **blades** narrowly oblong-elliptic to oblong-oblancoolata, (9.5–) 13–19 cm long,

(2.6–) 3.8–5.2 cm wide, 1.2–1.8 times longer than the petioles, somewhat inequilateral, one side 2–3 mm wider, gradually acuminate at apex, narrowly acute at the base, drying dark brown and matte above, slightly pale, semiglossy and yellow-brown below; **primary lateral veins** not at all obvious on dried leaves; upper surface with minor veins weakly raised, closely parallel, the veins as well as the interveinal area densely and minutely papillate at high magnification with short, pale cellular inclusions visible (these not visible to naked eye but readily visible at 10× magnification). INFLORESCENCES erect after flowering; **peduncle** 8–9 cm long, drying 1.5 mm wide, dark yellow-brown; **spathe** greenish white, 9 cm long, 1 cm wide when furled; **spadix** weakly stipitate 2 mm, 5–5.8 cm long, 5.5 mm diam., styles drying matte, dark brown, irregularly 4–5-sided, 2–2.6 mm wide; stigma oblong, 0.6 mm long, 0.2 mm wide, slightly raised.

*Stenospermatum benavidesae* is known only from the type locality at La Planada in Colombia (Nariño) at 1,300–1,700 m elevation in *Premontane wet forest* life zone.

This species is characterized by its slender stems which are often transversely fissured and light brown upon drying, a petiole sheath that is gradually tapered to the geniculum, the narrowly oblong-elliptic to oblong-ob lanceolate brownish drying blades and the weakly stipitate spadix.

*Stenospermatum benavidesae* is probably closest to *S. longipetiolatum*, a species described from Volcán Pichincha in central Ecuador but that species has stems that lack any transverse fissuring and has the epidermis on older stems flaking loose. The petioles on *S. longipetiolatum* for those leaves not associated with the inflorescences may be sheathed only to the middle (versus fully sheathed to the geniculum in *P. benavidesae*) and the blades dry lighter brown and are proportionately broader, being up to 3 times longer than broad. In addition, minor veins on the type of *S. longipetiolatum*, while closely parallel and similar to *S. benavidesae*, have more prominent cross-veining and lack the interveinal pale cellular inclusions. In addition *S.*

*longipetiolatum* has a proportionately broader spadix, 5.7 times longer than broad (versus 1.5 times longer than wide in *S. benavidesae*) with the stigmas sunken in a more decidedly raised semicircular receptacle.

The species is named in honor of Olga de Benavides, a botanist at the Universidad de Nariño in Pasto, Colombia who collected the type specimen. Dr. Benavides was long associated with the La Planada Reserve and made most of the initial collections from the area. She was instrumental in the founding of La Planada as a nature preserve since the property was once a part of her family's estate.

*Paratype*: COLOMBIA. **Nariño**: Ricaurte, forest, 1,300 m, 18 Apr 1941, *Kjell von Sneidern 595* (GH, NY).

***Stenospermatum gentryi* Croat, sp. nov.**

Type: COLOMBIA. Nariño: La Planada Biological Reserve, Tuquerres-Ricaurte, 7 km above Chucunés on road between Tuquerres and Ricaurte, primary forest and margins of old pasture along Sendero La Vieja, 01°06'N, 77°54'W, 1,780–1,850 m, 7 Mar 1990, *Croat 71173* (holotype, MO-3828398; isotypes, AAU, B, COL, CUVC, F, GH, HUA, K, M, NY, PSO, QCNE, S, SEL, UB, US).

Internodia 1.5–4 cm longa, 8–13 mm diam.; petiolus 11–22.5 cm longus, vaginata 10–21 cm; lamina oblonga-elliptica, 15.5–25.5 cm longa, 4.7–8.7 cm lata; spatha (8.8–) 11–14.2 cm longa, 2–2.5 cm lata, persistens intactum; spadix 6–9 cm longus, 5–7 mm diam., aurantiacus per anthesis.

Terrestrial or epiphytic; **internodes** 1.5–4 cm long, 8–13 mm diam., medium to dark green, semiglossy, sometimes weakly striate, drying conspicuously and irregularly ridged and granular, usually glossy and appearing as if it is varnished upon magnification; **petioles** 11–22.5 (averaging 18 cm) long, sheathed 10–21 cm, to within 2 to 3.5 cm from apex, rarely completely to apex, oval above sheath, deeply and sharply to weakly and narrowly sulcate; geniculum more deeply sulcate; **blades**

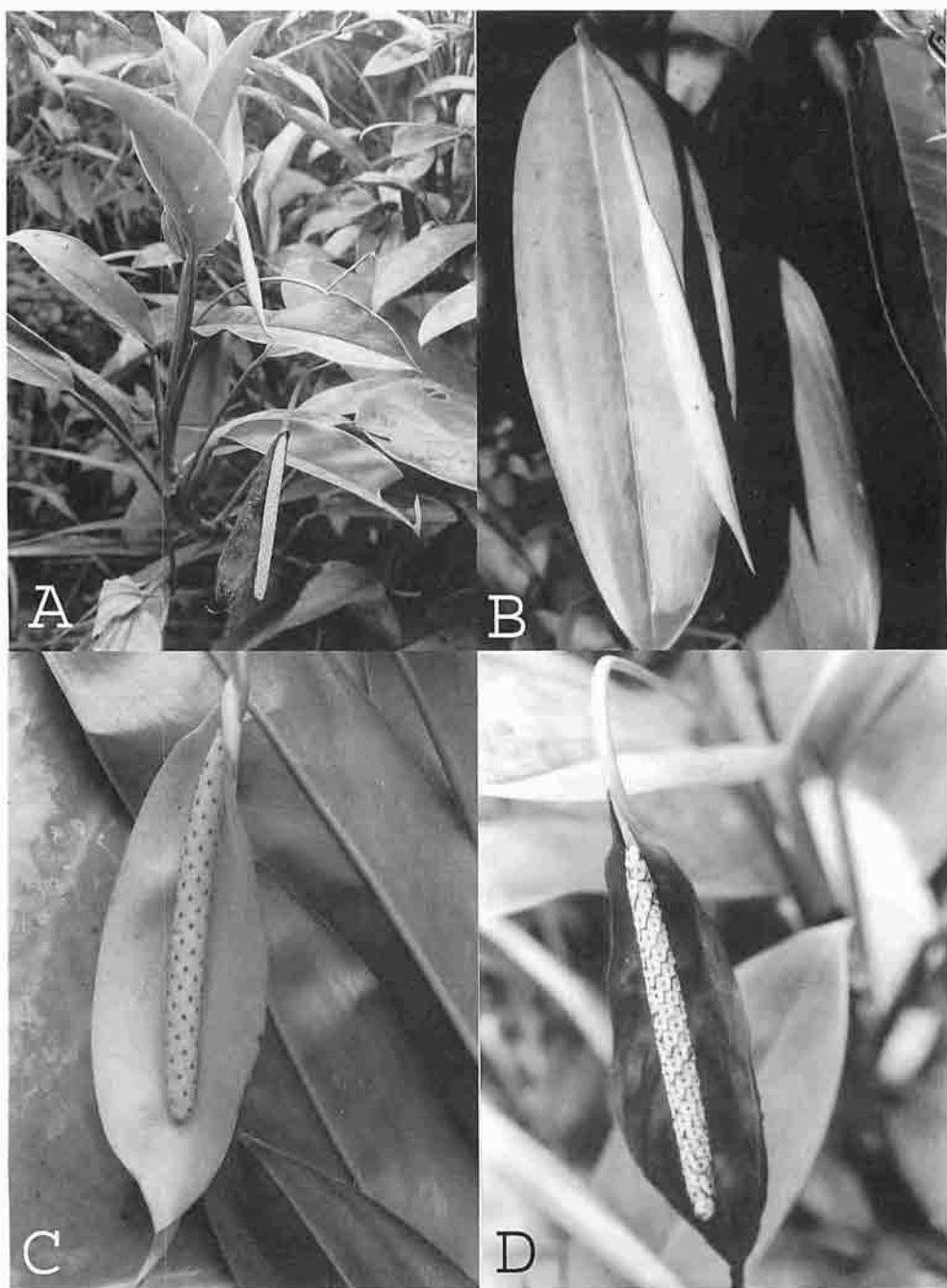


Fig. 50. a–d. *Stenospermation gentryi* Croat. a & c. (Croat 69631). a. Habit. b & d. (Croat 71173). b. Leaf blade, adaxial surface with early stage inflorescence. c. Inflorescence showing spathe and spadix. d. Infructescence.

oblong-elliptic, acuminate to apiculate at apex, acute, obtuse, or even rounded at base, 15.5–25.5 cm long, 4.7–8.7 cm wide, (averaging  $20 \times 6.0$  cm), 2.5–4.3 times longer than broad, 0.8–1.5 times as long as the petioles, broadest at or slightly above middle, 1.08–1.4 times longer than petioles (averaging 1.28), subcoriaceous, dark green and matte to semiglossy above, slightly to moderately paler and semiglossy below, drying dark brown and matte to weakly glossy above, moderately paler, yellow-brown and semiglossy below; **midrib** narrowly sunken and slightly paler above, thicker than broad and paler below; **primary lateral veins** obscure above, flat, darker, and indistinguishable from other lateral veins below; **minor veins** drying closely parallel, the larger 2–3 mm apart, with lesser veins closely interconnected with cross-veins, some of these oblique. INFLORESCENCES cernuous, usually held above the leaves; **peduncle** 25–30 cm long, 1–2 mm diam.; **spathe** (8.8–) 11–14.2 cm long, 2–2.5 cm wide, white, turning brown, and persisting intact, narrowly long caudate-acuminate at apex, decurrent onto peduncle at base; **spadix** 6–9 cm long, 5–7 mm diam., creamy white pre-anthesis, orange at anthesis, pale orange post-anthesis. Flowers 2–3 per primary spiral, 2.5–2.9 mm long, 2.8–3.8 mm wide.

*Stenospermation gentryi* is known only from southern Colombia (Nariño) at 1,800–2,650 m in *Premontane wet forest* life zone. The species is quite common at La Planada, having been collected in the swampy area of pasture south of the beginning of the Sendero Natural and extensively in the primary forest and margins of old pastures along Sendero La Vieja.

The species is characterized by its moderately short internodes, its nearly fully sheathed petioles, the moderately small yellowish-brown-drying oblong-elliptic blades with the minor veins on the upper surface drying closely parallel and raised and especially by its cernuous white spathe which persists intact and free from spadix but held parallel to the spadix, as well as by the yellow spadix.

*Stenospermation gentryi* is close to *S. rusbyi* from Peru and Bolivia in having a persistent spathe and in having closely aligned and raised minor veins on the upper dried blade surfaces. That species is restricted to the eastern slopes of the Andes, mostly known from Bolivia, but has been collected in Peru on the Amazon slope in Cuzco Depart. in Pacaurtambo and Convención, in Pasco Depart. in Oxapampa Prov., and in the Department of Amazonas in Condorcanqui Prov. in the Cordillera del Cóndor along the border of Ecuador. It also occurs in Ecuador in the Cordillera del Cóndor in Morona-Santiago Prov. in Gualaquiza Cantón. Whereas *S. gentryi* is restricted to the western slopes of the Andes and differs from *S. rusbyi* in having smaller leaves (15–25 cm long and averaging 19 cm long), more fully sheathed petioles (ranging from fully sheathed to sheathed to within 3.5 cm from apex and averaging to within 2 cm from apex). In contrast, *S. rusbyi* has leaves ranging from 18 to 39 cm long and averaging 28 cm long and petioles that are sheathed from 2 to 22 cm from the apex and end an average 7 cm short of the petiole apex.

*Stenospermation gentryi* is also similar to *S. matheusii* var. *stipitatum* described from material on Volcán Pichincha in western Ecuador. That taxon differs however in having leaf blades that dry with the closely parallel minor veins evenly sunken with intervening rows of more or less punctiform whitish raphide cells while *S. gentryi* has leaf blades drying with prominent irregular cross-veins and almost completely lack the punctiform raphide cells.

*Stenospermation gentryi* might also be confused with *S. ulei* K, Kr. but that species differs in having a shorter and thicker spadix and a longer stipe, and does not occur in either Colombia or Ecuador.

The species was first collected by Al Gentry along with Olga de Benavides and Phillip Keating in January 1988 and it is named in Gentry's honor. Gentry, who was a colleague at the Missouri Botanical Garden, was one of the preeminent plant explorers in the neotropics until his un-

timely death in 1993 while on an expedition to Ecuador.

**Paratypes:** COLOMBIA. **Nariño:** Ricaurte, La Planada, a 7 km de Chucunés, 01°10'N, 77°58'W, 1,800 m, 25 Sep 1989, *Benavides 10795* (MO, PSO); 1,800 m, 20 Jul 1993, *Restrepo & G. Ramírez 578* (MO); *Restrepo 528* (MO); *Restrepo & G. Ramírez 508* (MO); La Pina, 01°06'N, 77°54'W, 1,950–2,010 m, 9 Mar 1990, *Croat 71237* (MO, PSO); 01°05'N, 78°01'W, 1,780 m, 28 Jul 1988, *69631* (CUVC, HUA, MO, PSO); 01°05'N, 78°01'W, 1,800–1,850 m, 4 Jan 1988, *Gentry et al. 60367* (MO); Pialapí, 01°10'N, 77°55'W, 1,800–1,900 m, 10 Aug 1990, *Luteyn & D. Stella Sylva S. 13995* (MO, US).

***Stenospermation laevis* Croat, sp. nov.**

Type: COLOMBIA. Nariño: La Planada, 7 km above Chucunés on road between Tuquerres and Ricaurte, along trail to summit of hill behind Centro de Científicos, 1,780 m 01°05'N, 78°01'W, 28 Jul 1988, *T. B. Croat 69638* (holotype, MO-69638; isotypes, B, COL, K, NY, PSO, US).

Internodia (1–) 3–6 (–9) cm longa, 5–6 mm diam.; petiolus 9–15 cm longus, ca. 75% vaginatus; lamina oblongo-elliptica, (8.5–) 16–21.5 cm longa, (3.3–) 5–7 cm lata; spatha alba, 4.5–9.3 cm longa, decidua; spadix stipitatus, 7–13 mm, 4.5–9.3 cm longus, 4–5 mm diam.

Epiphytic; **internodes** green to reddish brown, weakly glossy, (1–) 3–6 (–9) cm long, 5–6 mm diam., drying dark reddish brown, ribbed to moderately smooth, semiglossy; **petioles** 9–15 cm long (averaging 12.3 cm), sheathed around 75% of length, terete, narrowly and obtusely sulcate; **blades** oblong-elliptic, inequilateral (one side 3–5 mm wider) and narrowly acuminate at apex, inequilateral and acute to obtuse at base, (8.5–) 16–21.5 cm long, (3.3–) 5–7 cm wide (averaging 18.7 × 5.9 cm), 2.8–3.4 times longer than broad, 1.4–2.1 times longer than the petioles; upper surface dark green and velvety; lower surface somewhat paler and glossy, drying dark brown, matte and smooth

above, paler, yellow-brown and weakly glossy below; **midrib** narrow, sunken and weakly discoloured marginally above, convex and much paler below, drying more or less concolorous above, slightly darker below; **primary lateral veins** weakly visible, flat and slightly paler above, weakly visible, flat and slightly darker below, scarcely more conspicuous than minor laterals; upper surface drying with the veins mostly 4–5 mm apart, at most weakly raised, the intervening area with even weaker veins with a scattering of short pale, inconspicuous cellular inclusions and with many oblique cross-veins especially toward the margins; lower surface finely and closely striate. INFLORESCENCES initially cernuous, eventually erect; **peduncle** 12.5–19.3 cm long, emerging from apex of sheath; **spathe** white, 4.5–9.3 cm long, deciduous; **spadix** stipitate 7–13 mm, creamy-white, 4.6–7.5 cm long, 4–5 mm diam. at middle, 3 mm diam. at apex, weakly tapered. Flowers irregularly rounded, drying dark brown, matte, 1.5–1.6 mm diam.; stigma 0.5–0.6 mm wide, broadly elliptic to subrounded, drying dark black with a medial depression.

*Stenospermation laevis* is known only from the type locality at La Planada in Colombia (Nariño) at 1,780–1,800 m elevation in *Premontane wet forest*. At La Planada the species was collected once along the trail behind the Centro de Científicos along the trail to El Hondón as well as other unspecified sites.

This species is characterized by its epiphytic habit, elongate internodes drying dark reddish brown, the oblong-elliptic blades which are matte on the upper surface and glossy on the lower surface as well as by the narrowly pedunculate, prominently stipitate, slender spadix.

*Stenospermation laevis* might be confused with *S. longipetiolatum* Sod., which also has long internodes and leaves of similar size and shape but that species has stems which dry yellow-brown and more finely ribbed and blades that dry with the veins close and prominent on the upper surface as well as having a shorter and stubbier spadix.

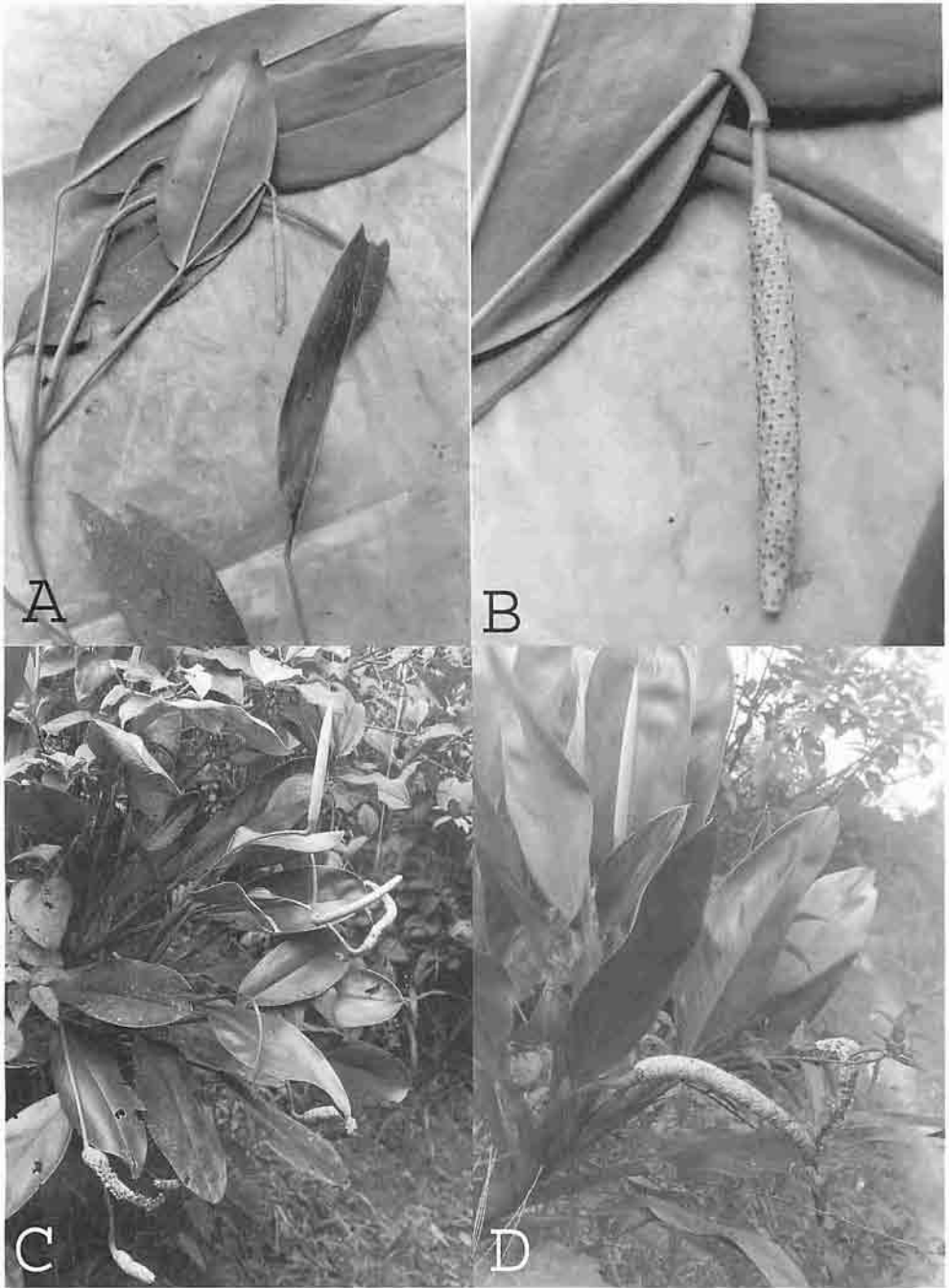


Fig. 51. a–b. *Stenospermaton laevis* Croat. (Croat 69638). a. Fresh, unmounted specimen. b. Fresh, unmounted specimen showing inflorescence. c–d. *Stenospermaton longispadix* (Croat 69630). c. Habit. d. Habit.

At La Planada, *S. laevis* is most similar to *S. benavidesae* which differs in having shorter internodes which dry pale brown, matte and finely and deeply striate as well as in having more fully sheathed petioles extending up to the much narrower geniculum as well as in having an essentially sessile spadix.

There are also several other species of similar appearance, but each differs in certain key characters. *Stenospermation andreanum* Engler differs in having shorter petioles and a much shorter, thicker spadix. *S. densiovulatum* Engler has shorter, thicker internodes and a much thicker spadix.

The epithet "laevis" comes from the Latin meaning "smooth", referring to the texture of the dried blade surface.

*Paratypes*: COLOMBIA. **Nariño**: Ricaurte. La Planada, 01°10'N, 77°58'W, 18 Jan 1990, *Benavides 11280* (MO); 01°08'N, 77°58'W, 1,750 m, 26 Nov 1981, *Gentry et al. 34997* (COL, MO); 01°05'N, 78°01'W, 1,800 m, 22 Dec 1987, *Gentry & P. Keating 59726* (MO); trail to El Hondón, 5–12 km SW of La Planada, 01°04'N, 78°02'W, 1,750–1,800 m, 6 Jan 1988, *Gentry et al. 60505* (MO).

***Stenospermation longifolium*** Engl., *Bot. Jahrb. Syst.* 37: 111. 1905. Type: ECUADOR. Pichinchia: Apr 1900, *Sodiro s.n.* (holotype, B; isotype G).

*Stenospermation maximum* Engl., *Bot. Jahrb.* 37: 113. 1905. Type: Ecuador. Esmeraldas: Between Nanegal and Gualea, *Sodiro s.n.* (holotype, B).

Terrestrial; **plants** to ca. 1 m tall; **internodes** 2.5–3.5 cm long, 1.5–1.7 cm diam., dark green and semiglossy, becoming brown, scurfy, and densely transverse fissured in age; **petioles** 15–30 cm long (averaging 22 cm), dark green, semiglossy, the free portion thicker than broad, not sulcate, sheath ending 2–10 cm from base of geniculum (extending to the geniculum when subtending an inflorescence); geniculum sulcate; **blades** oblong-elliptic, acuminate at apex, rounded to obtuse or acute at base, 15–35.5 cm long, 5–13.5 cm wide (averaging 19 × 8 cm), 2.6–3.1 times longer

than broad, 0.7–1.3 times length of the petioles, broadest at or near middle, slightly inequilateral, 3–16 mm wider on one side, subcoriaceous; upper surface dark green, finely striate, and matte drying brown (gray in Ecuador) lower surface slightly to moderately paler and semiglossy, drying paler reddish brown (greenish brown in Ecuador); **midrib** narrowly sunken and concolorous above, thicker than broad and slightly paler below; **primary lateral veins** raised above, but scarcely more so than the close minor veins, scarcely distinguishable from the minor veins below; **minor veins** prominently raised and obvious to the touch on both fresh and dried specimens on the upper surface. INFLORESCENCES cernuous; **peduncle** to 36 cm long; **spathe** white (pale green elsewhere), 11–16 cm long, narrowly acute (acumen to 2 cm long) fallen on mature inflorescences; **spadix** white, up to 4 cm shorter than spathe, 10.5–12 cm long, 8 mm diam. at base, 12 mm diam. at middle, 9 mm diam. at apex; broadest at middle, stipitate. Flowers 4–5 per primary spiral, 2.5–3.3 mm long, 2.4–3.1 mm wide.

*Stenospermation longifolium* is known in southern Colombia (Nariño) and Ecuador (Cañar, Carchi, Cotopaxi, Esmeraldas, Pastaza, Pichincha), at elevations of 650–2,300 m, mostly above 1,500 m, in *Pre-montane wet forest* life zone.

This species is distinguished by its terrestrial habitat and the matte somewhat velvety, and especially by its weakly pleated upper blade surface with conspicuously raised minor veins. No other *Stenospermation* at La Planada has such a leaf blade, which is rare in the genus. While it resembles in some respects the genus *Dieffenbachia* because of its terrestrial habit, it differs in lacking prominent primary lateral veins.

*Additional specimens examined*: COLOMBIA. **Nariño**: Ricaurte La Planada, Isla de los Osos, 01°10'N, 77°58'W, 1,500–1,800 m, 1 May 1988, *Benavides 9763* (MO); Cerro Leon, 01°10'00"N, 77°58'00"W, 2,200 m, 14 Mar 1997, *G. Herrera & Bittner 9453* (MO); 1,800 m, July 1992, *Restrepo 561A* (MO); Along Sendero Vieja, along ridge top in



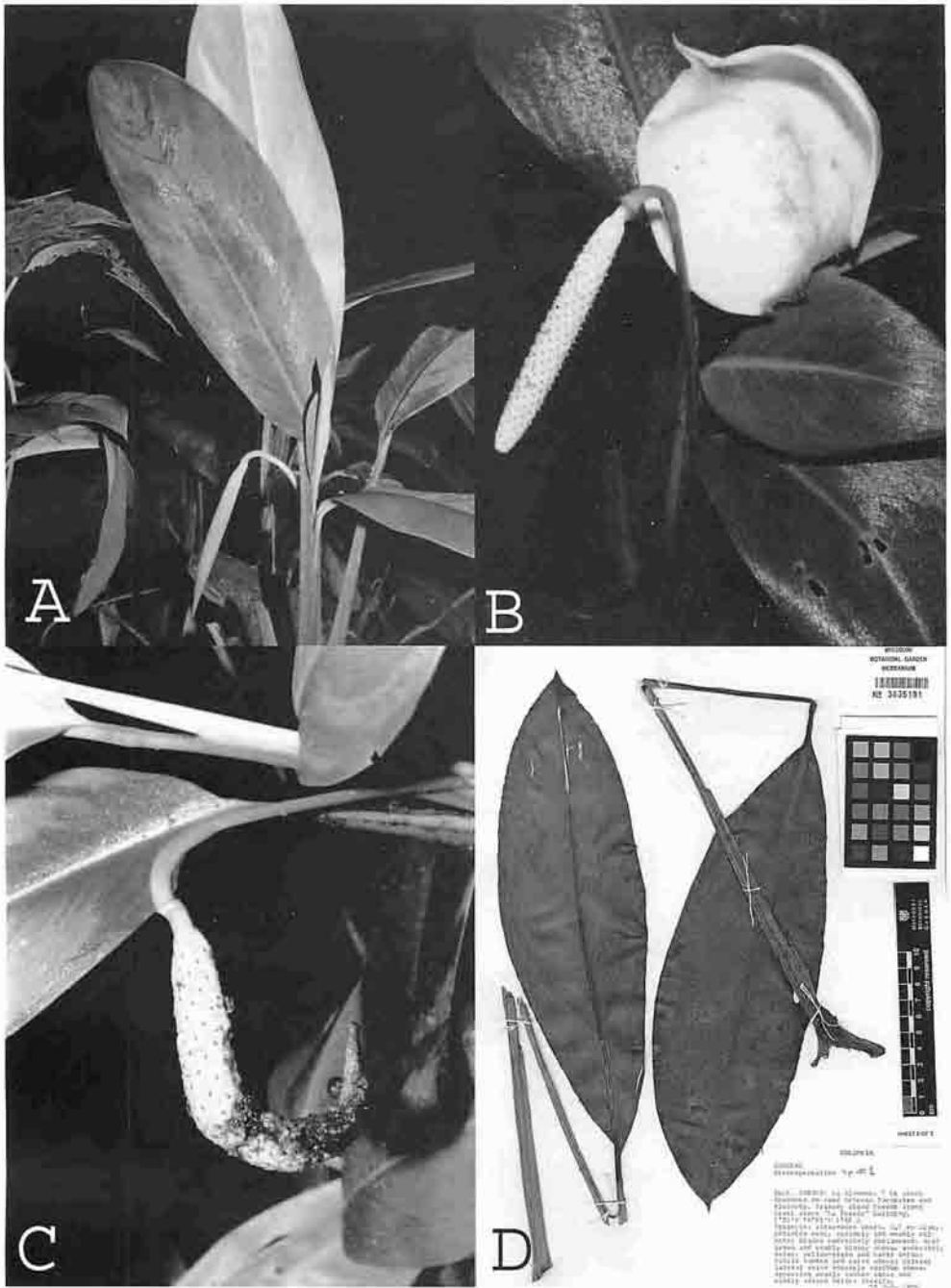


Fig. 52. a–c. *Stenospermation longifolium* Engl. (Croat 71205). a. Habit, b. Inflorescence showing spathe and spadix. c. Infructescence. d. *Stenospermation* species unknown # 1. (Croat 69598). d. Herbarium specimen.

direction of La Pina, 01°06'N, 77°54'W, 1,950–2,010 m, 9 Mar 1990, *Croat 71205* (MO, PSO); 01°05'N, 78°01'W, 1,780 m, 26 Jul 1988, *69575* (CUVC, HUA, MO, PSO); Borde Hermógenes, 1,800 m, 13 Nov 1993, *Restrepo 704* (MO). ECUADOR. **Carchi**: Cerro Golondrinas, Upper Río Gualpí headwaters, 00°50'N, 78°13'W, 2,250–2,265 m, 15–20 Jul 1993, *B. Boyle, P. Chamorro, M. Fleury, P. Hibbs & M. Quer 2273* (MO, NY, QCNE); Cerro Golondrinas, Upper Río Pablo drainage, 00°52'N, 78°10'W, 1,730–1,760 m, 14 Apr 1993, *B. Boyle, S. Riley & S. Way 1685* (MO); Espejo, El Gualtal, Faldas de Cerro Golondrina Hembra, 00°51'N, 78°07'W, 2,450 m, 21 Aug 1994, *W. Palacios 12651* (MO, QCNE); Mira, Norte del Carmen, camino a Chical, 00°51'N, 78°13'W, 2,000–2,200 m, 10 Feb 1992, *W. Palacios et al. 9712* (MO, QCNE); Tulcan, Parroquia Tobar Donoso, Sector Sabalera, Reserva Indígena Awá, 01°00'N, 78°24'W, 650–1,000 m, 19–28 Jun 1992, *Galo Tibpaz et al. 1507* (MO).

***Stenospermation longispadix*** Croat, **sp. nov.** Type: COLOMBIA. Nariño: La Planada, 7 km above Chucunés on road between Tuquerres and Ricaurte, along Sendero Natural, *Croat 69630* (holotype, MO; isotypes, K, PSO).

Internodia usque 6 cm longa, 3–3.5 cm diam.; petiolus 20–30 cm longus, 9–14 mm diam., anguste et acute sulcatus, vaginatus fere aut omnino usque geniculum; lamina coriacea, oblongo-elliptica, 26–44 cm longa, 12–19 cm lata; nervis primariis lateralibus lentiter plicato-elevatis supra; spatha 15–26 cm longa, pallide viridis ante anthesin, decidua; spadix viridi-albus, 19–25 cm longus; baccae albae.

Terrestrial, to 2 m tall; **internodes** to 6 cm long, 3–3.5 cm diam., pale green, semiglossy; **petioles** 20–30 cm long (averaging 26.1 cm), 9–14 mm diam., thicker than broad, narrowly and sharply sulcate adaxially, sheathed to geniculum or occasionally to within 3 cm of geniculum (rarely to 7 cm from geniculum), drying light brown, matte, finely several-ribbed; **blades** coriaceous, narrowly elliptic to oblong-elliptic or oblanceolate-elliptic, sub-

rounded to obtuse then shortly and abruptly acute and apiculate to short-acuminate at apex, acute and somewhat attenuated at base, 26–44 cm long, 12–19 cm wide (somewhat narrower, to 10 cm wide on the uppermost leaves associated with the inflorescence, averaging  $37.3 \times 16$  cm), 2.0–2.4 times longer than broad, 1.3–1.8 times longer than the petioles, inequilateral, one side usually 4–8(–12) mm wide; upper surface dark green and matte; lower surface pale, yellow-green and matte; margin usually yellowish; **midrib** deeply sunken and moderately paler along margins above, much thicker than broad, narrowly rounded and moderately paler below; **primary lateral veins** very weakly pleated-raised above, darker than surface and moderately visible below; **upper surface** drying with the surface moderately flat and smooth or conspicuously irregular with the veins forming depressions and with the minor veins weakly raised and with the intervening area somewhat granular, sometimes conspicuously wrinkled or folded, usually sparsely and inconspicuously pale short-lineate; **lower surface** drying moderately smooth with the minor veins bluntly raised, the intervening areas densely whitish speckled, the larger of these consisting of short lines perpendicular to the veins. INFLORESCENCES erect; **peduncle** (31–) 41–43 cm long, 5–8 mm diam. at middle; **spathe** pale green, 15–26 cm long (with spathe furled), naviculi-form at anthesis, deciduous soon after anthesis; **spadix** white at anthesis, greenish white post-anthesis, 19–25 cm long. Flowers 5–7 per primary spiral, 2.2–2.8 mm long, 2.0–2.9 mm wide. INFRUCTESCENCES with **fruiting spadix** 19–27 cm long, 25–30 mm diam., cylindroid, sessile; mature **berries** white.

*Stenospermation longispadix* is found only in Colombia (Nariño) and Ecuador (Pichincha), at elevations of 1,700–1,900 m in *Premontane wet forest*. This species is abundant in areas to the south of the beginning of the Sendero Natural and was seen in other areas of the forest as well.

The species can easily be recognized among other species of *Stenospermation*

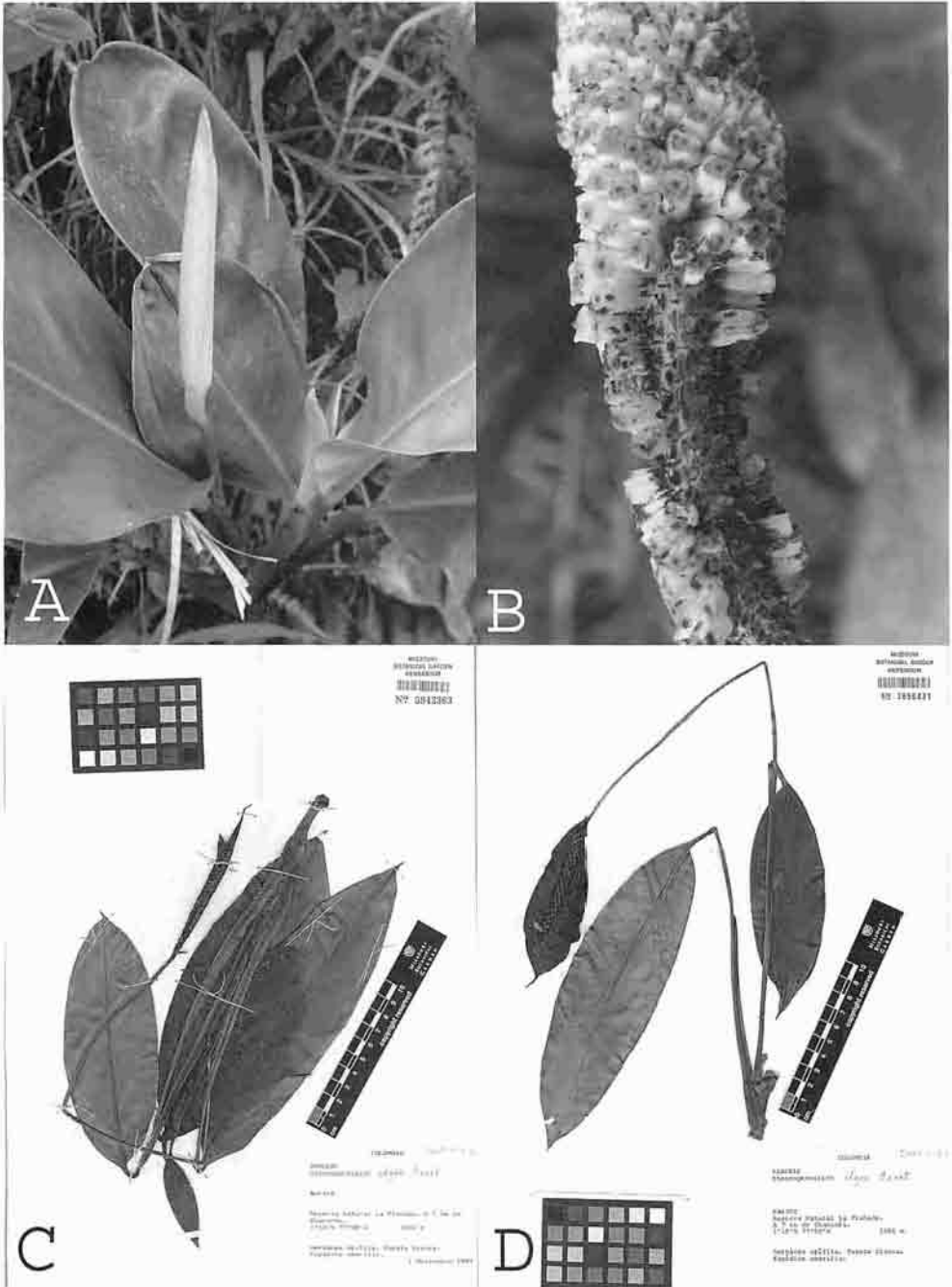


Fig. 53. a–b. *Stenospermation longispadix* Croat. (Croat 69630). a. Inflorescence. b. Detail of infructescence. c–d. *Stenospermation olgae* Croat. (Benavides 8726) c. Herbarium specimen. d. Herbarium specimen.

because of its large size. Furthermore, its spadix is of exceptional length, hence the name *S. longispadix*. No other species at La Planada has leaves even approaching the size of this species.

*Stenospermation longispadix* is perhaps most similar to *S. arborescens* Madison from Cordillera de Cutucú, a site with primarily endemic species, owing to the large size of that species, but *S. arborescens* differs in being even larger, to 3 m tall with petioles 60–80 cm long and blades 60 × 25 cm. In addition, the leaves of that species dry dark yellow-brown and glossy on the upper surface, petioles are yellow-brown, not black and are not sheathed to the apex. The inflorescence of *S. arborescens* also differs in being stipitate and in drying dark orange-brown rather than black.

In Colombia, *S. longispadix* is most easily confused with *S. popayanense* Engl. which has blades of similar color and shape but that species has smaller leaves (32 cm long and 8.5 cm wide on the type) with the minor veins on the upper surface closer and more prominently raised and much more densely and prominently arrayed with short pale cellular inclusions and with the lower surface densely pale-speckled but without the transverse lineations so prevalent on *S. longispadix*. In addition, the spadix of *S. popayanense* is much shorter (to 6 cm long).

*Stenospermation crassifolium*, another similar species, differs in being epiphytic, and also does not have a petiole sheath extending to near the blade base. In addition, the lower blade surface is densely dotted with darker brownish circular dots whereas *S. longispadix* has the lower surface densely arrayed with pale short lines that cover the entire surface (including the veins) and are perpendicular to the veins.

A noteworthy collection from the Depart. of Chocó in Colombia (*Silverstone-Sopkin et al.* 1498) shares many traits with *S. longispadix*, but differs in having blades which are glossy below and prominent, long raphide cells between the veins on the upper surface, compared with the matte

lower surface and much shorter, inconspicuous raphide cells of the La Planada material.

Four collections at La Planada (*Bittner* 2551 (MO, PSO); *Croat* 71215 (CUVC, HUA, MO, US), *G. Herrera & Bittner* 9174 (MO, PSO) and *Restrepo* 775 (MO, PSO), are very similar to *S. longispadix* and may ultimately be considered to be that species but we have chosen to not include them here. All of these collections were said to be epiphytic, have more slender stems and a shorter, thicker spadix and generally dry somewhat brownish. In addition, *Croat* 71215 (the only collection for which I have photographs of the live plants) shows a series of weak longitudinal folds even on older unfurled blades, a condition never seen on the live plants of the larger terrestrial plants of *S. longispadix*. However despite these stated differences, we are reluctant either to include them fully within *S. longispadix* or describe them as a distinct species owing to the fact that they are otherwise identical to *S. longispadix* in the appearance of their dried leaves. These unusual specimens will remain associated with *S. longispadix* until additional field studies can be carried out.

*Paratypes*: COLOMBIA. **Nariño**: Ricaurte, La Planada Reserve, 1,700–1,900 m, 18 Jan 1990, *Benavides* 11336 (MO, PSO); 1,800 m, 20 Jul 1993, *Restrepo & G. Ramírez* 577 (MO); 1,800 m, Jan 1993, *Restrepo* 630 (MO); 01°10'N, 77°58'W, 1,800 m, 1 Nov 1987, *Benavides* 8717 (MO); 1,800 m, 5 Apr 1992, *Restrepo* 550 (MO); 01°09'N, 77°59'W, 1,850–1,950 m, *Bittner* 2551 (MO).

***Stenospermation olgae* Croat, sp. nov.**

Type: COLOMBIA. Nariño: La Planada, 7 km from Chucunés, 01°10'N, 77°58'W, 1,800 m, 1 Nov 1987, *O. de Benavides* 8726 (holotype, MO-3656431; isotypes, B, K, PSO, US).

Internodia 1–3 cm longa, 1 cm diam.; petiolus 19–22 cm longus, 0.63–0.79 vaginatus; lamina 16.2–23 cm longa, 4.7–6.5 cm lata; spatha alba, 10.5 cm longa, 1 cm lata; spadix 6 mm longus, in sicco 4 mm diam., luteolus.

Epiphyte; **internodes** elongate, the uppermost to ca. 1 cm long, soon more elongate, to at least 3 cm long, 1 cm diam. (drying to ca. 6 mm diam.) drying reddish brown, matte, conspicuously, finely and irregularly folded; **petioles** 19–22 cm long, drying finely striate, sheathed 0.63–0.79 their length, the sheath decurrent at apex, the free portion weakly sulcate; **blades** oblong-elliptic, narrowly acuminate at apex, obtuse to acute and attenuate at base, 16.2–23 cm long, 4.7–6.5 cm wide (averaging  $20 \times 5.8$  cm), 2.9–3.4 times longer than wide, 0.7–1.2 times length of the petioles, equilateral or weakly inequilateral (one side 2–3 mm wider), drying dark gray-brown and matte above, medium yellow-brown and semiglossy below; **midrib** drying deeply sunken and concolorous above, thickly convex, slightly darker and finely striate below; **primary lateral veins** not at all obvious above or below when fresh, the dried upper surface with some thicker veins spaced 6–8 mm apart, these moderately straight and not intersected with cross-veins, the intervening space semiglossy with magnification above  $7\times$  and with the minor veins very close and heavily broken up with conspicuous cross-veins, with pale short cellular inclusions very sparse, located most frequently toward the margins; dried lower surface uniformly and minutely striolate, lacking any sign of cross-veins or pale short cellular inclusions. INFLORESCENCES erect; **peduncle** 32 cm long, drying dark brown, semiglossy, 1.5 mm diam.; **spathe** white, 10.5 cm long, 1 cm wide when furled, conspicuously long-acuminate; **spadix** 6 mm long, yellow, drying 4 mm diam. Flowers more or less regularly hexagonal, drying dark brown, matte, 2.5–2.7 mm wide; stigma oblong, drying blackened, 0.6–0.8 mm long.

*Stenospermation olgae* is known only from the type locality at La Planada at 1,800 m in *Premontane wet forest* life zone.

The species is characterized by its epiphytic habit, internodes longer than broad, the petioles sheathed 0.63–0.79 their length, the oblong-elliptic blades which dry matte and heavily and closely veined on

the upper surface with conspicuous cross-veins and weak short pale cellular inclusions as well as by its long-pedunculate inflorescence, the slender white spathe and the yellowish spadix.

Although the spadix is described at “amarillo” it is unlikely that is a very bright yellow, something the senior author has never seen in the genus.

The species is closest to *S. laevis* Croat, also described in this paper, differing from that species in having conspicuously raised minor veins with extensive cross-veins (versus moderately smooth upper blade surfaces on dried plants) and sessile yellowish spadices (versus prominently stipitate white spadix for *S. laevis*).

#### *Stenospermation* sp. unknown #1

Epiphyte; **internodes** short, 2.7 cm diam.; **petioles** oval, narrowly and weakly sulcate, ca. 38 cm long, sheathed one third to almost half its length; **blades** narrowly elliptic, abruptly acuminate at apex, acute and attenuate at base, 27.3–30.3 cm long, 7–10.5 cm wide (averaging  $28.8 \times 8.6$  cm), 2.9 times longer than broad, ca. 0.76 times length of the petioles, moderately coriaceous, dark green and weakly glossy above, moderately paler, yellow-green and matte below, drying dark brown and matte above, yellow-brown and matte below; upper surface drying smooth, the interveinal areas faintly striate longitudinally with a regularly scattering of pale whitish cellular inclusions and dense granulation; lower surface with pale transverse cross-veins between the minor veins with a dense array of granulations; **midrib** sunken and paler above, drying sunken and concolorous above, narrowly rounded and coarsely striate, darker below; **primary lateral veins** scarcely visible above, appearing weakly sunken above and weakly raised below; **minor veins** weakly visible, 4–6 mm apart and drying undulate on both surfaces; sterile.

The species was collected only once in primary cloud forest along trail above La Posada. It is characterized by its epiphytic habit, pale brown petioles sheathed 0.39–

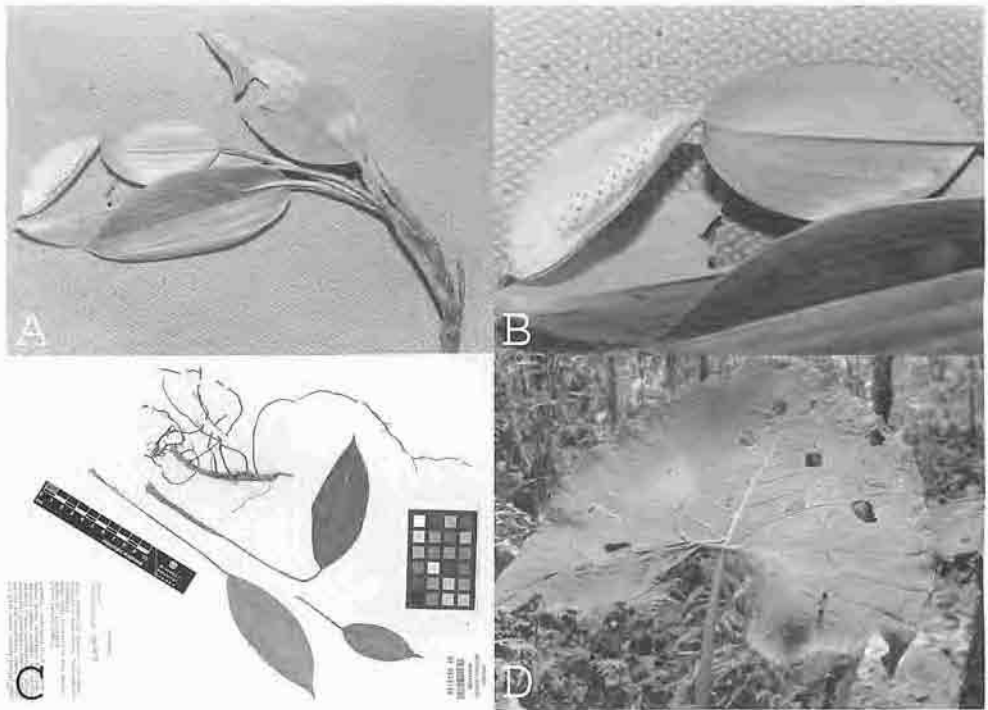


Fig. 54. a–b. *Stenospermatum* species unknown # 2. (Croat 69671). a. Fresh, unmounted specimen. b. Inflorescence showing spathe and spadix. c. *Stenospermatum* species unknown # 3. (Croat 69640). c. Herbarium specimen. d. *Xanthosoma undipes* (K. Koch & C.D. Bouché) K. Koch. (Croat 71488). d. Leaf blade, adaxial surface.

0.47 of their length, and narrowly elliptic, brown-drying blades. It is curious that the upper blade surface of one sheet of *Croat* 69598 dries moderately smooth whereas another sheet of the same number has a leaf that dries minutely wrinkled. Both have surfaces that are conspicuously granular.

*Specimen seen:* Colombia. **Nariño:** Ricaurte. La Planada. 7 km above Chucunés on road between Tuquerres and Ricaurte, 1,780 m 01°05'N, 78°01'W, 27 Jul 1988, *Croat* 69598 (MO, PSO).

#### *Stenospermatum* sp. unknown # 2

Epiphytic; **internodes** to 2 cm long, 9 mm diam, gray, semiglossy; **petioles** sheathed 0.75–0.87 the full length of petiole, the free portion 1.7–2.2 cm long, narrowly and obtusely sulcate; geniculum acutely sulcate; **blades** ovate-elliptic, acuminate at apex, obtuse to rounded at base,

12.2–14.2 cm long, 4.5–5.5 cm wide (averaging  $13.5 \times 4.9$  cm), 2.6–2.7 times longer than wide, subcoriaceous; surfaces semiglossy; **midrib** narrowly sunken and slightly paler above, prominently raised and paler below, drying narrowly sunken and concolorous above, thickly convex and striate, darker below; **primary lateral veins** scarcely visible on either surface; upper surface with **minor veins** close, conspicuously and bluntly raised with numerous oblique cross-veins and lacking pale, short-linear cellular inclusions; lower surface smooth, uniformly finely and weakly striate, lacking any obvious cellular inclusions. **INFLORESCENCES** erect, cernuous; **peduncle** 18 cm long, 1.5 mm diam. at middle, exiting petiole sheath at point of attachment with blade; **spathe** yellow-white outside, greenish white inside, 6 cm long, 1.7 cm wide; **spadix** creamy white, cylindroid, nearly sessile or sessile, 3.5 cm

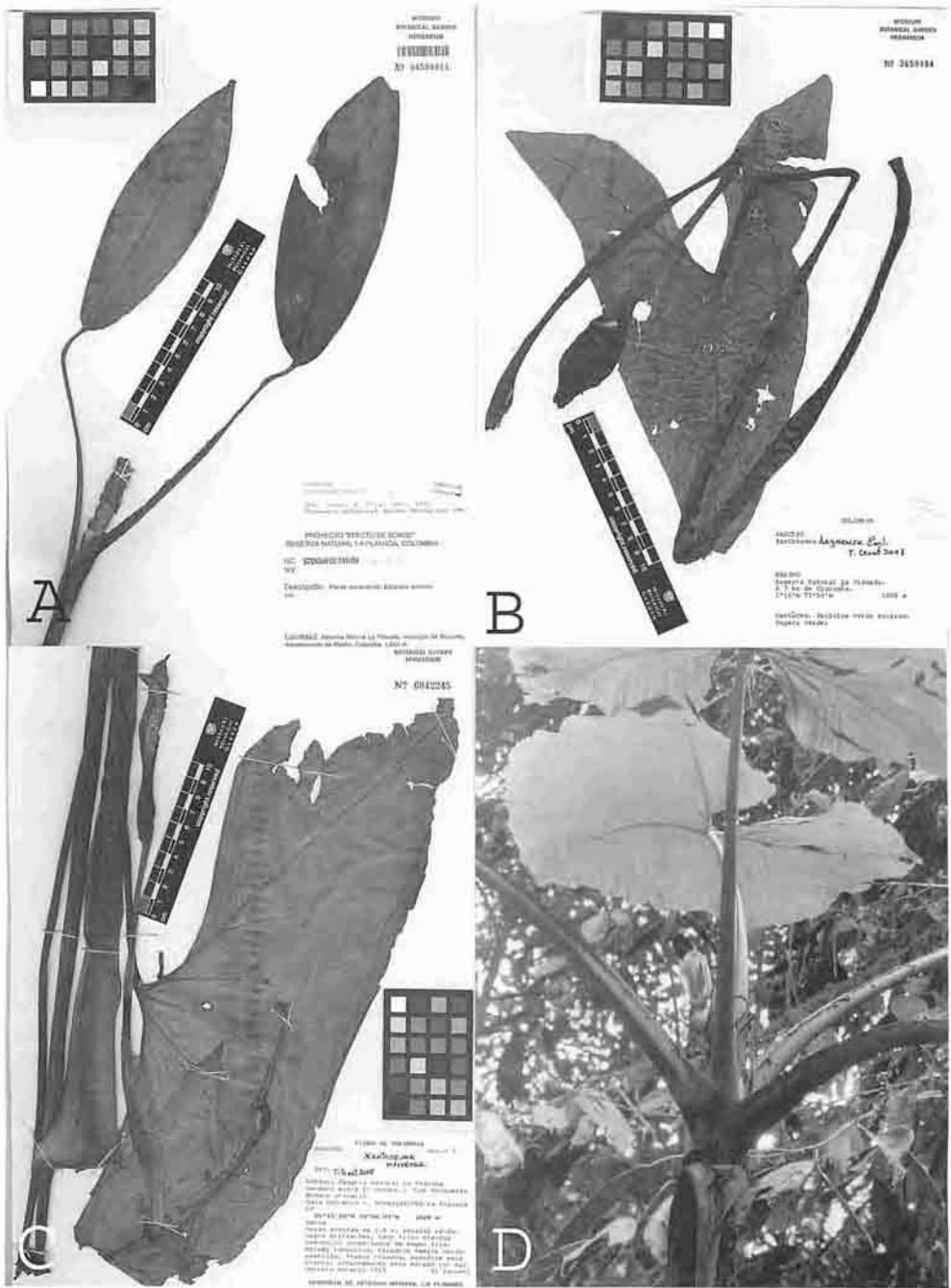


Fig. 55. a. *Stenospermation* species unknown # 4. (Restrepo 703). a. Herbarium specimen. b. *Xanthosoma daguense* Engl. (Benavides 8974). b. Herbarium specimen. c. *Xanthosoma herrerae* Croat & P. Huang. (Herrera 9315). c. Herbarium specimen. d. *Xanthosoma undipes* (K. Koch & C.D. Bouché) K. Koch. (Croat 71596). d. Habit.

long, 4 mm diam. Flowers 4–6-sided, 2.4–2.7 mm wide, drying dark brown, matte.

This species was collected only once at La Planada on the trail above La Posada. It is probably closest to *S. longipetiolatum* but that species differs in having the style with a pale annular ring around it. More material is needed to ascertain if this taxon is worthy of recognition as new to science.

It can be recognized by its moderately long and slender internodes, by the free portion of the petiole being short as well as weakly and obtusely sulcate. It is similar to other collections at La Planada including *Croat 69631*, but that species has a sharp sulcus on the free portion of petiole, a longer petiole, and generally larger blades. It is also similar to *Croat 69640*, but that species has a long rather than short unshathed portion of the petiole.

*Specimen seen:* COLOMBIA. **Nariño:** Ricaurte, La Planada, 7 km above Chucunés on road between Tuquerres and Ricaurte, along trail at summit of hill from trail beginning at La Posada, 1,850 m 01°05'N 78°01'W, 28 Jul 1988, *Croat 69671* (MO, PSO).

### ***Stenospermatum* sp. unknown #3**

Epiphytic; **internodes** 1–1.5 cm long, medium green, semiglossy, 6 mm diam.; **roots** apparently randomly arranged along stem, long, narrow, weakly branched, brown; **petioles** terete, very slender, narrowly and obscurely sulcate, sheathed 0.12–0.45 the length of the petiole; **blades** oblong-elliptic, gradually acuminate at apex, acute to obtuse at base, (7–)11–12 cm long, (2.5–)4 cm wide, slightly inequilateral (one side 2–4 mm wider), broadest at or near middle, subcoriaceous; surfaces glossy, moderately bicolorous, drying dark brown and weakly glossy above, grayish yellow-green and semiglossy below; **midrib** narrowly raised and concolorous above, convex and paler below, drying weakly raised and weakly paler above, bluntly angular and yellowish brown below; **primary lateral veins** scarcely visible on either surface; upper surface with the minor veins drying

weakly raised above, larger veins at 4–6 mm apart, intervening finer veins with many oblique cross-veins, very short cellular inclusion visible but few, especially toward margins; lower surface with the veins 4–5 mm apart with the intervening area densely striate. INFLORESCENCES and INFRACTESCENCES not seen.

This species was collected only once, on the trail behind the Centro Científico. It is recognized by its moderately long, slender internodes, its long, terete petioles which are sheathed only in lower 1/3 and are narrowly and weakly sulcate in the unshathed portion, and its blades which are glossy on both surfaces.

Because there is so little material of this species, it is impossible to describe it as a new species. Yet, it does not seem to match any known species.

A collection from Ecuador in the province of Cañar at 600 m, between Azogues and El Triunfo (*Croat 50903*) is similar and may be the same species. It differs only in drying darker on the lower surfaces.

*Specimen seen:* COLOMBIA. **Nariño:** Ricaurte, La Planada, 7 km above Chucunés on road between Tuquerres and Ricaurte, along trail to summit of hill behind Centro de Científicos, 01°05'N, 78°01'W, 1,780 m, 28 Jul 1988, *Croat 69640* (MO, PSO).

### ***Stenospermatum* sp. unknown #4**

Epiphytic vine; **internodes** 2.5–3.5 cm long, drying 10 mm diam., finely striate and minutely granular, dark reddish brown; **petioles** 19–20 cm long, sheathed 0.62–0.68 their length, slender, obtusely sulcate on the free portion, drying dark brown, finely striate, matte; **blades** oblong-elliptic, narrowly acuminate at apex, inequilateral, obtuse to rounded at base, inequilateral, one side 4–5 mm wider, 18.5–19.5 cm long, 5.4–6.3 cm wide, ca. 3.0 times as long as wide, dark green and semiglossy above, slightly paler and semiglossy below, drying smooth, dark brown and weakly glossy above, smooth, yellow-brown and semiglossy below; upper surface with the minor veins close and with many cross-veins; lower surface closely and finely striate



throughout. INFLORESCENCES not seen; **spadix** reported as golden yellow.

The species was collected only once from some unreported site but it is pretty clearly an undescribed species. The golden-yellow spadix, if this proves to be true, might even be unique for the genus.

*Specimen seen*: COLOMBIA. **Nariño**: Ricaurte, La Planada, Municipio Ricaurte, 1,800 m, 13 Nov 1993, *C. Restrepo 703* (MO, PSO).

**Xanthosoma** Schott in Schott & Endlicher, *Melet. Bot.* 19. (1832).

Terrestrial; **caudex** tuberous and subterranean or growing over the surface of the ground and rooting at the lower nodes, the apical portion erect, stout; sap with white latex; **petioles** amplexicaule, conspicuously sheathed at the base, subterete above the sheath, moderately spongy; **blades** moderately thin; sagittate, hastate, trisect or pedatisect; **midrib** sunken above, prominently raised below; **primary lateral veins** of the blades or their segments spreading toward the margins, forming several collective veins; **tertiary veins** conspicuous. INFLORESCENCES 1–several per axil, much shorter than the leaves; **spathe** convolute at base, tube usually green, sometimes tinged along the open margin with purple, constricted somewhat above the tube; tube mostly ellipsoid, persistent after anthesis; the blade moderately thin, usually white naviculiform at anthesis, promptly deciduous after anthesis; **spadix** shorter than the spathe, divided into pistillate and staminate portions; the pistillate portion basal, cylindrical, densely many-flowered, slightly tapered toward the apex, green to bright orange; staminate portion clavate, usually several times longer than the pistillate portion, slightly constricted above the sterile portion at the base; sterile staminate portions with irregularly shaped sterile staminate flowers, these usually elongated in the direction of the axis. Flowers unisexual, naked; staminate flowers irregularly 4–6-sided, the stamens 4–6, connate to form an obpyramidal truncate synandrium; anthers with

thecae obversely oblong-triangular or oblong, opening at the apex of the connective by a short slit; ovaries oblong, to ovoid, coherent by the thickened annuliform styles, 2–4 celled; ovules several or numerous, anatropous; stigma discoid or hemispheric-discoid, 3- or 4 lobate. INFRUCTESCENCES with **berries** cylindroid, 3–4 celled; seeds many per locule, ovoid, shorter than the funicles, testa sulcate. Species ca. 57, Mexico to Paraguay.

#### KEY TO SPECIES OF *XANTHOSOMA* IN LA PLANADA

1. Blades to ca. 1 m long, broadly ovate, about as broad as long; internodes on adult plants more than 4 cm diam . . . . . *X. undipes* K. Koch
1. Blades usually less than 50 cm long, more or less triangular-sagittate, considerably longer than broad; internodes on adult plants less than 4 cm diam.
  2. Blades usually more than 20 cm long, to ca. 40 cm, posterior rib naked more than 3 cm from petiole. . . . .  
 . . . . . *X. herrerae* Croat & P. Huang
  2. Blades usually less than 20 cm long, posterior rib naked to within 1–2 cm from petiole. . . . .  
 . . . . . *X. sp. unknown* # 1

***Xanthosoma herrerae*** Croat & P. Huang, **sp. nov.** Type: COLOMBIA. Nariño: La Planada Sendero entre El Hondon y "Los Horquetas", 01°10'18"N, 78°00'09"W, 1,820 m, *Gerardo Herrera C. 9315* (holotype, MO-6042245).

Internodia ca. 3 cm diam.; petiolus ad 141 cm longus; lamina 56 cm longa, 38 cm lata; nervis primariis lateralibus 3–4 utroque; nervis basalis 11 (–12) utroque; spathe 14.7 longa, tubo 1.5 cm diam., viridis extus, purpureus-violaceus intus; spadix 11.7 cm longus; parte pistillata 1.7 cm longa.

Terrestrial, to 1.8 m high; **internodes** short, ca. 3 cm diam.; **petioles** to 141 cm long, greenish black and glossy, drying

medium yellow-brown near the base, otherwise dark brown to almost blackish in part, finely ribbed longitudinally and matte, drying; cataphylls whitish; **blades** 56 cm long, 38 cm wide, 1.4 times longer than broad, ca. 0.3 times as long as the petioles, dark green and matte above, slightly paler and weakly glossy below, drying somewhat yellowish green on both surface; **anterior lobe** 32.5 cm, broadly rounded along margin; **posterior lobes** 28 cm long, 12.5 cm wide; **sinus** 21.5 cm deep, 8 cm wide; **primary lateral veins** 3–4 pair, arising at 70–80° angle, sunken and concolorous above, narrowly rounded and drying darker below; **basal veins** 11 (–12) pairs, drying darker than surface, the 1st pair free to the base, the posterior rib straight to the apex of the lobe, naked to 3 cm, with the basal veins more or less evenly branching off the rib, ca. 6–7 acroscopic, 6–7 basioscopic. INFLORESCENCES with peduncles to 43 cm long, medium green, marked with lilac-purple, drying 5 mm diam., blackened; **spathe** 14.7 long, tube 1.5 cm diam., green outside; purple-violet inside, blade white, 2.5 cm wide when flattened; **spadix** 11.7 cm long; pistillate portion greenish yellow, 1.7 cm long on front side; staminate portion white 10.7 cm long, the sterile staminate portion ca. 4 cm long, 4 mm diam., the fertile portion 8 mm diam. at its broadest point.

*Xanthosoma herrerae* is endemic to Colombia (Nariño), known only from La Planada at elevation of 1,820 m. It occurs only in *Premontane wet forest*.

This species is easily distinguished by its extremely long petioles (to 140 cm long), and its thin conspicuously sagittate leaf blades with the posterior lobe almost as long as the anterior lobe with the posterior rib of the posterior lobes naked for more than 3 cm. The species is closest to another species of *Xanthosoma* (cf. *daguense*) which differs in having a shorter petiole only 1.9 times longer than blade, which dries blackened and glossy. In contrast the petioles of *X. herrerae* are 2.6 times longer than the blades and dry dark brown, matte and finely ribbed longitudinally.

*Xanthosoma herrerae* differs from *X. daguense* in being much larger (to 1.8 m

versus rarely more than 1 m for *X. daguense*), having much longer blades (to 53.5 cm versus less than 42 cm and averaging only 3.5 cm long in Colombia and 29.4 cm long in Ecuador) and especially in having a much longer peduncle to 42 cm long and more than 3 times longer than the spathe, versus typically less than 12 cm long and usually about as long as spathe or rarely more than twice as long as spathe for *X. daguense*.

*Xanthosoma herrerae* differs from *X. undipes*, the only other known species at La Planada not mentioned above by having much smaller leaves with proportionately longer posterior lobes (ca. 2.3 times longer than broad for *X. herrerae* versus ca. 1.2 times longer than wide for *X. undipes*) and a moderately slender trunk. In addition *X. undipes* has proportionately shorter peduncles (usually scarcely longer than the spathe versus more than 3 times longer than the spathe for *X. herrerae*).

This species is named in honor of Costa Rica botanist Gerardo Herrera, who was the first collector of the species. Herrera collected extensively at La Planada in 1997 and 1998.

***Xanthosoma undipes*** (K. Koch & C. D. Bouché) K. Koch, *Bonplandia* 4: 3. 1856. *Alocasia undipes* K. Koch & C. D. Bouché, en A. Braun *et al.*, *Append. gen. sp. Hort. berol.* 1854 5. 1854–1855. Type; not seen. *X. jacquinii* Schott, nom. illeg.; *X. roseum sensu* Standl. (1937), non Schott.

Terrestrial, **stems** mostly 1–4 m long, internodes to 20 cm diam., the leaf scars ca. 30 cm apart midway on trunk, but leaves closely clustered at apex; **internodes** brown and scurfy, to 6 cm long to 30 cm apart midway on trunk, 10–20 cm diam. on adult plants; **petioles** to nearly 1 m long, erect-spreading, yellow-green, moderately glossy, terete, somewhat spongy, sheathed to 2/3 their length, about as long as the blades; **blades** broadly ovate, acute to obtuse at apex, prominently sagittate at base, to over 1 m long, to 85 cm wide, broadest at or somewhat below point of petiole attach-

ment; upper surface medium green and weakly glossy to matte, thinly coriaceous; lower surface markedly paler, somewhat bicolorous, and matte; **anterior lobe** to 65 cm long, 75 cm wide; **posterior lobes** to 50 cm long, 43 cm wide; **sinus** narrowly parabolic, to 30 cm deep; **midrib** broadly raised, slightly paler and semiglossy above, round-raised, matte and slightly paler below; **primary lateral veins** ca. 12 per side, departing midrib at 60°–75° angles, ascending to collective vein, round-raised, slightly paler, and semiglossy above, round-raised, paler, and matte below; **tertiary veins** in part weakly sunken above, raised below; **reticulate veins** in part distinct below; INFLORESCENCES several per axil; **peduncle** 14–16 cm long (in other parts of its range 8.5–34 cm), somewhat flattened, pale green, matte; **spathe** erect, 7–10 cm long, 3–4 cm wide; spathe tube to 6.5 cm long, pale green, tinged purple on front edge outside, weakly glossy, dark reddish purple inside, becoming purple-brown within post-anthesis) spathe blade white on both surfaces; **spadix** 10–18 cm long pistillate portion orange and staminate portion creamy-white, the sterile staminate portion creamy yellow. INFRUDESCENCES erect; **spadix** 3–4 cm long, 2–3 cm diam., broadest at middle; **berries** pale green to greenish yellow.

*Xanthosoma undipes* widely ranges from Belize, Puerto Rico, Trinidad, Colombia (Antioquia, Nariño, Valle del Cauca), Costa Rica, Ecuador (Cañar, Carchi, Cotopaxi, Esmeraldas, Guayas, Los Ríos, Manabí, Napo, Pichincha), Honduras, Mexico (Veracruz), Nicaragua, Panama, Peru (Cajamarca, Junín, Madre de Dios, Pasco), Suriname to Venezuela (Amazonas, Aragua, Miranda, Sucre, Tachira, Yaracuy), at elevations of 20–2,900 m, primarily above 800 m, in *Premontane wet forest* and *Tropical wet forest*, *Montane rain forest* life zones.

This species is easily recognized by its large size, its succulent, thick trunk 10–20 cm in diam., its subterete, greenish petioles and its large thin leaves with convex major veins on the upper surface and prominent tertiary venation.

The species is somewhat dubious from the nomenclatural standpoint. *Xanthosoma*

*undipes* purportedly ranges from Belize to Ecuador and Peru east to Venezuela and Suriname which would be a strange pattern of distribution known only for a few species of Araceae.

In my opinion the taxon that occurs in Costa Rica, Panama and Colombia may not be the same as that which occurs in the Amazon basin and in Venezuela but until a monographic study has been made to study all the material no decision can be made.

*Additional specimens examined:* COLOMBIA. **Nariño:** Ricaurte, La Planada, 7 km above Chucunés (along road between Tuquerres and Ricaurte) along trail to El Hondón, beginning at Quebrada Tejón and for 0.5 km beyond, 01°08'N, 77°54'W, 780–800 m, 15 Mar 1990, *Croat 71488* (MO, PSO); Altaquer-Tumaco, Río Ñambí, 7 km W of Altaquer, 01°18'N, 78°04'W, 1,100–1,130 m, 20 Mar 1990, *Croat 71596* (MO, PSO); 01°10'N, 77°58'W, 1,800 m, 15 Nov 1987, *Benavides 8924* (MO, NY); 01°05'N, 78°01'W, 1,800 m, 21 Dec 1987, *Gentry et al. 59656* (MO). ECUADOR. **Carchi:** Cerro Golondrinas, N-facing slope on south side of upper Río Blanco Valley, 00°52'N, 78°11'W, 1,750–1,800 m, 06 Feb 1993, *B. Boyle & A. Boyle 1501* (MO).

#### *Xanthosoma* sp. unknown #1

Terrestrial; **internodes** to 3 cm long, 4 cm diam., covered with light brown petiole bases and fibers; **cataphylls** to 34 cm long, drying dark yellow-brown, mostly remaining intact, erect to somewhat spreading, drying yellow-brown and semiglossy, only the oldest becoming fibrous with fine fibers; **petioles** 69–84 cm long (averaging 74 cm), ca. 9 mm diam., somewhat spongy, subterete midway, obscurely angled adaxially toward apex, dark green but heavily tinged dark purple toward base, semiglossy, drying somewhat blackened and semiglossy; **blades** 30–40 cm long, 21–38 cm wide (averaging 35 × 29.5 cm), 1.1–1.5 times longer than broad, 0.4–0.5 times length of the petioles; triangular-sagittate-hastate, shortly acuminate at apex, prominently lobed at the base, thinly coriaceous, weakly glossy, dark blackish green above, medium

green below, drying yellowish olive-green and weakly glossy above, grayish yellow-green and semiglossy below; **posterior lobes** broader than long, 16–23.5 cm long, 6–10.5 cm wide, bluntly acute at the apex, directed somewhat outward at 50–55° angle; **anterior lobe** 19–25.5 cm long, weakly convex along the lateral margins but the lateral margins of the blade weakly constricted below the petiole attachment; **sinus** 11–15 cm deep; **basal veins** 6–7 pairs, 3–4 of them acroscopic, 2–3 (–4) basispic; **posterior rib** straight to apex of posterior lobe, naked 2–2.7 cm; **midrib** and primary lateral veins deeply sunken and concolorous above, narrowly round-raised and slightly paler below; **primary lateral veins** 3–4 pair, arising at 25–35° angle, convex below; **collective veins** arising from the tip of the posterior lobe, 6–7 mm from the margin; tertiary veins moderately distinct, flat, darker than surface. INFLORESCENCES erect; **peduncle** erect 35.5 cm long, drying to 5 mm diam., dark blackish brown; **spathe** 17 cm long; tube 7 cm long, 3.2 cm diam., dark green, the margin purple, dark purple on the inside of the tube; spathe blade medium green outside, pale green within; **spadix** with the pistillate portion pale yellow-green; staminate portion creamy white.

*Xanthosoma* sp. # 1 is known for certain only from La Planada in *Premontane wet forest* at 1,800 m.

This species is characterized by its moderately small stature, (typically less than 1 m tall), its subterete petiole which dries blackish and moderately glossy, the triangular sagittate-hastate blade with the posterior lobes directed somewhat outward at 50–55° angle and pointed at apex as well as the long-pedunculate inflorescence with the spathe tube dark purple on the inside.

*Specimens examined*: COLOMBIA. **Nariño**: Ricaurte, La Planada, Tuquerres-Ricaurte, 7 km above Chucunés (on road

between Tuquerres and Ricaurte), along Sendero Vieja, along ridge top in direction of La Pina, 1°06'N, 77°54'W, 1,950–2,010 m, 9 Mar 1990, *Croat 71227* (MO); 1°10'N, 77°58'W, 1,800 m, 16 Nov 1987, *Benavides 8974* (MO).

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