

Revision of *Spathiphyllum* (Araceae) for Mexico and Central America

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ABSTRACT

The genus *Spathiphyllum* is revised for Mexico and Central America for the first time. Forty-three named species are included for the region. Sixteen new species are described here: *S. almirantense* Croat, *S. ayalae* Croat & O.Ortiz, *S. bobdressleri* Croat & O.Ortiz, *S. bonyicense* Croat, *S. cardonanum* Croat & Grayum, *S. clewellii* Croat, *S. cotonense* M.Cedeño & O.Ortiz, *S. darienense* Croat & O.Ortiz; *S. guadalupense* Díaz Jim., *S. hannonii* Croat, *S. hubertkrausei* Croat, *S. kennedyae* Croat, *S. luteynii* Croat & O.Ortiz, *S. morii* Croat & O.Ortiz, *S. munniae* Croat, and *S. ortizii* Croat.

Key words: Araceae, Central America, new species, revision, *Spathiphyllum*.

INTRODUCTION

William Botting Hemsley published a revision of the plants of Mexico and Central America between 1879 and 1888, and his treatment of the Araceae (Hemsley, 1885: 417–435) dealt with only nine species of *Spathiphyllum* [*S. atrovirens* Schott, *S. brevirostre* Schott, *S. cochlearispathum* (Liebm.) Engl, *S. friedrichsthalii* Schott, *S. fulvovirens* Schott, *S. ortgiesii* Regel, *S. phrynifolium* Schott and *S. wendlandii* Schott as well as one unnamed species collected by Osbert Salvin (*Salvin s.n.* (K)]. The genus *Spathiphyllum* is here revised for all of Mexico and Central America for the first time.

Materials and Methods

Approximately 600 herbarium specimens were reviewed, mainly at MO but virtually all Central American herbaria were visited, sometimes many times but especially during 2017 with funding from an NSF OPUS grant (DEB-1456316) when 25 herbaria in 7 countries were visited. In addition, the study was supported by no fewer than 20 separate field trips to virtually every part of Central America since 1967. Description format was based on formulations prescribed by Croat & Bunting (1979). Ecological descriptions of habitat were based on the Holdridge life zone system (Holdridge et al., 1971) except in Mexico for where no such map exists.

History of classification

The genus was described in 1832 by Heinrich W. Schott based on *Spathiphyllum lanceifolium* (Jacq.) Schott from the Cordillera Central in Venezuela (Schott, 1832). That species was originally described as *Dracontium lanceifolium* Jacq. in 1791 (Jacquin, 1791: 118). Schott published an additional species, *Spathiphyllum sagittifolium* (Rudge) Schott in the same publication (Schott, 1832.) but it proved to belong to a radically different genus, *Urospatha* Schott (Lasioideae).

The next species described in the genus *Spathiphyllum* were published by Eduard F. Poeppig from Peru, *S. caudatum* Poepp. and *S. candicans* Poepp., both published in *Nova Genera & Species Plantarum* (Poeppig, 1845: 85). The former also proved to be a *Urospatha*, *U. caudata* (Poepp.) Schott. The latter proved to be a synonym of *Spathiphyllum cannifolium* (Dryand. ex Sims) Schott with the transfer published in 1853 (Schott, 1853). Liebmann published *Hydnostachyon cochlearispathum* Liebm. (Liebmann, 1849). The species was transferred to *Spathiphyllum* by Engler in his revision of *Spathiphyllum* in the de Candolles' *Monographiae Phanerogamarum* in 1879 (Engler, 1879: 221). Also in 1853, Schott published several additional species (Schott, 1853), *Spathiphyllum heliconiaefolium* Schott [later synonymized with *S. cochlearispathum* (Liebm.) Engl.], *S. humboldtii* Schott, *S. friedrichsthalii* Schott and *S. gardneri* Schott but he also transferred *Pothos cannifolus* Dryand. ex Sims to *Spathiphyllum*.

Karl Koch published the genus *Massowia* K.Koch in 1852 (Koch, 1852) which proved to be synonymous with *Spathiphyllum* Schott. In 1856 he published *Massowia lanceolata* (Koch, 1856) and the following year he published the combination to place it in *Spathiphyllum* as *S. lanceolatum* (K.Koch) K.Koch (Koch, 1857) but it soon proved to be the same as *S. cochlearispathum*.

In 1857, Schott published seven species in volume 7 of the *Oesterreichisches Botanisches Wochenblatt* (Schott, 1857), namely *Spathiphyllum phrynifolium* Schott, *S. schomburgkii* Schott, *S. commutatum* Schott (from Asia), *S. cuspidatum* Schott, *S. fendleri* Schott (now = *S. friedrichsthalii* Schott), *S. blandum* Schott and *S. bonplandii* Schott (now = *S. cannifolium*).

In 1858, Schott published three Central American species, *Spathiphyllum atrovirens*, *S. fulvovirens* and *S. wendlandii* in the *Oesterreichische Botanische Zeitschrift* (Schott, 1858). In 1860, two additional names were published, *S. lechlerianum* Schott from Peru (Schott, 1860) and *S. candolleanum* Schott but the latter proved to be a synonym of *S. humboldtii* Schott.

In 1870, Eduard A. Regel published *Spathiphyllum minabassae* (Teijsm. & Binn.) Regel with the basionym *Spathiphylopsis minabassae* Teijsm. & Binn. and *S. ortgiesi* Regel (Regel, 1870). The former proved to be a synonym of *Spathiphyllum commutatum* Schott.

In 1874, the name *Spathiphyllum pictum* W.Bull (W. Bull, 1874) appeared but it proved to be a *Dieffenbachia* and in 1877 *Spathiphyllum wallisii* Regel from Colombia was published (Regel, 1877). N.E. Brown (1878) published three species in *The Gardeners' Chronicle & Agricultural Gazette* in 1878, *S. patinii* (B.S.Williams ex R.Hogg) N.E.Br., *S. floribundum* (Linden & André) N.E.Br. and *S. candidum* N.E.Br. but the latter proved to be synonymous with *Spathiphyllum cannifolium* (Dryand. ex Sims) Schott.

In 1879, A. Engler published *Spathiphyllum cochlearispathum* with the basionym *Hydnostachyon cochlearispathum* Liebm. and *S. cochlearispathum* var. *longirostre* (Liebm.) Engl., but the variety *longirostre* is no longer recognized and is just considered the same as *S. cochlearispathum* (Engler, 1879). In the same year the name *Spathiphyllum amazonicum* Spruce ex Engl. was introduced but this proved to be *Urospatha sagittifolia* (Rudge) Schott and *S. beccari* Engl. was published but became *Holochlamys beccari* (Engl.) Engl.

In 1880, *Spathiphyllum glaziovii* Engl. (Engler, 1880) was published but it proved to be synonymous with *S. humboldtii*.

Except for an additional five varieties no longer recognized, the turn of the 20th Century left us with 18 species, 17 of which were neotropical. Most of the subsequent work with *Spathiphyllum* in the early part of the 20th Century was by A. Engler who described *Spathiphyllum grandifolium* Engl., *S. huberi* Engl., (now a synonym of *S. humboldtii* Schott), *S. laeve* Engl., *S. quindiuense* Engl. and *S. tenerum* Engl. in *Bot. Jahrb. Syst.* (Engler, 1905). The name *Spathiphyllum dechardii* (Andrews) Gentil was introduced in 1907 by Louis Gentil but proved to be a synonym of *S. cannifolium* (Dryand ex Sims) Schott (Gentil, 1907).

By the middle of the 20th Century, there were several botanists describing species of *Spathiphyllum*. Karl Krause, now working alone, described *Spathiphyllum juninense* K.Krause from Peru (Krause, 1932). In Asia the Japanese botanist, Sumihiko Hatusima introduced the name *Spathiphyllum micronesicum* Hatus. from the Palau Archipeligo in Micronesia in 1939 (Hatusima, 1939) but it became synonymous with the widespread *S. commutatum*. Paul Standley described *Spathiphyllum zetekianum* Standl. (Standley, 1940). Another Japanese botanist, Takasi Tuyama described *Spathiphyllum funereum* Tuyama (Tuyama, 1940), yet another synonym of *S. cannifolium*. Cyrus Longworth Lundell described *Spathiphyllum lacustre* Lundell (Lundell, 1941: 4) which proved to be synonymous with *S. cochlearispathum*.

In 1960, the first modern revision of *Spathiphyllum* was prepared by George S. Bunting (1960). The genus was well-researched but Bunting relied heavily on the number of ovules per locule in his key (a laborious character to check) and provided almost no illustrations. This work published the greatest number of species ever with 10 species newly described (Bunting, 1960). These were *Spathiphyllum gracile*, *S. jejunum*, *S. kalbreyeri*, *S. maguirei*, *S. matudae*, *S. minus*, *S. monachinoi*, *S. neblinae*, *S. patulinervum* and *S. sipapoanum*. Bunting went on to

describe *Spathiphyllum perezii* (Bunting, 1977) and later still *S. bariense* and *S. mawarinumae* (Bunting, 1988).

Bunting's colleague Dan H. Nicolson also described *Spathiphyllum solomonense* Nicolson (in Eyde et al., 1967), and published a new combination, *S. schlechteri* (Engl. & K.Krause) Nicolson (Nicolson, 1968), two of the three Asian species in the genus. At the Smithsonian, Lyman Smith described *Spathiphyllum graziellae* L.B.Sm. in honor of Brazilian aroid botanist, Graziela Barroso (Smith, 1968). In Mexico, Japanese botanist, Eizi Matuda described *Spathiphyllum uspanapaense* (Matuda, 1976).

Richard A. Baker, at the Field Museum in Chicago, worked extensively with Araceae (Croat & Baker, 1979) and along with William Burger, revised the genus *Spathiphyllum* in Costa Rica (Baker & Burger, 1976). This work resulted in two new taxa, *Spathiphyllum silvicola* R.A.Baker and *S. wendlandii* Schott ssp. *montanum* R.A.Baker. The latter proved to be recognizable at the species level and was elevated at *Spathiphyllum montanum* (R.A.Baker) Grayum by Michael H. Grayum (1997) for his treatment of the Araceae of Costa Rica (Grayum, 2003).

Robert L. Dressler, working with the Smithsonian Tropical Research Institute in Panama for many years, had a keen interest in *Spathiphyllum* and routinely collected and cultivated the most interesting species he found in Panama. His work is honored in part by the publication of *Spathiphyllum dressleri* Croat & F.Cardona (Croat & Cardona, 2004). Yet another species, *Spathiphyllum bobdressleri* Croat & O.Ortiz was collected by Dressler and is published in this revision. Moreover, Dressler with Helen Kennedy collected two additional new species of *Spathiphyllum* in a single locality in one day (see *Spathiphyllum almirantense* Croat and *S. kennedyae* Croat in this revision).

Work in northern Peru in Amazonas Department by Rodolfo Vasquez and his colleagues on the Flora of the Río Cenepa (Croat, Swart & Yates, 2005), resulted in the discovery of several new species. These were *Spathiphyllum brent-berlinii* Croat, (named in honor of Brent Berlin who collected many of the plants making the Flora of Cenepa possible), *S. diazii* Croat and *S. buntingianum* Croat, honoring the extensive work done by George Bunting on the genus.

Additional new species include *Spathiphyllum abelianum* A.Rojas & J.M.Chaves (Rojas & Chaves, 2011) from Costa Rica and *S. pygmaeum* Bogner from Ecuador (Bogner, 2011).

This revision includes sixteen additional new species. This brings the total number of known named species in the Neotropics to 127 while there are three described species in Asia. With the publication of this revision there are 45 species which occur in Central America.

Generic Relationships

Spathiphyllum is a member of the subfamily *Monsteroideae*, a group of 12 genera characterized by their lack of laticifers, the frequent presence of H-shaped or T-shaped trichosclerids, apically geniculate, heavily sheathed petioles, typically elongated leaves, often oblique and inaequilateral blades, boat-shaped unconstricted spathes with the spadix fertile to the apex with bisexual flowers, but sometimes with sterile flowers at the base. At present, there are 453 named species of the subfamily in Mexico and Central America.

Monsteroideae consists of three tribes: Spathiphyllae, Anepsiadeae and Monstereae. Tribe Spathiphyllae consists of two genera, *Spathiphyllum* and *Holochlamys* (with a single Asian species possibly nested within *Spathiphyllum*). The tribe is characterized by its almost entirely terrestrial habit, rhizomatous stems, tissues with trichosclerids and lacking laticifers, elongate, heavily sheathed petioles, moderately thin, elongated, inequilateral, parallel-veined blades with the lateral veins alternating between close thick veins and smaller veins of ascending and descending magnitude, the minor veins typically also parallel, as well as solitary, usually long-pedunculate inflorescences with boat-shaped, typically persistent spathes and perigonate, 4- or 6-tepalate flower with the staminal thecae dehiscing by a longitudinal slit with pollen mostly forced out to the tepal surfaces. The small Asian genus *Holochlamys* differs from *Spathiphyllum* in having the peduncle extremely short, the spathe thin and marcescent, a unilocular ovary with basal placentation in contrast to having spathes persisting intact and with 2- to 4-locular ovaries with axile placentation in *Spathiphyllum*.

Geographic Distribution

The genus *Spathiphyllum* currently has 130 species, 127 in the Neotropics and 3 in Asia; 97 species occur in South America of which twelve range into Central America. Central America has 42 species (16 of which are newly described in this paper). In South America most of the species range at relatively low elevations from Colombia east to Venezuela and the Guianas as well as south along the Pacific coast to Ecuador and into the Amazonian rainforest as far south as Brazil and Peru. Only a single species occurs on the eastern edge of Brazil (*Spathiphyllum gaziellae* L.B. Smith). The genus does not occur in Argentina, Uruguay or Paraguay, and Bolivia has only one species (*S. fosteri* Croat & Acebey, ined.). Colombia is the most species-rich country with 34 species. Ecuador has 32, Peru 23, Venezuela 17 and Brazil 12. The Guianas are also surprisingly rich considering the size of the area with Guyana having seven species, Suriname two and French Guiana two.

One new species from Ecuador was recently published, *Spathiphyllum ivanportillae* Croat & Weessies (Croat & Weessies, 2020). There remain 26 unpublished species (including seven undescribed species from Colombia discovered by Felipe Cardona). There are 42 species that occur in Central America with 16 of them new to science published in this paper. Twelve of the Central American species (*S. darienense* Croat & O.Ortiz, *S. dressleri* Croat & F.Cardona, *S. floribundum* (Linden & André) N.E.Br., *S. friedrichsthalii* Schott, *S. fulvovirens* Schott, *S. kalbreyeri* G.S.Bunting, *S. laeve* Engl., *S. patinii* (B.S.Williams ex R.Hogg) N.E.Br., *S. phryniifolium* Schott, *S. quindiuense* Engl., *S. wendlandii* Schott, *S. zetekianum* Standl.) range to Colombia and at least one, *S. friedrichsthalii* ranges to Ecuador. At present only 53 neotropical species have been published. While the Central American species are presently well defined, much work remains in South America. The Colombian species, numbering 34, have been revised by Felipe Cardona (Cardona, 2004). While some species in South America are wide ranging, e.g. *S. canniifolium* (Dryander ex Sims) Schott, most species are relatively narrowly ranging or locally endemic. Unlike several other aroid genera (*Adelonema*, *Anthurium*, *Monstera*, *Philodendron*, *Rhodospatha*, *Stenospermation*), which are most species-rich in the wetter forests of NW Ecuador, Colombia and Panama, *Spathiphyllum* is weakly

represented there with only *S. cornejoi* Croat, *S. friedrichsthalii* Schott, *S. floribundum* (Linden & André) N.E.Br., *S. Fulvovirens* Schott, *S. grandifolium* Engl., *S. phryniifolium* Schott, *S. leave* Engl. *S. kalbreyeri* Bunting and *S. wendlandi* Schott despite the fact that it is one of the genera of Araceae most heavily dependent on abundant sources of water owing to its thin leaves and a terrestrial habit. Most of the Central American species are plants of the forest understory and while often closely associated with stream banks most are not riparian. An exception is *Spathiphyllum quindiuense* which occurs in streams on rocks. In addition, some species mostly inhabit swamps or grow rooted along watercourses (*S. friedrichsthalii*, *S. uspanapaense*). Alternatively, most species from the South American continent occur in or adjacent to streams, often growing on rocky substrates as in the case of those growing on water falls: *S. oriximinense* Croat ined., *S. grazielae* L.B.Smith, or on sandstone cliffs (*S. nangaritense* Croat & Bogner, *S. davidneillii* Croat and *S. manuense* Croat ined.). One species, *S. davidneillii*, perhaps the first ever reported in the genus, is a true epiphyte but one still associated with sandstone outcrops, much like those published by George Bunting from the Venezuelan Guyana Region. The potential for more species in South America is enormous given their tendency toward narrow endemism, their frequently small size and the numerous isolated habitats not yet investigated.

Phylogeny

As part of a broader phylogenetic study of the subfamily *Monsteroideae*, Alejandro Zuluaga and collaborators (Zuluaga et al., 2015) used three plastid and one nuclear marker to test if *Spathiphyllum* was a monophyletic genus or if the smaller component of three species from Southeast Asia was distinct from the larger group in the Neotropics. This study supported the monophyly of the genus *Spathiphyllum* and showed *Spathiphyllum* to be sister to the remaining *Monsteroideae*. They also found that the monotypic Asian genus *Holochlamys* is seemingly nested within *Spathiphyllum* in a clade that contains the few Asian species as well as the American *S. canniifolium* (Dryander ex Sims) Schott.

TAXONOMY

Spathiphyllum Schott in Schott & Endlicher, Melet. Bot.: 22. 1832. — Type: *S. lanceifolium* (Jacq.) Schott (*Dracontium lanceifolium* Jacqu.).

Hydnostachyon Liebm., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1849: 23. 1849. — Type: *Hydnostachyon cochlearispathum* Liebm. [= *Spathiphyllum cochlearispathum* (Liebm.) Engl.].

Massowia K.Koch, Bot. Zeitung (Berlin) 10: 277. 1852. — Type: *Massowia canniifolia* (Dryand. ex Sims) K.Koch, (*Pothos canniifolia* Dryand. ex Sims). [= *Spathiphyllum canniifolium* Dryand ex Sims) Schott].

Spathiphyllopsis Teijsm. & Binn., Natuurk. Tijdschr. Ned.-Indi 25: 400. 1863. — Type: *Spathiphyllopsis minabassae* Teijsm. & Binn. [= *Spathiphyllum commutatatum* Schott].

Amomophyllum Engl. in Gard. Chron, ser. 2, 7: 139. 1877, [non *Amomophyllum* Watelet (1866); i.e. fossil Zingiberaceae]. — Type: *Amomophyllum patinii* (B.S.Williams ex R.Hogg)

Engl., (*Anthurium patinii* B.S.Williams ex R.Hogg; lectotype, designated by Nicolson, 1967). [= *Spathiphyllum patinii* (B.S.Williams ex R.Hogg) Engl.]

Terrestrial herbs; rhizome creeping, often just below the surface of the ground, the plant appearing to be acaulescent; internodes short; cataphylls usually missing; roots emerging through the petiole bases. LEAVES several, mostly erect to erect-spreading; **petioles** often fully sheathed, with apical geniculum; **blades** oblong to elliptic to narrowly elliptic, acuminate at apex; midrib sunken above, narrowly raised below; primary lateral veins moderately numerous, extending to the margins; interprimary veins and minor veins nearly always present, usually alternating with descending order of vein size, higher order veins transverse-reticulate. INFLORESCENCE solitary; peduncles as long as or longer than leaves; **spathe** oblong-elliptic to elliptic or obovate, acuminate at apex, acute to obtuse or rounded and sometimes conspicuously decurrent at base; midrib and primary lateral veins white or green but usually turning green post-anthesis; **spadix** cylindric, erect, shorter than spathe, stipitate, rarely sessile, stipe often adnate in part to the spathe; **flowers** bisexual, perigyniate; tepals 4–6, arching over pistil and rarely fused into a ring; stamens 4–6, free, filaments short, flattened; connective slender; thecae oblong-ellipsoid to ovoid, dehiscing by longitudinal slit; pollen inaperturate, ellipsoid to ellipsoid-oblong; gynoeceum ovoid, subcylindric, obovoid or flask-shaped; ovary 3-locular, rarely 2- or 4-locular, ovules 2, 4, 6 or 8 per locule, anatropous to hemianatropous; placentation axile; style conic and sometimes prominently exerted, sometimes truncate; stigma 2- or 3-lobed or subcapitate. **Berries** 1–8 seeded, greenish; seeds oblong, elliptic to ovate or reniform, pale yellow to brown, striate-verrucose; embryo axile, elongate, slightly curved; endosperm copious.

Distribution — Central America from central Mexico along both coasts to Panama and throughout the northern third of South America; West Indies (rare in Lesser Antilles); Eastern Malay Archipelago, New Guinea to the Pacific Islands (Melanesia, Moluccas, Palau Is, Sulawesi, New Britain, New Ireland).

One hundred sixteen species occur in the Neotropics; three or four (one undescribed) species in Asia; 43 species in Central America

Distribution in Central America

The distribution of species in North America shows considerable endemism with 12 of the 17 Mexican species considered endemic. While Middle America (Guatemala, Belize, Honduras, Nicaragua and Costa Rica) has 15 species, only four of them, *S. abelianum* and *S. cardonatum* from Costa Rica and *S. clewellii* and *S. hannonii* from Honduras are endemic to that region. Aside from *S. blandum*, *S. clewellii*, *S. hannonii*, *S. matudae* and *S. ortgiesii* all the other Mesoamerican species occur in Costa Rica. In most aroid genera Costa Rica usually has a higher percentage of endemics and Honduras has among the fewest endemics. Thus, the distribution of endemic *Spathiphyllum* species in Central America is bimodal with Mexico having 12 of 17 species endemic and Panama having 9 of 23 species or almost half of its total species number. While the distribution of *Spathiphyllum* in South America is still poorly known, twelve of the Central American species are known to range to Colombia, namely *S. dressleri*, *S. floribundum*, *S. friedrichstahlia*, *S. fulvovirens*, *S. kalbreyeri*, *S. leave*, *S. patinii*, *S. phryniiifolium*, *S. quindiuense*, *S. silvicola*, *S. wendlandii* and *S. zetekianum*.

INFRAGENERIC CLASSIFICATION

Key to the sections of *Spathiphyllum* in Mexico & Central America (adapted from Cardona, 2004).

- 1a.** Perianth segments (tepals) totally connate..... **I. sect. *Massowia***
1b. Perianth segments (tepals) free, at least at the apex **2**
- 2a.** Pistils truncate to subtruncate or blunt and scarcely exceeding the perianth.....
 **II. sect. *Amomophyllum***
2b. Pistils attenuate or conical and exceeding the perianth **III. sect. *Spathiphyllum***

I. *Spathiphyllum* sect. *Massowia* (K.Koch) Engl. in Monogr. Phan. [A.DC. & C.DC.] 3: 228. 1879. — *Massowia* K.Koch, Bot Zeitung (Berlin) 10: 277. 1852. — Type: *Spathiphyllum cannifolium* (Dryand. ex Sims) Schott, (*Pothos cannifolius* Dryand. ex Sims).

Spathiphyllopsis Teijsm. & Binn., Natuurk. Tijdschr. Ned.-Indi 25: 400. 1863. — Type: *Spathiphyllopsis minahassae* Teijsm. & Binn. [= *Spathiphyllum commutatum* Schott].

Central American species in this section: *S. leave* Engl.

II. *Spathiphyllum* sect. *Amomophyllum* (Engl.) Engl. in Monogr. Phan. [A.DC. & C.DC.] 3: 227. 1879. — *Amomophyllum* Engl., Gard. Chron. n.s. 7: 139. 1877. — Type: *Spathiphyllum patinii* (B.S.Williams ex R.Hogg) N.E.Br., (lectotype, designated by Nicolson, 1967).

Central American Species in this section: *S. atrovirens* Schott, *S. brevirostre* (Liebm) Schott, *S. darienense* Croat & O.Ortiz, *S. dressleri* Croat & O.Ortiz, *S. floribundum* (Linden & André) N.E.Brown, *S. fulvovirens* Schott, *S. kalbreyeri* G.S.Bunting, *S. kennedyae* Croat, *S. morii* Croat & O.Ortiz, *S. ortgiesii* Regel, *S. ortizii* Croat, *S. patinii* (B.S.Williams ex R.Hogg) N.E.Brown, *S. quindiuense* Engl., *S. silvicola* R.A.Baker, *S. uspanapaense* Matuda.

III. *Spathiphyllum* sect. *Spathiphyllum*. — (sect. '*Euspathiphyllum*' Engl. in Monogr. Phan. [A.DC. & C.DC.] 3: 220. 1879). — Type: as for genus. *Hydnostachyon* Liebm., Vidensk. Meddel. Naturhist. Foren. København 1849: 23. 1849. — Type: *Hydnostachyon cochlearispathum* Liebm. [= *Spathiphyllum cochlearispathum* (Liebm.) Engl.].

Central American species in this section: *S. admirantense* Croat, *S. ayalae* Croat & O.Ortiz, *S. bobdressleri* Croat & O.Ortiz, *S. bonyicense* Croat, *S. cardonanum* Croat & Grayum, *S. clewelii* Croat, *S. cochlearispathum* (Liebm.) Engl., *S. friedrichsthalii* Schott, *S. guadalupense* Díaz Jim., *S. hentrichianum* Díaz Jim, *S. hubertkrusei* Croat, *S. luteynii* Croat & O.Ortiz, *S. matudae* G.S.Bunting, *S. mixtecorum* Díaz Jim. & Pérez-Farr., *S. montanum* (R.A.Baker) Grayum, *S. munniae* Croat, *S. phryniifolium* Schott, *S. uspanapaense* Matuda, *S. wendlandii* Schott, *S. wilfridoanum* Díaz Jim., *S. zetekianum* Standley.

Key to *Spathiphyllum* species of Mexico and Central America Note: Species may appear more than once in key.

- 1a.** Flowers with the pistils prominently exerted, protruding significantly above the level of the tepal (usually 2–5 mm above tepals), usually pointed at apex..... **2**
- 1b.** Flowers with the pistils barely exerted, not protruding significantly above level of the tepals, usually bluntly pointed at apex **36**
- 2a.** Spathe white at anthesis..... **3**
- 2b.** Spathe green to greenish at anthesis **10**
- 3a.** Species from Mexico (includes *S. friedrichsthalii* which ranges from Mexico to Ecuador...**4**
- 3b.** Species from Costa Rica or Honduras..... **7**
- 4a.** Plants less than 60 cm tall; spathe less than 10 cm long, less than 3.5 cm wide; primary lateral veins departing midrib at 25–45° ***S. uspanapaense*** Matuda
- 4b.** Plants generally more than 60 cm tall; spathe more than 10 cm long, more than 4 cm wide; primary lateral veins departing midrib at 45–80° **5**
- 5a.** Petiole with geniculum less than 2.7 cm long; plants inhabiting open swampy areas; flower very fragrant..... ***S. friedrichsthalii*** Schott
- 5b.** Petioles with geniculum typically more than 4 cm long; plants typically not in open swampy areas; flower fragrance unknown **6**
- 6a.** Plants 1–2.5 m tall; petioles sheathed 0.66–0.71 their length; geniculum moderately conspicuous, typically more than 4 cm long; primary lateral veins 14–25 per side, drying paler on lower surface; western Mexico, Guatemala and El Salvador.....
..... ***S. matudae*** G.S.Bunting
- 6b.** Plants to 1 m tall; petioles sheathed 0.78 their length; geniculum scarcely visible, no more than 2 cm long; blades weakly short-acuminate at apex; primary lateral veins 27 per side, drying darker on lower surface; Mexico, N. Oaxaca State, Cordillera de Mastepec .
..... ***S. munniae*** Croat
- 7a.** Petioles sheathed throughout **8**
- 7b.** Petioles sheathed 0.57–0.80 their length **9**
- 8a.** Petioles usually sheathed throughout and continuous with the margin of the decurrent base of the blade; sheath margins often minutely undulate; blades oblanceolate to elliptic, 24–74 cm long, 8.5–17(28) cm wide, 3.0– 3.2 times longer than wide, attenuate and decurrent onto the geniculum at base; spathe white with green midrib; Costa Rica to Panama and Colombia at 0–1150 m ***S. wendlandii*** Schott
- 8b.** Petioles usually sheathed throughout but ending rounded and weakly free-ending, not continuous with the margin of the decurrent base of the blade; sheath margins not at all undulate; blades narrowly ovate-elliptic, 45 × 19.3 cm, 2.3 times longer than wide, broadly acute and weakly attenuate at base; spathe greenish white; Honduras, swampy Atlantic coastal forest near sea level..... ***S. clewellii*** Croat
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- 9b.** Plants usually more than 40 cm tall; spadix cylindroid with acute and narrow conical

- pistils; Costa Rica & W. Panama. *S. montanum* (R.A.Baker) Grayum
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- 11a.** Spadix white to yellowish cream at anthesis **12**
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- 13b.** Leaf blades usually 7–13 cm wide, 3–4 times longer than wide; primary lateral veins 10–17 per side, departing midrib at 3–60° **14**
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- 14b.** Petiole more than 50 cm long..... **16**
- 15a.** Petioles 25–68 cm long, sheathed to the geniculum; blades more than 45 cm long, 1.8–2 times longer than wide; primary lateral veins 27–42 per side. *S. guadalupense* Díaz Jim.
- 15b.** Petioles 35–46 cm long, sheathed no more than 90% their length; blades less than 45 cm long, 2.6–3.6 times longer than broad; primary lateral veins mostly 11–15 per side
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- 16a.** More than 38 primary lateral veins per side *S. maldonadoanum* Díaz Jim.
- 16b.** Fewer than 38 primary lateral veins per side **17**
- 17a.** Geniculum less than 5.5 cm long..... **18**
- 17b.** Geniculum more than 5.5 cm long..... **19**
- 18a.** Leaf blade less than 50 cm long, 7–13 cm wide; primary lateral veins less than 17 per side.....*S. bentrichianum* Díaz Jim.
- 18b.** Leaf blade more than 50 cm long, 14–29 cm wide; primary lateral veins more than 24 per side *S. wilfridoanum* Díaz Jim.
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..... *S. cochlearispathum* (Liebm.) Engl.
- 19b.** Large plants (to 2.3 m tall), growing in large aggregations in open areas; petioles up to 2 times longer than petioles, sheathed to the middle or somewhat above the middle; blades 2–2.5 times longer than broad; spadix stipitate 8–22 mm.
.....*S. croatii* Díaz Jim. & Pérez-Farr.
- 20a** Petiole sheath extending across geniculum *S. ortgiesii* Regel
- 20b.** Petiole sheath extending at most to base of the geniculum **21**

- 21a.** Plants less than 0.75 m tall **22**
- 21b.** Plants to more than 1 m tall..... **23**
- 22a.** Petioles less than 20 cm, sheathed to the geniculum; blades less than 28 cm long and 8 cm wide; drying black to dark greenish above; primary lateral veins (9–12 per side); spathe 8.23–12 cm long x 3–5 cm wide; spadix whitish cream 2.2–5 cm long, the stipe to 15 mm long; Oaxaca *S. mixtecorum* Díaz Jim. & Pérez-Farr.
- 22b.** Petioles 35–46 cm long, sheathed 0.39–0.90 its length; blades 26–36.7 cm long x (6)8.6–13.2 cm wide, drying typically medium green on both surfaces; primary lateral veins (9)11–15 per side; spathe 3.8–16 cm long, (1.9)2.6–6.0 cm wide; spadix typically light green, 3.5–8 cm long, sessile or with stipe 2–4 mm long; Guerrero to Oaxaca..... *S. hubertkrusei* Croat
- 23a.** Plants to 1 m tall; geniculum scarcely visible, no more than 2 cm long; blades weakly short-acuminate at apex; primary lateral veins drying darker on lower surface; Mexico, N Oaxaca State, Cordillera de Mastepec..... *S. munniae* Croat
- 23b.** Plants 1–2.5 m tall; geniculum moderately conspicuous, typically more than 2.5 cm long; blades acute-acuminate or mucronate at apex (short-acuminate for *S. guadalupense*); primary lateral veins usually, drying paler than blade surface (concolorous for *S. guadalupense*); Mexico, Guatemala and El Salvador **24**
- 24a.** Petioles sheathed to the geniculum; blades short-acuminate; primary lateral veins drying concolorous with blade; eastern slope in Tabasco State, Mexico... *S. guadalupense* Díaz Jim.
- 24b.** Petioles sheathed 0.5–0.7 their length; blades acute-acuminate to mucronate; primary lateral veins drying paler or darker than blade surfaces; western slope of Central American and Mexico **25**
- 25a.** Petioles mostly 35–50 cm long; primary lateral veins (14)20–25 per side; spadix frequently stipitate (stipe 0.6–2.0(2.5) cm long); pistils constricted between the ovary and the style. *S. matudae* G.S.Bunting
- 25b.** Petioles 55–81 cm long; primary lateral veins 26–38 per side; spadix sessile or stipitate to 11 mm, not constricted between ovary and style **26**
- 26a.** Petiole lacking a white, band along the margin of the sheath; petioles sheath 3–6.5 cm or up to the geniculum; leaf blade ca. 2 times longer than broad, obtuse or rounded at base; spadix 6.5–10 cm long. *S. frailescanense* F.J.-Pérez, Díaz Jim. & Pérez-Farr.
- 26b.** Petiole with a white, band along the margin of the sheath; petioles sheath 19–27.3 cm from the geniculum; leaf blade up to 3 times longer than broad, acute and weakly attenuated at base; spadix 14.5–15 cm long..... *S. hannonii* Croat
- 27a.** Usually growing in swampy areas; spathe and spadix white at anthesis..... *S. friedrichsthalii* Schott
- 27b.** Growing in forested areas; spathe green at anthesis..... **28**

- 28a.** Spathe pale green with darker green veins; spadix cream; Panama (Cerro Campana and Cerro Jefe); 700 m.....***S. bobdressleri*** Croat & O.Ortiz
- 28b.** Spathe solid medium green; spadix green; Costa Rica, Panama or Belize to Colombian and Ecuador..... **29**
- 29a.** Spadix spherical to fusiform; style broadly conical; Costa Rica (endemic).....
.....***S. cotonense*** M.Cedeño & O.Ortiz
- 29b.** Spadix generally cylindroid; style slender, sharply tapered; Panama or Belize to Colombian and Ecuador **30**
- 30a.** Leaf blades ovate to elliptic, 1.8–2 times longer than wide, rounded to acute at base (somewhat attenuated at very base in *S. bonyicense*); primary lateral veins very close to moderately closely spaced, usually more than 25–30 per side (with veins slightly more widely spaced for *S. bonyicense*)..... **31**
- 30b.** Leaf blades elliptic to ovate-elliptic, lanceolate or broadly oblanceolate, (2.0)2.6–3.1(3.5) times longer than wide (blades only 1.3–1.9 times longer than wide but with many close veins in *S. dressleri*), narrowly rounded to acute or weakly attenuate at base; primary lateral veins widely spaced, usually fewer than 20 per side **32**
- 31a.** Leaf blades drying dark brown on the upper surface, rounded but at very base decurrent on the petiole; primary lateral veins in the lower 6 cm of blade numbering 5 or 6 per side; spathe narrowly long attenuate at apex with the narrowed portion 4–5 cm long; spadix green; 1800–1810 m.***S. cardonanum*** Croat & Grayum
- 31b.** Leaf blades drying medium brownish gray above; base of blade acute; primary lateral veins in the lower 6 cm of blade numbering 2 or 3 per side; spathe short-acuminate at apex; spadix white; less than 300 m. ***S. bonyicense*** Croat
- 32a.** Leaf blades less than 30 cm long and 8.5 cm wide; spathe less than 15 cm long; pistils green at apex, whitish at base; tepals free from one another; berries white at maturity; Panama (Comarca Ngäbe-Buglé at 1688 m in a *Lower montane rain forest* life zone).....
..... ***S. ayalae*** Croat & O.Ortiz
- 32b.** Leaf blades often more than 32 cm long and 8.5 cm wide; spathe usually more than 14 cm long (to 33 cm long); pistils green throughout; tepals free from one another; berries greenish at maturity..... **33**
- 33a.** Leaf blades mostly elliptic to oblanceolate with the base narrowly acute; primary lateral veins 15–30 per side and very closely spaced **34**
- 33b.** Leaf blades mostly lanceolate to oblong-lanceolate or oblong, rounded, truncate to obtuse at base (acute in *S. zetekianum* but the primary lateral veins not close and numerous); primary lateral veins 15–25 but not closely spaced **35**
- 34a.** Leaf blades obovate-elliptic to broadly oblanceolate, drying dark gray-brown to dark brown above, yellow-brown to grayish brown below; Panama: Colón, Coclé & Panamá Provinces, 100–1100 m..... ***S. luteynii*** Croat & O.Ortiz
- 34b.** Leaf blades elliptic, drying gray; Panama: Bocas del Toro, less than 200 m.....
..... ***S. almirantense*** Croat

- 35a.** Blades lanceolate, acute or sometimes obtuse at base; the stylar region of the pistil obtuse; Panama: Canal Zone to Colombia: Chocó, 40–400 m. *S. zetekianum* Standl.
- 35b.** Blades oblong-lanceolate or oblong, rounded, truncate to obtuse at base; Panama & Belize to Ecuador, 50–1500 m, mostly in Tropical moist forest, Premontane wet forest and Tropical wet forest in Mesoamerica *S. pbryniifolium* Schott
- 36a.** Species from Mexico **37**
- 36b.** Species from Nicaragua to Colombia and other parts of South America **38**
- 37a.** Leaf blades narrowly ovate to linear-lanceolate, 11.5–26.5 cm long, 3.3–6.0 cm wide, 2.8–5.2 times longer than broad; plants less than 60 cm tall; spathe less than 10 cm long, less than 3.5 cm wide; primary lateral veins departing midrib at 25–45°; Mexico, 25–150 m *S. uspanapaense* Matuda
- 37b.** Leaf blades elliptic to ovate-elliptic, (7.5) 20–41(65) cm long, 12–21(24.7) cm wide; spathe (12.8) 17–26.5 cm long, 5–9.5(11.3) cm wide; spadix more than 12 cm long, typically more than 4 cm wide; primary lateral veins departing midrib at typically 45° on larger blades; Mexico to Belize, Guatemala & El Salvador, 330–1700 m *S. brevirostre* (Liebm.) Schott
- 38a.** Spadix white or creamy **39**
- 38b.** Spadix green or greenish **45**
- 39a.** Spathe white, at least on inner surface **40**
- 39b.** Spathe green on both surfaces **43**
- 40a.** Leaf blades mostly 17–20 cm wide *S. fulvovirens* Schott
- 40b.** Leaf blades less than 12.5 cm wide **41**
- 41a.** Leaf blade 6.0–7.5(9.6) times longer than wide *S. quindiuense* Engl.
- 41b.** Leaf blades 2.5–3.6 times longer than wide **42**
- 42a.** Spathe markedly narrowed, usually acute and only weakly attached at base, usually spreading; Panama: Colón, Guna Yala & Panamá, 250–800 m. *S. patinii* (B.S. Williams ex R.Hogg) N.E. Brown
- 42b.** Spathe acute to rounded but tightly affixed to peduncle, usually suberect; Panama: Coclé, Colón, Guna Yala, 35–200 m *S. kalbreyeri* G.S. Bunting
- 43a.** Leaf blades 9–12.5 cm wide *S. floribundum* (Linden & André) N.E. Br.
- 43b.** Leaf blades (9.5) 14–17 cm wide **44**
- 44a.** Leaf blades 2.5–2.9 times longer than wide; Costa Rica to Panama and Colombia; 40–800 m *S. silvicola* R.A. Baker
- 44b.** Leaf blades 6.5–7.5 times longer than wide; Panama and Colombia *S. quindiuense* Engl.

- 45a. Species from Mexico to Belize, Guatemala & El Salvador, mostly above 650m
.....*S. brevirostre* (Liebm.) Schott
- 45b. Species from Nicaragua, Costa Rica, Panama & Colombia 46
- 46a. Leaf blades less than 14 cm wide..... 47
- 46b. Leaf blades usually more than 15 cm wide 53
- 47a. Spathe usually more than 3 cm wide (sometimes to only 2.5 cm wide in *S. dressleri*);
central Panama to northern Colombia at elevations of near sea level to 700 m in areas of
Premontane wet forest and *Tropical wet forest* life zones..... 48
- 47b. Spathe usually less than 3 cm wide..... 49
- 48a. Plants to 0.5 m tall; blades obovate-elliptic; spathe caviform, 6.55–13 cm long, 2.2–4
times longer than broad; spadix 1.5–2.2 cm long; style often acute and weakly protruding;
ovules 1 per locule. *S. dressleri* Croat & F.Cardona
- 48b. Plants to 0.75 m tall; blades elliptic; spathe flattened, 7 cm long, 1.4 times longer than
broad; spadix 2.5–5.5 cm long; style rounded and barely perceptible; ovules 4–6(7) per
locule. *S. darienense* Croat & O.Ortiz
- 49a. Leaf blades typically less than 6 cm wide..... *S. ortizii* Croat
- 49b. Leaf blades typically more than 6 cm wide..... 50
- 50a. Leaf blades less than 26 cm long; spadix less than 5.5 cm long.....
..... *S. floribundum* (Linden & André) N.E.Br.
- 50b. Leaf blades more than 33 cm long; spadix usually more than 6 cm long 51
- 51a. Leaf blades usually less than 11 cm wide; tepals free, not fused into a complete circle
around pistils..... *S. kalbreyeri* G.S.Bunting
- 51b. Leaf blades more than 10 cm wide; tepals free from one another or fused into a complete
circle around pistil..... 52
- 52a. Petioles frequently densely covered with minute stellate scale-like trichomes; tepals fused
into a complete circle around pistil *S. laeve* Engl.
- 52b. Petioles glabrous; tepals not fused into a circle.*S. abelianum* A.Rojas & J.M.Chaves
- 53a. Leaf blades markedly decurrent at base with the geniculum of the petiole seemingly
3–5 cm below the end of the blade proper; petioles glabrous; Costa Rica and western
Panama *S. atrovirens* Schott
- 53b. Leaf blades acute to rounded at base with the geniculum of the petiole directly at base of
the blade; Costa Rica, Panama & Colombia 54
- 54a. Plants usually less than 1 m tall or to 1.25 m; petioles often densely covered with scale-
like stellate trichomes, sheathed 0.25–0.73 their length; spathe scarcely or not at all
decurrent at base; Nicaragua, Costa Rica, Panama at sea level to 1100 m (mostly less than
500 m) to 1550 in Colombia.*S. fulvovirens* Schott

- 54b.** Plants to 1.6–2 m tall; petioles glabrous, sheathed 0.7–0.8 their length or only to 0.25 their length; spathe prominently decurrent at base; Panama: Veraguas, Santa Fe at 580 m, and Bocas del Toro, less than 200 m)..... **55**
- 55a.** Plants to 1.6–2 m tall; petioles sheathed 0.7–0.8 their length; blades narrowly ovate, less than 50 cm long, rounded and attenuate at base; spathe narrowly ovate, less than 27 cm long, decurrent 2–3 cm at base; Panama: Veraguas, Santa Fe. *S. morii* Croat & O.Ortiz
- 55b.** Plants to 1.65 tall; petioles sheathed 0.25 their length; blades narrowly ovate-elliptic, more than 60 cm long, subrounded and inequilaterally obtuse, scarcely attenuate at base; spathe decurrent 13.5 cm at base; Panama: Bocas del Toro, less than 200 m).....
.....*S. kennedyae* Croat

SPECIES DESCRIPTIONS

Spathiphyllum abelianum A.Rojas & J.M.Chaves, Brenesia 75–76: 4. 2011. — Type: COSTA RICA. Puntarenas: Isla del Coco, Parque Nacional Isla del Coco, meseta occidental, fila al N de cerro Iglesias y rumbo a cabo Dampier, 05°31'05"N, 87°04'35"W, ca. 400 m, 27 June 2010 *A.F. Rojas & J.M. Chaves 8996* (holotype, CR; isotypes MO, USJ).

Terrestrial herb to ca. 1 m tall, forming large dense populations in understory; internodes short, 1.8–2.1 cm diam. LEAVES erect; **petioles** 58.4–90.2 cm long, **sheathed** 0.33–0.50 its length, glabrous, drying yellowish brown; free part up to 42.5 cm long; geniculum 2.2–3.9 cm long, light green, paler than shaft, drying darker than shaft, not thickened; **blades** narrowly elliptic to subovate, 33–49.8 cm long, 11.5–17.6 cm wide, 2.5–3.0 times longer than wide, 0.57–0.6 times longer than petioles, thinly coriaceous, moderately inequilateral, prominently short-acuminate at apex, narrowly acute at base, moderately bicolorous, semiglossy, drying dark brown and matte above, much paler, yellowish brown and weakly glossy below; midrib sunken and slightly paler above, narrowly raised and paler below, drying sunken and concolorous above, narrowly rounded and darker below; **primary lateral veins** 28–30 per side, departing midrib at 50–53° at base of blade, more narrowly acute toward apex, broadly curved, moderately sunken and concolorous above, narrowly rounded and concolorous below, drying concolorous above, narrowly rounded and darker below, barely more prominent than interprimary veins and these alternating with increasingly smaller lateral veins. INFLORESCENCE almost as long as leaves; peduncle 84.5–101.3 cm long; **spathe** 21.5–28.2 cm long, 2.1–3.6 cm wide, spreading, lanceolate, medium green, narrowly long-acuminate at apex, generally decurrent at base, drying dark reddish brown; **spadix** 6.0–9.4 cm long, 5–7 mm diam., stipitate 1.1–1.7 cm, medium green, drying dark brown; flowers 6–8 tepalate; tepals separated, green; **pistils** white, weakly and narrowly raised; ovary 3(4)-locular; berries uniformly white, lacking seeds.

Figures 1–7.

Distribution — The species is apparently restricted to three populations in Costa Rica on the Meseta Occidental on the Isla del Coco (Rojas & Chaves-Fallas, 2011).



Figure 1: *Spathiphyllum abelianum*, Habit, Photo A. Rodriguez



Figure 2: *Spathiphyllum abelianum*, Upper blade surface, Photo A. Rodriguez



Figure 3: *Spathiphyllum abelianum*, Lower blade surface, Photo A. Rodriguez

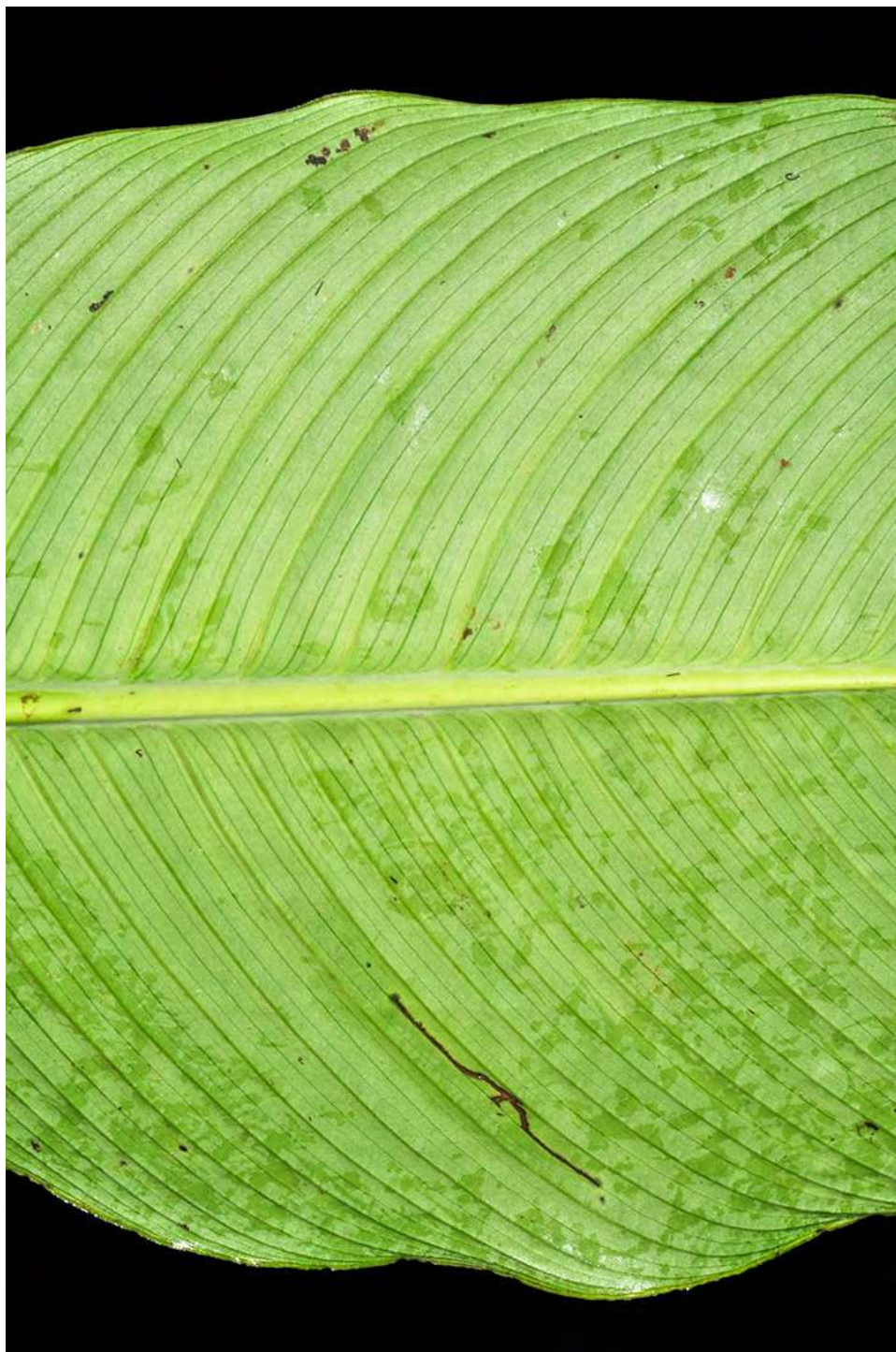


Figure 4: *Spathiphyllum abelianum*, Lower blade surface, Photo A. Rodriguez



Figure 5: *Spathiphyllum abelianum*, lower blade surface showing base with geniculum, Photo A. Rodriguez



Figure 6: *Spathiphyllum abelianum*, A. Rodriguez 14610, Costa Rica, Photo A. Rodriguez



Figure 7: *Spathiphyllum abelianum*, A. Rodriguez 14610, Costa Rica, Photo A. Rodriguez

Comments — *Spathiphyllum abelianum* is characterized by its modest size, long-petiolate leaves, moderately broad blades, an inflorescence longer than the leaves with a moderately broad, green, spreading spathe and green spadix with the white pistils barely emerging above the level of the tepals.

Spathiphyllum abelianum is closest to *S. fulvovirens* which occurs on the Atlantic slope of Costa Rica and has shorter petioles (mostly 46–74 cm long versus mostly 70–90 cm for *S. abelianum*) which are usually covered with stellate trichomes (versus glabrous for *S. abelianum*) and proportionately narrower leaves (2.7–3.0 times longer versus about 2.5 times longer for *S. abelianum*), a shorter spathe (9–18 cm long versus 21.5–28.2 for *S. abelianum*). *Spathiphyllum abelianum* may be confused with *S. silvicola* but that species differs by having the petiole sheathed up to 0.6 or 0.8 its length, in having proportionately broader, more narrowly acuminate blades 1.7–2.5 times longer than broad, 12–22 pairs of primary lateral veins that spread at up to 60 or 75° angle and usually are more prominently quilted, a usually erect spathe and a creamy white spadix.

Additional specimens seen: **COSTA RICA. Puntarenas:** Puntarenas, Isla de Coco, meseta occidental, fila al N. de cerro Iglesias y rumbo a cabo Dampier, 05°31'20"N, 87°04'45"W, ca. 350 m, 23 January 2010, *J. M. Chaves & A. F. Rojas* 25 (CR, MO, US); Parque Nacional Isla de Coca, al N. de Caboo Dampier, cercanías de Quebrada Albatroz, 05°31'0.35"N, 87°04'28.4"W, 360 m, 10 November, 2016, *Rodriguez* 14610 (CR).

Spathiphyllum almirantense Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: hill behind Almirante, first ridge, 09°16'36"N 82°23'36"W, 16 November 1971, *H. Kennedy & R. Dressler* 1264 (holotype, F-1771496).

Diagnosis: *Spathiphyllum almirantense* is characterized by its modest size, light brown-drying, fully sheathed petioles, sheath weakly and narrowly ending at apex, grayish matte-drying, elliptic, narrowly acuminate, weakly bicolorous blades with the surfaces drying minutely areolate as well as by the long-pedunculate inflorescence with the broad, narrowly acuminate, green spathe and green spadix with prominently exerted pistils.

Herb to 1.6 m tall; **internodes** short, drying 2.5 cm diam., densely rooted. LEAVES with **petioles** 39.5–41.5 cm long, drying light brown, finely ribbed, densely granular, sheathed to the geniculum but with the distal few cm so narrow as to be scarcely visible, the sheath to 6 mm high midway; **sheath** 36.5–39.0 cm long, margins drying thin, dark brown, sometimes breaking up; free part lacking or at most a few millimeters long; geniculum 2.0–2.5 cm long, more or less terete but narrowly sulcate, slightly darker, not swollen; **blades** elliptic, 41.8 cm long, 16.9 cm wide, 2.4 times longer than wide, about as long as petioles, narrowly and gradually short-acuminate at apex, weakly attenuate at base, light green above, pale yellow-green and matte below, drying greenish gray and weakly glossy above, slightly paler and yellowish gray, semiglossy below; midrib obtusely and deeply sunken and concolorous above, narrowly rounded and closely ribbed, concolorous below; **primary lateral veins** fewer than 20 per side, departing midrib at an acute angle, then at 30–50°, weakly raised and concolorous above, narrowly raised, darker or concolorous below; minor veins weakly and irregularly sunken, narrowly, closely and uniformly spaced and paler below; surfaces densely and minutely

areolate. INFLORESCENCE held well above the leaves; peduncle 67 cm long, drying light brown, closely ribbed, densely granular, matte, 3.5 mm diam.; **spathe** 20.3 cm long, 6 cm wide, dark green outside, olive-green inside, closely veined, the veins thin, dark, frequently branched; **spadix** 8.5 cm long, 1.3 cm diam., light green; flowers 7–9 visible per spiral; tepals free to the base, constricted on either side with a narrow flaring lobe; **pistils** 4–5 mm long, 3.5 mm diam., prominently exerted, pointed, often with an oblique spreading extension directed to one side; ovules 2 per locule, initially eccentric with the funicle attached midway, becoming cylindroid, 2 mm long, 0.8 mm diam. Berries not seen. **Figure 8.**

Distribution — *Spathiphyllum almirantense* is endemic to Panama, known only from the type locality in Bocas del Toro Province at 100–200 m in a *Premontane wet forest* life zone.

Comments — *Spathiphyllum almirantense* is perhaps most easily confused with *S. wendlandii* owing to the fully sheathed petioles but that species has petioles that are prominently alate throughout with the wing continuous with the decurrent base of the blade, oblanceolate to elliptic blades that are often more than 50 cm long and 3.0–3.2 times longer than wide, short-acuminate at apex, attenuate and decurrent onto the geniculum at base and dry dark gray-brown to greenish brown above and yellowish brown below. In contrast, *Spathiphyllum almirantense* has petioles only narrowly and inconspicuously sheathed, elliptic leaf blades less than 50 cm long and 2.4 times longer than wide, narrowly and gradually acuminate at apex, weakly attenuate at base and dry greenish gray and weakly glossy above, slightly paler and yellowish gray below. Like *Spathiphyllum almirantense*, *S. blandum* has a fully sheathed petiole but that species, known mostly from Veracruz State in Mexico with an outlying population in Honduras, also differs by having a broadly winged petiole that merges with the wing on the geniculum and continues as the margin of the blade, whereas in *S. almirantense* the sheath diminishes to practically nothing by the time it reaches the apex of the blade. *Spathiphyllum ortgiesii*, yet another species with a fully sheathed petiole, differs by having the petiole margin crinkled and continuous with the margin of the blade as well as by having the blade drying frequently dark brown to blackened.

Etymology — The species is named for the type locality near Almirante in Bocas del Toro Province.

Spathiphyllum atrovirens Schott, Oesterr. Bot. Z. 8: 179. 1858. — Type: COSTA RICA. [Guacantaste?]: Pedregal, 10.VIII.1857, *Wendland 1264* (lectotype GOET, designated by Dowe et al., 2022).

Herb to ca. 1.5 m tall; internodes short, 3–4 cm diam.; sheath dark green, weakly glossy, subterete, slightly thicker than broad. LEAVES 71.3–86.8 cm long; **petioles** (22)50–70(117) cm long, sheathed 0.26–0.50 (0.66) cm, 1–2 cm wide on the sides; sheath 31–51 cm long, margin slightly paler, weakly wrinkled; free part (8)22–67 cm long, less than 8 mm diam.; geniculum 3–7 cm long but 3–5 cm below where the blade appears to end, sharply sulcate in apical ½; **blades** lanceolate or oblong-lanceolate or broadly elliptic, (27)40–61 cm long, (9.5)15–22(26.5) cm wide, 2–3 times longer than broad, 0.3–0.8 times as long as petioles, acuminate at apex, obtuse to rounded or subtruncate and also usually somewhat



Figure 8: *Spathiphyllum almirantense*, Kennedy & Dressler 1264 TYPE, Panama

attenuated onto petiole at base, subcoriaceous, dark green and weakly glossy to semiglossy above, moderately paler and weakly glossy below, drying medium gray and matte above, grayish green and semiglossy below; midrib sunken and paler above, thicker than broad, paler and weakly glossy below; **primary lateral veins** 17–38 per side, departing midrib at 60–70°, weakly quilted-sunken above, weakly convex to narrowly rounded and paler below; tertiary veins obscurely visible below. INFLORESCENCE erect, shorter than to about as high as leaves; peduncle terete, (33)50–103 cm; **spathe** pale green at anthesis, weakly glossy, somewhat hooding spadix, cucullate, elongate-elliptic to oblanceolate, (11)16–29(38) cm long, (4.3)6.7–7.5(12.0) cm wide, attenuate-acuminate, strongly apiculate at apex, acute and decurrent 3–16 cm at base; **spadix** (2.9)3.5–6.0(10.0) cm long, stipitate 0.5–1.0(2.3) cm, white-cream to greenish white, weakly glossy, 9 mm diam., inclined forward; flowers 7–9 visible per spiral; tepals pale yellow-brown, free at apex, irregularly 3- or 4-sided and cucullate; **pistils** weakly exerted, obpyramidal, slightly constricted between the annular style and the ovary, apically subtruncate, only the elevated stigma exceeding the perianth; ovary 3-locular, truncate at apex, style not visible or up to 0.5 mm long, the ovules superposed, varyingly (2)3 or 4 in each of the 3 locules, totally (8)912 ovules per ovary. INFRUCTESCENCE pale green, 2.3–2.7 cm diam.; pistils green, acute, rounded at apex, held slightly above tepals; **berries** drying 4–5 mm diam., rounded and drying dark brown at apex, sides of the ovary pale brown; seeds drying blackened, smooth, glossy, 2.5 mm long, 1.4 mm diam., terete in cross-section. **Figures 9–16.**

Distribution — *Spathiphyllum atrovirens* ranges from Costa Rica (both slopes of the Cordillera Tilarán & Cordillera Central and western slopes of Cordillera de Talamanca) to western Panama at 600–1700 m in *Tropical wet forest* life zones.

Comments — *Spathiphyllum atrovirens* is characterized by its blades which are prominently attenuated at the base so that the geniculum appears to be well below the end of the blade proper as well as by its typically hooding, pale green spathe, white-cream to greenish white, prominently stipitate spadix with only weakly exerted pistils which are slightly constricted between the annular style and the ovary which is apically subtruncate with only the elevated stigma exceeding the perianth (M. Grayum, pers. comm.).

Spathiphyllum atrovirens tracks in the key to near *S. fulvovirens* but that species has leaf blades which are acute to rounded (or only weakly decurrent) at base with the geniculum of the petiole held directly at base of the blade in contrast to having the leaf blades markedly decurrent at base with the geniculum of the petiole seemingly 3–5 cm below the end of the blade proper and by having the petioles densely covered with scale-like stellate trichomes.

Bunting (1960), argued that the original material of *S. atrovirens* was destroyed, and he designated *Pittier 9053* at US as the neotype. However, this notion was superseded due to the fact of the existence of an original material from GOET, which was designated as the lectotype by Dowe et al. (2022).

Additional specimens seen: **COSTA RICA.** *H. Pittier 7995* (BR, MO); **Alajuela:** Reserva Biológica Monteverde Río Peñas Blancas, Finca de Jesús Rojas, 10°16'48"N, 84°43'48"W, 850–900 m, 4 December 1989, *E. Bello 1557* (MO); Forest along Río Sarapiquí upstream from crossing of road to Colonia Virgen del Socorro, 10°6'N, 84°11'W, 740 m, 10°05'24"N,



Figure 9: *Spathiphyllum atrovirens*, Habit. Photo: O. Ortiz



Figure 10: *Spathiphyllum atrovirens*, Spathe, face view. Photo: O. Ortiz



Figure 11: *Spathiphyllum atrovirens*, Close-up of infructescence. Photo O.Ortiz



Figure 12: *Spathiphyllum atrovirens*, Croat 46776, Costa Rica



Figure 13: *Spathiphyllum atrovirens*, Dressler 3985, Panama



Figure 14: *Spathiphyllum atrovirens*, Grayum 5520, Costa Rica



Figure 15: *Spathiphyllum atrovirens*, Hammel 12827, Costa Rica



Figure 16: *Spathiphyllum atrovirens*. Luteyn 3271, Costa Rica

84°10'12"W, 740 m, 3 July 1985, *M.H. Grayum & B.E. Hammel 5520* (MO); Several kms before Monteverde Cloud Forest Reserve, 930 m, 10°17'N, 84°48'W–10°16'48"N, 84°48'00"W, 930 m, 1 March 1986, *S. Hoover 1354* (MO); Reserva Monteverde Río Peñas Blancas, Vertiente Atlántica, Finca de Klaus Stein, 10°18'00"N, 84°45'00"W, 900 m, 4 July 1988, *E. Bello 147* (MO); Along road between San Ramon and Bajo Rodriguez, 11–12 km NW of San Ramon, 10°10'40"N, 84°34'10"W, 1025–1100 m, 3 Sept 1996, *T.B. Croat 78861* (MO); 2.7 km N of La Balsa de San Ramon, 10°11'24"N, 84°30'00"W, 1000–1100 m, 9 April 1976, *J. Utley & K. Utley 4592* (DUKE, MO); 2 km N of Angeles Norte de San Ramon, 10°09'36"N, 84°28'48"W, 4000 ft, 20 May 1973, *J. Utley 3696* (DUKE); Collected along road for a distance of 4 km beyond Los Angeles about 11 km N of San Ramon, 10°10'48"N, 84°27'36"W, 1200 m, 27 June 1972, *J.L. Luteyn 3271* (DUKE, MO); Pasture land and low area next to stream, 2 km N of Angeles Norte de San Ramon, 4000 ft, 20 May 1973, *J.L. Luteyn 3696* (MO); Below the cataract of San Ramón, 3.5–4.0 mi W of center of San Ramón, 10°04'48"N, 84°31'12"W, 800 m, 2 February 1979, *T.B. Croat 46776* (MO). **Heredia:** Río Sarapiquí, about ca. 10 km from Cariblanco, upstream from bridge on road to la Virgen del Socorro, 10°10'12"N, 84°07'48"W, 10 June 1982, *B.E. Hammel et al. 12827* (MO). **Puntarenas:** 9 km W of Monteverde on road to Interamerican Highway, 10°16'N, 84°50'W, 900 m, 12 June 1989, *W. Haber & W. Zuchowski 9250* (MO); Parque I, La Amistad San Vito Coto Brus, Finca Cafrosa, Quebrada Pizote, 08°54'36"N, 82°46'48"W, 1200 m, 22 Sept. 1990, *M. Ramírez en el curso II de Parataxónomos 95* (MO); Cordillera de Tilarán, Monteverde, 6 km S of Santa Elena on road to highway, Los Cerros, ridge between Río Guacimal and Río Lagarto, 10°16'48"N, 84°48'36"W, 900–1080 m, 19 July 1991, *W. Haber & W. Zuchowski 10768* (CR); Cordillera de Tilarán, San Luis, INVU, Monteverde, 10°16'12"N, 84°47'24"W, 1100 m, 13 January 1994, *Z. Fuentes 624* (CR, INB, MO). **San José:** Guadalupe, near San José, 09°32'24"N, 83°55'48"W, 3 February 1922, *J.M. Greenman & M.T. Greenman 5422* (EAP, MO). **PANAMA. Chiriquí:** Gualaca-Chiriquí Grande, vicinity Lago Fortuna, along trail to meteorological station on Río Hornito departing from highway N side, ca. 5 km S of Centro de Científicos, 08°45'N, 82°18'W, 1000 m, 24 July 1994, *T.B. Croat & G. Zhu 76418* (HUA, LE, MO, US, USB, WU); Vicinity of Barriles, 6–16 km S of Volcán, 1000–1300 m, 25 April 1971, *R.L. Dressler & N.H. Williams 3985* (MO). **Veraguas:** Vicinity of Santa Fé, along road between Alto Piedra and Calovebora, 0.5 mi N of Alto Piedra, on slopes of Cerro Tute, Parque Nacional Cerro Tute, 800–1030 m, 15 July 1994, *T. B. Croat & G. Zhu 76898* (MO).

Spathiphyllum ayalae Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Comarca Ngäbe-Buglé: Kanintú, Quebrada Hacha, slopes of Cerro Santiago, mature montane forest, 08°30'28.3"N, 81°45'26.3"W, 1688 m, 4 Sept. 2012, *M.Ayala, A. Ibañez, Á. Celis & R. Flores 1571MA* (holotype, PMA-106401).

Diagnosis: *Spathiphyllum ayalae* is characterized by its mediocre size, petioles sheathed about 2/3 their length, ovate-elliptic blades that are shorter than petioles and markedly decurrent at base, drying dark gray-green above, grayish yellow-green below as well as by prominently decurrent, green spathe, green, short-cylindroid-tapered spadix with connate tepals and prominently exserted pistils which are green at apex, white at base as well as berries that mature white.

Terrestrial to 0.7 m; internodes short, ca. 1.5 cm diam. LEAVES 60–80 cm; **petioles** 34–49

cm long, sheathed about 2/3 their length, drying light brown, sheath 21–32 cm long, margins mostly persisting intact; free part terete, 14.5–18.5 cm long; **blades** ovate-elliptic, 26.2–30.5 cm long, 7.3–8.5 cm wide, gradually acuminate at apex, attenuate and markedly decurrent on petiole at base, 6.3 times longer than broad, 0.60–0.75 times as long as petioles, moderately thin, moderately bicolorous, drying dark gray-green above, grayish yellow-green below; midrib drying weakly raised and slightly darker above, narrowly raised and darker below; **primary lateral veins** 9–11 per side, scarcely discernable above, weakly raised and drying darker below; minor veins weakly visible; upper surface densely and minutely areolate-granular; lower surface minutely areolate. INFLORESCENCE about as long as leaves; peduncle 70.5 cm long; **spathe** narrowly elliptic, 14.5 cm long, 6.6 cm wide, green, held erect, decurrent 3.2 cm on peduncle; **spadix** green, stipitate 2–3 mm, short-cylindroid-tapered, protruded forward from spathe, 6 cm long, 1.8 cm diam. at base, 1.2 cm diam. near apex; pistils green at apex, white at base; flowers 5–6 visible per spiral, 1.2–2.2 mm wide, tepals connate except for the 5–6 short lobes; **pistils** prominently exerted beyond tepals for 2–3 mm, green at apex, white at base; ovaries 2- or 3-locular; ovules 2 or 3 per locule. INFRUCTESCENCE with berries maturing white; seeds 5–7 per berry, 2 or 3 per locule, 3.2–4.0 mm long, 1.6–1.8 mm diam., oblong-elliptic, smooth, black, glossy after being dried. **Figures 17–19.**

Distributon — *Spathiphyllum ayalae* is endemic to Panama, known only from the type locality in the Comarca Ngäbe-Buglé at 1688 m in a *Lower montane rain forest* life zone.

Comments — *Spathiphyllum ayalae* is similar to several other Central American species, especially *S. silvicola* which differs by having leaves that are not decurrent on the petiole at base, flowers that lack protruded styles, a spathe that is proportionately narrower and less decurrent at base (to 1.4 cm) and that is reflexed, not erect. *Spathiphyllum phryniifolium* differs by having tepals free and by having green berries. *Spathiphyllum montanum* differs by having blades that dry typically brown, a spathe that is white and tepals that are free.

Etymology — The species is named in honor of Melisa Ayala who collected the type specimen. Ayla is a Spanish botanist working in Panama.

Spathiphyllum blandum Schott, Oesterr. Bot. Wochenbl. 7: 159. 1857. — Type: presumed destroyed. GUATEMALA, *J.D. Smith 1534* (neotype, US-45431; isoneotypes, G, GH, designated here).

Herb mostly to 1 m, less frequently to 1.5 m tall; internodes short to 1.7–4.0 cm diam. LEAVES 21–114 cm long; **petioles** 16–57 cm long, sheathed 0.60–0.95 their length or sometimes nearly to the geniculum; **sheath** 13.5–52.3 cm long, inrolled, thin, pale and finely undulate, minutely pale-green-speckled, the margins sometimes breaking free, free part subterete to terete, slightly thicker than broad; geniculum 1.3–36*2.5(4) long, the apex sulcate with the minutely undulate leaf base margins decurrent on to geniculum; **blades** elliptic to oblong- or lanceolate-elliptic, 25.5–53 cm long and 9–22 (25) cm wide, 2.1–3.5 times longer than wide, 0.7–1.6 times longer than petioles (mostly about as long as petioles), commonly widest at the middle and narrowed equally toward either end, acute-acuminate at apex, acute and attenuate as well as undulate at base, thinly coriaceous, dark green and semiglossy above, moderately paler and matte below, drying dark gray-brown to dark brown



Figure 17: *Spathiphyllum ayalae*, Ayala et al 1571, TYPE, Habit with infructescence. Photo: O.Ortiz



Figure 18: *Spathiphyllum ayalae*, Ayala et al 1571, Infructescence. TYPE. Photo: O.Ortiz



Figure 19: *Spathiphyllum ayalae*, Ayala et al. 1571, TYPE, Panama

and weakly glossy above, yellowish brown to gray-brown, rarely dark brown and semiglossy to weakly glossy below; midrib concolorous and concave above, thicker than broad and whitish below; **primary lateral veins** 15–20 per side, sunken above, narrowly rounded, whitish and raised below; interprimary veins slightly darker than surface; minor veins moderately distinct to obscure. INFLORESCENCE held slightly above leaves; peduncle commonly 1.5–2.0 times longer than petiole, 22–94 cm long; **spathe** medium green, typically elliptic, 8.7–27.5 cm long, 4–11 cm wide, acuminate at apex, acute or obtuse finally attenuate, decurrent (often obliquely so) onto peduncle for 2.0–5.5(8.5) cm, medium green, erect to erect–spreading weakly backwards, more or less hooded, semiglossy inside, slightly paler and almost matte outside; **spadix** (3.0) 4.5–11.0(14.0) cm long, sessile or stipitate 1(–2) cm, initially darker green than spathe, white at anthesis, becoming green; flowers 6–8 visible per spiral; tepals free, drying dark brown; pistils prominently elongate-conic, exserted 4–5 mm, acute at apex, about as long as the tepals; **pistils** prominently protruded before anthesis; ovary (2–)3-locular, ovules collatera*1, varying from 3 to 1 in each of the 3 locules. INFRUCTESCENCE with fruiting spadix tuberculate, berries to 10.5 mm long, obovoid, rostrate; seeds 3–7, oblique-reniform-ovoid to oblong in profile, inner faces flat and smooth, outer face rounded, smooth to slightly verruculose between vertical rows of foveolae. **Figures 20–26.**

Distribution — *Spathiphyllum blandum* ranges from Mexico to El Salvador on the Pacific coast and Belize, Guatemala and Honduras and Panama along the Caribbean coast of Central America, occurring from sea level to 1300(1900) m in *Tropical wet forest* and *Tropical moist forest* life zones. It should be expected in Costa Rica.

Comments — *Spathiphyllum blandum* is characterized by its petioles being shorter than or only slightly longer than the blades and having a short geniculum (1.3–2.8(4.0) long), sheathed 0.4–0.6 its length or sometimes nearly to the geniculum with the sheath inrolled, thin, pale and finely undulate and minutely pale-green-speckled, more or less elliptic blades, a medium green spathe which is decurrent on the peduncle, often obliquely so, measuring 2.0–5.5(8.5) cm long and a spadix that is white at anthesis with conical exserted pistils.

Spathiphyllum blandum is most easily confused with *S. cochlerispatham* which is common along the Caribbean slope of Mexico but that species differs by having petioles with a much longer geniculum and the spadix is typically light green (though sometimes interpreted as whitish on labels).

Schott (1857) published *Spathiphyllum blandum* from a cultivated collection without specific origin. The *Prodromus Systematis Aroiderum* (Schott, 1860) had not corrected this matter since no new information had been added in that revision. Nevertheless, his drawings [Schott's *Icones*: Schott (1984)] show considerable detail and closely represent the material circumscribed here for the species in Central America which has largely been going by this name. His drawings, in part painted, are as follows: 3107 showing two blades with both surfaces, 3110 showing a whole plant in habit, 3111 showing an inflorescence with dissected pistils and 3112 showing two inflorescences in side view and surface view. In lieu of a type specimen these drawings might be best to typify *S. blandum* but Bunting chose to neotypify it with a herbarium specimen. While Schott's actual description gives little in the way of help to absolutely define



Figure 20: *Spathiphyllum blandum*, P. Díaz Jiménez et al. 1551, Habit. Photo: P. Díaz Jiménez

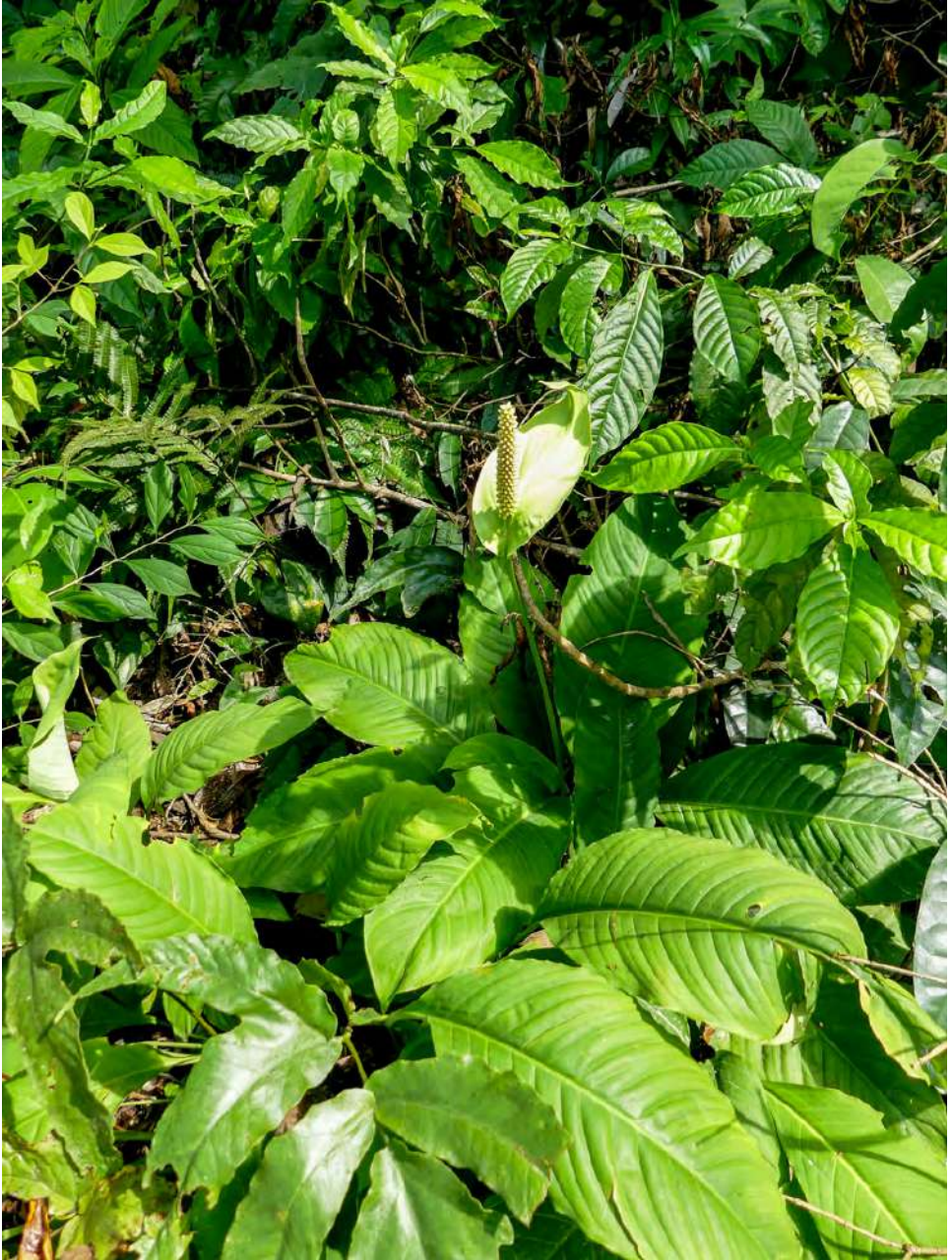


Figure 21: *Spathiphyllum blandum*, Habit. Photo: P. Díaz Jiménez



Figure 22: *Spathiphyllum blandum* Close-up of Inflorescence. Photo: P. Díaz Jiménez

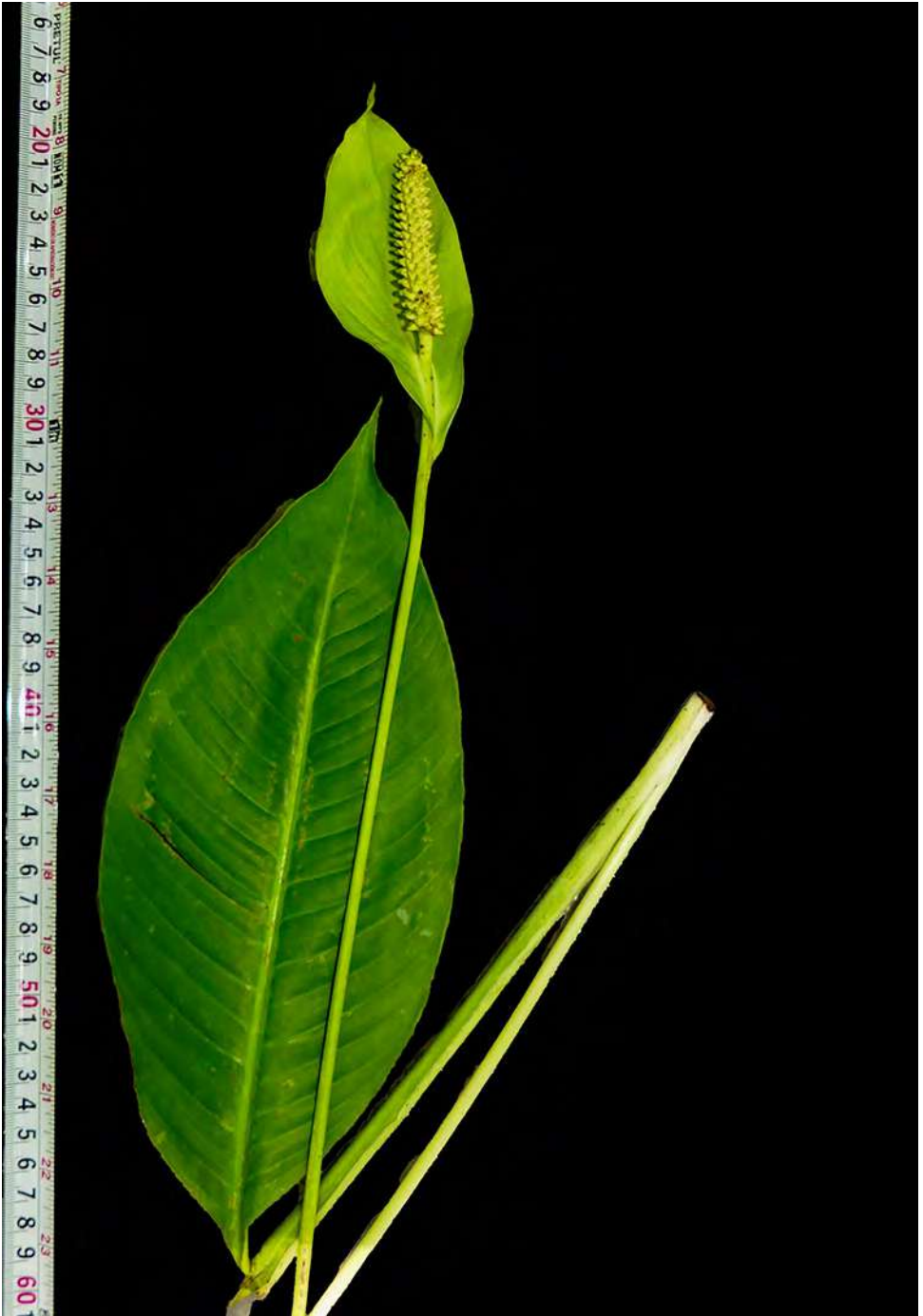


Figure 23: *Spathiphyllum blandum*. flattened flowering plant, Photo: P. Díaz Jiménez



Figure 24: *Spathiphyllum blandum*, Close-up of leaf, *Croat & Hannon 63426*



Figure 25: *Spathiphyllum blandum*, J.D. Smith 1534 TYPE, Guatemala



Figure 26: *Spathiphyllum blandum*, Croat & Hannon 63235, Mexico

it as a species distinct from all other Central American species, it does adequately match his drawings. His characterization of it as a moderately small plant with oblong-elliptic blades and a spadix with protruding styles is important. Curiously, Schott did not mention the color of the spathe or spadix but in his *Icones*, the spathe is green and the spadix is white exactly as it is in most collections at anthesis. It is uncertain how Engler came to know the species, but since living material was available in Vienna, it may have become more widespread in cultivation. Nevertheless, Engler and Krause, in their 1908 revision of the Monsteroideae, merely state that the spathe was pale on both sides without mentioning color and gave no hint for the color of the spadix. Bunting (1960) also failed to mention the colors of the spathe or spadix.

Engler & Krause (1908: 124–125) in their revision in *Das Pflanzenreich* essentially followed Schott's description but gave the first hint of a collecting locality for the species by citing a curious record, "Surinam oder Niedert. Guiana, Bluefields, Mosquito, an der Küste–Herb. Martius [Munich], Brussel [BR]. By citing material from the Guianas and at the same time the Atlantic coast of Central America [Mosquita Coast of Honduras and Bluefield in Nicaragua], it is apparent that they did not know where this species came from at all since essentially no species of Araceae is shared between these areas. We have seen neither collection cited by Engler & Krause in that treatment, but it is highly unlikely that the Central American species going by the name *Spathiphyllum blandum* also occurs in the Guianas in South America.

When Bunting published his revision of *Spathiphyllum*, a hundred years later (Bunting, 1960), he cited as the type the original description, citing Article 10 of the 1956 International Code of Botanical Nomenclature but also indicated that *J. D. Smith 1534* could appropriately represent this species. Tropicos lists *Glaziov 10126* (P) as the type but there is no evidence that this collection was ever seen or designated by either Schott, Engler or by the last monographer, George Bunting. Therefore, at Bunting's suggestion, the *J. D. Smith 1534* collection is designated as the neotype here.

Croat 47861 cultivated at the Missouri Botanical Garden is unusual for the species in having longer than normal geniculum, to 4 or more cm long. The collection warrants further observation.

Additional specimens seen: **BELIZE. Cayo:** Hummingbird Highway. Forest along highway at mile 28.5 on Hummingbird Highway, south of Belmopan, 17°04'N, 88°36'W, 200–300 ft, 14 June 1973 – 21 June 1973, *T.B. Croat 24569* (MO); Ca 15 km N from main road to Belmopan; Spanish Lookout; Aguacate Lagoon, 17°16'N, 089°00'W, 15 November 1987, *M.J. Balick, G. Shropshire & D. Friesen 1800* (MO); Barton Creek: Barton Creek. High bush on limestone hill, 17°12'N, 088°57'W, 25 April 1981, *Caroline Whitefoord 2636* (MO); Blue Hole Camp: Vaca Plateau. Blue Hole Camp, 16°47'26"N, 088°56'01"W, 600 m, 8 May 1980, *Caroline Whitefoord 2032* (MO); Hummingbird Highway: Hummingbird Highway, Miles 28, 17°04'N, 088°36'W, 300 ft, 14 June 1973, *Al Gentry 8255* (MO); St. Herman: Caves Branch, St. Herman's Hill, east of Hummingbird Highway, 17°07'53"N, 088°41'50"W, 240 m, 29 July 1976, *Caroline Whitefoord 1169* (MO). **Stann Creek:** Cockscomb Basin, Jaguar Preserve, 10 km W of Maya Center, off Southern Highway. Gibnut Loop Trail, 16°45'N, 88°35'W, 400 m, 20 May 1990, *Michael J. Balick et al. 2602* (MO); Cockscomb Mountains: high ridges above

Mares Nest Camp, 16°43'N, 88°40'W, 15 June 1990, *Arvigo et al.* 456 (NY); Cocoa Branch: Cockscomb Mountains; tributary of Cocoa Branch of Sittee River, 2 km due N of Victoria Peak. Premontane wet forest, 16°49'47"N, 088°37'17"W, 300–500 ft, 5–6 June 1973, *A.H. Gentry* 8017 (MO); Humming Bird Highway: High ridge, base of hill, Humming Bird Highway, 17°03'N, 088°34'W, 100–200 m, 26 July 1954, *P.H. Gentle* 8259 (LL); Middlesex: Middlesex, 17°01'25"N, 088°30'34"W, 200 ft, 15 May 1929, *W.A. Schipp* 252 (MO); Waha Leaf Creek: Waha Leaf Creek, 16°37'27"N, 088°22'22"W, 5–80 m, March 1954, *Molina* 288 (EAP). **Toledo:** San José. 1.5 mi S of Mayan village of San José, ca. 5 mi W of Columbia Forest Station. Along river banks on limestone, 16°15'N, 089°04'W, 12 June 1973, *T.B. Croat* 24332 (MO); San José, 6.7 miles north of Columbia Forest Station, 16°16'07"N, 089°06'11"W, 13 June 1973, *John D. Dwyer* 11162 (MO); Union Camp: Maya Mountains, Union Camp, 16°23'N, 089°08'W, 2800 ft, 23 March 1977, *Boutin & Schlosser* 5126 (MO); Big Fall Estate, ca. 3 airline km NE of village of Big Fall, just E of Southern Highway. Tall, mostly evergreen forest remnant in area converted to orange plantations, along streamlet with *Terminalia* common trees, 16°16'23"N, 88°52'27"W, 40 m, 4 May 1996, *G. Davidse, B.K. Holst & A. Whittemore* 35586 (MO, SEL); Southern Maya Mountains, Bladen Nature Reserve, large sinkhole just S of the upper Bladen Branch and 1.3 airline km SE of "AC Camp". Forested limestone sinkhole with steep slopes and clay soils and surrounding forest leading up from river, 16°28'17"N, 88°55'04"W, 210–330 m, 13 May 1996, *G. Davidse, M. Meadows & A. Whittemore* 35856 (BRH, MO); Bladen Nature Reserve, Bladen River at the point where the river passes between the Eastern-most hills, just before river bends to the south. Margins and alluvium of Bladen River and limestone bluffs, 16°32'N, 088°41'W, 100 m, 18 July 1995, *D.E. Atha & S.W. Brewer* 1169 (MO); Bladen: Southern Maya Mountains, Bladen Nature Reserve, West Snake Creek. Along Snake Creek through tall evergreen forest. GPS coordinates, 16°27'54"N, 089°01'04"W, 580 m, 29 May 1997, *D.L. Holland* 35 (BRH, MO); Columbia Forest Reserve: Southwestern Maya Mountains, Columbia River Forest Reserve. Trail between Union and Gloria Camps. Moist evergreen forest, canopy 25–30 m, on slightly undulating limestone hills; emergents to 40 m (*Terminalia amazonia*); understory *Chamaedorea* palms common; common herbs along trail: *Calathea micans*, *Hoffmannia bullata*, and many peridophytes, 16°23'22"N, 89°08'10"W, 700–750 m, 13 April 1992, *B.K. Holst* 4366 (MO); Columbia River Forest Reserve: Little Quartz Ridge, SW slopes, NE of Camp 1, 16°23'25"N, 89°06'40"W, 800–850 m, 21 February 1997, *B.K. Holst* 5904 (MO); Columbia Forestry Station: Columbia Forestry Station, 16°16'N, 089°06'W, 12 June 1973, *A.H. Gentry* 8147 (MO); Dolores Estate: Ca. 40 km SW of Punta Gorda, Dolores Estate. Growing along trail. Primary forest, 15°59'20"N, 089°12'34"W, 1 February 1990, *M.J. Balick, S. Cal, S. Cucul & S. Matola* 2537 (MO); Esperanza: Along trail to Esperanza beginning 1 mile north of Columbia Forest Station. Disturbed forest, 16°18'N, 089°02'W, 500–1100 ft, 12 June 1973, *T.B. Croat* 24226 (MO); Jacinto Hills: Jacinto Hills, 16°09'N, 088°55'W, 6 April 1946, *P.H. Gentle* 5542 (LL); Monkey River: Rancho Chico - Cockscomb, Monkey River, 14 April 1943, *P.H. Gentle* 4407 (LL); San José. Vicinity of San José, Mayan Indian Village, 6.7 miles north of Columbia Forest Station. Disturbed forest, 16°16'N, 089°06'W, 13 June 1973, *T.B. Croat* 24450 (MO). **EL SALVADOR:** Sonsonate: Cuisnahuat, A.N.P. El Balsamar, río el tanque. 13°41'N 089°36'W, 539 m, 12 April 2011, *Dagoberto Rodríguez* 2273 (LAGU, MO). La Libertad Municipio Antiguo Cuscatlán. Jardín Botánico La Laguna, 13°40'N 089°15'W, 795–810m, 21 July 1997, *Miguel A. Renderos* 246 (MO). **GUATEMALA. Alta Verapaz:** El Estor. Along road to El Estor (Lago Izabal), 2 miles E of highway CA-14 to Cobán. Steep road bank at edge of

disturbed forest, 15°18'54"N, 090°17'38"W, 1300 m, 18 July 1977, *T.B. Croat 41437* (MO); Oxec: 9 miles up road to Oxec along gravel road which turns N off Highway 7E between Tukurú and El Estor, ca. 6 km NE of Panzós, 15°29'25"N, 089°40'27"W, 800 m, 20 July 1977, *T.B. Croat 41682* (MO); Sebol: 3 km NWW of Sebol off old road to Petén, 15°49'44"N, 089°57'25"W, 14 April 1964, *Elias Contreras 4305* (LL); Oxec: 7 miles up road to Oxec along road which turns off Highway 7E between Tukurú and El Estor, ca. 6 km NE of Panzós, 15°30'21"N, 089°40'23"W, 700 m, 20 July 1977, *T.B. Croat 41655* (MO); Sacte: Sacté, 15°33'49"N, 090°26'47"W, 1974, *Kunkel 601* (BR). Panzós: 8 km al N de cruceo a Taguinco, Hidrochulac, camino Tactic-Cahabón. Veg. Selva alta perennifolia, 800 m, 2 September 1988, *Esteban M. Martínez S, W.D. Stevens, A.N. Díaz & H. Droege 23435* (MO). **Izabal:** Santo Tomás de Castilla. Montañas del Mico, 7–8 km W of Santo Tomás de Castilla on road to microwave tower. Tall forest on limestone, some areas with thin, black soil, 15°40'54"N, 088°40'42"W, 600–650 m, 19 August 1988, *W.D. Stevens, E. Martínez S, H. Droege & A.N. Díaz 25548* (MEXU, MO); Puerto Barrios. GUATEL: En la torre de GUATEL, Sierra del Mico. Bosque mesófilo, 15°40'18"N, 088°41'33"W, 940 m, 8 September 1988, *Esteban M. Martínez S, W.D. Stevens, A.N. Díaz & H. Droege 23557* (MO). **Peten:** Modesto Méndez: 20 km north of Modesto Méndez. From thickets along stream in wet tropical forest, low limestone hills, 180 m, 17 June 1971, *W.E. Harmon & J.A. Fuentes 5721* (UMO 99897). Dolores: 3.5 km east of Dolores, 20 April 1961, *Elias Contreras 2194* (LL); Santa Toribio Road: [Dolores] Km 77/78 of the Santa Toribio road, 3 km WNW of the village. [In high forest], 20 April 1961, *Elias Contreras 2145* (LL). San Luis, 10 July 1959, *C.L. Lundell 16285* (LL). **Quetzaltenango:** Colomba. Coatepeque - Retalhuleu, Hwy. CA-2, 3 mi S of turnoff to Colomba, between Coatepeque and Retalhuleu. Coffee plantation, 14°39'30"N, 091°46'36"W, 600 m, 22 January 1987, *T.B. Croat & D.P. Hannon 63413* (MO); **Santa María.** Along Highway Cito N of jct. with CA2, toward Quezaltenango, in watershed reserve INDE (Inst. Nac. de Electrificación, Guatemala) "Santa María" (Central Hidroeléctrica), Km 199. Loose gray soil, steep slopes W of highway, 14°43'35"N, 091°42'31"W, 1200–1300 m, 22 January 1987, *T.B. Croat & D.P. Hannon 63426* (WU, MO, MEXU, PMA, IMB, F); Volcan Zunil: SW slope of Volcán Zunil, 14°41'59"N, 091°25'56"W, 1900 m, 9 May 1990, *Juan José Castillo Mont & D.R. Hodel 1063* (MO). San Marcos. Africa: 1 mile above Africa, ca. 3.3 miles above Finca Armenia above San Rafael. Steep forested slopes, 1600 m, 13 July 1977, *T.B. Croat 40951* (MO); La Trinidad: La Trinidad, ca. 2 km from Finca Armenia above San Rafael. Forest above coffee finca, 1100–1250 m, 12 July 1977, *T.B. Croat 40869* (MO). **HONDURAS.** **Atlántida:** Campamento Quebrada Grande ca. 10 km south west of La Ceiba. At base of north slope of Pico Bonito, from camp to 2 km east of camp, upland forest, 15°42'N, 86°51'W, 80–150 m, 09 May 1993, *R.L. Liesner 26093* (MO, TEFH); Esparta. Rio Lean: San José de Texiguat–Suyapa de Lean, Valley of the Río Leán, vicinity of Las Lomas, between San José de Texiguat and Suyapa de Leán (Matarras), lowland, evergreen rainforest remnants among pastures, 15°33'N, 087°26'W, 80 m, 16 May 1991, *G. Davidse, Ramón Zúñiga & P.R. House 34448* (K, MO). La Ceiba. La Ceiba: *T.G. Yuncker, J.M. Koepper & K.A. Wagner 8225* (MO). Tela. Lancetilla, Jardín Botánico de Lancetilla, 3 km al sur de Tela, selva alta perennifolia con zonas de cultivo y plantas introducidas, 15°43'38"N, 087°26'57"W, 100–150 m, 8 June 1985, *Oswaldo Téllez & Esteban Martínez S. 8786* (MO); Hills above Lancetilla, 15°44'N, 087°27'W, 200 ft, 23 July 1934, *T.G. Yuncker 4729* (MO, NY); Lancetilla Valley ca. 10 miles southeast of Tela; along Río Lancetilla, on trail to water reservoir, 15°44'N, 087°27'W, 10–150 m, 3 August 1977, *T.B. Croat 42635* (MO); Lancetilla, 10 km SO de Tela, Clima lluvioso tropical, 15°44'N, 087°27'W, 30 m, 18 August 1979, *Carlos Soto 14* (MO); Valley above Lancetilla, 15°43'N,

087°27'W, 90–100 ft, 17 July 1934, *T.G. Yuncker 4631* (MO); Near Lancetilla, 15°44'N, 087°27'W, 100–150 ft, 12 August 1934, *T.G. Yuncker 5007* (MO). **Comayagua:** Siguatepeque. El Achote. Near El Achote [Achote], hills above the plains of Siguatepeque, 14°32'39"N, 087°51'47"W, 1350 m, 13 July 1936, *T.G. Yuncker, R.F. Dawson & H.R. Youse 5845* (F, MO, NY). Taulabé. El Carrizal: Mixed forest El Carrizal 14 kms NW of Siguatepeque, 14°40'22"N, 087°56'55"W, 900 m, 27 June 1971, *Antonio Molina R. & Albertina R. Molina 26059* (F); Yojoa: Lago de Yojoa, 14°48'N, 087°59'W, *R. Zuniga 585* (TEFH). **Copán:** Copán Ruinas. Los Zapotes: Montaña Los Zapotes, mountain to the west of Los Zapotes, 18 km north of Copán Ruinas on the road to Agua Caliente from Copán Ruinas and 2–3 km west of Los Zapotes school, 14°58'N, 089°10'W, 950–1050 m, 30 April 1996, *T. Hawkins 980* (EAP, MO); Nueva Arcadia: 6 km south of Nueva Arcadia, collection from wet fields and thickets in draw, with pine forests on higher ground, 15°00'N, 088°46'W, 560 m, 14 July 1971, *W.E. Harmon & J.A. Fuentes 6438* (MO, UMO, UMO 99989). Santa Rita, Santa Rita de Copan, 24 km E of Santa Rita de Copan, deep very mesic draw, surrounded by hills mostly devoid of natural vegetation, 14°56'N, 088°55'W, 18 August 1970, *W.E. Harmon & John D. Dwyer 4029* (MO). Cortés, Omoa, Corinto, Aldea de Corinto y alrededores frontera con Guatemala. 55 km al O de Puerto Cortés, clima lluvioso tropical, campos abiertos, 15°34'53"N, 088°22'21"W, 30 m, 9 August 1975 – 11 August 1975, *Cirilo Nelson, Ernesto Vargas, Marcial Erazo, Marta García & Mercedes Sierra 2900* (MO). Puerto Cortés, La Pita: Aldea La Pita, 5 km SO de Puerto Cortés, clima lluvioso tropical, 15°46'18"N, 087°57'08"W, 50 m, 26 November 1975 – 30 November 1975, *Cirilo Nelson, Ernesto Vargas & Marcial Erazo 3082* (MO); Olancho, Río Olancho, Francisco de la Paz – Gualaco, along Río Olancho, on road between San Francisco de la Paz and Gualaco, 13.6 mi SW of Gualaco, in disturbed virgin forest on steep slope ca 1/2 mi E of main road, along gravel road into private property, 15°00'N, 86°07'W, 1300 m, 6 February 1987, *T.B. Croat & D.P. Hannon 64294* (ENCB, MEXU, MO, NY, VDB, WU). Yoro: Río Pijol Valley. 7 km south east of Nueva Esperanza, along forested Quebrada that flows into Río Pijol, and adjacent slopes, 15°12'N, 87°35'W, 1300–1500 m, 29 May 1993, *R.L. Liesner 26677* (MO); Pasture trail into forest begins 1 km SW of San José de Texiguat, along the Texiguat river SSE into forest, 15°30'N, 87°26'W, 100–400 m, 18 April 1994, *D.L. Hazlett & A.E. Brant 8056* (MO). **MEXICO.** Escuela de Centro de Orientación Lomas, February 1956, *E. Matuda s.n.* (MEXU). **Chiapas:** Ocozocoautla, 16°42'36"N, 093°31'12"W, May 1949, *Carlson 2126* (EAP); San Cristobal de las Casas; road between San Cristobal and Palenque, 97 km NE of San Cristobal, 17°27'00"N, 092°03'36"W, 1130 m, 10 October 1986, *B. Hammel, E. Martinez & M. Merello 15621* (MO); W side toll bridge, Río Usumacinta Mex. 186, 22 July 1971, *J. Vaughan, J. Dwyer, D. Spellman & R. Wunderlin 215* (MO); Ixhatan. Bochil–Pichucalco, Along road between Bochil and Pichucalco, near shrine along road at 430 m, 1.7 km S of Ixhatan, 3.5 mi N of Ignacio Zaragosa, 17°15'36"N, 093°00'36"W, 430 m, 24 August 1996, *T.B. Croat 78598* (L, LE, KRAM, MO, Z); Mpo. Angel Albino Corzocas: above Finca Cuxtepec, 15°43'48"N, 092°57'36"W, *Breedlove & Strother 46726* (CAS); Mpo. Cintalapa: Colonia Francisco I. Madero–Colonia A. Lopez Mateos, 1250 m, *Breedlove 49050* (CAS); Mpo. Ocosingo: 70 km SW of Palenque, rd. to Ocosingo along the Jol Uk'um, 17°10'12"N, 092°06'36"W, 550 m, *Breedlove & Almada 48302* (CAS); *Breedlove 47175* (CAS); Mpo. Palenque, near Agua Azul, 17°32'24"N, 092°11'24"W, 600 m, *Breedlove & Keller 49576* (CAS); Mpo. Trintaria, 10 km ENE of Dos Lagos, above Sta. Elena, 16°06'00"N, 091°33'00"W, 1170 m, *Breedlove 56513* (CAS). Angel Albino Corzo, steep heavily wooded slope near the Rancho Viejo of the Finca Prusia, 2400 ft, 23 January 1968, *Alush Shilom Ton 3585* (F). Berriozábal, limestone fissured ridge, Lower Montane Rain Forest,

Quercus, Billia, Persea, Nectandra, Mirandaceltis, Turpinia and Calatola, 13 km north of Berriozábal near Pozo Turipache and Finca El Suspiro, 900 m, 25 December 1972, *D.E. Breedlove & R.F. Thorne 30814* (MO, RSA). Cintalapa, Montane Rain Forest, with scattered Pinus and Liquidambar, at crest of ridge 3 km east of Francisco Madero, northeast of Cintalapa, 1250 m, 4 October 1974, *D.E. Breedlove 38042* (MO). **Escuintla:** El Triunfo, Escuintla–Finca Tres de Mayo, about 14 miles N of Escuintla, along gravel road to Finca Tres de Mayo, ca. 4 miles NE of El Triunfo, 15°24'36"N, 092°49'48"W, 400 m, 21 August 1977, *T.B. Croat 43895* (MO); **Juárez:** En el volcán Tacaná, camino entre Talquián y Chiquihuite, veg. bosque mesófilo de montaña, 15°06'00"N, 092°06'00"W, 1800 m, 28 April 1987, *E. Martínez & A. Reyes 20414* (MEXU, MO). Mapastepec, Sierra de Soconusco, Highway 200 – Tuxtla Gutierrez, Sierra de Soconusco, new unfinished road to Tuxtla Gutierrez from Hwy. 200 (5.5 mi NW of turnoff to Mapastepec), 6.5–8.5 mi up road, veg. type: “selva alta perennifolia”, 15.31.48N 092.48W, 20 January 1987, *T.B. Croat & D.P. Hannon 63350* (MO). Palenque, Bonampak, along gravel road between Palenque and Bonampak, 88–90 miles SE of Palenque, disturbed forest over limestone, 16°52'30"N, 091°12'03"W, 350–370 m, 5 July 1977, *T.B. Croat 40204* (MO); Disturbed forest along gravel road from Palenque to Bonampak, 60 miles SE of Palenque, 16°48'36"N, 092°16'12"W, 400 m, 5 July 1977, *T.B. Croat 40174* (MO); Palenque, Palenque–Ocosingo, along Highway 199 from Palenque to Ocosingo, 27 miles SW of Palenque, 17°20'24"N, 092°04'12"W, 210 m, 6 July 1977, *T.B. Croat 40305* (MO); 5 miles SW of Palenque, on road to Chancala, Ocosingo and San Cristóbal de las Casas, 17°28'12"N, 091°57'36"W, 200 m, 4 July 1977, *T.B. Croat 40149* (MO). **Oaxaca:** Dtro. de Tuxtepec, Mpio. de Acatlán; Rincón del Tigre, 2 km from Acatlán on road to Capilla, at edge of riparian woodland with Brosimum alicastrum near sugar cane fields. ca. 18°31'N, 96°36'W, ca. 100 m elev, 18°31'12"N, 096°34'12"W, 19 May 1986, *R.E. Gereau, M. Sousa S, R. Torres C. & L. Cortés A. 2192* (MO, NY, RSA); Valle Nacional, Valle Nacional–Oaxaca, along Highway 175 between Valle Nacional and Oaxaca, 6 mi above bridge at Valle Nacional, area near shrine, virgin forest on steep, rocky slopes, 17°43'48"N, 096°18'36"W, 660 m, 26 August 1996, *T.B. Croat 78710* (ENCB, MO). Ixtlan, Mpio. Santiago Comaltepec, La Esperanza, 17°45'N, 096°30'W, 1600 m, 25 May 1988, *Ricardo Lopez Luna 279* (MO). Mixe: Mpio. de Totontepec, Totontepec, bosque mesófilo de montaña, 17°15'N, 096°02'W, 1900 m, 21 May 1990, *José Rivera Reyes & Gary J. Martin 1484* (MO). Tuxtepec, Tuxtepec–Matias Romero, along Highway 147 between Tuxtepec and Matias Romero (Hwy. 185), 15 km S of Highway 175, along stream, 17.49.48N 096.06W, <100 m, 26 August 1996, *T.B. Croat 78725* (ENCB, MO). Esmeralda, Esmeralda–Rio Verde, Uspanapa Region, along gravel road from Esmeralda (17 km E of Sarabia) to Río Verde, 1.1 mi S of Esmeralda. Edge of pasture and in forest on karst limestone formation on steep slopes with cliffs, veg. type: “selva alta perennifolia”, 17.09.36N 94.45W, 100 m, 18 January 1987, *T.B. Croat & D.P. Hannon 63235* (MEXU, MO, USM); **Yucatan:** Sotuta–Tixcacaltuyub, Cenote Xmucuy, selva baja caducifolia en transición hacia selva mediana caducifolia en las cercanías de un cenote, 20°33'00"N, 088°59'24"W, 20 m, 24 September 1966, *G. Carnevali et al. 4282* (MO, SEL). **Zelaya:** near Rama, 12°10'N, 084°13'W, 50 m, 22 Sept 1972, *M.T. Madison 720* (SEL); **Atlántico Norte:** Río Leicus [Likus], región de Tronquera, SO de Along road to Colonia Yolaina, Colonia La Esperanza, etc, ca. 1.3 km SE of intersection with road between Nueva Guinea and Colonia Verdún, immediately upriver from bridge over Caño Sardina, disturbed evergreen forest and river banks, 11°40'N, 84°26'W, 180–200 m, 11 February 1978 – 12 February 1978, *W.D. Stevens 6312* (MO). Waspan, Comarca del Cabo, matorrales húmedos, 14°36'N, 084°06'W,

60 m, 19 August 1965, *A. Molina R. 14928* (F). **PANAMA: Colon:** Donoso, 08°50'18.8" N, 80°39'26", 157 m, 23 June 2015, *W Irving Vergara-Pérez 1024*(PMA); **Panama:** Trails near top of Cerro Campana, 08°42'N 079°56'W, 850 m, 23 July 1983, *James S. Miller et al. 742* (MO).

Cultivated. UNITED STATES. Florida. Dade. Miami: Coconut Grove, the Kampong, 4013 Douglas Rd, 25°40'N, 80°15'W, 1–6 m, 31 May 1990, *Hans T. Beck & L. Jackson Beck 1129* (MO, NY). **Missouri. Saint Louis City:** Missouri Botanical Garden: In Research Greenhouses on Garden grounds, cultivated collection, 38°36'N, 090°15'W, 160 m, 29 June 1999, *H.H. Schmidt 3625* (MO, UMO).1833, *Bonpland 4477* (P); cultivated at Phipps Conservatory, 20 April 1990, *E. York 2446* (MO); Received from Ellen York (2446), Botanical Garden, Pittsburgh; exact origin unknown, 17 March 1997, *T.B. Croat 79541* (MO).

Spathiphyllum bobdressleri Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Panamá: Cerro Campana, 08°41'21"N, 79°54'54"W, 600 m, 24 June 1969, *R.L. Dressler 3639* (holotype, MO-2807365).

Diagnosis: *Spathiphyllum bobdressleri* is characterized by its moderately large size, broad sheath that is rounded at apex, ovate-lanceolate gradually long-acuminate blades which are attenuated at base and dark gray-green above, grayish yellow-green below, 16–19 primary lateral veins per side, a long-pedunculate inflorescence, large, long-decurrent, green spathe and cream-colored, long-stipitate spadix with long protruding styles.

Herb to 1.3 m tall; internodes short, 3 cm diam. LEAVES 106–133 cm long; **petioles** 55–78 cm long, drying tan-brown, sheathed 0.50–0.75 its length; sheath 40–42 cm long, drying dark brown and contrasting sharply with the dried shaft of petiole, semiglossy, rounded at apex, margins persisting intact; free part 7–45 cm long; geniculum 1.5 cm long, sharply sulcate, darker; **blades** 51–56 cm long, 13–19 cm wide, 2.7–3.9 times longer than wide, 0.9–1.2 times longer than petioles, narrowly long-acuminate at apex, attenuate at base, thinly coriaceous, dark green and semiglossy above, slightly paler and semiglossy below, drying grayish green and semiglossy above, moderately paler and greenish below; midrib broadly convex and concolorous above, narrowly rounded and short pale-lineate below, drying finely ribbed and darker than surface; **primary lateral veins** 14–19 per side, departing midrib at a steep angle then spreading at 30–55°, flattened and concolorous above, weakly raised and darker below; interprimary veins alternating with even more reduced primary lateral veins; minor veins weakly visible and closely spaced on both surfaces, often short pale-lineate above. INFLORESCENCES erect; peduncle 41–90 cm long; **spathe** 25–36 cm long, 6–10 cm wide, narrowly long-acuminate at apex, long-decurrent at base, light green, drying light brown to greenish brown, short pale-lineate on inner surface; **spadix** cream-colored, 6.3–8.0 cm long, 1.1–1.3 cm diam. (without the exerted pistils), 1.2–1.7 cm wide (with exerted pistils included), stipitate 1.5–2.2 cm, drying yellowish brown; flowers 6–7 visible per spiral, 2.3–3.0 mm wide; tepals free, 2 mm wide, broadly rounded on both margins, matte with punctiform cellular inclusions; **pistils** 3 mm long, 1 mm diam., sharply exerted; ovary ca. ½ as long as entire pistil, 3-locular; style 1.2–1.3 mm long, conical, drying brownish; ovules 1 per locule, 0.9 mm long; stamens 1 mm long, 1 mm wide, thecae oblong, parallel. INFRUCTESCENCE not seen. **Figures 27–33.**



Figure 27: *Spathiphyllum bobdressleri*, Habit. Photo: O. Ortiz

much thicker than broad, the remaining surface minutely granular; **primary lateral veins** 30–32 per side, departing midrib at 40° near apex, at 70° toward the base, scarcely raised and concolorous, weakly undulate above, narrowly and irregularly raised and slightly darker below; upper surface drying moderately smooth, weakly granular; lower surface minutely pale intermittent ridged and minutely granular. INFLORESCENCE 82 cm long, held slightly above the leaves; peduncle 74 cm long, drying 4 mm diam., drying light yellow-brown, matte; **spathe** greenish, narrowly elliptic, acute at apex, broadly acute at base, drying dark yellow-brown, matte inside, greenish yellow, weakly glossy inside with veins close and moderately distinct, both surfaces drying finely ribbed with subrounded cellular paler inclusions; **spadix** white, narrowly cylindroid, 10.5 cm long, 1.3 cm diam.; flowers 8–9 visible per spiral; **pistils** narrowly pointed and protruding 3 mm above tepals, the pistil tip eventually deciduous and leaving a pale ring-like scar on the pistil. INFRUCTESCENCE not seen. **Figure 34.**

Distribution — *Spathiphyllum bonyicense* is endemic to Panama but is expected in neighboring Costa Rica, occurring at less than 100 m elevation in Bocas del Toro Province in a *Tropical moist forest* life zone.

Comments — *Spathiphyllum bonyicense* is closest to *S. cardonanum*, a species occurring at high elevations (1800–1810 m), but that species differs by having the leaf blades drying dark brown on the upper surface with the base of blade basically rounded but at very base decurrent on the



Figure 28: *Spathiphyllum bobdressleri*, Habit with inflorescence. Photo: O. Ortiz

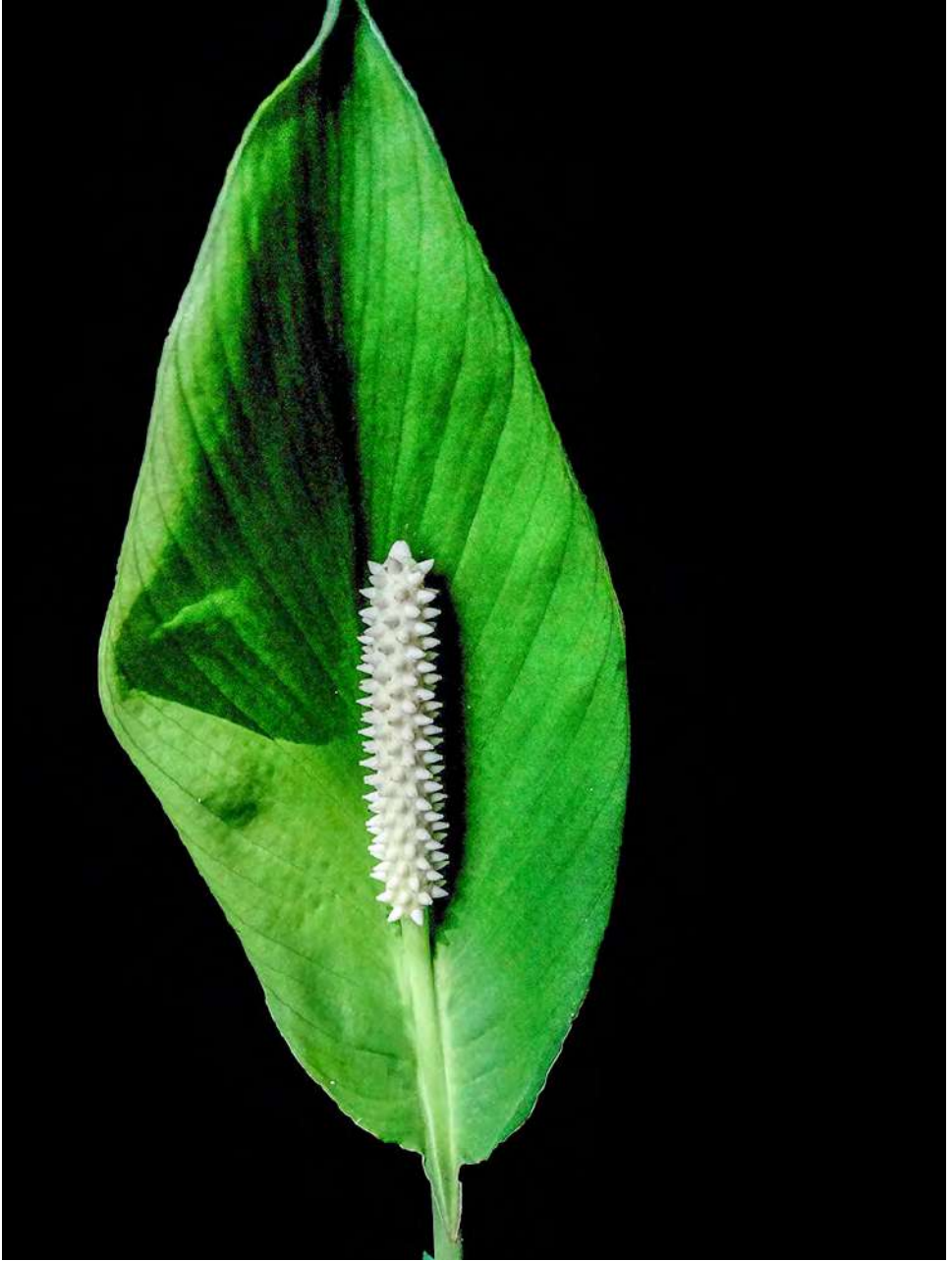


Figure 29: *Spathiphyllum bobdressleri*, Inflorescence. Photo: O. Ortiz



Figure 30: *Spathiphyllum bobdressleri*, Close-up of infructescence. Photo: O. Ortiz



Figure 31: *Spathiphyllum bobdressleri*, Dressler 3639, TYPE, Panama



Figure 32: *Spathiphyllum bobdressleri*, Dressler 3660, Panama



Figure 33: *Spathiphyllum bobdressleri*, Dressler 3676, Panama

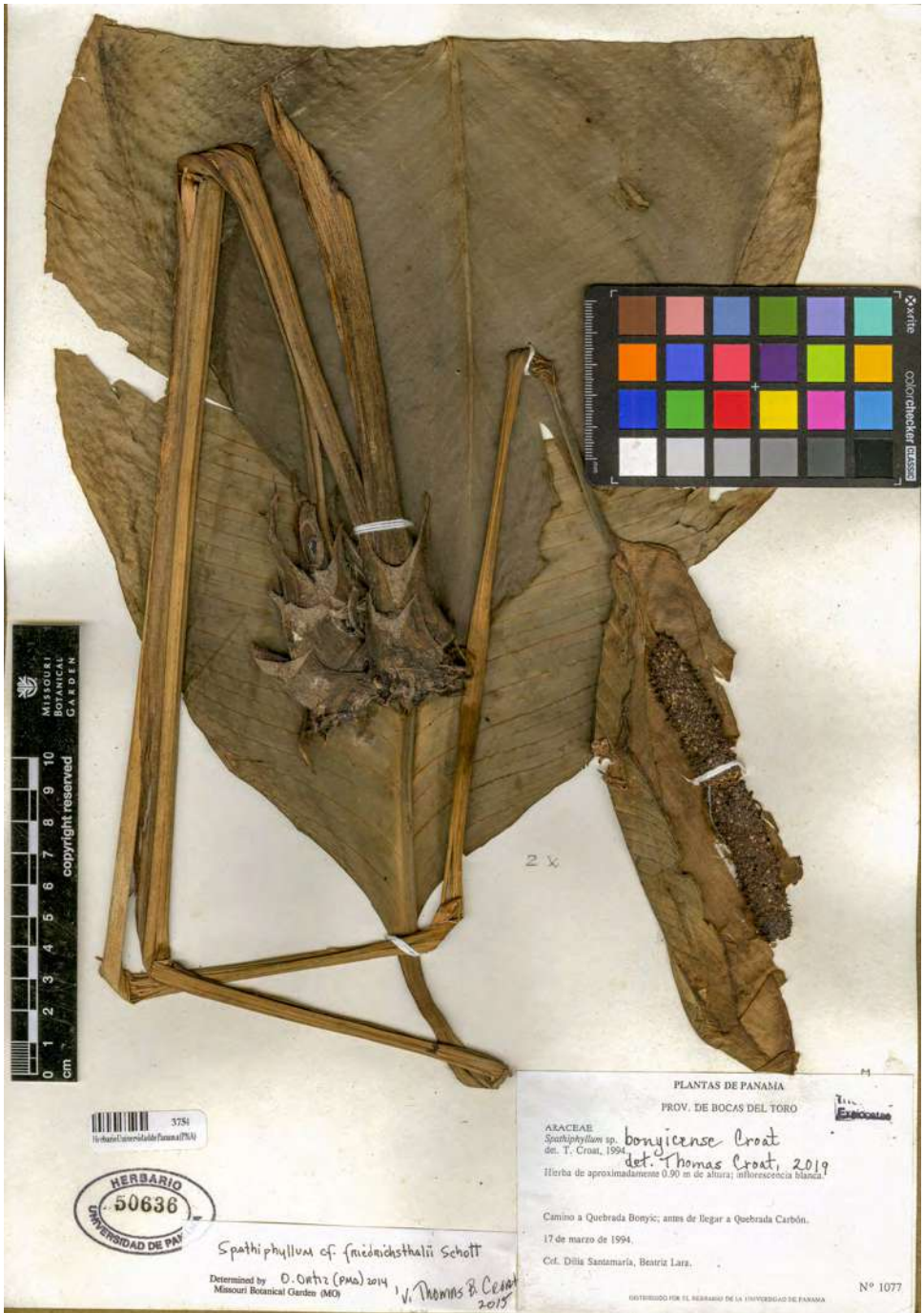


Figure 34: *Spathiphyllum bonycense*, D. Santamaria & B. Lara 1077, TYPE, Panama

Distribution — *Spathiphyllum bobdressleri* is endemic to Panama, known only from the Province of Panamá on Cerro Jefe and Cerro Campana and in Colón Provinces on Santa Rica Ridge at 700–800 m elevation in a *Premontane wet forest* life zone.

Comments — *Spathiphyllum bobdressleri* is most similar to two other Central American species, *S. cardonanum* and *S. bonyicense*, both of which differ by having a solid medium green spathe and a green spadix. In contrast *S. bobdressleri* has a pale green spathe with darker green veins and a cream-colored spadix.

Spathiphyllum bobdressleri has been confused with *S. phryniiifolium* and is found in similar habitats and has a similarly stubby stipitate inflorescences. On the other hand *S. bobdressleri* differs in having proportionately narrower, more long-acuminate blades with closer primary lateral veins and a cream-colored rather than green spadix, as well as a spathe that dries more yellow-brown and is proportionately longer than the spadix (10.0–20.5 cm longer versus usually 5–15 cm longer for *S. phryniiifolium*).

Etymology — The species named for Dr. Robert Dressler (1927–2019) who was a research scientist working for the Smithsonian Tropical Research Institute in Panama for many years. He was an orchid specialist but also had a keen interest in *Spathiphyllum*.

Paratypes: PANAMA. Panamá: Cerro Jefe, forest near river, ca. 700 m, ca. 09°13'N, 79°21'W, 17 July 1969, *R.L. Dressler 3676* (MO); Parque Nacional Altos de Campana, 08°00'N, 79°00'W, 803 m, 6 May 2015, *M. Samaniego & C. Galdames MS 0354* (SCZ); Parque Nacional Altos de Campana, 08°00'N, 79°00'W, 803 m, 6 May 2015, *M. Samaniego & C. Galdames MS 0355* (SCZ).

Spathiphyllum bonyicense Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Camino a Quebrada Bonyic, antes de llegar a Quebrada Carbón, 17 March 1994, *D. Santamaria & B. Lara 1077* (holotype, PMA-50636).

Diagnosis: *Spathiphyllum bonyicense* is characterized by its nearly fully sheathed, light brown-drying, finely ribbed petioles, the grayish brown-drying, ovate-elliptic, short-acuminate blades which are obtuse and attenuated at base, the inflorescence held slightly above the leaves, a green spathe and white, cylindroid, weakly stipitate spadix with weakly protruding pistils.

Herb to 0.9 m tall; internodes short, 3 cm diam. LEAVES 70 cm long; **petioles** 57 cm long, sheathed 47.5 cm, 0.83 its length, drying light brown, matte, finely ribbed and minutely granular; **sheath** drying medium dark brown, matte, to 8 mm high in the middle, margin darker brown, persisting intact; free part 6 cm long, sulcate; geniculum 3 cm long, drying darker, sharply sulcate, not swollen; **blades** ovate-elliptic, 49 cm long, 24 cm wide, 2 times longer than broad, 0.85 times as long as petioles, short-acuminate at apex, obtuse and attenuated at base, thinly coriaceous, drying brownish gray and matte to weakly glossy above, moderately paler, yellow-brown and semiglossy below; midrib weakly raised and slightly paler above, prominently raised, thicker than broad, closely ribbed below, the ribs slender,

petiole and with the primary lateral veins in the lower 6 cm of blade numbering 5 or 6 per side. In addition, the spathe is narrowly long-attenuate at apex with the narrowed portion 4–5 cm long and the spadix is green. In contrast *S. bonyicense* has leaf blades drying medium brownish gray above with the base of blade acute and with the primary lateral veins in the lower 6 cm of blade numbering 2 or 3 per side, and the spathe short-acuminate at apex and the spadix is white. It occurs at less than 300 m elevation.

Etymology — The species is named for the type locality in the vicinity of the Quebrada Bonyic in Bocas del Toro.

Spathiphyllum brevirostre (Liebm.) Schott, *Aroideae* 1: 2, f. 8. 1853. — *Hydnostachyon brevirostre* Liebm., Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn 1849(1–2): 25. 1849. — Type: MEXICO, [In sylvis umbrosis montanis, Cuesta de Teotálcingo]; June 1842, *F. Liebmann s.n.* (holotype, C).

Terrestrial herb, 50–100 cm tall; internodes short, 2–3 cm diam. LEAVES with **petioles** (41)49–119 cm long, usually longer than the blades, sheathed 27–62 cm, rarely to the geniculum, free part (8)24–57 cm long, 3–4 mm diam., subterete, slightly thicker than broad, rounded abaxially, minutely speckled; **sheath** 28–72 cm long, erect, undulate, the margin crisped, inrolled, in part sometimes becoming free; geniculum 2.3–4.5 cm long; **blades** elliptic to narrowly ovate-elliptic to lanceolate or ovate-elliptic, scarcely inequilateral, (7)20–41(65) cm long, 10–21(25) cm wide, (1.9) 2.5–2.7(3.8) times wider than long, widest below the middle, 0.5–0.8 times as long as petioles, briefly acuminate at apex, obtuse at base, weakly decurrent onto the petiole, thinly coriaceous to moderately thin, matte, moderately bicolorous, dark green and semiglossy above, much paler and matte below, drying dark brown and matte to semiglossy above, moderately paler and medium gray-brown to greenish gray and matte to semiglossy below; **midrib** narrowly rounded and paler to concolorous above, thicker than broad and slightly paler below; **primary lateral veins** (9–)13–14 per side, acutely sunken to quilted-sunken and concolorous above, narrowly rounded and darker below, departing midrib at (40)45–50(55)°; minor veins few, moderately obscure. INFLORESCENCE with peduncle 63–142 cm long, 1.5 or more times as long as blade, held slightly above the level of the leaves; **spathe** white to greenish white, elliptic, (12)17–27 cm long, (4)5–10(12) cm wide, acuminate or subcaudate at apex (acumen 1.5–4.0 cm long), acute at base and decurrent on the peduncle 2.5–4.5 cm, drying dark brown; **spadix** stipitate 0.6–1.8 cm (stipe 2.5 mm diam.), 3–7 cm long, 1.7 cm diam.; flowers (6)8–11 per spiral; tepals drying dark brown, sometimes with a somewhat fimbriate margin; **pistil** shortly exceeding the perianth, constricted between the ovary and the inflated, ± annular style, crowned by the stigma; tepals to 6.8 mm long, free throughout most of their length, drying thin and light brown, subtriangular and thickened at apex; pistils rounded at apex and scarcely exceeding tepals; ovary 3-locular, ovules superposed or collateral, totaling 9–12 ovules per ovary, ovary usually 1, sometimes 2 per locule. INFRUCTESCENCE 10.7–12.8 cm long, 1.8–2.0 cm diam.; berries obovoid, rostellate; seeds 2.5–4.0 mm long, 1.8–2.5 mm diam., rounded on both ends, sometimes flattened on one side, drying brownish, semiglossy, irregularly striate and weakly warty. **Figures 35–43.**



Figure 35: *Spathiphyllum brevirostre*, Leaf adaxial Surface. Photo: A. Acebey



Figure 36: *Spathiphyllum brevirostre*, Leaf. Photo: A. Acebey



Figure 37: *Spathiphyllum brevirostre*, Habit, at Kroemer's house in San José Coatepec, Veracruz State, Mexico



Figure 38: *Spathiphyllum brevirostre*, Plant with inflorescence, Photo A. Acebey



Figure 39: *Spathiphyllum brevirostre*, Leaf with inflorescence, Photo A. Acebey



Figure 40: *Spathiphyllum brevirostre* Close-up of inflorescence, Photo A. Acebey



Figure 41: *Spathiphyllum brevirostre*, Liebmans s.n., TYPE, Mexico

slopes, 17°39'36»N, 96°19'12»W, 1210 m, 30 June 1977, *T.B. Croat 39772* (MO); Tuxtepec–Oaxaca, [Mun. San Juan Bautista Valle Nacional], along Highway 175 through Sierra de Juárez between Tuxtepec and Oaxaca, 18.4 mi S of bridge at Valle Nacional at ca. Km 140. Cloud forest, 17°37'48»N, 96°20'24»W, 1500 m, 19 February 1979, *T.B. Croat 48062* (MO); Valle Nacional–Oaxaca, [Mun. San Juan Bautista Valle Nacional], Sierra de Juárez, along Highway 175, between Valle Nacional and Oaxaca, 10 miles SW [above/west] of Valle Nacional, disturbed primary forest, 17.42N 96.18.36W, 700 m, 30 June 1977, *T.B. Croat 39807* (MO); [Mun. San Jaun Bautista Valle Nacional], Sierra de Juárez, along Highway 175, between Valle Nacional and Oaxaca, 26 miles SW [above/west] of Valle Nacional, primary forest on steep slopes, 17°34'48»N, 96°23'24»W, 1900 m, 30 June 1977, *T.B. Croat 39885* (MO); Tuxtepec–Oaxaca, [Mun. San Juan Bautista Valle Nacional], along Highway 175 through Sierra de Juárez between Tuxtepec and Oaxaca, Valle Nacional, roadside and forest on steep slopes, 17°37'48»N, 96°20'24»W, 1450 m, 19 February 1979, *T.B. Croat 47969* (MO); [Mun. San Juan Bautista Valle Nacional], along Highway 175 through Sierra de Juárez between Tuxtepec and Oaxaca, 18.4 mi S of bridge at Valle Nacional at ca. km 140, cloud forest, 17°37'48»N, 96°20'24»W, 1500 m, 19 February 1979, *T.B. Croat 48081* (MO). Ixtlan, Oaxaca–Tuxtepec, 5 km al N de Vista Hermosa, km 175 carr. Oaxaca–Tuxtepec, veg. sec. de bosque mesófilo con elementos de selva alta perennifolia, 1260 m, 14 April 1982, *R. Torres C. & D. Lorence 296* (MEXU, MO). Mixe, Municipio Totontepec, camino a Rancho Río Colorado, la entrada se encuentra 1 km al N de Amatepec hacia Choapan, bosque mesófilo perturbado, 18 Sept 1988, *Rafael Torres C. & C. Martínez R. 12458* (MEXU). Tehuantepec, Mpio. Guevea de Humboldt, Cerro Picacho,



Figure 42: *Spathiphyllum brevirostre*, Inflorescence, Croat 39772, Mexico

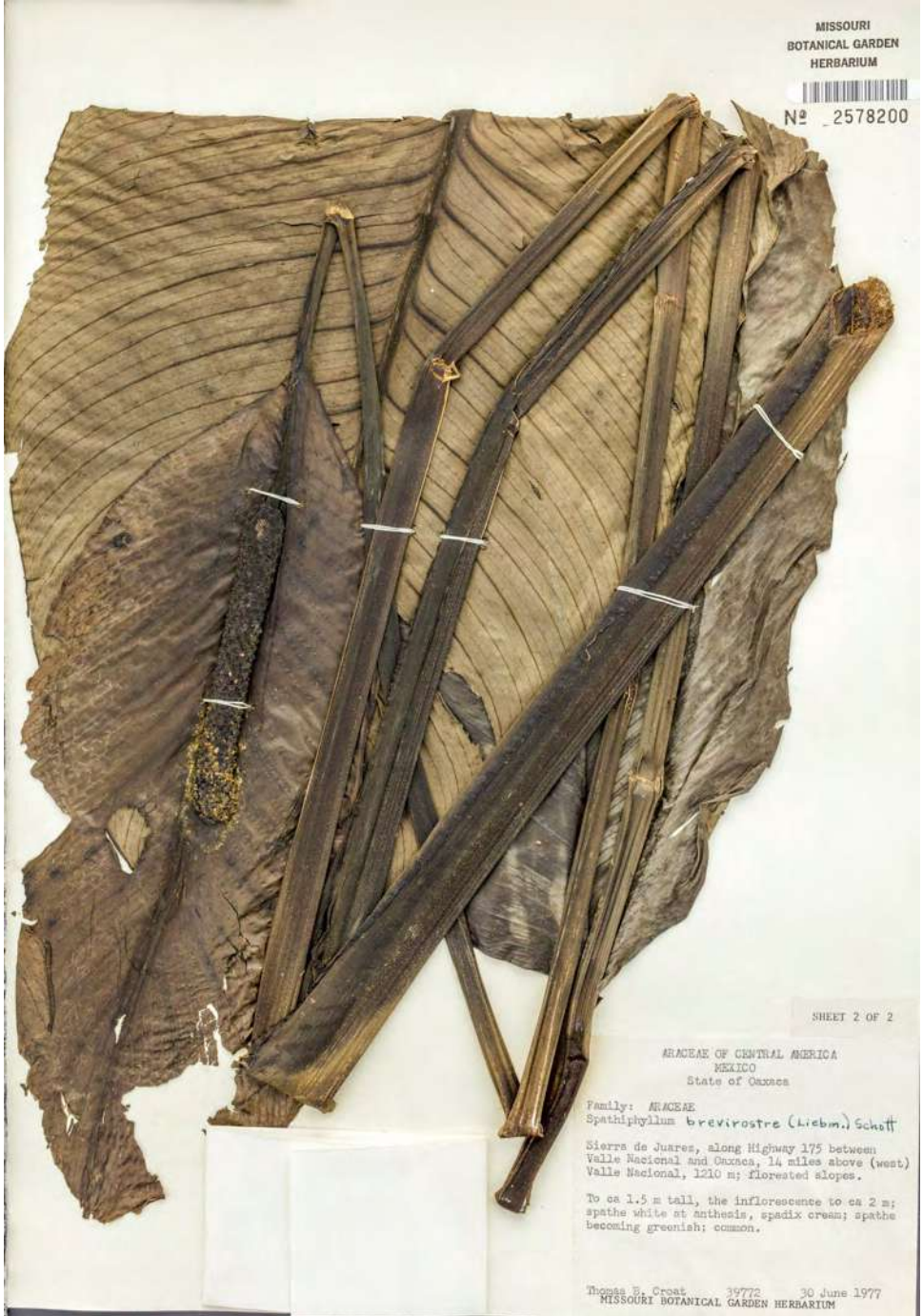


Figure 43: *Spathiphyllum brevirostre*, Leaf, Croat 39772, Mexico

Distribution — *Spathiphyllum brevirostre* is endemic to Mexico, known only from Chiapas, Oaxaca, Veracruz and Puebla at (400)1100–1900 m in *Premontane wet forest* life zones.

Comments — *Spathiphyllum brevirostre* is characterized by its relatively small size, its scarcely inequilateral, elliptic blades, the greenish white, decurrent spathe and the stipitate, white to greenish-white spadix with the pistils scarcely or not at all protruding.

Note that *Schott's Icones 37: c7, drawing 3116*, could serve well as an illustration for those unable to observe the Liebmann type specimen.

Additional specimens seen: **MEXICO. Chiapas:** Cuadrante 60-A, Asoc. secundaria de 3 años con *Trema micrantha*-*Acacia cornigera*-*Heliconia bihai*, derivado de una selva alta perenn. de *Guatteria anomala*, 380 m, July 1965, *Chavelas, J. et al. 1316* (MEXU); La Trinitaria, Montane Rain Forest at km 21–23 along road from Lago Tzicao to Santa Elena, 1230 m, 7 November 1988, *D.E. Breedlove & T.F. Daniel 71214* (CAS); Slope with Montane Rain Forest 21–23 km along road from Lago Tzicao to Santa Elena, 1230 m, 25 May 1988, *D.E. Breedlove 68713* (CAS); Slope with *Pinus*, *Quercus*, and *Liquidambar* at Cinco Lagunas, Lagos de Montebello National Park, 1600 m, 24 May 1988, *D.E. Breedlove 68630* (CAS); Unión Juárez, en el volcán Tacaná, 500 m al E de Talquián, veg. bosque mesófilo de montaña, 15°04'48"N, 092°04'48"W, 1700 m, 7 February 1987, *E. Martínez S, A. Márquez, G. Urquijo, & M. Ramírez 19717* (MEXU, MO). **Oaxaca:** Finca Nubes, Barranca del Nus o Chiri, 19 February 1957, *Miranda, F. 8467* (MEXU); Mountain slopes between 6 and 14 miles from bridge at Valle Nacional on road to Oaxaca, 580 m, 23 September 1961, *H.E. Moore, Jr. & G.S. Bunting 8899* (BH, MO); *H.E. Moore, Jr. & G.S. Bunting 8897* (BH, MO); Cerca de Metates, 21 km al S de Valle Nacional, sobre la carretera a Oaxaca, bosque perennifolio con abundantes trepadoras y epífitas, 1100 m, 28 May 1973, *Rzedowski 30656* (MO); In sylvis umbrosis montanis, Cuesta de Teotálcingo, June 1842, *Liebmann s.n.* (C, Photo of specimen at MO); Metates, Tuxtepec–Oaxaca, [Mun. Santiago Comaltepec], along Highway 175 through Sierra Juarez between Tuxtepec and Oaxaca, 13.9 mi S of bridge at Valle Nacional, 2.6 mi S of Metates, near Km 152.5, cloud forest on steep slopes, 17°39'36"N, 92°19'12"W, 1165 m, 19 February 1979, *T.B. Croat 47934* (MO); Mpio. San Miguel Chimalapa, Cerro de la División, ca. 5 km al E de Benito Juárez, ca. 39 km en línea recta al NNE de San Pedro Tapanatepec. Al SO de la cima del cerro, bosque de encino con pino, y *Liquidambar*, *Calophyllum* en las cañadas y muchas epífitas; pendientes con suelos perturbados, 16°42'00"N, 94°04'48"W, 1300 m, 22 March 1985, *S.J. Maya 1415* (MEXU); Valle Nacional, Valle Nacional–Oaxaca, along highway 175 between Valle Nacional and Oaxaca, 17–19 miles above bridge at Valle Nacional, 17.36.36N 96.21W, 1430–1970 m, 21 February 1987, *T.B. Croat 65577* (CAS, MEXU, MO); Tuxtepec–Oaxaca, [Mun. San Juan Bautista Valle Nacional], along Highway 175 through Sierra de Juarez between Tuxtepec and Oaxaca, 18.4 mi S of bridge at Valle Nacional at ca. Km 140, cloud forest, 17°37'48"N, 96°20'24"W, 1500 m, 19 February 1979, *T.B. Croat 48035* (MO); [Mun. San Juan Bautista Valle Nacional], 6 miles SW [west] of Valle Nacional on Highway 175 between Tuxtepec and Oaxaca, steep forested ravine, 17°43'12"N, 96°19'12"W, 660 m, 29 June 1977, *T.B. Croat 39748* (MO); Valle Nacional–Oaxaca, [Mun. San Juan Bautista Valle Nacional], Sierra de Juárez, along Highway 175, between Valle Nacional and Oaxaca, 20 miles SW [above/west] of Valle Nacional, 17.37.12N 96.21W, 1540 m, 30 June 1977, *T.B. Croat 39821* (MO); [Mun. San Juan Bautista Valle Nacional], Sierra de Juárez, along Highway 175, between Valle Nacional and Oaxaca, 14 miles SW [above/west] of Valle Nacional, forested

8.1 km al N de Guevea de Humboldt, Mpio. Guevea de Humboldt, veg. Bosque mesófilo, con Pinus, Quercus, 16°50'24"N, 95°22'12"W, 1800 m, 30 August 1986, *Torres C, R. & L. Cortes A. 8864* (MEXU). **Puebla:** Cuetzalan del Progreso, San Miguel Tzinacapan Village on path ca. 2.5 km toward Masa, 20°00'57"N 097°33'23"W, 650 m, 5 November 2017, *T.B. Croat 107334* (MO, PMA); **Veracruz:** Volcan San Martin, 18°34'48"N 095°09'00"W, 1250 m, 8 August 1971, *Neuling & Gómez Pompa 2529* (F, MO).

Spathiphyllum cardonanum Croat & Grayum, **sp. nov.** — Type: COSTA RICA. Limón: Talamanca, Parque Nacional La Amistad, Cuenca del Sixaola, Camp 1, Río Lori, 09°21'27"N 083°13'45"W, 1800 m, 17 February 2007, *A.K. Monro & D. Santamaría 5458* (holotype, MO-6176155-56; isotype, INB).

Diagnosis: *Spathiphyllum cardonanum* is usually a montane species and is characterized by its short thick internodes, petioles sheathed about 2/3 of their length and drying with adaxial ribs, narrowly ovate, acuminate blades which are rounded to acute and then weakly attenuated at base with numerous, mostly closely spaced, broadly spreading primary lateral veins as well as by the long-pedunculate inflorescence with a broad, green, naviculiform spathe and by a short-stipitate, green spadix with prominently protruding, acute, green pistils.

Terrestrial herb, 1.0–1.5 m tall; internodes short, 3–4 cm diam. LEAVES 90–159 cm long; **petioles** 50–79 cm long, sheathed 61–67% of length, drying light yellow-brown to grayish yellow-brown, green, matte, prominently and sharply ridged abaxially; sheath 33.5–49.5 cm long, its margin concolorous, loosening but remaining intact (sometimes persisting weakly as loose fibers); free portion of petiole 16.5–30.5 cm long, oval in cross-section; geniculum sulcate, 2.5–3.5 cm long, 3–5 mm diam., drying blackened; **blades** narrowly ovate, (29)36–49 cm long, (13)(2.2)16–26 cm wide, 1.5–1.8 times longer than wide, 0.60–0.72 times as long as petioles, gradually acuminate at apex (acumen 2.0–2.3 cm long), rounded and briefly short-attenuate at base, thinly coriaceous, moderately bicolorous, dark green and matte to semiglossy above, moderately paler and matte below, drying dark brown to grayish yellow-brown and semiglossy above, yellowish brown to grayish yellow-brown and semiglossy below; major veins sunken above; midrib thicker than broad and paler below; **primary lateral veins**, 25–30 per side, departing midrib at an acute angle then spreading at 70–80° near the base, to 65–70° midway, at 25–50° toward apex, weakly sunken and concolorous above, narrowly raised below, spaced 4–10(15) mm apart, drying weakly raised and concolorous above, narrowly rounded and darker below; minor veins moderately obscure. INFLORESCENCE held well above the leaves; peduncle 53–112 cm long; **spathe** (11.7)17–25 cm long, (4.2)6–12 cm wide, green to greenish yellow, drying greenish brown to yellowish brown; **spadix** green, stipate 5–7 mm, (4.2)11–14 cm long, (1.1)1.3–2.2 cm diam.; flowers 6–7 visible per spiral in flower, up to 10 in fruit; **pistils** acute, green, prominently exerted 2–5 mm above tepals, drying narrowly and sharply acute, blackened; ovary 3-locular, 3 mm long, 3.5 mm diam.; ovules 2 per locule; seeds smooth, usually 2 per locule, obtusely 3-sided (shaped like a tangerine wedge to jelly bean-shaped), 2.2–3.0 mm long, 1.4–1.6 mm wide, unridged, densely and minutely pale-granular. **Figures 44–48.**

Distribution — *Spathiphyllum cardonanum* is endemic to Costa Rica in Cartago and Limón Provinces at (460)1040–1810 m in *Tropical wet forest* or *Premontane rain forest* life zones.



Figure 44: *Spathiphyllum cardonatum*, *Monro & D. Santamaría 5458*, TYPE, Costa Rica



Figure 45: *Spathiphyllum cardonanum*, Monro & D. Santamaría 5458, TYPE, Costa Rica



Figure 46: *Spathiphyllum cardonatum*, L.D. Vargas 1316, Costa Rica

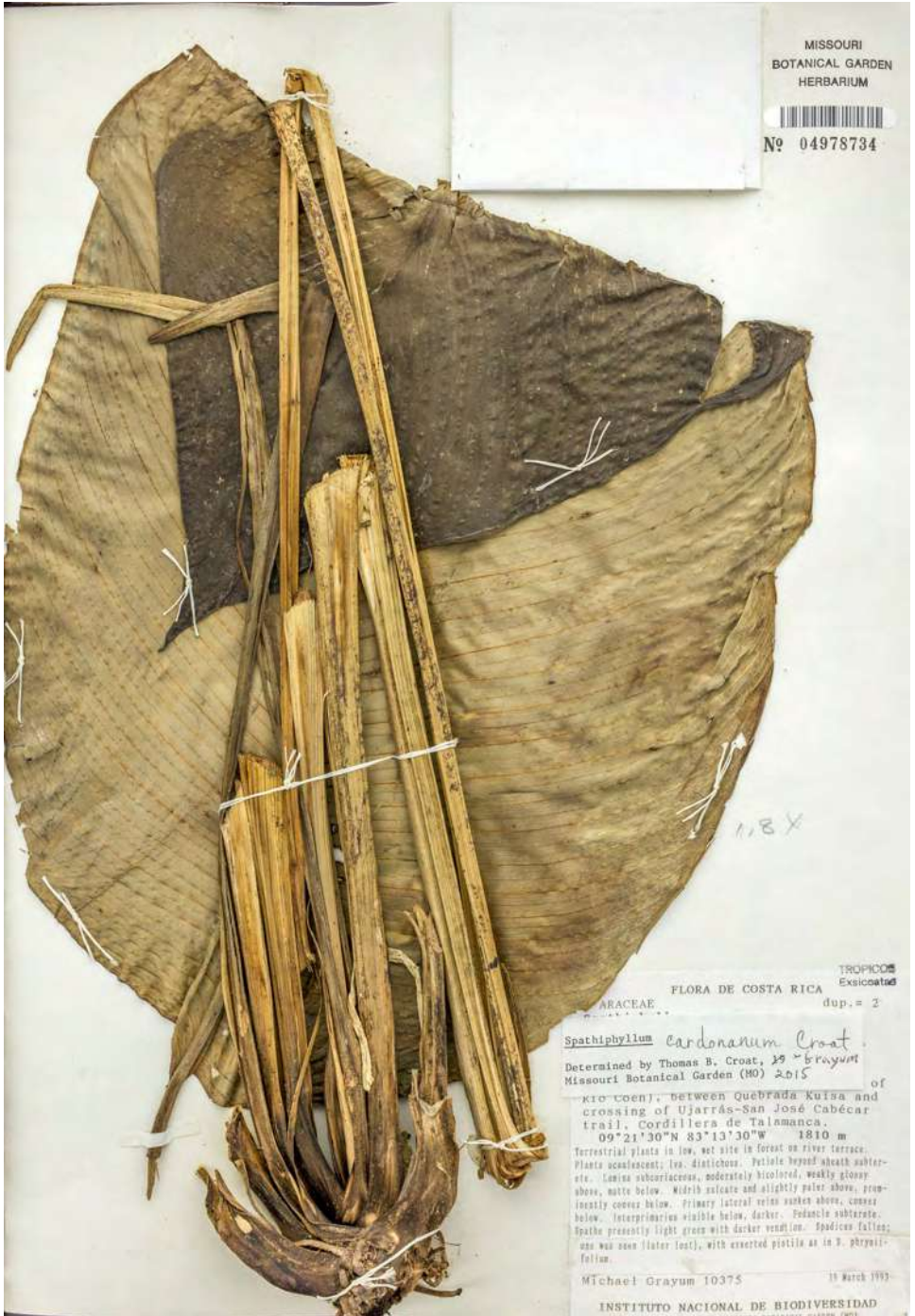


Figure 47: *Spathiphyllum cardonanum*, Grayum 10375, Costa Rica



Figure 48: *Spathiphyllum cardonanum*, A. Fernández 948, Costa Rica

Comments — *Spathiphyllum cardonanum* may be confused with *S. bonyicense* Croat which occurs at less than 300 m elevation and also differs by having the leaf blades two times longer than broad (in contrast to 1.4–1.9 times for *S. cardonanum*) and drying medium brownish gray on the upper surface and with the base of blade acute as well as having the primary lateral veins in the lower 6 cm of blade numbering only 2 to 3 per side (in contrast to 5 or 6 veins in the lower 6 cm of the blades for *S. cardonanum*). In addition, the spathe of *S. bonyicense* is short-acuminate at apex and the spadix is white. In contrast, *S. cardonanum* has leaf blades which dry dark brown above, have the base of blade basically rounded but decurrent onto the petiole at the very base. *Spathiphyllum cardonanum* occurs at 1000–1810 m and has the primary lateral veins in the lower 6 cm of blade numbering 5 or 6 per side, its spathe is narrowly long-attenuate at apex with the narrowed portion 4–5 cm long and it has a spadix green.

Spathiphyllum cardonanum has been confused with *Spathiphyllum phryniifolium* Schott but that species differs by having leaf blades typically lanceolate, 2.5–4.5 times as long as wide with the primary lateral veins more widely spaced, typically 1.5–2.0 cm apart. In addition, the blades and especially the spathe of *S. phryniifolium* dry much darker, usually somewhat blackened.

Alvaro Fernández 948 is unusual for being smaller than the Grayum collection from the same region and has the margin of the sheath more fibrous.

Etymology — The species is named in honor of Colombian botanist, Felipe Cardona, Director of the HUA Herbarium at the Universidad de Antioquia in Medellín who has revised the Colombian *Spathiphyllum* (Cardona, 2004). Felipe is also one of the leaders in a group of Colombian aroid botanists who are tackling the many taxonomic problems in that aroid-rich country.

Paratypes: **COSTA RICA. Cartago:** Turialba, 9:15:78N 83:41:15W. 1091 m, *Vargas 1316* (INB). **Limón:** Talamanca, P.N. Cordillera de Talamanca, Río Coén, 800 m aguas abajo unión Queb. Kirigú, de Ujarrás a San José Cabécar, 09°23'40"N, 83°12'50"W, 1600 m, 31 March 1993, *Alvaro Fernandez 948* (CR); Talamanca, along S side of Río Lori (tributary of Río Coén), between Quebrada Kuisa and crossing of Ujarrás-San José Cabécar trail, Cordillera de Talamanca, 09°21'00"N, 83°13'12"W, 1810 m, 19 March 1993, *M. Grayum 10375* (MO).

Spathiphyllum clewellii Croat, **sp. nov.** — Type: HONDURAS. Gracias a Dios: La Mosquitia, alrededores del Río Plátano; 84°40'N–58°00'N, 15°30'–15°55'W, 50–200 m; 17–23 May 1973, *A. Clewell & G.A. Cruz 4060* (holotype, MO-2162792; isotype, FSU) [plus 2 duplicates of unknown distribution, fide A. Clewell].

Diagnosis: *Spathiphyllum clewellii* is characterized by its medium stature (to 1 m tall), light brown-drying petioles which are fully sheathed to the base of the blade and weakly free-ending and rounded, ovate-elliptic, brown-drying, moderately bicolorous, narrowly and gradually acuminate, inequilateral (up to 2 cm wider on one side) blades with 20–22 primary lateral veins per side as well as by the long-pedunculate inflorescence with the light brown-drying, heavily ribbed petioles and the greenish white, oblanceolate spathe and the stipitate, narrowly

cylindroid spadix with prominently and narrowly pointed, dark brown and matte-drying pistils.

Herb to 1 m tall; internodes short, to 2.5 cm diam; LEAVES with **petioles** to 60 cm long, sheathed throughout, drying medium yellow-brown, matte, the dried margin weakly undulate, ending broadly rounded at apex; geniculum 4 cm long, drying slightly darker; **blades** 45.3 cm long, 19.3 cm wide, 2.3 times longer than broad, ovate-elliptic, narrowly long-acuminate at apex, broadly acute and briefly attenuate at base, drying weakly glossy and gray-brown above, grayish yellow-brown and almost matte below; midrib deeply sunken and concolorous above, narrowly rounded and paler below; **primary lateral veins** 18–22 per side, departing midrib at 50–70°, drying concolorous, scarcely raised above, weakly raised and darker below; minor veins close and fine. INFLORESCENCE erect; peduncle 58 cm long, 6 mm diam.; **spathe** 23.3 cm long, 6 cm wide, lanceolate, somewhat naviculiform, greenish-white, drying dark brown; **spadix** 12.5 cm long, 1.3 cm diam., fused to 5 cm at base, stipitate 1.5 cm; styles protruding 2–3 mm above tepals on dried specimens, dark brown; flowers 5–7 per spiral; tepals free, 1.2–1.8 mm wide, the inner margins paler and somewhat undulate; stamens held at surface of tepals; anthers 1 mm long and wide; thecae more or less parallel. **Figure 49.**

Distribution — *Spathiphyllum clewellii* is endemic to Honduras, known only from the type locality on the La Mosquitia Coast in the Department of Gracias a Dios at near sea level in a *Tropical wet forest* life zone.

Comments — *Spathiphyllum clewellii* was previously confused with *S. blandum*, a species which differs by having a geniculum 1.5–2.5(4) cm long, the petiole sheath does not extend to the base of the blade and is tightly inrolled, and blades which dry dark gray-brown to dark brown above and yellowish brown to gray-brown below.

Spathiphyllum clewellii has also been confused with *Spathiphyllum friedrichstali*, which differs by having petioles less prominently winged only to the middle or up to 90% its length and with a sheath narrowly attenuated at apex, blades that are 2.4–3.9 times longer than wide and usually drying gray-green to dark gray or gray-brown as well as by having a pure white spathe.

Another common Central American species which is similar to *S. clewellii* is *S. phryniifolium* which differs by having petioles which are much less sheathed, ranging from 29 – 95% their length, narrowly elliptic to oblanceolate blades that are proportionately much longer (2.3–3.8 times longer than broad) and dry dark brown to greenish above, yellow-brown or rarely greenish and semiglossy below.

Etymology — The species is named in honor of Dr. Andre Clewell from Florida State University who collected the type specimen. Clewell graduated from Oberlin College and earned his Ph.D. in Botany from Indiana University. He currently works to protect plant biodiversity as a Restoration Ecologist.

Spathiphyllum cochlearispathum (Liebm.) Engl, Monogr. Phan. [A.DC. & C.DC.] 2: 221. 1879. — *Hydnostachyon cochlearispathum* Liebm., Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn 1849(1–2): 24. 1849. — Type: MEXICO. Veracruz: in sylvis umbrosis circa Hda. de Mirador, November 1841, *F. Liebmann s.n.* (lectotype, C; isolectotype C, designated by Bunting, 1960).



Figure 49: *Spathiphyllum clewellii*, Andre Clewell & G.A. Cruz 4060, TYPE, Honduras

Hydnostachyon longirostre Liebm., Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn 1–2: 24. 1849–50. — *Spathiphyllum longirostre* (Liebm.) Schott, Aroideae 1: 2. 1853. — *Spathiphyllum cochlearispathum* (Liebm.) Engl. var. *longirostre* (Liebm.) Engl. in Monogr. Phan. [A.DC. & C.DC.] 2: 221. 1879. — Type: MEXICO. Veracruz: Colipa, March 1841, F. Liebmann s.n. (C, photo; also illustrated in Schott Icones 36: C7–D6 3151–3160).

[*Spathiphyllum liebmanni* Schott, Aroideae 1: 2. 1853, nom. illeg., *Hydnostachyon cochlearispathum* Liebm. in synonym.]

Spathiphyllum heliconiifolium Schott ('*heliconiaefolium*'), Aroideae 1: 2, pl. 5 & 6. 1853. — *Massowia heliconiifolia* (Schott) K.Koch, Bonplandia 4: 11. 1856. — Type: Schott, Aroideae 1: pl. 5 & 6 (lectotype, designated here).

Massowia lanceolata K.Koch, Bonplandia 4: 11. 1856. — *Spathiphyllum lanceolatum* (K.Koch) K.Koch, Berl. Allg. Gart. 25: 174. 1857. — Type: not seen.

Spathiphyllum lacustre Lund, Contr. Univ. Mich. Herb. 6: 4. 1941. — Type: MEXICO. Tabasco: Batacánm, Ojo de Agua, at edge of lake, 17°52'50"N, 71°07'59"W, 49 m, 9–14 May 1939, E. Matuda 3136 (holotype, MEXU; isotype, MO).

Terrestrial, understory herb, 0.5–1.8 m tall; internodes short, to 3–4 cm diam. LEAVES (41)83–145(184) cm long; **petioles** 40–80(115) cm long, sheathed (0.24)0.38–0.67(0.82) its length; **sheath** 24–62 cm long with margins inrolled, finely mottled with white and often crinkled-cripsed along margins, densely and minutely pale-speckled; free portion of petiole 12–42 cm long, slightly thicker than broad; geniculum (3–5)6–7(9) cm long, terete; **blades** oblong or oblong-lanceolate to narrowly elliptic, widest at or just below middle, (35)43–75(80) cm long, (10)15–23(29) cm wide, (1.4)1.8–2.7(5.4) times longer than wide, 0.5–1.7 times longer than petioles, acuminate or cuspidate at apex, usually rounded or rarely obtuse or subcordate at base, thinly coriaceous to sometimes ± leathery, dark green and semiglossy above, much paler and weakly glossy to matte below, weakly quilted, drying grayish brown to dark brown and matte to semiglossy above, dark brown to greenish yellow-brown or sometimes gray-brown, weakly glossy to semiglossy below; midrib sunken and weakly paler above, thicker than broad and concolorous to dark green and pale-speckled below; **primary lateral veins**, 20–25 per side, separated 1.0–1.7(2) cm, departing midrib at 60–75°, sunken to quilted-sunken above, narrowly rounded and slightly paler below; minor veins few, visible to moderately obscure. INFLORESCENCE erect, 70–140 cm long, held above leaves; peduncle (46)90–156 cm long; **spathe** cucullate, oblanceolate or elliptic, 15–34 cm long, (5)8–10(14) cm wide, 2.4–3.9 times longer than wide, acuminate at apex, subcuneate or attenuate base, light green to green; **spadix** 5–12(14) cm long, 1.3–2.6 cm diam., sessile or stipitate to 1 (1.8) cm, light green to pale greenish white at anthesis, dark green in fruit; flowers 7–10 visible per spiral; **pistils** sharply emergent; ovary 3-locular, superposed (overlapping), 6–16 ovules per ovary, 2–5(6) per locule. INFRUCTESCENCE to 17 cm long; berries obovoid, greenish, rostrate, ca. 1 cm long; seeds ca. as many as ovules, irregularly oblique-ovoid to oblong in profile, ca. 4 mm long, surface smooth and shiny between the vertical rows of foveolar. **Figures 50–59.**

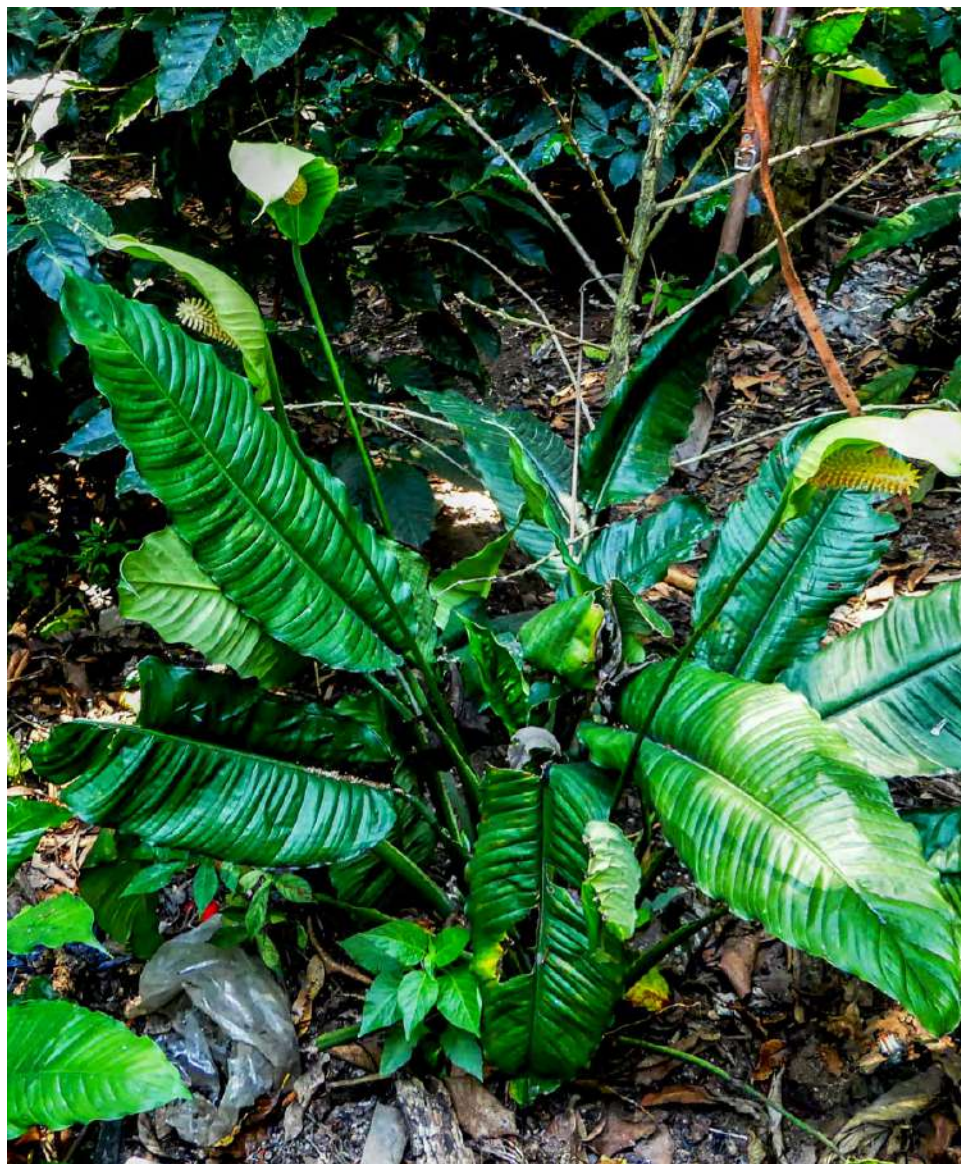


Figure 50: *Spathiphyllum. cochlearispathum*, P. Díaz Jiménez 1499. Photo: Díaz Jiménez



Figure 51: *Spathiphyllum cochlearispathum*, Spathe and spadix, *Amith* 74654. Photo: Amith



Figure 52: *Spathiphyllum cochlearispathum*, Spathe and spadix, *Amith 74654*. Photo: Amith



Figure 53: *Spathiphyllum cochlearispathum*, Details plate: **A.** Habit, **B.** Blade, adaxial surface, **C.** Inflorescence, **D.** Pistgils, **E.** Infructescence, **F.** Seeds, Credit: P. Díaz Jiménez



Figure 54: *Spathiphyllum cochlearispathum* vs *S. croatii*. Credit: P. Díaz Jiménez

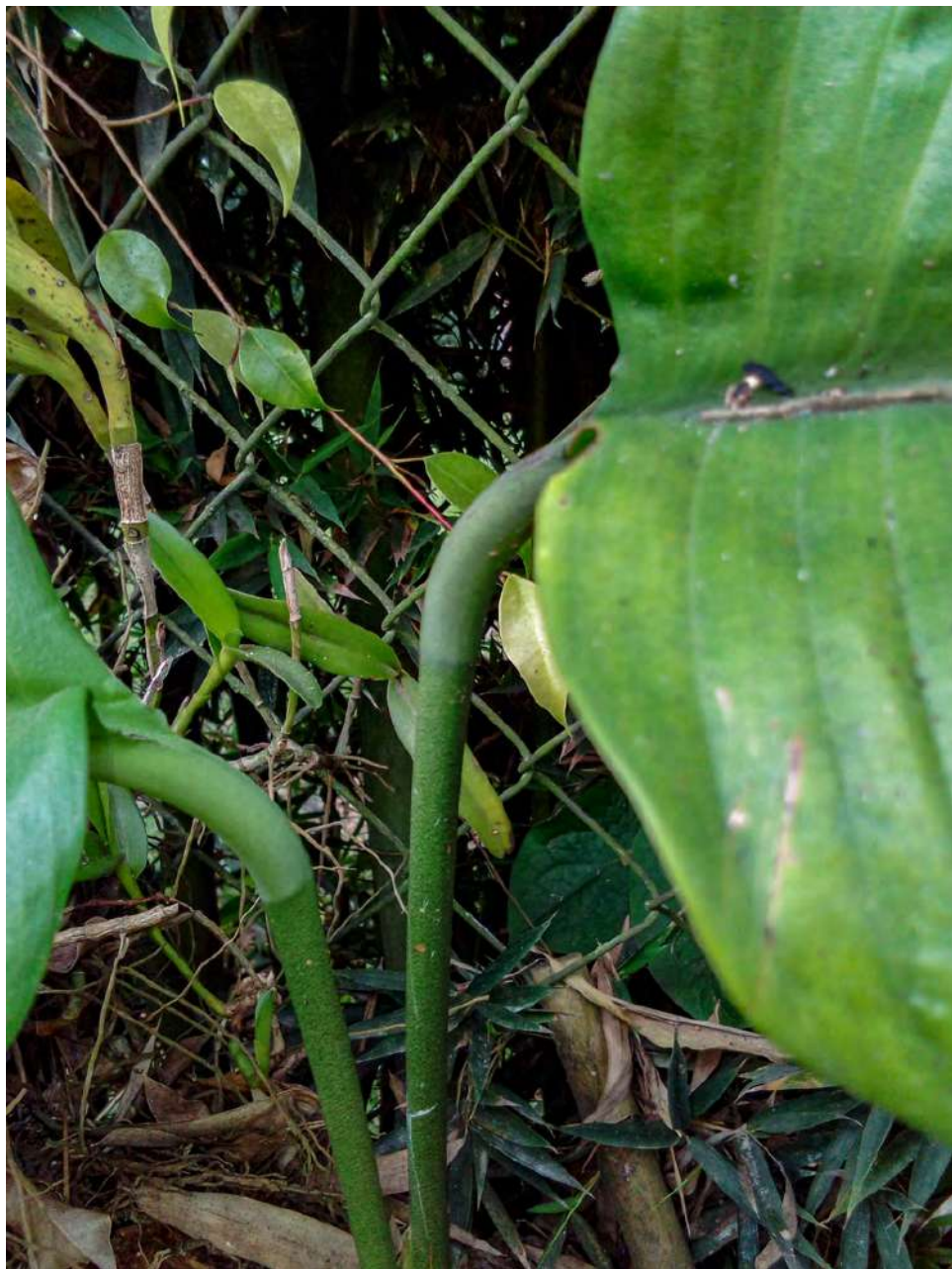


Figure 55: *Spathiphyllum cochlearispathum*, Petiole and leaf base showing elongated geniculum. Photo: P. Díaz Jiménez



Figure 56: *Spathiphyllum coclearispathum*, flowers showing extruding pollen. Photo: P. Díaz Jiménez



Figure 57: *Spathiphyllum cochlearispathum*, Croat 48368, Mexico



Figure 58: *Spathiphyllum cochlearispathum*, Croat & Hannon 65445, Mexico



Figure 59: *Spathiphyllum cochlearispathum*, Croat 78675, Mexico

Distribution — *Spathiphyllum cochlearispathum* is endemic to Mexico, ranging along the Caribbean coast in Veracruz, eastern Oaxaca and Chiapas, Tabasco, and Yucatán in a *Tropical moist forest* life zone from sea level to 1260(1500) m. In addition, unconfirmed collections occur in adjacent Belize and Guatemala.

Comments — *Spathiphyllum cochlearispathum* is characterized by its medium size, growth in scattered populations in the forest understory with petioles that are about half as long as the blades and are extensively sheathed to 2/3 their length (often to near to the geniculum) with the sheath margins finely mottled white and often crinkled-cripsed along margins and with an elongated geniculum (3)6–7 cm long, blades that are narrow (3–4 times longer than broad), often dark brown-drying, the spadix that is sessile to only short-stipitate (to 1.5 m), leaf blades usually with the base subrounded, 20–25 primary lateral veins per side, a broad, cucullate, light green to green spathe and a stubby, stipitate, light green to creamy white spadix with sharply emergent pistils.

The determination of Mexican *Spathiphyllum* has been problematic with regard to this name and it has been applied much too broadly by most taxonomists, including the senior author. Most recently, owing to the work of co-author Pedro Díaz we have come to realize that the species must have a much narrower circumscription. It has been confused for a long time with material now named *S. croatii*, which Díaz distinguishes in being of smaller stature and growing in scattered populations in the forest understory and have proportionately shorter petioles that are about half as long as the blades and are sheathed proportionately more extensively, often to near to the geniculum, by having leaf blades that are proportionately narrower (3–4 times longer than broad) and by having the spadix sessile to only short-stipitate. In contrast, *S. croatii* is a taller plant (to more than 2 m tall), forming larger populations in more aquatic situations, and has petioles about twice as long as the blades, proportionately broader blades (2.0–2.5 times longer than broad) that are not sheathed to near the base of the blade as well as by having the spadix more prominently stipitate with the stipe 8–22 mm long. *Spathiphyllum croatii* is common around the Los Tuxtlas Biological Station but is not known at all from the type locality of *S. cochlearispathum* at higher elevations in Veracruz State

Spathiphyllum cochlearispathum is also easily confused with *S. matudae* which has petioles with a similarly long geniculum but which has proportionately smaller blades, usually a white spathe, and appears to be restricted to western Mexico and the Pacific slope of Guatemala and El Salvador.

The species has also been confused with *Spathiphyllum blandum* which differs by having typically smaller, more elliptic blades with a usually white spathe (at anthesis). In contrast to *S. cochlearispathum*, both *S. blandum* and *S. friedrichstahlü* have the geniculum rarely more than 2 cm long.

The designated lectotype of *Spathiphyllum heliconiifolium* Schott, described from cultivation of a plant of unknown origin, is comprised of two complementary plates associated with the protologue. They are to be considered together as a single entity for the purpose of typification.

MEXICO. Chiapas: Cuadrante 63-A, 410 m, *Chavelas, J. et al. 1808* (MEXU); Ixtacomitán, Hwy 195, S of Pichucalco, 23 July 1984, *O. Schwartz 14* (DUKE); Ixtacomitán, Bochil–Pichucalco, along road between Bochil and Pichucalco, 17.1 km SW of Pichucalco, 6.6 km above Ixtacomitán [Ixtacomotán], 17.2 km above Villa Hernández, along road and steep rocky stream, 17.25.48N 093.05W, 430 m, 24 August 1996, *T.B. Croat 78675 & 78676* (both MO); Las Margaritas, a 12 km al E del Lago Tziscaco camino a Ixcán, veg. selva alta perennifolia, 16°06'00»N, 91°34'12»W, 1250 m, 16 November 1984, *E. Martínez S, O. Téllez, M. Sousa, & G. & J. Davidse 8628* (MO); Tziscaco, 12 km E of Tziscaco, along carretera fronteriza, semi-evergreen montane forest, 16°10'12»N, 92°04'48»W, 1200–1300 m, 16 November 1984, *G. Davidse, Mario Sousa, O. Téllez, E. Martínez & J. Davidse 29882* (MEXU, MO); Tenejapa, Río Seco Cruz Pilal, 900 m, 25 August 1982, *Alush Méndez Ton 4515* (MO); Tila, Ejido Tiontipac, camino de Terracería Tila-Salto de Agua, bosque caducifolio secundaria, suelo rojo arcilloso con rocas aflorantes, cafetal, 1100 m, 15 August 1977, *Juan I. Calzada, W. Márquez, & S. Avendaño 3317* (MO). **Oaxaca:** Along the dirt road to Chayuco 12 km from Mex. Hwy 200, secondary growth of Selva mediana, elev. 220 m, 16°22'12»N, 97°48'00»W, 220 m, 29 January 1983, *J.S. Miller & Pedro Tenorio L. 526* (MO); Tuxtepec to Oaxaca, 55 km S of Tuxtepec, on forested slopes along small draw along road, secondary & much disturbed primary forest, limestone, common, 17°36'36»N, 96°19'48»W, 630 m, 26 September 1986, *B.E. Hammel & M. Merello 15483* (MO); Uxpanapa Road from Highway 185 at Sarabia, 52 km E of highway along small stream by road, 17°09'36»N, 94°31'48»W, 100 m, 08 October 1986, *B.E. Hammel & M. Merello 15580* (MO); Puerto Eligio Mun. Comaltepec, carr. Tuxtepec a Oaxaca, Sierra Juárez km 149, veg. bosque primario, suelo profundo, textura arcilloso, 800 m, 17 June 1966, *G. Martínez Calderón 885* (MO); Mpio. Santa María Chimalapa, Arroyo Margo, ca. 5 km al E de Santa María, cañada con selva perturbada (rodeada por encinar), suelo negro, 16°55'N, 94°39'W, 250 m, 5 September 1984, *H. Hernández G. 392* (CHAPA); Río Corte, Sarabia–Uspanapa, along road to Uspanapa from Sarabia, 1.5 mi W of Río Corte, 9.7 mi E of Sarabia, disturbed virgin forest just south of road on slope, veg. type “selva alta perennifolia”, 17.06N 94.55.48W, 220 m, 20 February 1987, *T.B. Croat & D.P. Hannon 65445* (MO); Valle Nacional, Valle Nacional–Oaxaca, along Highway 175 between Valle Nacional and Oaxaca, 4.3–6 mi. above the bridge at Valle Nacional, roadside vegetation, veg. type selva mediana subperennifolia, 17°43'48»N, 96°18'36»W, 625–785 m, 21 February 1987, *T.B. Croat and D.P. Hannon 65545* (MEXU, MO); Choapan, Dto. Choapan, Cerro de Lalana, in rain forests, Cerro de Lalana, northeastern Oaxaca, 17°25'48»N, 95°54'00»W, 1500 m, 11 May 1939, *R.E. Schultes & Blas Pablo Reko 868* (ECON, MO); Ixtlan, Mpio. de Comaltepec, R. Acahual Grande, bosque mesófilo de montaña, 17°37'N, 96°21'W, 1200 m, 30 August 1990, *Ricardo López Luna & G.J. Martin 680* (MO); Mpio. de Santiago Comaltepec, Puerto Eligio, bosque mesófilo/selva perennifolia, 17°45'N, 96°30'W, 700 m, 10 July 1988, *Eusebio Lopez Garcia 137* (MO); Tehuantepec, “La Cueva del capitán salvaje”, 31.4 km al NW de la Chiviza carr. a Santiago Lachiguirí, veg. bosque mesófilo, 16°43'48»N, 95°31'12»W, 1260 m, 24 August 1984, *Rafael Torres C. & Cipriano Martínez 5936* (MEXU, MO); Huatla de Jimenez, Teotitlán del Camino–Chilchotla, [Mun. Santa María Chilchotla], along road between Teotitlán del Camino and Chilchotla, 3 mi past turn-off to Huatla de Jiménez, steep slopes covered with large stones interspersed with some nature plants and coffee trees,

18°10'48»N, 96°50'24»W, 1265 m, 23 February 1979, *T.B. Croat 48368* (MO); Mun. Santiago Lachiguiri, cerro selva del aserradero, al E de crucero Guadalupe, el cual se encuentra 12.5 km al NE de Santiago Lachiguiri, bosque mesófilo perturbado, 16°43'N, 95°30'W, 1400–1700 m, 9 May 1991, *Rafael Torres C. & A. Campos 13937* (MO). **Tabasco:** In wet gallery forest, savanna WSW of Huimanguillo, 21 May 1963, *F.D. Barlow 30/16* (US); Mpo. Tacotalpa, 2 km NW of Tapijulapa, 17°27'36»N, 92°46'12»W, *Cowan et al. 3531* (CSAT); Municipio Teapa, 7 km SE of Teapa on road to Tacotalpa; Rancho San Eneas; Sierra Madrugal woods on steep limestone hills, 17°34'48»N, 92°49'48»W, 70 m, 30 Sept 1986, *B. Hammel & M. Merello 15522* (MO); Cerro del Madrigal, arriba del Centro Puyacatengo, Chapingo, al lado del río Puyacatengo, 3 km de la carr. Teapa-Tacotalpa, selva (s.a.p.) sobre calizas, bien conservada, 18 June 1983, *C.P. Cowan, Sergio Zamudio, & Angeles Guadarrama 3968* (MO); **Veracruz:** In shallow water of pool, Sontecomapan, on road from Catemaco to Montepio, 18°30'00»N, 95°01'48»W, 10 m, 11 April 1952, *H.E. Moore, Jr. 6269* (BH, GH, MO); Las Cruces, MAPA 38.0 29.0, veg. primaria, Selva Alta Perennifolia, en suelo con agua estancada, 14 July 1970, *L. Nevling & A. Gomez-Pompa 1507* (F); Trail to Ejido Laguna Escondida near Estación Biología Los Tuxtlas, 170–200 m, 28 May 1981, *A.H. Gentry, E. Lott, UNAM tropical botany class 32390* (MO); Cerro de Chicahuaxtla-Cuauhtlapan, D-3-51, “chile de gato”, 18°51'36»N, 97°00'36»W, 1600 m, 22 January 1968, *M. Rosas R. 1028* (A); Los Tuxtlas, Catemaco–Montepio, along road between Catemaco and Montepio, 4.7 km S of Los Tuxtlas Field Station, 7.4 km beyond end of asphalt highway, 17.5 km N of Catemaco, 18°36'36»N, 95°03'36»W, 50 m, 25 August 1996, *T.B. Croat 78688* (K, MO, NY, US); Actopan, Playa Paraiso, 2 km NW of La Boca, near La Laguna de la Mancha, hidrofita emergente, primaria, suelo inundado, asoc. Pontederia y Acrostichum, 19°36'00»N, 96°23'24»W, 0 m, 11 July 1977, *A. Novelo 423* (MO, XALU). Hidalgotitlan, La Laguna, Usapanapa, 17°15'36»N, 94°30'00»W, 28 May 1974, *Gomez-Pompa & Nevling GP-5191* (XALU); Brecha La Laguna – el Elefante, arcilloso amarillento, “Jimbal” (S.A.P.), primaria, 17°16'48»N, 94°30'00»W, 150 m, 26 July 1974, *Mario Vazquez et al. V-852* (XALU); En el Ejido Agustín Melgar, a 2 km from Campamento Hermanos Cedillo, Acahual derivado de selva alta perennifolia, secundaria, suelo negro arcilloso, calido humedo, 17°12'36»N, 94°34'48»W, 31 m, 1 July 1981, *J.I. Calzada 7516* (CHAPA); Huatusco, Huatusco–Puente Nacional, “El Mirador”, 21 km E of Huatusco at Km 45 along Hwy to Puen te Nacional, small patches of virgin forest and trees remaining in pasture with numerous epiphytes, 19°12'36»N, 96°52'12»W, 1200 m, 23 August 1977, *T.B. Croat 43979* (MO); Ixtaczoquitlan, Cerro de Cuauhtlapan (entre Cuauhtlapan y Tuxpango), 18°51'36»N, 97°01'48»W, 1250 m, 30 April 1967, *M. Rosas R. 326* (A); Minatitlan, 13.7 km E of La Laguna, near Usapanapa, luego 6.5 km al N sobre camino nuevo no completo (brecha 93) a Belisario Domínguez, afloramientos cársticos, 17°19'48»N, 94°22'48»W, 130 m, 10 October 1984, *Tom Wendt & S. Plettman 4475* (CHAPA); Playa Vicente, Cerca de Galeana rumbo a Santa Teresa, Playa Vicente, riparia, secundaria, 150 m, 18 December 1970, *A. Lot 1138* (XALU); Puente Nacional, Barranca de Pachuquilla, vegetación riparia, 19°13'48»N, 96°36'36»W, 5 May 1991, *M. Chazaro B, H. Oliva R, & A. Flores M. 6626* (MO); San Andrés Tuxtla, Road from Estación Biológica Los Tuxtlas to Playa Montepio, ca. 7.8 km N of Estación Los Tuxtlas, in forest along stream west of road, 18°34'48»N, 095°09'36»W, 120 m, 29 Sept 1986, *B.E. Hammel, M. Merello & S. Sinaca 15506* (MO); 1.5 km NE de la Estación de Biología Tropical Los Tuxtlas, veg. pastizal, 18°33'36»N, 095°03'36»W, 45 m, 19 July 1994, *Renée González Montagut 13* (MEXU, MO); Floor of tropical forest, San Andres Tuxtla, 3 April 1939, *R.E. Schultes et al. 29* (ECON); cumbres del Bastonal, 11 km S de Tebanca, 15 km NE de Catemaco, 18°19'48»N, 094°59'24»W, 900 m, 26 April 1982, *G. Ibarra M. et al. 1983*

(MEX); Salto de Eyipantla, selva alta subperennifolia, 18°22'48"N, 095°12'00"W, 300 m, 19 July 1967, *L. Neuling & Gomez-Pompa 119* (GH); Estacion Biología Tropical Los Tuxtlas. El Vigia, Lote 67, veg. selva alta perennifolia, 18°34'48"N, 095°03'36"W, 250 m, 2 June 1983, *Guillermo Ibarra Manriquez 649* (MO); Estacion de Biología Tropical Los Tuxtlas, Lote 67, veg. selva alta perennifolia, 18°33'36"N, 095°03'36"W, 200 m, 19 Sept 1983, *Guillermo Ibarra Manriquez 874* (MO); Salto de Eyipantla a 8 km de Sihuapan, 18°24'N, 095°12'W, 200 m, 11 January 1980, *Maria González G. 295* (MO); Estacion de Biología Tropical Los Tuxtlas, Sontecomapan—Estacion de Biología Tropical Los Tuxtlas, along road between Sontecomapan and Estacion de Biología Tropical Los Tuxtlas, N of San Andrés Tuxtla, S of Montepio, 5 mi and 2 km E of Estacion Biología Tropical Los Tuxtlas. Roadside with water-filled ditches, 18°34'48"N, 095°03'36"W, 50–150 m, 16 January 1987, *T.B. Croat & D.P. Hannon 63108* (MO); Totutla, moist woods and slopes of barranca de Santa Maria across highway from Hda. El Mirador, km 45 on highway between Conejo (near Puente Nacional) and Huatusco, 19°12'00"N, 096°45'36"W, 21 Sept 1961, *H.E. Moore, Jr. & G.S. Bunting 8866* (BH, MO).

Cultivated plants: **COSTA RICA. Puntarenas:** Las Cruces Botanical Garden, along Rio Jaba, lower montane rainforest, 08°47'24"N, 082°57'00"W, 1200 m, 8 May 1980, *A. Meerow, L. Besse, & K. Tan 2015* (SEL). **UNITED STATES. Missouri:** St. Louis city, cultivated at Missouri Botanical Garden, originally collected in Mexico as *York 2606* on 7 July 1962 by *D.B. Dunn & Class UMO 51122*, Croat assigned number – *Croat 73887* (MO); 9 October 1892, *MBG s.n.* (MO); 26 April 1905, *G.E. McClure s.n.* (MO); *Engler 17* (MO). **Pennsylvania:** Cultivated at Phipps Conservatory, 20 April, 1990, *Karwinsky, W. 837* (MW); Originally collected as *York 2606*; Cultivated at Fairchild Garden, 3 February 2006, *T.B. Croat 73887* (MO).

Spathiphyllum cotonense M.Cedeño & O.Ortiz, **sp. nov.** — Type: COSTA RICA. Puntarenas: Cantón Coto Brus, distrito Sabalito, Las Alturas de Coton, 8° 56' 52,36" N 82° 50' 15,71" W, 22 October 2022, 1460 m, *M. Cedeño, N. Köster, M. Blanco, O. Ortiz 2579* (holotype USJ; isotype B).

Diagnosis: *Spathiphyllum cotonense* is characterized by having narrowly lanceolate or obovate-elliptic blades, sheathed petioles 2–4 cm before the geniculum, inflorescence white or light green during anthesis, the midrib dark green, spherical spadix and the pistils broadly conical and white in anthesis, completely projecting above tepals.

Terrestrial, up to 40 cm tall; stems rhizomatous, up to 10 cm long, 1–2 cm diameter; internodes short. ADULT LEAVES up to 5 present, spreading; **petioles** usually 11.5–20 cm long, petiole sheathed usually 2–4 cm before the geniculum (sheathed 0.82–0.90 their length), sheath persistent; geniculum 0.4–1.0 cm; **blades** narrowly lanceolate or obovate-elliptic, 10–20 × 3.5–10 cm, 2–2.8 times longer than wide, apex long acuminate, the base acute to attenuate or rounded, thinly coriaceous, drying gray-green above and pale green below; midrib sunken and slightly paler above, thicker than broad; margin crenated; **primary lateral veins** 8–17 per side, departing from midrib at 45°, sunken above, prominent below, minor veins obscure. INFLORESCENCE more or less erect; peduncle usually 20–40 cm long; **spathe** 5–12 × 2–4 cm, obovate or ovate, apex short acuminate, white or light green during anthesis, the midrib dark green; **spadix** stipitate or sessile, spherical to fusiform, 1.0–2.5 cm long, 5–8 mm diameter, light green; **pistils** white at anthesis, broadly conical, projecting above tepals.

INFRUCTESCENCE with berries darker green during development; seeds white, 2.5–3.0 mm long. **Figures 60–63.**

Distribution — *Spathiphyllum cotonense* is endemic to Costa Rica, from 1390 to 1460 m, growing in *Premontane wet forest* and *Tropical wet forest* life zones.

Comments — Specimens of *Spathiphyllum cotonense* were previously considered by Ortiz et al. (2021) as new records of *S. dressleri* Croat & F. Cardona for Costa Rica. However, during fieldwork in 2021 and 2022, two more populations were found in the south of the country in the Cordillera de Talamanca, with which we were able to compare more in data with the populations of the type locality of *S. dressleri* in Panama. This species differs from *S. dressleri* by its moderately small size up to 40 cm tall, spherical to fusiform spadices at anthesis with broadly conical white styles, which are completely projecting above tepals.

Flower and fruit of this species have been recorded in June, September and October.

Etymology — The name refers to the type locality where the plants are growing in a protected area.

Paratypes: **COSTA RICA. San José:** Cantón Turrubares, distrito Mercedes Sur, 9° 47' 15,5" N 84° 26' 12,57" W, 18 June 2020, 1393 m, *M. Cedeño, J.E Jiménez & J. Hidalgo 1905* (USJ). **Puntarenas:** Cantón Coto Brus, distrito San Vito, Estacion Biologica Las Cruces, 8° 47' 02,47" N 82° 58' 39,94" W, 12 September 2008, 1372 m, *F. Oviedo-Brenes, R. Quiros & V. Milla-Quesada 241* (HLDG); Cantón Coto Brus, distrito Sabalito, Finca de Wilberht Barrantes, 8° 48' 58,6" N 82° 56' 17,02" W, 05 March 2012, 1372 m, *F. Oviedo-Brenes 1797* (HLDG).

Spathiphyllum croatii Díaz Jim. & Pérez-Farr, *Phytotaxa* 522(1): 58–61, f. 2A–F. 2021. — Type: MEXICO. Veracruz: Municipio San Andrés Tuxtla, road between Laguna Escondida and Laguna Azul, Vegetación riparia, 18°35'22"N, 95°05'18"W, 118 m, 03 April, 2021, *P. Díaz Jiménez, M. Á. Pérez-Farrera & H. Gómez-Domínguez 1503* (holotype XAL, isotypes HEM, UJAT).

Terrestrial, understory herb, frequently forming large aggregations with dozens of plants along lakesides and streams, up to 2.3 m tall; internodes short, to 2.5–5 cm diam. LEAVES 61–203 cm long; **petioles** up to twice as long as the blades, 42–145 cm long, 5–10 mm diam., sheathed to near the middle or above middle; **sheath** and free portion finely pale-dotted with white, margins entire and wrinkled, inrolled, light green; free part 10–81 cm long; geniculum 5–9 cm long, 4.5–15.0 mm diam., light green, finely pale-dotted with white; **blades** oblong, oblong-ovate or oblong-elliptic, widest at or just below middle, 34–71 cm long, 16–29 cm wide, 2.0–2.5 times longer than wide, cuspidate at apex, obtuse or rounded at base, thinly coriaceous, dark green and glossy above, light green and semiglossy below, drying green to dark brown above, green to light brown and semiglossy below; midrib sunken and weakly paler above, finely pale-dotted with white, thicker than broad, dark green to yellowish-green above and light green to whitish below; **primary lateral veins** 20–37 per side, separated 0.6–1.7 cm, departing midrib at 60–80°, sunken and dark green above, light green, narrowly rounded below; minor veins dark green below. INFLORESCENCE erect, usually equal to or taller than leaves;



Figure 60: *Spathiphyllum cotonense*, M. Cedeño at al. 25791, Habit. TYPE. Photo: M. Cedeño

peduncle 50–209 cm long, 4.5–14.0 mm diam.; **spathe** cucullate, oblanceolate or elliptic, 16.5–34.0 cm long, 8.0–14.5 cm wide, acuminate at apex, subcuneate, attenuate, oblique or obtuse at base, decurrent 5–16 mm at base, yellowish-green at anthesis, dark green post-anthesis; **spadix** 3.6–12.2 cm long, 1.6–2.5 cm diam., cream-yellowish, sweet and pleasantly scented at anthesis, stipe 8–22 mm, 4.0–7.3 mm diam., light green at anthesis, dark green and finely pale-dotted with white post-anthesis; flowers with perianth of 6 free tepals, 1.9–2.8 mm long; stamens 4 or 6; anthers, 1.5–2.4 mm long; thecae oblong, 0.6–1 mm; **stigmas**, sharply emergent, elongate-conic, 5–15 mm long; style 2.5–6.0 mm long, 1.8–2.5 mm diam. at the base; ovary 3-locular, 2–5 ovules per ovary, 6–16 ovules per locule, INFRUCTESCENCE 9–11(14) cm long, 2.5–3.3 diam.; berries obovoid to oblong, rostrate, 9–13 mm long, 3.1–6.1 mm wide, yellowish at maturity; seeds oblong, obovoid to irregularly oblique-ovoid, 2.5–3.3 mm long, 1.3–1.8 mm wide, light brown to grayish or dark brown-stained and glossy when fresh, dark brown when dry. **Figures 64–69.**

Distribution — *Spathiphyllum croatii* is endemic to Mexico, known at present only from an



Figure 61: *Spathiphyllum cotonense*, Infructescence, M. Cedeño at al. 19051. Photo: M. Cedeño



Figure 62: *Spathiphyllum cotonense*, Inflorescence, M. Cedeño at al. 25793. Photo: M. Cedeño



Figure 63: *Spathiphyllum cotonense* Oviedo-Brenes 1797



Figure 64: *Spathiphyllum croatii*, Population with many individuals at Los Tuxtlas, Veracruz, Mexico. Photo: J. Díaz Jiménez

Fco. Rueda, sabana, 23 September 1979, *C. Cowan 2514* (MO); Mangroves and adjacent freshwater swamp, Sontecomapan, 18°30'00"N, 095°01'48"W, 0 m, 23 May 1981, *A.H. Gentry, E. Lott & UNAM tropical botany class 32280* (MO); Coatzacoalcos. 6 miles E of Coatzacoalcos along Highway 180, disturbed hillside and surrounding marsh, 18°04'48"N, 094°21'36"W, 10 m, 3 July 1977, *T.B. Croat 40063* (MO); Cardenas, A 2 km del Poblado C-29, 18°03'49"N 093°27'24"W, 14 m, *P. Díaz Jiménez 612* (MO); Huimanguilo, Km 10.4 de la desviación de Huimanguillo hacia Francisco Rueda, 17°49'12"N 093°30'36"W, 37 m, *Cowan 2514* (MO); Veracruz, Entre La Esmeralda y Poblado Cinco, Mpio. de Usupanapa, 17°12'N 094°45'W, 100m, *Kromar 2682* (MO). **Veracruz:** Mun. Catemaco, in shallow water of pool, Sontecomapan, on road from Catemaco to Montepio, 18°30'00"N, 95°01'48"W, 10 m, 11 April 1952, *H.E. Moore, Jr. 6269* (BH, GH, MO); La Palma, 18°33'21"N, 95°03'35"W, 56 m, *P. Díaz Jiménez 1306* (MEXU); La Palma, 18°33'N, 95°03'W; 24 m, 03 April, 2021, *P. Díaz Jiménez, M. Á. Pérez-Farrera & H. Gómez-Domínguez 1505* (HEM, UJAT); Road between Tebanca and Miguel Hidalgo, 18°33'N, 95°03'W; 24 m, *P. Díaz Jiménez, M. Á. Pérez-Farrera & H. Gómez-Domínguez 1505* (HEM, UJAT); Coatzacoalcos, Coatzacoalcos cerca de Nanchital, asociación de *Vochysia hondurensis*, 18°04'12"N, 94°24'00"W, July 1962, *Cazares, J.M. Leon 121* (MEXU); Hills between Playa Escondida and Estación Biológica Los Tuxtlas,



Figure 65: *Spathiphyllum croatii*, Habit, Díaz Jiménez *et al.* 1503. TYPE. Photo: P. Díaz Jiménez

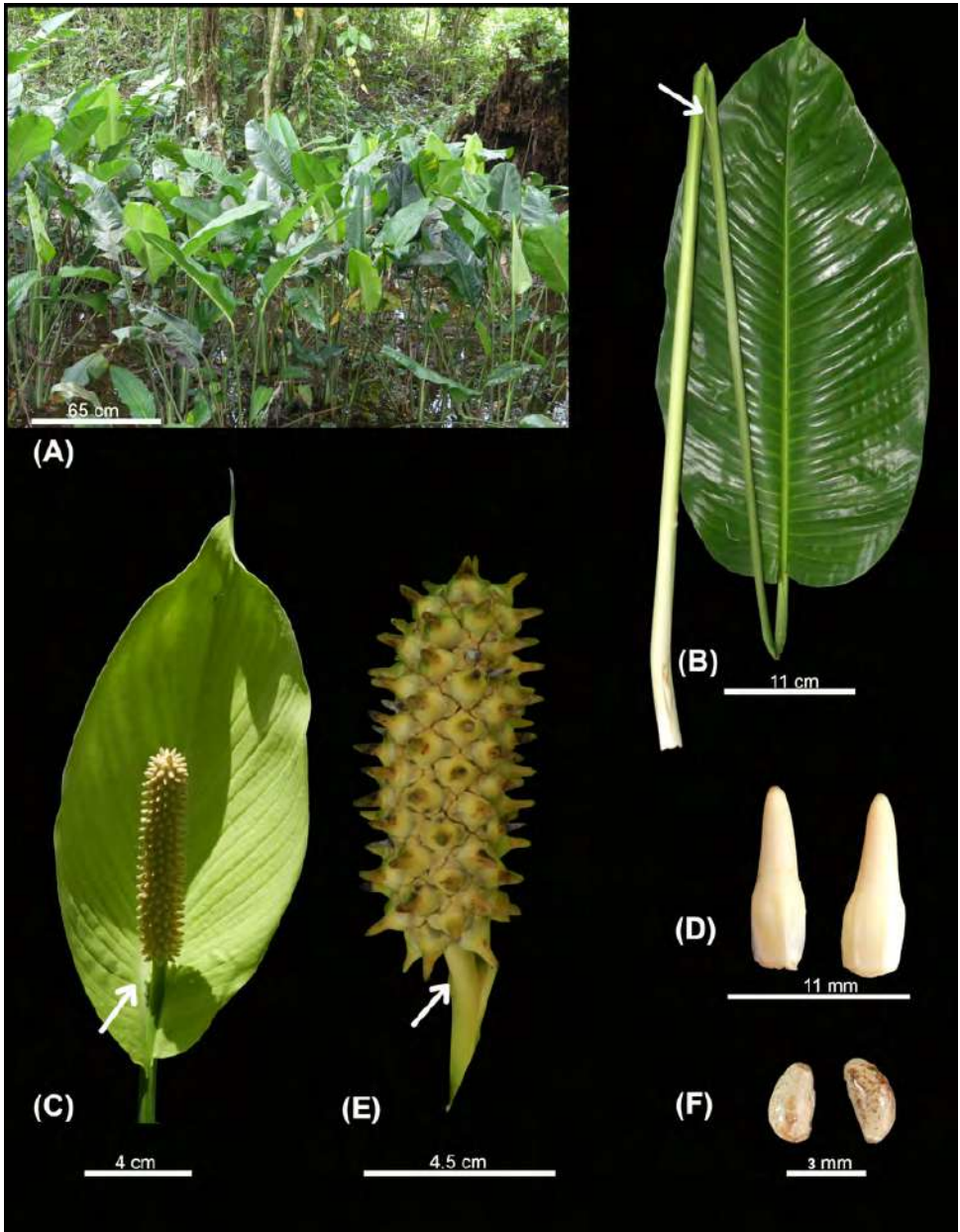


Figure 66: *Spathiphyllum croatii*. Plate showing: **A.** Population of adult plants showing typical growth habit in dense population in open area. **B.** Leaf blade, adaxial surface with folded petiole which is much longer than blade. **C.** Inflorescence with green spathe and greenish spadix. **D.** Close up of ovary. **E.** Infuctescence showing acute protruding styles. **F.** Seeds. Credit: P. Díaz Jiménez



Figure 67: *Spathiphyllum croatii*, Gentry & Lott 32280, Mexico



Figure 68: *Spathiphyllum croatii*, Croat 40063, Mexico



Figure 69: *Spathiphyllum croatii*, Ibarra Manríquez 649, Mexico

arc along the Gulf of Mexico coast in the state of Veracruz. The species grows mainly in open areas of disturbed, riparian vegetation or relics of evergreen tropical rainforest, commonly on the banks of rivers, lagoons or ditches, ranging from sea level to 900(1000) m. It forms populations of many individuals.

Comments — *Spathiphyllum croatii* is morphologically similar to *S. cochlearispathum* which differs in being of smaller stature and grows in scattered populations in the forest understory and have proportionately shorter petioles that are about half as long as the blades and are sheathed proportionately more extensively, often to near to the geniculum, by having leaf blades that are proportionately narrower (3–4 times longer than broad) and by having the spadix sessile to only short-stipitate. In contrast, *S. croatii* are taller plants (to more than 2 m tall), forming larger populations in more aquatic situations, have petioles about twice as long as the blades, proportionately broader blades (2.0–2.5 times longer than broad) and are not sheathed to near the base of the blade as well as by having the spadix more prominently stipitate with the stipe 8–22 mm long.

Flowering occurs throughout the year, but generally with a marked peak at the end of the dry season and early rainy season, between April and August (P. Díaz Jiménez pers. obs.).

Additional Specimens Seen: **MEXICO: San Andrés Tuxtla:** Laguna Escondida, 5 km al NW de la Estación Biológica Los Tuxtlas, acuatica, suelo fangoso, asoc. piper, 18°21'00"N, 95°10'12"W, 160 m, 25 September 1971, R. Hernández M. & R. Cedillo T. 1258 (MEXU, XALU); Trail to Ejido Laguna Escondida near Estación Biológica Los Tuxtlas, 170–200 m, 28 May 1981, A.H. Gentry & E.J. Lott 32390 (MO); Estación Biológica Tropical Los Tuxtlas. El Vigía, Lote 67. Veg. selva alta perennifolia, 18°34'48"N, 095°03'36"W, 250 m, 2 June 1983, G. Ibarra Manriquez 649 (MO); Road from Estación Biológica Los Tuxtlas to Playa Montepio; ca. 7.8 km N of Estación Los Tuxtlas. In forest along stream west of road, 18°34'48"N, 95°09'36"W, 120 m, 29 Sept. 1986, B.E. Hammel, M. Merello & S. Sinaca C. 15506 (MO); Along road between Sontecomapan and Estación de Biología Tropical Los Tuxtlas, N of San Andrés Tuxtla, S of Montepio, 5 mi and 2 km E of Estación Biológica Tropical Los Tuxtlas, roadside with water-filled ditches, 18°34'48"N, 095°03'36"W, 50–150 m, 16 January 1987, T.B. Croat & D.P. Hannon 63108 (MEXU, MO); 1.5 km NE de la Estación de Biología Tropical Los Tuxtlas, veg. pastizal, 18°33'36"N, 095°03'36"W, 45 m, 19 July 1994, R. González M. 13 (MEXU, MO); Los Tuxtlas, Catemaco–Montepio, along road between Catemaco and Montepio, 4.7 km S of Los Tuxtlas Field Station, 7.4 km beyond end of asphalt highway, 17.5 km N of Catemaco, 18°36'36"N, 95°03'36"W, 50 m, 25 August 1996, T.B. Croat 78688 (K, MO, NY, US); Laguna Escondida – Laguna Azul, 18°35'18"N, 95°05'39"W, 142 m, 01 August 2014, P. Díaz Jiménez 1321 (MEXU); Road between Laguna Escondida and Laguna Azul, 18°35'18"N, 95°05'39"W, 142 m, 03 April, 2021, P. Díaz Jiménez, M. Á. Pérez-Farrera & H. Gómez-Domínguez 1502 (HEM, UJAT); Laguna Azul, 18°35'18"N, 95°05'39"W, 142 m; 03 April, 2021, P. Díaz Jiménez, M. Á. Pérez-Farrera & H. Gómez-Domínguez 1504 (HEM, UJAT); Catemaco, Laguna Escondida, Estacion Biologica Los Tuxtlas, Sontecomapan, acuatica, suelo fangoso, asoc. piper, 18°21'00"N, 95°10'12"W, 160 m, 25 September 1971, R. Hernández M. & R. Cedillo T. 1258 (XALU); Estacion de Biologia Tropical Los Tuxtlas, Lote 67, veg. selva alta perennifolia, 18°33'36"N, 095°03'36"W, 200 m, 19 Sept. 1983, G. Ibarra Manriquez 874 (MO); Salto de Eyipantla a 8 km de Sihuapan, 18°24'N, 095°12'W, 200 m, 11 January 1980, M.G.G. 295 (MO); **Tabasco:** Huimanguillo. Km 10.4 de la desviación de Huimanguillo hacia

18°34'48»N, 095°03'00»W, 50–100 m, 27 May 1981, A. Gentry, E. Lott & UNAM tropical botany class 32354 (MO).

Spathiphyllum darienense Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Darién: Bahia Piñas, not distant from Colombia border of Chocó Department, 07°38'33»N 078°11'06»W, 1 March 2019, 144 m, O. Ortiz 3534 (holotype PMA, isotype MO).

Diagnosis: *Spathiphyllum darienense* is characterized by having petioles sheathed to about midway, arched elliptic gradually acuminate blades with 12–13 primary lateral veins, a long-pedunculate inflorescences with a short, ovate greenish spathe and a short, green spadix (less than 5.5 cm long) as well as a stigma not exceeding the perianth and a 3-locular ovary with 4–6(7) ovules per locule;

Terrestrial, to 75 cm tall; LEAVES tightly clustered; **petioles** erect, terete, (6)10–22(28) cm long, 0.7–1.1(1.4) times longer than blades, sheathed to ca. midway, geniculum ca. 2 cm long, paler than shaft; **blades** arched, elliptic, widest near middle, 13–20(26) cm long, 5.5–9.0(10.5) cm wide, 1.9–2.3 times longer than wide, about as long as petioles, gradually acuminate at apex, acute at base, dark green, semiglossy above, moderately paler, semiglossy below; midrib sunken and concolorous above, narrowly rounded and paler below; **primary lateral veins** 12 or 13 per side, departing midrib at 45–50°, weakly quilted-sunken and concolorous above, narrowly rounded and paler below. INFLORESCENCE with peduncle 60 cm long; **spathe** ovate, 7 cm long, 5 cm wide, greenish, erect-spreading, short-acuminate and down-turned at apex, rounded at base; **spadix** 2.5–5.5 cm long, short-stipitate (stipe 8 mm long), medium green, erect-spreading; flowers ca. 4 visible per spiral; perianth yellow-green at anthesis, convex at apex with a barely perceptible, weakly exerted style, tepals turning lavender in fruit, segments separate; **pistil** pale green, apically rounded, stigma scarcely elevated and not exceeding the perianth; ovary 3-locular, 4–6(7) ovules per locule; fruiting spadix smooth with the young berries spheroid, white, slightly exceeding perianth, matte, yellow-brown at tip; seeds 1 or 2 per locule, surface vertically furrowed and foveolate between verrucose ridges. **Figures 70–74.**

Distribution — *Spathiphyllum darienense* is known only from Panama (Darién) and adjacent Colombia in Chocó and Antioquia Departments at 50–940 m in *Premontane wet forest* and *Tropical wet forest* life zones.

Comments — The species most confused with *Spathiphyllum darienense* is *S. floribundum* which differs by having a much shorter peduncle (16–37 cm long), and a white, reflexed, lanceolate to oblong-elliptic spathe that is 1.2–3.0 cm wide. In contrast, *Spathiphyllum darienense* differs in having a peduncle 60 cm long, an ovate, greenish, erect-spreading spathe that is 5 cm wide. *Spathiphyllum darienense* also could be confused with *Spathiphyllum silvicola* which differs by having 12–22 primary lateral veins per side and a long-acuminate, lanceolate spathe (9.8–14.5 cm long, 2.0–3.8 cm wide) and a longer, creamy white spadix (5.3–10 cm long). In contrast, *S. darienense* has only 12 or 13 primary lateral veins per side, a shorter, ovate spathe and a shorter, green spadix (less than 5.5 cm long).

Etymology — The species is named for Darién Province, Panama.



Figure 70: *Spathiphyllum darienense*, Habit of flowering plant, O. Ortiz 2964. Photo O. Ortiz



Figure 71: *Spathiphyllum darienense*, Inflorescence, *O. Ortiz 2964*. Photo: O. Ortiz

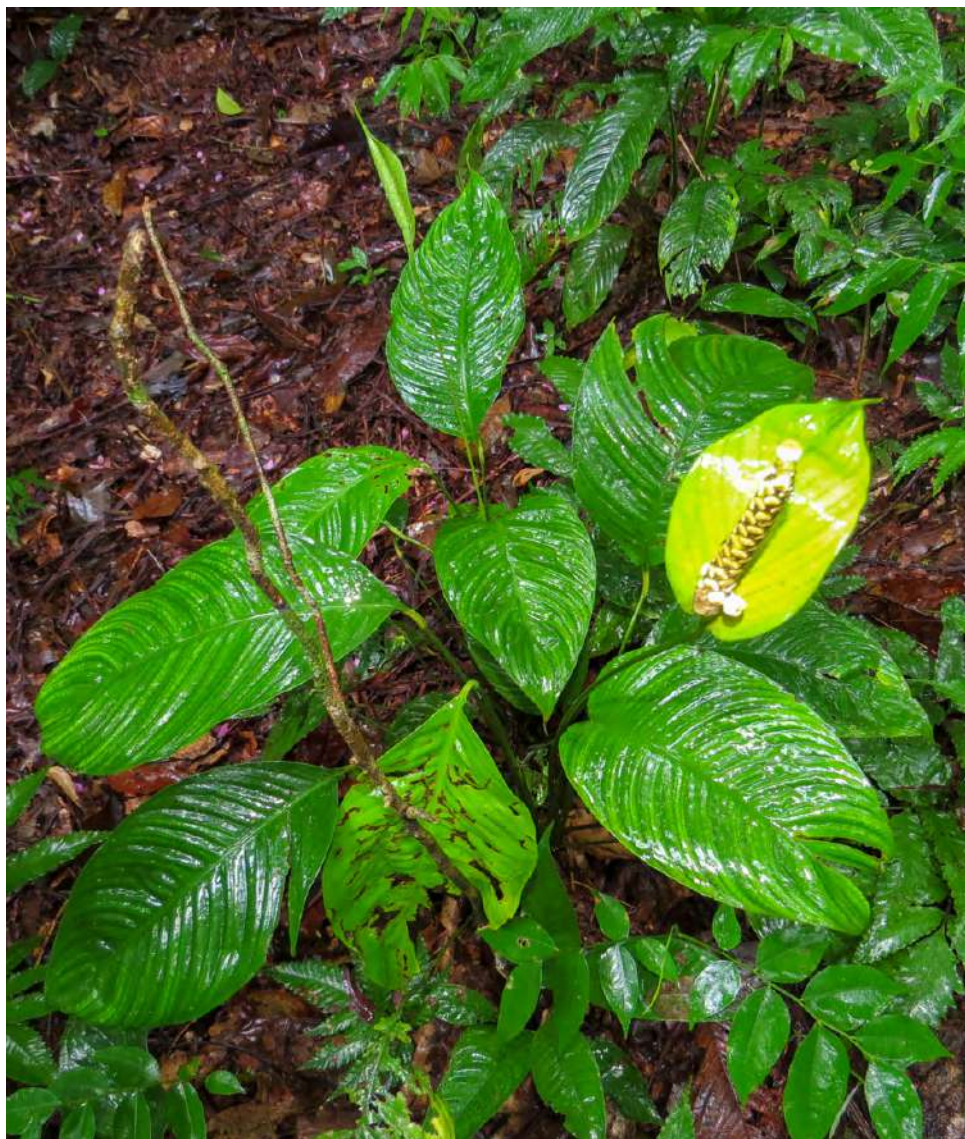


Figure 72: *Spathiphyllum darriense*, Habit. O. Ortiz 2964. Photo: O. Ortiz



Figure 73: *Spathiphyllum darriense*, Close-up of infructescence, O. Ortiz 2964. Photo: O. Ortiz



Figure 74: *Spathiphyllum darienense* O. Ortiz 3534, TYPE, Panama

Paratypes: **COLOMBIA. Antioquia**: Turbo. Correg. Lomas aisladas. Loma mediana, 50 m, 5 February 1985, *E. Renteria, A. Cogollo & J. Brand 3500* (JAUM, MO). Tarazá. correg. El Doce: Correg. El Doce. 201 km NE de Medellín. En camino a Barroblanco. Bosque húmedo tropical, 300 m, 18 August 1986, *Callejas R. et al. 2401* (NY). **Chocó**: Serranía de Baudo, along road between Las Animas and Pato on Río Pato, ca 4 km SW of Pato on property of Sr. Gutierrez, 5°30'N, 76°46'W, 150 m, 18 April 1983, *T.B. Croat 56129* (CHOCO, COL, MO); Along road between San José del Palmar and Novita, between La Itálica and San José del Palmar, ca 3 km W of San José del Palmar. 4 56'N, 76 29'W; elev. 930 m, 4°56'N, 76°29'W, 930 m, 11 May 1983, *T.B. Croat 56646* (CUVC, MO). **PANAMA. Darién**: Área de Manejo Especial de Bahía Piñas, bosque cercano a Aceite, 7°37'41" N, 78°11'10" W, 87m, 30 Jun 2018, *O. Ortiz, C. Ramos & J.U. Jiménez 2964* (PMA, MO). Vicinity of airstrip at Cana gold mine; disturbed forest; Tropical Wet Forest (Holdridge Life Zone System), 480 m, 29 July 1976, *T.B. Croat 38059* (B, K, MO); Río Balsa. 9 Balsa - Areti, Peak ca. 300 ft high between Río Balsa and Río Areti at their confluence, 07°34'N, 077°48'W, 300 ft, 13 September 1966, *J.A. Duke 8755* (GH, MO); Quebrada Bidoto (Peccary Creek) off Río Areti. 07°31'N 077°48'W - 07°35'N, *Duke 13593* (MO); Nique. Alturas de Nique - Coasi, Lower slopes of Alturas de Nique along Río Coasí, 07°36'N, 077°47'W, 26 December 1980, *R.L. Hartman 12266* (MO); Cocalito: Cocalito, 13 August 1961, *J. Dwyer s.n.* (MO).

Spathiphyllum dressleri Croat & F.Cardona, *Aroideana* 27: 139–141. 2004. — Type: PANAMA. Canal Area: Navy Reservation (Pipeline Rd), ca. 14 km N of Gamboa, 30 Sept. 1971, 09°10'58"N 079°45'54"W, 100 m, *R.L. Dressler 4100* (holotype, MO-2807361–2; isotypes, B, COL, HUA, K, PMA, US).

Terrestrial to epipetric, 45 cm tall; stems rhizomatous, to 20 cm long, 1–2 cm diam.; internodes short. LEAVES spreading, with up to 10 present; **petioles** 11–15(54) cm long, matte, 1.0–1.5 times longer than the blades, finely ridged on unwinged portion (abaxially and on sides), sheathed (0.3)0.52–0.92 its length, (1.0)2.5–4.0 cm from blade, rounded to 3-ribbed adaxially; sheath (5)16–31 cm long, erect-spreading, intact; free portion 0.5–9.7 cm long, terete to ovate in cross-section, usually not at all sulcate, occasionally sharply sulcate; geniculum 0.5–1.0 cm, sharply sulcate; **blades** obovate-elliptic, (12)15–20(40) cm long, (4.4)5.5–11.0(15.2) cm wide, (1.5)2.2–4.2 times longer than wide, 0.9–2.2 times longer than petioles, abruptly to gradually long-acuminate at apex, acute to weakly attenuate or rounded and briefly decurrent onto petiole at base, thinly coriaceous, matte, dark green above, much paler below, drying dark brown to gray-green above, grayish yellow to pale yellow-brown below; midrib obtusely sunken and concolorous to slightly paler above, thicker than broad, acutely several-ribbed and concolorous to slightly paler below; **primary lateral veins** (5)11–15 per side, departing midrib at (20)35–40°, quilted-sunken above, pleated-raised below, decurrent at midrib, concolorous on both surfaces; interprimary lateral veins almost as prominent as primary lateral veins; minor veins obscure. INFLORESCENCE erect, held among the leaves; peduncle (8)15–23(40) cm long, much shorter than the leaves; **spathe** 6.5–13.0 cm long, 2.5–6.0 cm wide, 2.2–3.3(4.0) times longer than wide, naviculiform, light green, semiglossy within, matte outside, with nearly 15 veins, these sunken on outer surface; stipe 77–15 mm long, 3 mm diam.; **spadix** cylindrical, 1.5–2.2 cm long, 8–10 mm diam., 1.6–4.7 times longer than wide, light green, matte; flowers 4–5 per spiral; tepals free, medium green, drying medium brown, pale granular; **pistils** darker green, often sharply acute, projecting above tepals ca. 1

mm, ovules 3-locular, 1 ovule per locule; pollen white. INFRUCTESCENCE: *berries* green, 7 mm long, 5.5 mm diam., prominently mamilliform; seeds 3.3–4.0 mm long, 2.2 mm diam., prominently granular. **Figures 75–83.**

Distribution — *Spathiphyllum dressleri* ranges from central Panama to northern Colombia at elevations from near sea level to 700 m in areas of *Premontane wet forest* and *Tropical wet forest* life zones.

Comments — The species is characterized by its moderately small size (up to 45 cm tall), matte-drying, yellowish brown petioles sheathed from half way to nearly throughout with sheath erect-spreading, by intact, obovate-elliptic, matte leaf blades which dry brown to gray-green above, grayish yellow to pale yellow-brown below, usually 11–15 primary lateral veins per side, the inflorescence held among the leaves with a boat-shaped, green, prominently decurrent spathe and a stipitate, stubby, light green spadix with acute pistils weakly protruding above the tepals.

Spathiphyllum dressleri is most similar to *S. luteynii* but that species differs by having usually longer blades (28.5–53.5 cm long), more primary lateral veins (15–30 per side), more closely spaced primary lateral veins which depart midrib at a 25–30° angle, a longer spathe (13.5–21.5 cm long) and a longer, more narrowly cylindroid spadix (4.8–8.6 cm long) which is less stipitate (stipe 1–3.7 cm long). In contrast, *S. dressleri* has blades mostly less than 20 cm long, fewer (fewer than 15 per side), more widely spaced primary lateral veins, a short spathe (less than 13 cm long) and a stubbier spadix (1.5–2.2 cm long) which is more prominently stipitate (stipe 7.7–15 mm long).

Spathiphyllum dressleri is also similar to *S. silvicola* but that species differs by having a more narrowly cylindroid spadix that is 6.3 times longer than wide with the style very short and sunken into a deep depression on drying. In contrast, *Spathiphyllum dressleri* has a proportionately shorter, stubbier spadix that is more broadly cylindroid, ca. 2.5 times longer than broad with the pistils at least weakly protruding at the apex.

Additional specimens seen: COLOMBIA. **Chocó:** Nuquí, Costa del Pacifico, correg. Termales, bosques entre quebrada Piedra-Piedra, y río Terco, 20 min, de camino S de hotel Pijibá (SO de Nuquí), 05°37'N, 076°15'W, 0–50 m, 9 September 1994, *Ricardo Callejas et al. 11244* (HUA, MO). PANAMA. **Bocas del Toro:** Valle del Silencio, along Río Changuinola, ca. 1 km above mouth of Río Teribe, vicinity Teribe Indian population; disturbed forest among cacao plantations, 09°21'40"N, 82°31'40"W, < 100 m, 25 June 1994, *T.B. Croat & G. Zhu 76424* (MO); Chiriquí Grande: Chiriquí Grande - Fortuna, Along road between Chiriquí Grande and Fortuna, 3 mi W of Chiriquí Grande, 8°47'N, 82°09'W, 10 m, 9 March 1985, *T.B. Croat & M.H. Grayum 60148* (MO, UB). **Coclé:** Vicinity of El Valle de Antón; at La Mesa, 0.2 mi from jct. of Finca Macarenitas and Finca Adela at Finca Gabriella, along water lines to reservoir, 08°38'N, 80°09'W, 7 July 1994, *T.B. Croat & G. Zhu 76744A* (MO, NY); El Copé. Forest on continental dvd above town, 0 8°38'N, 80°38'W, 700–900 m, Apr/27–29/1985, *B. Hammel 13672* (MO); El Copé. Sendero desde la casa de los guardaparques hasta la quebrada, 7 Julio 1996, *J. Aranda et al. 2844* (MO); La Mesa: above El Valle de Anton, ca 2 km W of Cerro Pilon on slopes of steep hill, 860–900 m, 21 July 1976, *Croat T.B. 37355* (MO). **Colón:** Along Río Guanache, 3–5 km above bridge on Colón-Portobello Road, 09°30'N, 79°30'W, 30–



Figure 75: *Spathiphyllum dressleri*, Habit, Croat & Grayum 60148, Panama



Figure 76: *Spathiphyllum dressleri*, Habit with Inflorescence, Croat & Grayum 60148, Panama

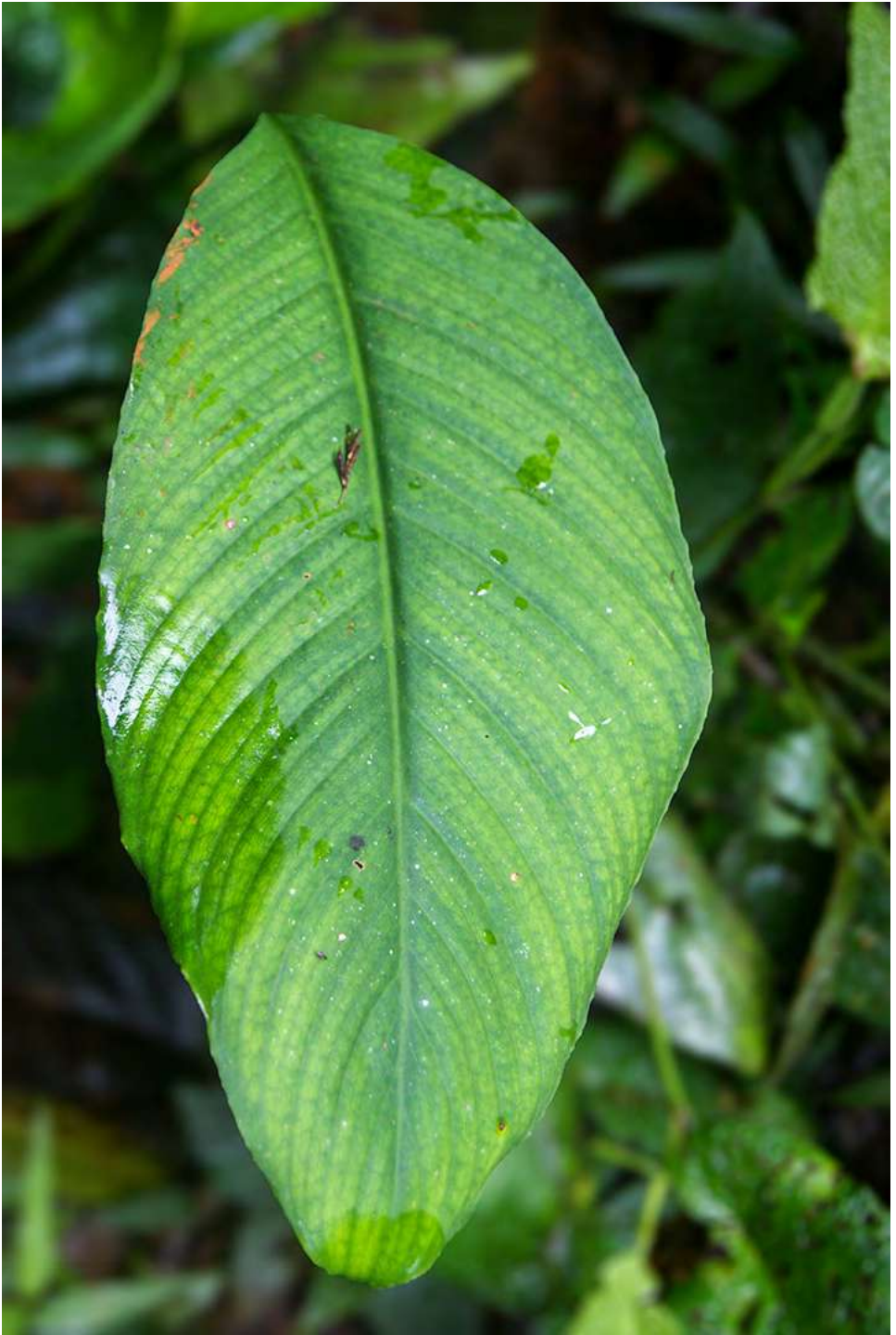


Figure 77: *Spathiphyllum dressleri*, Leaf blade adaxial, *Croat & Grayum 60148*, Panama

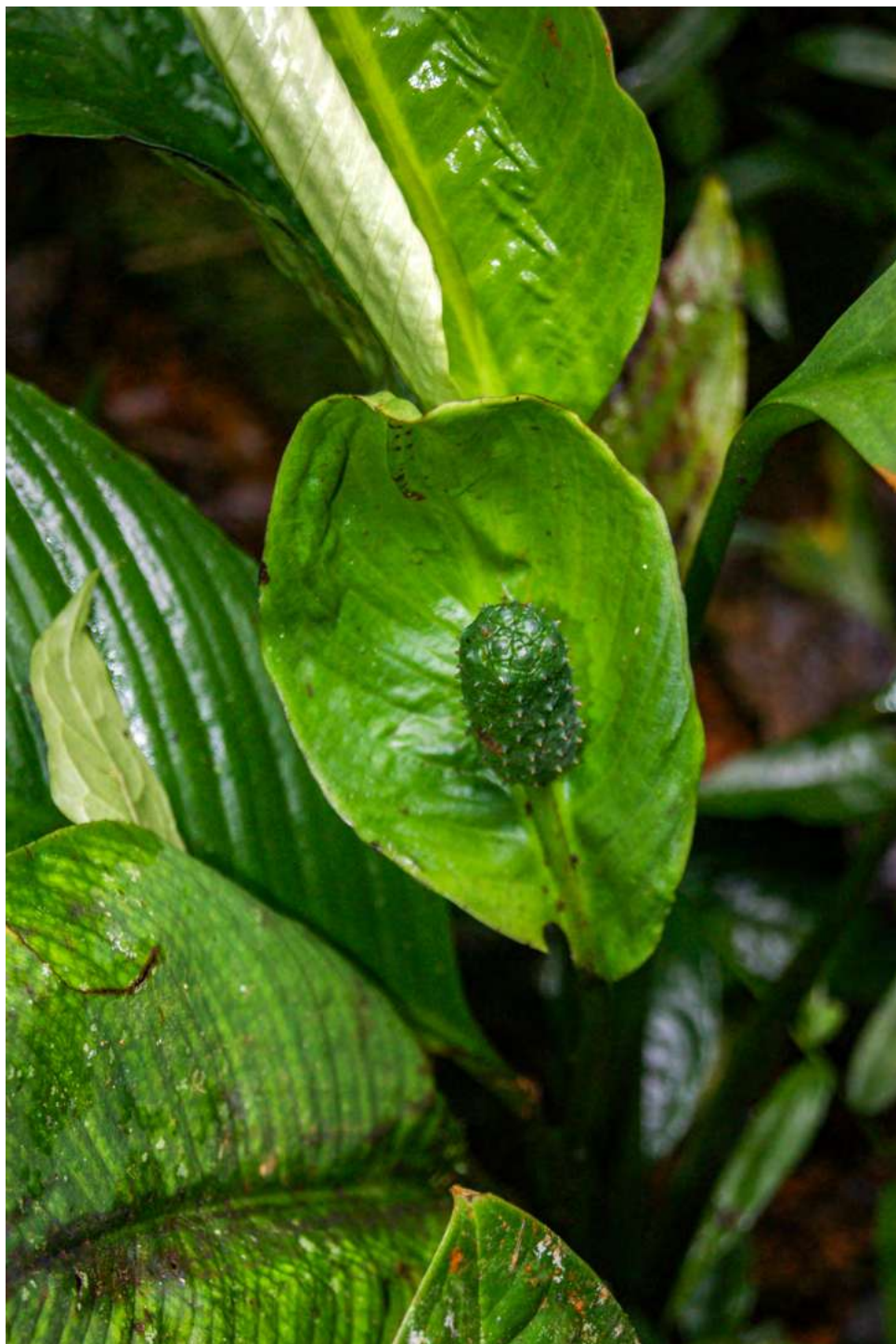


Figure 78: *Spathiphyllum dressleri*, Inflorescence, *Croat & Grayum 60148*, Panama



Figure 79: *Spathiphyllum dressleri*, O. Ortiz 2897, Inflorescences, Panama



Figure 80: *Spathiphyllum dressleri*, Close up of Inflorescence with stigmas exposed



Figure 81: *Spathiphyllum dressleri*, Hammel 13672, Panama

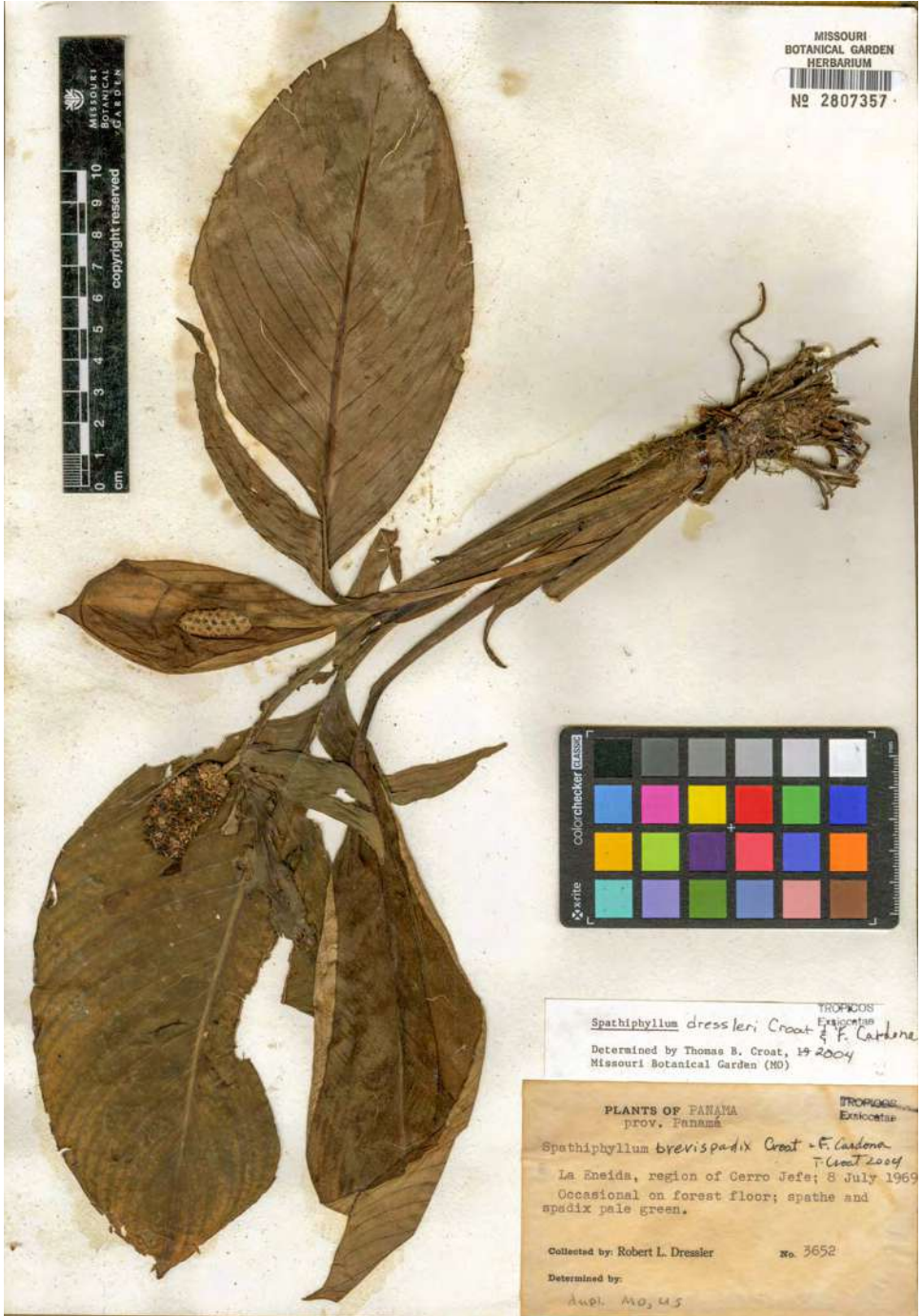


Figure 82: *Spathiphyllum dressleri*, Dressler 3652, Panama



Figure 83: *Spathiphyllum dressleri*, H. Herrera 42, Panama

100 m, 22 September 1996, *T.B. Croat 79349* (MO); Carretera a filo Santa Rita, 8 millas de la Carretera Transisthmica, 9:20 N 79 45 W, 390 m, 15 November 1985. *Herrera & McPherson 42*(PMA). **Panamá:** Panama to San Blas Trail from end of rd past Los Altos de Pacora region of Cerro Jefé. On to Cerro Brewster, 9°17'N, 79°17'W, 600–800 m, Apr/20–25/1985, *B. Hammel & G. de Nevers 13618* (MO); Cerro Campana, trail to summit, 31 August 1975, *R.L. Dressler 5140* (MO); Woods around La Eneida, 1000 m, 5 August 1970, *J.L. Luteyn & H. Kennedy 1742* (DUKE, MO); Cerro Jefe, near La Eneida (Alto de Pacora), 13 Sept 1970, *H. Kennedy 502* (DUKE, MO); Serranía de Majé, ridge south of Choco village of Ipetí. Río Ipetí drainage system. 08°47'N, 78°27'W, 500–600 m, 11 December 1981, *S. Knapp & K. Sytsma 2361* (MO); Cerro Jefe: La Eneida, region of Cerro Jefe, 8 July 1969, *R.L. Dressler 3652* (MO, PMA, US); Santa Rita: 28 October 1973, *H. Kennedy & K. Meyer 3309* (SEL). **Guna Yala:** Comarca de San Blas, Cordillera de San Blas, límite San Blas/provincia de Panamá; caminando hacia en lado Pacífico de la Cordillera entre el campamento Ilegandi y tributario del Río Piriati. Tierra continental de Playón Chico, 09°13'N, 78°16'W, 50–200 m, 8 noviembre 1991, *Heraclio Herrera, Jimmy Mojica y Johny Morris 1124* (MO); Nusagandi: Nusagandi, 09°18'N, 078°58'W, 400 m, 26 July 1986, *J.F. McDonagh, B.A. Lewis, N.J. Gumpel & A.J. Plumptre 672* (BM, DUKE). **Veraguas:** Valley of Río Dos Bocas, 11 km from Escuela Agrícola Alta Piedra (above Santa Fe) on road to Calovebora, primary forest along river, 450 m, 30 August 1974, *T.B. Croat 27520* (MO); Trail to “Buenos Aires,” north slope of ridge east of Cerro Tute, NW of Santa Fe, 22 December 1975, *R.L. Dressler 5237* (MO); Trail to “Buenos Aires,” north slope of ridge east of Cerro Tute, NW of Santa Fe, 22 December 1975, *R.L. Dressler 5257* (MO); Vicinity of Continental Divide, third branch of Río Santa María to dropoff to lowlands, 12–15 km NW of Santa Fe, 650–750 m, 16 November 1974 – 17 November 1974, *R.L. Dressler 4851* (MO, PMA, UB).

Spathiphyllum floribundum (Linden & André) N.E.Br., *Gard. Chron.* 2: 783. 1878. — *Anthurium floribundum* Linden & André, *Ill. Hort.* 21: pl. 159. 1874. — Type: pl. 159, *L'illustration Horticole* 21: 24. 1874 (lectotype, designated here).

Terrestrial, usually less than 1 m tall. LEAVES 17–61 cm long; **petioles** (6)10–22(33) cm long, 0.7–1.1(1.4) times longer than blades, usually sheathed 0.3–0.7 its length, rarely sheathed nearly to the geniculum; sheath 9.0–19.7 cm long, the margins paler, thin, finely and minutely striate, often scarious or broken, free part mostly 7.2–20.5 cm long, terete; geniculum 1.0–2.5 cm long, drying darker; **blade** mostly elliptic to elliptic-oblongate, widest at or just above middle, 13–28 cm long, 5.5–10.5 cm wide, 2.5–3.4 times longer than wide, 0.6–1.2 times longer than petioles, often moderately inequilateral (one side 0.5–1.3 cm wider), narrowly long-acuminate at apex, equilateral and acute (sometimes attenuated, sometimes inequilateral) at base, dark green and matte-subvelvety above, drying usually greenish gray to sometimes dark brown, matte to weakly glossy above, yellowish brown to gray-brown and semiglossy below; midrib broadly raised and slightly darker above, narrowly rounded and several ribbed, darker below; **primary lateral veins** 9–13 per side, departing midrib at (45)60–75°. INFLORESCENCE held among the leaves or slightly longer than leaves; peduncle (16)20–40 cm long; **spathe** white to greenish white or pale green, reflexed to spreading, lanceolate to oblong-elliptic, 4–8(11) cm long, 1.2–3.0 cm wide, attenuate to cuspidate at apex, acute to subtruncate and clasping the peduncle at base; **spadix** oblong, 2.5–5.5 cm long, stipitate 0.3–0.8 cm, greenish white; flowers 2 or 3 visible per spiral; perianth green to brownish or red-brown, rarely maroon, segments separate or sometimes conglutinate in age; **pistil** white,

obpyramidal, apically truncate; stigma elevated and shortly exceeding the perianth; ovary 3-locular, 4–6(7) ovules per locule; fruiting spadix smooth; berries spheroid, white, green and truncate at apex; seeds 1 or 2 per locule, surface vertically furrowed and foveolate between verrucose ridges. **Figures 84–91.**

Distribution — *Spathiphyllum floribundum* ranges from Panama to Colombia and Venezuela, from sea level to 600 m in Panama and from 100–1500 m in Colombia in *Tropical wet forest* and *Premontane wet forest* life zones.

Comments — *Spathiphyllum floribundum* is characterized by its moderately small size, petioles sheathed nearly to the geniculum, conspicuously oblique, mostly elliptic to elliptic-oblongate, somewhat velvety blades as well as the white to greenish white, reflexed, lanceolate to oblong-elliptic spathe and greenish white, short-stipitate spadix with a weakly protruding pistil and greenish white, spheroid berries.

Spathiphyllum floribundum is similar to *S. kalbreyeri* but that species differs by having proportionately longer leaf blades that usually dry paler and yellow-brown on the lower surface as well as having narrower, mostly gray-drying, less prominently acuminate leaf blades.

In the Mexican and Central American *Spathiphyllum* key (in this paper) the species keys out close to both *S. kalbreyeri* and *S. laeve*, both of which differ by having blades more than 33 cm long and by having a spadix more than 6 cm long. *Spathiphyllum laeve* also differs by having united tepals.

Spathiphyllum floribundum is also similar to *S. patinii*, a species more common in Colombia. That species differs by having narrower, more lanceolate and more narrowly long-acuminate blades with the primary lateral veins departing the midrib at rarely more than 40° as well as by having a spathe that has a green midrib on the outer surface.

Additional specimens seen: **COLOMBIA. Antioquia:** Río Nuz, 600–1000 m, *F.C. Lehmann* 7758 (F, US); Sabaleta, 200 - 600 m, *F.C. Lehmann* 7757 (F); Mpio. de Amalfi, road between Amalfi and Fraguas, near Salazar, 17.5–19.8 km from centro of Amalfi, bosque húmedo premontaño, 06°57'N 075°02'W, 1480–1560 m, 14 February 1988, *J.M. MacDougal, Julio C. Betancur B. et al.* 3994 (MO); Corregimiento de Aquitania, Alto del Venado (Tierra Linda), 05°57'00"N 075°06'00"W, 1200–1350 m, 2 April 1992, *Ramiro Fonnegra G.* 4023 (CAS, HUA, M, MO, PMA); along Quebrada Negra, tributary to Punchina Res., cultivated as Selby 86-0772, 770–820 m, 20 April 1992, *S.W. Ingram* 1411 (SEL); Amalfi. Mpio. de Amalfi, road between Amalfi and Fraguas, near Salazar, 17.5-19.8 km from centro of Amalfi, bosque húmedo premontaño, 06°57'N 075°02'W, 1480 - 1560 m, 14 February 1988, *J.M. MacDougal, Julio C. Betancur B. et al.* 3992 (MO); Km 15 de Amalfi a Vetilla, 06°59'40"N 075°00'35"W, 1420–1515 m, 5 February 1995, *Julio C. Betancur B. et al.* 6124 (HUA, MO); 8–27 km NE of Amalfi, highway between Vetilla and Fraguas, near Salazar and Marengo, 06°56'N 075°04'W, 1150–1450 m, 7 December 1989, *Ricardo Callejas et al.* 9146 (HUA, MO, NY); Anorí, Vereda Santa Gertrudis, Finca La Estrella, 07°08'N 075°09'W, 1450–1500 m, 6 August 2002, *Arias* 140 (MO); Corr. de Providencia, 400–700 m, 12 December 1972, *D.D. Soejarto & Enrique Rentería A.* 3626 (HUA); Corr. de Providencia, Los Popales, 700 m, 25 October 1972, *D.D.*



Figure 84: *Spathiphyllum floribundum*, Habit



Figure 85: *Spathiphyllum floribundum*, Close-up of inflorescence



Figure 86: *Spathiphyllum floribundum*, Fonnegra 2976, Colombia



Figure 87: *Spathiphyllum floribundum*, Renteria 1498, Colombia



Figure 88: *Spathiphyllum floribundum*, J. Batista 754, Panama



Figure 89: *Spathiphyllum floribundum*, Croat 49101, Panama



Figure 90: *Spathiphyllum floribundum*, De Nevers 3968, Panama



Figure 91: *Spathiphyllum floribundum*, Dressler 3855, Panama

Soejarto et al. 3514a (HUA); Anori, 200–300 m, 17 April 1977, *J.I. Santa, Ramiro Fonnegra G. et al. 116* (COL, HUA); Sitios El Río and Bramadero, kms 1–9 on the hwy. between Anorí and Dos Bocas, NE from Pueblo de Anorí, 07°05'N 075°10'W, 1290–1510 m, 16 November 1989, *Ricardo Callejas et al. 8715* (HUA, MO, NY); Medellín, sector Río Samaná-Río Claro, San Luis-Antioquia, 370 m, 22 March 1982, *Juan José Hernández et al. 329* (HUA); Nariño, vereda Puente Linda, 05°34'00"N 075°03'00"W, 800 m, December 1995, *Fernando Alzate & L. Posada 36* (HUA); Vereda Puente Linda, margen izquierda del río samana, 05°34'N 075°03'W, 700 m, 11 September 1994, *Ramiro Fonnegra G. et al. 5014* (HUA, MO, US); San Carlos, 47.5 km E of San Carlos, Lake Punchina, secondary forest along streams feeding the lake (Quebradas La Villa y El Macho), 06°14'N 074°52'W, 650 m, 5 November 1987, *A.E. Brant, Julio C. Betancur B. & Ana V. Ayala 1660* (HUA, MO, US); Along creeks leading into ISA hydro- electric dam reservoir, collected with P. Velásques, A. V. Ayala, and J. Restrepo, 06°00'N 075°00'W, 775 m, 30 November 1988, *G. McPherson 13336* (MO); Corregimiento El Jordán, Vereda Juanes, entre el Campamento de ISA y el Río Samaná, borde Río Narices, 230 m, 11 March 1988, *L.K. Albert de Escobar et al. 8324* (MO, NY); Corregimiento El Jordán, vereda Juanes, entre el campamento de ISA y el Río Samaná, borde Río Narices, 230 m, 11 March 1988, *Linda K. Albert de Escobar et al. 8322* (HUA, MO); Remnants of recently cut forest along creek affluent to Río Guatapé, ca. 1.5 km from Presa Punchiná along road to Alto Samaná, Río Magdalena valley, 06°15'N 075°05'W, 870 m, 5 July 1986, *M.H. Grayum 7613* (MO); Corregimiento Alto de Samana, Vereda Miraflores, Quebrada La Miranda, 820–900 m, 13 June 1989, *Ramiro Fonnegra G. et al. 2976* (HUA, MO, NY); corregimiento Alto Samana, camino Jardin-Miraflores, Quebrada La Miranda, 06°05'N 075°52'W, 700–800 m, 24 October 1989, *Ricardo Callejas et al. 8538* (HUA, NY); San Luis, Cañon del Río Clara, Sector nor-occidental margen izquierda, 05°53'N 074°39'W, 330–450 m, 26 December 1983, *Álvaro Cogollo P. 1142* (JAUM, MO); Cañon del Río Claro, margen derecha, sector nor-oriental, 325–475 m, 28 October 1983, *Álvaro Cogollo P. 867* (JAUM, MO); Carretera hacia Aquitania, a 12 km de la Autopista Medellín–Bogotá, 05°53'N 074°56'W, 850 m, 24 November 1988, *Álvaro Cogollo P. et al. 3744* (JAUM, MO); vereda Manizales, finca de Ramon Jaramillo, 1460–1760 m, 11 October 1981, *C.I. Orozco et al. 555* (COL); Finca las Confusas, vereda las Confusas. Bosque primario poco perturbado, 06°03'N 074°48'W, 350–500 m, 10 April 1990, *Dayron Cárdenas L. et al. 2669* (JAUM, MO); Piedra de Castrillón, 3–4 hr. (on foot) S of town, lower montane forest on mild to steep slopes, dense where undisturbed, Canopy @ 12 m, dominated near summit by Melastomatac., Rubiac., Myrsinac., Clusiaceae and *Protium*, 06°01'N 075°01'W, 1500–1700 m, 8 May 1989, *D.C. Daly & Julio C. Betancur B. 5887* (COL, HUA, IBE, JAUM, MO, NY); San Luis, 06°02'30"N 074°59'49"W, 12 September 1982, *Enrique Rentería A. & Álvaro Cogollo P. 2654* (JAUM, MO); Quebrada "La Cristalina", 06°N 074°W, 470–700 m, 22 February 1987, *Juan Guillermo Ramírez & Dayron Cárdenas L. 600* (HUA, MO); Quebrada "La Cristalina", orilla oriental de la quebrada, 06°N 074°W, 550 m, 29 October 1987, *Juan Guillermo Ramírez & Dayron Cárdenas L. 1926* (HUA, MO); "La Cristalina", 06°N 074°W, 550–690 m, 25 August 1987, *Juan Guillermo Ramírez & Dayron Cárdenas L. 1525* (HUA); "La Cristalina", 06°N 074°W, 500–550 m, 6 December 1989, *Juan Guillermo Ramírez & Dayron Cárdenas L. 271* (HUA, JAUM); Sector Río Samaná-Río Claro, 600 m, 19 March 1982, *Juan José Hernández et al. 220* (HUA); Río Samaná-Río Claro, 550 m, 19 March 1982, *Juan José Hernández et al. 225* (HUA); Río Samaná-Río Claro, 600 m, 19 March 1982, *Juan José Hernández et al. 223* (HUA); 800 m, 3 July 1982, *Juan José Hernández & Saulo Hoyos 625* (HUA); Autopista Medellín–Bogotá, Sector Río Samaná-Río

Claro San Luis–Antioquia, 400–1000 m, 7 December 1981, *Juan José Hernández & Saulo Hoyos 187* (HUA, NY); via Medellín–Bogotá rd, quebrada La Tebaida, 06°08'N 075°10'W, 1010–1060 m, 22 June 1987, *Ricardo Callejas et al. 4019* (HUA); Río Samana norte, margen izquierda del río, sobre la vía Medellín–Bogotá, 06°00'N 074°50'W, 700–780 m, 23 June 1987, *Ricardo Callejas et al. 4083* (HUA, MO); Autopista Medellín–Bogotá. Vereda La Josefina, camino a Palmita, 800 m, 28 November 1983 – 10 December 1983, *Saulo Hoyos & Juan José Hernández 469* (JAUM, MO); Santo Domingo, en selvas húmedas en la Fuentes Termales de Santo Domingo, 1200 m, 7 May 1949, *R. Scolnik, Jorge Araque Molina et al. 19An495* (US); Sonsón, region de Rioverde a orillas de la quebrada “curubital”, 22 January 1947, *Gabriel Gutiérrez V. 35519* (F); Región de Rioverde a orillas de la quebrada “Curubital”, en lugares sombreados, en cuevas formadas por piedras, 22 January 1947, *Gabriel Gutiérrez V. 35519* (F, MO); Tarazá, Corregimiento “El 12”. 200 km NO de Medellín, 6 km del camino “EL 12”–Barroblanco, 456 m, 3 July 1980, *Ricardo Callejas 1173* (MO); Corr. El Doce, 201 km NE of Medellín, 300 m, 18 August 1986, *Ricardo Callejas et al. 2411* (HUA, MO); Corr. El 12, vía El 12–Barroblanco, Hac. Las Mercedes, potrero San Juan, 07°30'N 075°20'W, 180–310 m, 7 November 1987, *Ricardo Callejas et al. 5411* (HUA, MO); Zaragoza, Corr. El Bagre, secondary forest along Villa creek, vic. of town water reservoir, 100 m, 10 February 1972, *Djaja D. Soejarto et al. 3318* (HUA); **Boyacá**: High forested fronts, N of Bogotá, 4300 ft, 22 March 1933, *A.E. Lawrance 696* (F, GH, MO, US, WIS); **Caldas**: Barancas, Río Samana, 600 m, 26 July 1965, *F.A. Barkley & Gabriel Gutiérrez V. 35352* (US); **Córdoba**: Mun. de Tierralta, quebrada afluente del Río Simí en la margen derecha, en la confluencia con el río Esmeralda, bosque disturbado, 150 m, 27 July 1986, *Rodrigo Bernal 1191* (COL, MO); **Cundinamarca**: Paime, *Bro. Ariste-Joséph A924* (NY, US); **Santander**: Magdalena Valley, Campo Capote, 30 km E of Carare, mature forest, (with Curso Nacional Taxonomía Avanzado), 06°37'08"N 073°54'52"W, 300 m, 29 September 1977, *A.H. Gentry & Enrique Rentería A. 20037* (MO); Campo Capote (Carare Opón Santander), 230 m, 8 June 1979, *Enrique Rentería A. 1498* (COL, HUA, MO); Barrancabermeja, Magdalena Valley, between Sogamoso and Colorado Rivers, 100–500 m, 10 October 1934, *O. Haught 1386* (US). **PANAMA. Colón**: South approach to Cerro Bruja from Río Escandaloso, ridge top, 09°26'30"N 079°34'00"W – 09°28'30"N 079°34'30"W, 20 May 1978, *B.E. Hammel 3207* (MO); Upper Río Piedras headwaters, along trail from end of Santa Rita Ridge Road, ca. 11 km SW of Cerro Bruja, [Coordinates on original label: 09°25'N, 079°35'W], 09°25'N 079°38'W – 09°26'N 079°40'W, 600–700 m, 02 May 1981, *K.J. Sytsma, L. Andersson & R.L. Dressler 4254* (MO); Santa Rita lumber road, upper Río Mango Indio, north of Agua Clara weather station, 09°22'30"N 079°41'30"W, 11 March 1970, *R.L. Dressler 3855* (MO); Near Mina no. 2, Río Escandaloso (tributary of Río Boquerón), 09°26'30"N 079°33'00"W, 130–150 m, 20 May 1978, *R.L. Dressler 5816* (MO); Along the Río Escandaloso near Mina Boquerón Número 2, 09°25'00"N 079°33'00"W – 09°26'30"N 079°34'30"W, 250 m, 14 July 1979, *Thomas M. Antonio 1324* (MO); Donoso, Copper Mining Concession, 8 52 02 N 80 38 45W, 110 m, 13 November 2013, *J. Batista 754* (MO); **Darién**: Puerto Santa Dorothea (=Puerto Piñas), near Piñas Bay, 07°35'N 078°11'W, 0 m, 21 July 1962, *J.D. Dwyer 2257* (MO); **Panamá**: Panamá/ San Blas, El Llano–Cartí road, 09°20'N 079°00'W, 300–400 m, 28 August 1982, *C.W. Hamilton & H. Stockwell 1080* (MO); Chepo, El Llano to Cartí Road, 13.8 km N of the Panamerican Highway, 09°17'02"N 078°56'16"W, 05 October 1977, *J.P. Folsom, R.L. Dressler, R. Spear & E. Spear 5781* (MO); El Llano–Cartí Road, tropical moist forest, 09°16'N 078°58'W, 1000 ft, 06 September 1980, *K.J. Sytsma 981* (MO); El Llano–Cartí Road, tropical moist forest, 09°16'N 078°58'W, 1000 ft, 06 September 1980, *K.J. Sytsma 957* (MO); Along

new El Llano–Cartí road, 8–12 km N of El Llano, 09°16'10»N 078°55'41»W, 400–450 m, 12 December 1973, *M.H. Nee, A.H. Gentry & R.L. Dressler 8756* (MO); El Llan–Cartí highway, about 12 km N of El Llano, 09°15'50»N 078°56'30»W, 12 December 1973, *R.L. Dressler 4510* (MO); El Llano–Cartí Road, 10 km from Inter-American Hwy, 09°16'10»N 078°55'41»W, 05 October 1974, *S.A. Mori & J.A. Kallunki 2334* (MO); El Llano–Cartí Road; 10 km from Inter-American Hwy, 09°16'10»N 078°55'41»W, 4 October 1974, *S.A. Mori & J.A. Kallunki 2257* (MO); El Llano–Cartí Road, 23.4 km from Inter-American Hwy, wet forest, 09°18'24»N 078°57'01»W, 350 m, 13 April 1975, *S.A. Mori & J.A. Kallunki 5572* (MO); El Llano–Cartí road, 10.8 km from Inter-American Hwy, wet Forest, 09°16'20»N 078°55'45»W, 1100–1200 ft, 27 December 1974, *S.A. Mori, J.A. Kallunki & B.F. Hansen 4139* (MO); El Llano–Cartí Road in vicinity of Gorgas Lab Mosquito Control Project site at km 12, 09°16'10»N 078°56'30»W, 250 m, 1 August 1974, *T.B. Croat 26070* (MO); El Llano–Cartí road, 6.8 mi from the highway; primary forest along road, 09°16'02»N 078°55'54»W, 350 m, 5 December 1979, *T.B. Croat 49101* (MO); Rio Tapia, 09°02'48»N 079°24'17»W, 0–10 m, 07 December 1923 – 11 January 1924, *P.C. Standley 28125* (K, US); **Guna Yala:** Cordillera frente a Isla Narganá, Ribera de Río Diablo, 09°22'N 078°34'W, 65 m, 9 August 1994, *Carmen Galdames, E. Montenegro, Clementina Chung & Heraclio Herrera 1503* (MO); Cordillera frente a Isla Narganá, ribera de Río Diablo, 09°22'N 078°34'W, 65 m, 9 August 1994, *Carmen Galdames, E. Montenegro, Clementina Chung & Heraclio Herrera 1476* (MO); El Llano–Cartí Road, Km 26 [Coordinates on original label: 9°19'N, 78°55'W], 09°22'N 078°58'W, 200 m, 09 March 1985, *G.C. de Nevers, Heraclio Herrera & S. Charnley 5060* (MO); El Llano–Cartí Road, 20 km from Interamerican Hwy. [Coordinates on original label: 09°19'N, 75°5'W], 09°23'30»N 078°57'00»W, 100–350 m, 30 September 1984, *G.C. de Nevers, J. Vespúcio & Heraclio Herrera 3968* (MO); El Llano–Cartí road, 14–15 miles from Pan American Hwy, wet tropical forest, 09°20'N 078°58'W, 350 m, 10 May 1981, *K.J. Sytsma & L. Andersson 4469* (MO, US); **VENEZUELA. Zulia:** Perijá, alrededores de la estación hidrológica de Aricuaisá, margen del río Aricuaisá, bosque húmedo tropical, 100–250 m, 20 June 1982, *Gilberto N. Morillo et al. 9228* (MO, VEN); Ca 55 km SW of Machiques by air, Aricuisa (Ariguaisa) – pie de Monte on Río Aricuisa (Ariguaisa), 09°36'N 072°54'W, 100–250 m, 24 March 1982 – 25 March 1982, *R.L. Liesner & Ángel C. González 13174* (MO, VEN).

Cultivated. UNITED STATES. Missouri: Saint Louis City, 9 July 1986, *G. Rogers 174* (MO); Cultivated in the Climatron at MO, March 1988, *M.B.G. 773296* (MO); **Florida:** cultivated at Selby as SEL 84-52, 25 January 1986, *E.A. Christenson 1122* (SEL);

Spathiphyllum frailescanense E.J.-Pérez, Díaz Jim. & Pérez-Farr., *Phytotaxa* 591(2): 165–169, f. 2A–F, 3. — Type: MEXICO. Chiapas: Municipio Villacorzo, Área de Protección de Recursos Naturales La Frailescana, Cerro El Tomate, approximately 3.6 km southeast of Nuevo Refugio and 1.5 km from Rancho San Pascualito, 15°58'05.5»N, 93°27'38.6»W, 1590 m, 30 Sep, 2022, *A.F. José Pérez, P. Díaz Jiménez, M.Á. Pérez-Farrera & M.G. Martínez Martínez 261* (holotype, HEM; isotype, CHIP).

Terrestrial; understory herb, growing sparsely or forming populations of few individuals. Up to 1.40 m tall; internodes short, 26.5–37.4 mm diam. LEAVES 87–120.5 cm long; **petioles**

longer than the blades, 55.2–69.3 cm long, 5.2–8.5 mm diam., sheathed above middle, 3–6.5 cm from the geniculum, or to the geniculum, the **sheath** and free portion pale green and covered in white dots, sheath margins often wrinkled, rarely entire, inrolled, yellowish-green; geniculum 2.5–5 cm long, 7.8–10.9 mm diam., whitish-green and covered in white dots; **blades** oblong-elliptic or oblong-ovate, widest at or just below the middle, 31.5–51 cm long, 15–24 cm wide, approx. 2 times longer than wide, mucronate or acuminate at apex, obtuse or rounded at base, subcoriaceous, dark green and glossy above, pale below, drying black to dark greenish above, greenish to faintly dark brown below; midrib sunken and weakly paler above, thicker than broad, yellowish-green or dark green above and light green below; **primary lateral veins**, 26–32 per side, separated 5–12 mm, arising at a 60–80°, sunken and dark green above, light green below; minor veins dark green below. INFLORESCENCE erect, equal or taller than the leaves, rarely shorter than the leaves; peduncle 50–87 cm long, 5.6–9.9 mm diam.; **spathe** cucullate, oblanceolate or elliptic, 19.3–30.4 cm long, 9.6–12.5 cm wide, acuminate apex, subcuneate or oblique at the base, decurrent 1.8–5.5 mm at base, yellowish-green at anthesis, dark green at post-anthesis; **spadix** 6.5–10.2 cm long, 16.7–22.8 mm diam., cream-yellowish, emitting a sweet and pleasant scent at anthesis, sessile or on a short stipe up to 11 mm long, 5.4–6 mm diam., light green at anthesis; flowers with 5–6 free tepals, 2.2–4 mm long; 1.5–2.3 mm wide, 5 or 6 anthers, 1.2–1.8 mm long, thecae oblong, 1.2–1.8 mm, whitish pollen; **pistils** sharply emergent, conic or subcylindrical, 5.5–8 mm long, style 2.28–3.8 mm long, 2–2.4 mm diam. at the base; ovary 2 or 3-locular, 2–7 ovules per locule, often 5–11 ovules per ovary, rarely 14. INFRUCTESCENCE to 8.6–11 cm long, 27.6–42.8 diam.; berries obovoid to oblong, rostrate, 10.–12.2 mm long, 4.4–5.4 mm wide, yellowish at maturity; seeds oblong, obovoid or oblique-ovoid, 3.3–4.5 mm long, 2.6–3 mm wide, light brown and glossy when fresh. **Figures 92–95.**

Distribution — *Spathiphyllum frailesceanense* is endemic to the Sierra Madre of Chiapas, Mexico, known only from the municipalities of Acacoyagua, Angel Albino Corzo, Jaltenango, Mapastepec, Villacorzo and Villaflores, although, it is possible that this species is distributed throughout the Sierra Madre of Chiapas to Guatemala. It grows in evergreen rainforest, gallery vegetation, montane cloud forest, semi-evergreen forest and tropical sub-deciduous forest, between 700 and 2000 m. The species grows mainly scattered in the forest, sometimes forming populations of a few individuals in the understory, similar to that recorded in other species such as *S. brevirostre* and *S. ortgiesii* Regel, sometimes on the banks of streams.

Comments — *Spathiphyllum frailesceanense* is characterized by having the petiole longer than the blade (about 1.5 but not twice as long), the petiole sheath close to or reaching the geniculum, a long geniculum, oblong-elliptic or oblong-ovate blades, mucronate or acuminate at apex and obtuse or rounded at base, up to more than 32 primary veins per side, inflorescences almost as long as the leaves, sometimes shorter or longer, with a sessile spadix or on a short stipe and mostly between 5 and 11 ovules per ovary .

The species grows in the same area (Sierra Madre of Chiapas to Guatemala) as *Spathiphyllum matudae* and for a long time was confused and misidentified as that species, since both have corrugated blades and several ovules per ovary (up to 13; Bunting, 1960, 1965). However, *S. matudae* has shorter petioles, narrower blades, fewer primary veins per side, a spadix frequently stipitate and has its pistils constricted between the ovary and the style (Bunting, 1960).



Figure 92: *Spathiphyllum frailescanense*, A.F.J. Pérez 261, TYPE, Mexico



Figure 93: *Spathiphyllum frailescanense*, A.F.J. Pérez et al.261, TYPE, Mexico



Figure 94: *Spathiphyllum frailecanense*, Inflorescence, Breedlove 52315, Mexico



Figure 95: *Spathiphyllum frailescanense*, Leaf, Breedlove 52315, Mexico

Spathiphyllum frailescanense has longer petioles (55.2–69.3 cm *vs.* 35–50), oblong-elliptic or oblong-ovate blades (*vs.* lanceolate or elliptic-lanceolate, sometimes subovate), more primary lateral veins per side (up to 32 *vs.* 20–25), a sessile spadix or with a short stipe (less than 12 mm *vs.* stipitate spadix with a stipe up to 20 mm) and the pistils are not constricted between the ovary and the style (*vs.* constricted between the ovary and the style).

Specimens with inflorescence or infructescence were collected in both the dry and rainy seasons, between February and July, and in September.

Additional specimens seen: **MEXICO. Chiapas:** Montane Rain Forest, 10 km ENE of Dos Lagos above Santa Elena, 1170 m, 15 August 1981, *D.E. Breedlove 52315* (CAS, MO); Mun. Acacoyagua, Cerro Ovando, zona de amortiguamiento, 15°25'00.8"N, 92°38'20.7"W, 1267 m, 22 July 2005, *N. Martínez Meléndez 935* (HEM). Mun. Angel Albino Corzo, arriba del río por el lado noroeste de la Col. Santa Rita, 15°41'26"N, 92°48'14"W, 1400 m, 18 April 1990, *Alush Méndez T. 9330* (MO); Mun. Jaltenango-Mapastepec, Reserva El Triunfo, Polígono 1, Cañada Honda, 15°39'N, 92°48'W, 1450 m 23 April 1990, *M. Heath & A. Long 882* (CHIP, MO); Reserva El Triunfo, Polígono 1, Campamento HQ-Palo Gordo, 15°39'N, 92°48'W, 1900 m, 28 February 1990, *M. Heath & A. Long 823* (CHIP, MO); Mun. Villacorzo, Cerro del Tomate, 2 km al Sur del ejido San Pascualito, 30 km al sureste de Villacorzo, 15°58'09"N, 93°28'10"W, 1402 m, 28 April 2002, *J. Martínez-Meléndez 41* (HEM); A 2 km del ejido Monterrey, 16°02'53"N, 93°22'30"W, 789 m, 29 April 2002, *M.G. Pascacio Damián 14* (HEM); Rancho Samaria, 16°0'51"N, 93°22'5"W, 949 m, 5 April 2003, *E. Meléndez López 868* (HEM, MO); Área de Protección de Recursos Naturales La Frailescana, Cerro El Tomate, southeast of Nuevo Refugio and Rancho San Pascualito, 15°58'14.14"N, 93°27'47.01"W, 1380 m, 29 March 2020, *A.F. José Pérez 109* (HEM); Cerro El Tomate, southeast of Nuevo Refugio and Rancho San pascualito, 15°58'10.0"N, 93°28'08.8"W, 1357 m, 30 September 2022, *A.F. José Pérez, P. Díaz Jiménez, M.Á. Pérez-Farrera & M.G. Martínez Martínez 259* (HEM); Cerro El Tomate, southeast of Nuevo Refugio and Rancho San pascualito, 15°58'08.3"N, 93°28'04.43"W, 1334 m, 30 September 2022, *A.F. José Pérez, P. Díaz Jiménez, M.Á. Pérez-Farrera & M.G. Martínez Martínez 260* (HEM); Cerro El Tomate, southeast of Nuevo Refugio and Rancho San Pascualito, 15°58'05.9"N, 93°27'38.0"W, 1585 m, 30 September 2022, *A.F. José Pérez, P. Díaz Jiménez, M.Á. Pérez-Farrera & M.G. Martínez Martínez 262* (HEM); Mun. Villaflores, 1 km al este del ejido Nueva Independencia, Cerro Tres picos, 16°12' N, 93°35' W, 1300 m, 9 February 1995, *M.A. Pérez-Farrera 162* (HEM); Camino a ejido Tres Picos-Nueva Independencia, 15 March 1995, *M.A. Pérez-Farrera 186* (CHIP); Cerro Chumpipe, 8 km al SE del Ejido Tierra y Libertad, 16°11'50"N, 93°42'30"W, 1475 m, 24 May 1995, *M.A. Pérez-Farrera 423* (HEM); La angostura Plan de Ayala. 15°53'61"N, 93°13'88"W, 1145 m, 30 April 1999, *Jesús De la Cruz R. 94* (HEM). **EL SALVADOR.** Cultivated at Jardín Botánico, Zona 23W, 13°40'N, 89°15'W, 800 m, 18 July 1989, *R. Villacorta & S. Martínez 299* (MO).

Spathiphyllum friedrichsthalii Schott, *Aroideae* 1: 2, t. 4. 1853. — Type: GUATEMALA, *E. von Friedrichsthal s.n.* (W, presumed destroyed). — COSTA RICA, Limón: Siquirres, 10°13'12"N, 83°28'48"W, 30 m, 27 July 1930, *C.W. Dodge & V.F. Goerger 9414* (neotype, F; isoneotype, MO-992225, designated by Bunting, 1960).

Terrestrial herb, 1–3 m tall; internodes short, 3–5 cm diam. LEAVES 49–98(157) cm long;

petioles equalling or to 1.5 times longer than blade, 22–104 cm long, prominently sheathed to middle or above (0.5–0.9), sometimes nearly to geniculum; sheath 20–51 cm long, narrowly attenuated at apex, free part terete, 9–30 cm long; geniculum (1.2)1.7–2.7 cm long, usually drying darker, subterete to broadly and sharply sulcate; **blades** oblique, typically narrowly elliptic to oblanceolate, varying to broadly elliptic, widest at or just above the middle, (21)25–48(70) cm long, 6–23 cm wide, 2.4–3.9 times longer than wide, 0.6–1.1 times as long as petioles, usually drying gray-green to dark gray or gray-brown and weakly glossy to semiglossy above, acuminate-cuspidate at apex, cuneate or acute at base; **primary lateral veins** 12–20 per side, departing midrib at 60–75°. INFLORESCENCE held about as high as leaves; peduncle mostly 2–3 times as long as blade, 50–90(127) cm long; **spathe** strongly naviculiform, broadly oblanceolate to elliptic, 12–14(33) cm long and (3.5)4.5–8.0(9.2) cm wide, typically broadest above middle, long-acuminate-cuspidate at apex, cuneate at base and decurrent on peduncle 2.5–4.5(6.0) cm, white or green; **spadix** 3–7(10) cm long, stout, densely flowered, sessile or on stipe to 0.5(1.0) cm long; flowers 6–8 visible per spiral; perianth of separate segments, drying light brown; **pistil** greatly exceeding perianth, drying blackened; style subcylindric, fluted, apically blunt, stigmatic area prominent; ovary (2–)3-locular, ovules superposed, varying from (3–)5–8 in each of the 3 locules, fruiting spadix roughened by the persistent styles; berries obovoid, rostrate; seeds as many as the ovules or fewer, oblique-reniform to oblong in profile, the surface commonly smooth or occasionally verruculose between the vertical rows of foveolae, white at anthesis, later green in fruit; strongly and sweetly aromatic. **Figures 96–100.**

Distribution — *Spathiphyllum friedrichsthalii* ranges from Mexico to Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia to Ecuador, growing usually at or near sea level but ranging to about 100 m, rarely to as much as 240 m. A single collection reported for Cuba must be verified. [Santa Clara Province: Soledad, August 1940, *Gunckel s.n.* (MU).]

Comments — *Spathiphyllum friedrichsthalii* is characterized by its usually swampy habit with petioles equal to or longer than leaf blades and sheathed from the middle of the blade to near the geniculum, the mostly greenish drying blades which are narrowly acute at the base as well as by the prominently aromatic inflorescence with a white, broad, erect spathe and a white, cylindroid spadix with prominently exerted pistils. The species is probably the most aromatic of all *Spathiphyllum* species, capable of being smelled from long distances.

Spathiphyllum friedrichsthalii is most easily confused with *S. phryniifolium* which has a similar habit and similarly shaped inflorescence. That species differs by occurring in the forest understory and by having a green spathe and spadix.

There are doubtful determinations of collections of this species from as high as 1275 m (*Kress 94-4129*) and 1455 m (*Kress 94-3753*) that need to be studied. A collection at MO from El Salvador in Ahuachapán (*M. Sandoval & E. Sandoval 268*) is perhaps the only collection from the western slopes of Central America and it occurs at 450 m elevation.

Most collections of *Spathiphyllum friedrichsthalii* in Nicaragua differ by drying brown to yellow-brown in contrast to the specimens from Costa Rica and Panama. At the same time some collections from Nicaragua, especially those from the Department of Zelaya are significantly smaller (both blades and inflorescences) than most collections in Costa Rica and Panama.



Figure 96: *Spathiphyllum friedrichsthali*, Habit of flowering plant

While still being included here as *Spathiphyllum friedrichsthali*, Villalobos 156 from Costa Rica in the Cantón Los Chiles is quite diminutive and is purported to have a yellow spathe and white spadix. It is unusually small for *Spathiphyllum friedrichsthali* (50 cm tall) and warrants further investigation.

Additional specimens seen: **COLOMBIA.** **Antioquia:** 18 km al sur de Chigorodo, 40 m, 3 October 1986, Mercedes Palacio et al. 104 (HUA, MO, NY); Urabá, entre Mutatá y Pavarandocito, 80–90 m, January 1950, L. Uribe U. 2038 (NY); Arteaga, 200 m, 13 August 1948, Brabe et al. 18C701 (US); near Guapá, 53 km S of Turbo, 40 m, 24 April 1945, Haught 4598 (US); Estación “Camilo Restrepo”, 11 April 1955, H. Daniel 4947 (US); Municipio Chigorodo, 07°37'N, 076°42'W, 50 m, 17 December 1990, R. Callejas et al. 9712 (HUA). **Cauca:** Pacific coast, Río Micay, Noanamito, 5 m, 26 February 1943, Cuatrecasas 14217 (US); Margen izquierda del río Guapi, Estación del INCORA, suelos arcilloso pesados y malos para agricultura, zona de potreros (deforestada), 8–15 m, 6 January 1976, I.R. Cabrera 3823 (MO). **Chocó:** northern Colombia, Río Truandó, 1858, A.C.V. Schott s.n. (NY); Weeds near power station at La Vuelta, Río Andaguedá. 5°29'N, 76°33'W. Alt. ca. 70 m, 5°29'N, 76°33'W, 70 m, 10 December 1983, Adrian Juncosa 1586 (MO); Across river from Yuto, ca. 26 km S of Quibdo, swamp beside road, 40 m, 7 January 1979, A.H. Gentry & E. Renteria A. 23750 (HUA, MO); Jurubida–Choco, Playa Peñas blancas, queb. Aguas Calientes, 05°03'N, 77°21'W, 0–75 m, 23 December 1991, A. Gómez et al. 316 (HUA, MO); Docordó, northern mouth of Río San Juan, just above tidal influence, swampy forest at edge of town, 04°15'N, 77°25'W, 20 m, 31 March 1986, A.H. Gentry, E. Zardini, M. Monsalve & J.D. Caicedo 53846 (MO); Docordo, 10 m, potrero, 7 Sept. 1988, J. Estrada & E. Serrano 508 (COL); Along road

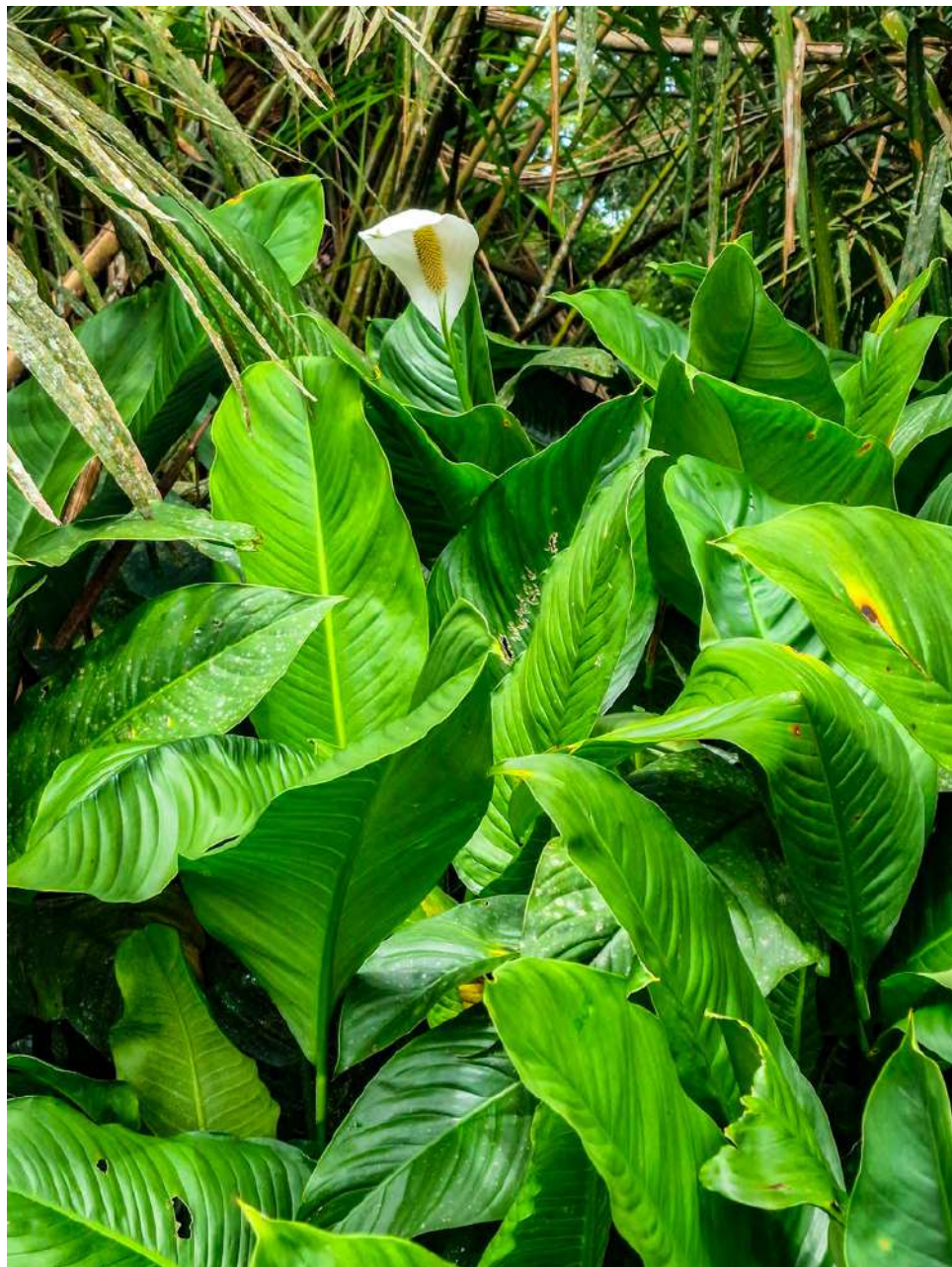


Figure 97: *Spathiphyllum friedrichsthaliani*, Habit, Photo: P. Díaz Jiménez



Figure 98: *Spathiphyllum friedrichsthahlii*, Close-up of inflorescence. Photo: P. Díaz Jiménez



Figure 99: *Spathiphyllum friedrichsthalii* Gentry 53846, Colombia



Figure 100: *Spathiphyllum friedrichsthali*, Stevens 7569, Nicaragua

between Playas de Oro and Tadó, Pueblo Rico (Risaralda to Quibdó Highway), 4.4 km W of Playa de Oro, 9.7 km E of Tapón, 16.5 km of Tadó, GPS coordinates, 05°18'18"N, 076°27'09"W, 240 m, 13 August 1997, *T.B. Croat & J.F. Gaskin 80763* (AMAZ, HUA, M, JUAM, MO); Carretera Istmina-Yuto (Taló), unos 10 KM antes de llegar a Yuto, 5 Mayo 1977, *J. Santa & O. Arboleda 278* (COL, HUA); Hoya del Río Atrato, Tagachí, 40–50 m, 9 Abril 1982, *E. Forero et al. 9074* (COL); Hoya del Río Atrato, Tagachí, 06°12'47"N 076°47'49"W, 40–50 m, 8 April 1982, *E. Forero et al. 9028* (COL); near Río Atrato in the area of Quibdó, 400 m, 22 January 1949, *J. Araque Molina & Barkley 19Ch049* (US); Andagoya, 70–100 m, 20 April 1939 – 30 April 1939, *Killip 35076* (US); Area of Baudó, on right bank of river Baudó, about 22 km upstream of estuary, about opposite estuary of Quebrada Majagual, in wet, muddy soil immediately at water's edge, influenced by salt water during high tide, 5 m, 8 February 1967, *H.P. Fuchs & L. Zanella 21832* (COL, MO, US); without locality, *Giraldo 316* (JUAM); Hoya del Río San Juan, Río Bicordó, afluente del Río San Juan, Alrededores de Noanamá, 04°42'N, 076°55'W, 20 m, 5 April 1979, *E. Forero et al. 4650* (MO, COL, HUA); Pacific coast, trail from Utria to Valle, 8 June 1950, *A. Fernandez 273* (COL, US); Río Atrato, 2–5 hours below Río Sucio, above Loma Teguerre, 16 May 1967, *J.A. Duke 11003* (MO, US); Río Serrano, afluente del río Atrato, 4–6 km arriba de Guayabal, 50 m, 30 April 1975, *E. Forero 1388* (COL, MO); Zona de Urabá, Cerros del Cuchillo, Piedemonte Cuchillo Negro, bosque primario perturbado, 100 m, 16 May 1988, *D. Cardenas 1895* (JAUM, MO); Zona de Urabá, Cerros del Cuchillo, Sector Camino de Corregimiento de Macondo al Cerro, bosque primario perturbado, 19 March 1988, *Dayron Cárdenas 1386* (JAUM, MO); Upper Río Truandó, La Teresita, 500 ft, 18 January 1974, *A.H. Gentry 9346* (MO); Río San Juan just above Istmina, 100 m, 14 August 1976, *A.H. Gentry & M. Fallen 17660* (MO); Hoya del Río San Juan, alrededores de Noanamá, 04°42'N, 076°55'W, 20 m, 4 April 1979, *E. Forero et al. 4511* (COL); Hoya del Río San Juan, Río Tamaná, afluente del Río San Juan, entre Primavera y Santa Rosa, 05°00'N, 076°44'W, 10 April 1979, *E. Forero et al. 4896* (MO); Municipio de Pizarro, carretera Pié de Pepé-Berrecul, km. 21–24, 17 November 1985, *J. Espina 1937* (COL, MO); Nuquí, Corregimiento Arusí, along Río Arusí, vic. of village of Arusí, 05°35'47"N, 077°28'31"W, 0 m, 27 June 2000, *T.B. Croat & M.M. Mora 83770 (=Mora 387)* (MO, COL); Corregimiento de Arusí, Estación Biológica El Amargal, 05°34'N, 077°30'W, 50 m, July 1998 – September 1998, *M.M. Mora 25* (MO); Quibdó, corregimiento de Bebará, sector La Calle en el Río Barbará, 12 Abril 1984, *W.A. Cordoba 424* (COL); Quibdó–Istmina, Carretera Quibdó–Istmina, adelante de Yuto, 70 m, 9 September 1976, *E. Forero & R. Jaramillo 2746* (COL, HUA, MO). **Narino:** Hwy. Tumaco–El Diviso at Ichimura, 90 m, 8 April 1963, *M.L. Bristol 743* (GH); Isla de Gallo Pacifico, Causitta “Garza”, 170 m, February 1942, *Dryander 2589* (US); Río Mira, 20 m, 1899, *Langlasse 2* (P, US); Tumaco, Llorente, 8 Sept 1976, *O. de Benavides 594* (COL). **Valle del Cauca:** Vicinity of Bahía Málaga, Base Naval Málaga, Río Bongito, 04°00'44"N, 077°20'04"W, 40 m, 29 July 1997, *T.B. Croat & John F. Gaskin 80570* (COL, HUA, MO); Cordoba, Dagua Valley, 80–100 m, 6 May 1922 – 8 May 1922, *Killip 5034* (NY, US); Río Calima (región del Chocó), La Trojita, 5–50 m, 19 February 1944 – 10 March 1944, *Cuatrecasas 16366* (US); Río Raposo, Raposo Field Station, 0 m, 27 March 1963, *Bristol 700* (US); Córdoba, 50–100 m, 17 February 1939, *E.P. Killip & H. Garcia 33397* (F, MO, US); Sabaletas, km 29 on hwy. between Buenaventura and Cali, near Río Sabaletas, 25 m, 4 June 1944 – 6 June 1944, *E.P. Killip & J. Cuatrecasas 38859* (US). Buenaventura, Corregimiento San Francisco, Vereda Calle Larga, Río Naya, Región Fitogeográfica del Chocó, 20 m, 3 February 1990, *W. Devia A., R. Bernal & E. Linares 2880* (MO, NY); Río Dagua, 1844, *F. Lehmann 5361* (NY); Bajo Calima Region, Municipio Buenaventura along banks of

Río Calima at end of road from Buenaventura, near village of Río Calima, 3°59'N, 76°58'W, 170 m, 4 February 1990, *T.B. Croat 70160* (MO); Mpo. Buenaventura, Community of San Isidro, in and around camp of INDERENA – FAO, vegetation on waste land and highly disturbed remnants of forest, 3°59'N, 76°57'W, 236 m, 15 November 1979 – 6 December 1979, *J. van Rooden et al. 353* (MO). **COSTA RICA. Iajuela:** Cantón de Los Chiles Ca. 40 km South of Los Chiles, just S of El Parque, ca. 40 km South of Los Chiles, just S of El Parque, 10.55N 84.39W, 40 m, 24 August 1990, 10°54'36»N, 084°39'00»W, 40 m, 24 August 1990, *G.E. Crow & Dora Ingrid Rivera 7621* (MO); 22 km NE of Quesada by air. 4 km W of Muelle San Carlos. Disturbed, seasonally dry primary forest. 10°28'N, 84°30'W, 10°27'36»N, 084°30'00»W, 9 April 1983, *R. Liesner 14148* (MO); Open swampy sites, cacao plantations and rice fields between Upala and San Antonio, just north of the Río Zapote, 10°54'N, 085°00'W, 75 m, 14 February 1982, *Wm. Burger, K. Barringer & Jorge Gomez-L. 11793* (MO); Río Zapote, along road between Cañas (Guanacaste) and Upala, near Río Zapote, 1.8–2.7 km south of Río Canalete, disturbed margins of primary forest, 10°44'24»N, 085°04'12»W, 100 m, 25 June 1976, *T.B. Croat 36385* (MO). Los Chiles, R.N.V.S. Caño Negro, Llanura de Guatuso, 10°53'24»N, 084°46'48»W, 40 m, 4 April 1995, *R. Villalobos 157* (INB); R.N.V.S. Caño Negro, Llanura de Guatuso, 10°52'48»N, 084°46'48»W, 30 m, 8 July 1987, *Nelson Zamora & I. Chacón 1368* (CR, MO); R.N.V.S. Caño Negro, Llanura de Guatuso, Playuelas, camino a Los Chiles sobre carretera, 10°54'36»N, 084°45'36»W, 50 m, 21 March 1994, *Kattia Martínez & J.P. Martínez 315* (CR, INB, K, MEXU, MO, NY, USJ). **Heredia:** La Selva, Finca La Selva, OTS Field Station on Río Puerto Viejo just E of its junction with Río Sarapiquí, 10°25'12»N, 084°00'36»W, 100 m, *Wilbur 38839* (DUKE); La Selva, 10°25'12»N, 084°01'12»W, *Hammel 7834* (DUKE); La Selva, OTS Field Station on Río Puerto Viejo, just E of jct with Río Sarapiquí Holdridge Trail at 2100 m line, 10°24'36»N, 084°00'00»W, 100 m, *Wilbur 37403* (DUKE); Par. Nac. Braulio Carrillo, Estación Magsasay, bosque primario, 10°24'00»N, 084°03'00»W, 200 m, 5 July 1990, *Gerardo Carballo 198* (CR, MO); La Selva Biological Station, 10°25'53»N, 084°00'13»W, 100 m, 27 May 1995, *R.L. Wilbur 64216* (DUKE); La Selva Biological Station, 10°25'53»N, 084°00'13»W, 100 m, 4 June 1995, *R.L. Wilbur & T. Mowbray 64376* (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53»N, 084°00'13»W, 100 m, 26 July 1979, *M.H. Grayum 2089* (MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53»N, 084°00'13»W, 100 m, 22 September 1982, *T. McDowell 188* (MO); La Selva, Puerto Viejo de Sarapiquí, [voucher for pollination observation (insects collected), visited by numerous Trigona bees and a large weevil, sent to H. Stockwell], 26 July 1979, *Francisco Jimenez III* (MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53»N, 084°00'13»W, 100 m, 27 November 1982, *T. McDowell 953* (MO(2)); Finca La Selva, Puerto Viejo, swamp, 3 April 1969, *G.W. Frankie 77A* (MO); Sarapiquí, Puerto Viejo, near Puerto Viejo along road near the Río Sucio, 10°27'36»N, 083°59'24»W, 20 m, 27 May 1976, *T.B. Croat 35690* (MO). **Limón:** Cahuita park, road S of the information house in old cativo forest, 09°42'00»N, 082°48'00»W, 4 May 1983, *L. Gomez et al. 20508* (CR, GH, MISSA, MO, WIS); Limón to Westfalia road, 10°07'48»N, 083°12'36»W, 0–5 m, 22 February 1984, *Khan et al. 1223* (BM, MO); ca. 1 mile NE of Bribri, ca. 40 miles SW of Limón, steep ravine above Río Catarata, 09°37'48»N, 082°48'36»W, 50–100 m, 12 August 1977, *T.B. Croat 43246* (MO); Barra del Colorado, N side, between town and ocean beach, 10°47'N, 83°35'W, elev. 0–2 m; swamp forest, collected with O.M. Montiel, 10°46'48»N, 083°34'48»W, 0–2 m, 12 September 1986, *W.D. Stevens 24217* (MO); Cantón de Limón 4 km S of city of Limón at

aeropuerto, marsh with *Typha* and Cyperaceae (with a floating mat of vegetation), 9.57.00N 83.01.05W, 1 m, 7 August 1990, *G.E. Crow & Dora Ingrid Rivera 7501* (MO); Parque Nacional Tortuguero Estación Aguas Frías, Colecta en Sendero Real, en potrero y orillas de calle, 10°27'00"N, 083°34'48"W, 0 m, 30 November 1990, *José Solano 239* (MO); Sea shore vegetation and swampy forest behind the shore at Cahuita and along the new road between Cahuita and Limón, 09°57'N, 083°02'W, 0–10 m, 27 November 1975 – 30 November 1975, *R. Baker & W. Burger 9* (MO); Sea shore vegetation, swamp forest, cacao plantations and secondary growth along the Caribbean Coast between the Río Bananito and Cahuita, 09°53'N, 082°59'W, 0–10 m, 9 February 1977 – 14 February 1977, *W. Burger, G. Visconti & J. Gentry 10484* (MO); Forest near farmhouse at Finca Castilla, 30 m, 29 July 1936, *C.W. Dodge & V.F. Goerger 9499* (MO); La Bomba–Cahuita, 20 m, March 1983, *L.D. Gómez & R. Hampshire 20121* (MO); Camino a La Estrella, 0–5 m, 28 February 1958, *José J. Córdoba 457* (MO); Parque Nacional Tortuguero, Parque Nacional Tortuguero Estación Sierpe, 5 Km N de La Aurora, Guápiles, límite sur del parque, junto al Río Sierpe, bosque primario, 10°21'36"N, 083°30'36"W, 30 m, 12 April 1990, *Abelardo Chacón 826* (MO); Parque Nacional Tortuguero, Estación Aguas Frías, colecta en Sendero Real, en potrero y orillas de calle, 10°27'00"N, 083°34'48"W, 0 m, 30 November 1990, *José Solano 239* (MO); Río Reventazón, along Río Reventazón, below farmhouse, Finca Castilla, in *Gynaerium sagittatum* thickets, 10°13'12"N, 083°28'48"W, 30 m, 27 July 1936, *C.W. Dodge & V.F. Goerger 9414* (MO). H.P. Limoncito, Cuenca del Banano, a orilla de la carretera, frente al aeropuerto, 09°57'00"N, 083°01'05"W, 1 m, 8 October 1997, *Alex. Rodríguez & L.D. Vargas 2547* (MO); Talamanca, no protegida, Cuenca del Sixaola, Sixaola, finca de la Asociación campesina ASACODE, sobre senderos aleños al albergue, bosques intervenidos, 09°33'36"N, 082°38'12"W, 10 m, 4 March 1999, *Alex. Rodríguez & L.D. Vargas 4530* (MO); R.I. Talamanca, Valle de Talamanca, Amubri, Katsi, 09°30'36"N, 082°55'48"W, 100 m, 16 June 1994, *G. Gallardo 218* (INB, MO).

ECUADOR. Esmeraldas: Capapa River. Near Playa Grande, 01 August 1967, *Játiva, C. & C. Epling 2067* (NY).

EL SALVADOR. Ahuachapán: San Francisco Menéndez, al pie de la quebrada Acosta, 13°49'N, 089°56'W, 450 m, 13 December 1995, *M. Sandoval & E. Sandoval 268* (MO).

HONDURAS. Gracias a Dios: Puerto Lempira, Rus-Rus, La Mosquitia, Caserío de Rus-Rus; vaguada del río Rus-Rus, llanos de pinares y gramíneas, nivel del mar, 14°42'N, 084°57'W, 0–5 m, 17 July 1977 – 21 July 1977, *Cirilo Nelson & Efraín Romero 4093* (MO).

MEXICO. Chiapas: Cintalapa, 10 km N of Cintalapa, 16°39'36"N, 093°00'00"W, 1150 m, 30 January 1990, *P.J. Stafford et al. 118* (MEXU).

Oaxaca: Tuxtepec, selva de *Lonchocarpus*, 14 September 1961, *M. Sousa 906* (MEXU).

GUATEMALA. Izabal: Oberhalb von Selepim entlang des Weges nach Bocanacha am Fuss der Sierra de Las Minas, 15°19'10"N 089°24'42"W, 20–80 m, 17 April 1998, *H. Förther et al. 10211* (M, MO, MSB).

NICARAGUA. Jinotega: Reserva Natural Kilambé, Municipio de Bocay, Comunidad Santa Teresa de Kilambé, 13°34'N, 085°39'W, 900–1100 m, 8 enero 2001, *R. Rueda, D. Paguaga, H. Mendoza, A. Rivera, N. Toval y M. Garmendia 15543* (HNMN); Río San Juan, El Castillo, "El Castillo", lowland disturbed forest on sandy clay soils, 11°02'N, 84°24'W, 4 September 1990, *J. Salick 7831* (MO); Río Indio, Caño Negro, bosque tropical muy húmedo, 11°02'N, 083°54'W, 0–5 m, 4 December 1982, *M. Araquistain 3420* (MO); "Buenos Aires" en la ribera del Río Sábalo, 11°02'N, 84°28'W, elev. aprox. 50 m, 11°02'N, 84°28'W, 50 m, 17 February 1984, *Pedro P. Moreno 22967* (MO); A lo largo del Río Indio, entre San Juan del Norte Nuevo y Viejo incluyendo el área de San Juan Viejo, 11°00'N, 84°05'W, 3 July 1994, *Ricardo Rueda, Edith Palma & Blas Hernández 1656* (MO, US); Reserva Indio-Maíz, a lo largo del caño el Tambor, ramal del río San Juan, 10°48'N, 083°58'W, 20–80 m, 11 febrero 1996, *Ricardo Rueda, Alfredo Grijalva,*

Rolando Dolmus y Milton Castrillo 4063 (HNMN); Reserva Indio-Maíz, Municipio de San Juan del Norte, caño Negro, ramal del Río Indio, 11°02'N, 083°54'W, 30 July 1996, *Ricardo Rueda, Indiana Coronado & Norlan Tercero 4729* (GH, MO); Reserva Indio-Maíz, Municipio de San Juan del Norte, a lo largo de la ribera del Río Indio, 11°06'N, 083°58'W, 5–20 m, 19 September 1998, *Ricardo Rueda, Indiana Coronado, Walter Velásquez & Yader Rubi 8818* (MO); Municipio de San Juan del Norte, Reserva Indio-Maíz, entre San Juan del Norte y la Finca de Chepelión, 11°04'N, 083°54'W, 50 m, 8 March 2002, *R. Rueda, D. Paguaga, N. Toval & J. Masís 16871* (MO); Municipio de San Juan del Norte, del delta 1 km al este y después 2 km al norte en el bosque, 10°48'N, 083°46'W, 40–80 m, 8 July 1995, *Ricardo Rueda, Blas Hernández & Edith Palma 2700* (MO). Atlántico Norte: Ca 13 km above Kururia, on road to San Jerónimo, evergreen forest, 14°40'N, 84°07'W, 200 m, 2 March 1979, *J. Pipoly 3813* (MO); Kururia, Colonia Kururia, tall evergreen rainforest and along careterra, 14°41'N, 84°04'W, 50 m, 3 March 1979, *J. Pipoly 3913* (MO); Monkey Point, 2 km al S sobre la costa, 11°36'N, 83°40'W, 1–5 m, 24 October 1981, *P.P. Moreno 12348* (MO); Experiment Station El Recreo on the Río Mico, 12°10'N, 84°18'W, 30 m, 1 June 1985, *G. Davidse, A. Grijalva & M. Sousa 30735* (MO); 8.1–12.2 km beyond (above) Kururia on road to San Jerónimo, moderately tall evergreen forest on low hills, 14°39'N", 84°04'W", 50–150 m, 17 April 1978, *W.D. Stevens 7569* (MO); Bridge over (Caño) Shilam Wasito, ca. 6.0 km E of first suspension bridge E of Rosita on road to Bonanza, thicket along stream, 14°00'N, 84°31'W, 75 m, 24 April 1978, *W.D. Stevens 8113* (MO); Santa Marta, along small stream at NW edge of town, 14°18'N, 083°37'W, 5 m, 10 March 1981, *W.D. Stevens & P.P. Moreno 19633* (MO); SW of Bluefields, from cemetery along road to new airstrip; shrubby savanna to disturbed tall evergreen forest, 11°59'N, 083°46'W, 10–40 m, 2 April 1981, *W.D. Stevens 19746* (MO); Swamp near Bilwaskarma [Seymour series], 14°44'N, 083°46'W, 0–30 m, 14 March 1971, *E.B. Nelson 4682* (MO); Swamp near Bilwaskarma [Seymour series], 14°44'N, 083°58'W, 0–30 m, 14 March 1971, *F.C. Seymour 4701* (MO); Francia Sipri or France ya Sirpi, between Waspán and Puerto Cabezas, rainforest [Seymour series], 14°20'N, 083°39'W, 0–50 m, 15 March 1971, *E.B. Nelson 4823* (MO, ENAG, GH, SMU); Municipio Rosita, Municipio Rosita, 15 km al NE del Poblado de Sahsa, (Bloque Kukalaya), 14°12'N, 84°09'W, 50–100 m, 23 May 1994, *Ricardo Rueda & Alfredo Grijalva 1473* (MO, WU); Municipio de Bonanza, reserva de Bosawas, Comunidad de Musawas, suroeste de Musawas, 14°06'59"N, 084°43'49"W, 50–200 m, 20 septiembre 2003, *I. Coronado & C. Gurdian 319* (HULE, MO); 10 km S of Rosita; open pasture, 13°50'N, 084°25'W, 50 m, 15 June 1978, *D.A. Neill 4483* (MO); A lo largo del Río Yanten, Bahía de Bluefields; breñas pantanosas [WAG], 12°03'N, 083°48'W, 0–2 m, 2 April 1949, *A. Molina R. 2083* (EAP); **Atlántico Sur:** Bluefields, 10 km north of Bluefields, alluvial forest along Río Escondido, 12°02'N, 083°46'W, 3 m, 9 December 1970, *W.E. Harmon & J.A. Fuentes 5094* (UMO 91750); Nueva Guinea, 11.46N 084.26.30W, 200 m, 11 August 1982, *M. Araquistain 3021* (MO); Punta Gorda, 11°30'N, 083°46'W, 0–2 m, 12 February 1982, *P.P. Moreno & J.C. Sandino 15213* (MO); Estación Experimental El Recreo, sureste de Río Mico, suroeste del campamento, sur de plantaciones de *Hevea brasiliensis*, 12°09'N, 084°19'W, 20–30 m, 4 December 1981, *J.C. Sandino 1650* (MO); Río Punta Gorda, Atlanta, al SE de "La Richard"; 11°32'N, 84°05'W, elev. aprox. 30 m, 11°32'N, 84°05'W, 30 m, 14 November 1981, *P.P. Moreno & J.C. Sandino 13079* (MO); Caño Monte Cristo, "La Grupera", 11°33'N, 87°48'W, elev. ca. 10 m, 11°33'N, 83°48'W, 10 m, 4 February 1982, *P.P. Moreno & J.C. Sandino 14656* (MO); Ciudad Rama, localidad de "San Agustín", al SE de Rama, bosque húmedo tropical, 12°09'N, 84°12'W, 60 m, 22 May 1984, *Walter Robleto 556* (MO); A lo largo del río Punta Gorda, entre el poblado de Nueva Atlanta y la desembocadura

del mismo, incluyendo el caño Masayon, 11°34'N, 84°28'W, 16 February 1994, *Ricardo Rueda, Blas Hernández, Indiana Coronado & Francisco Collantes 3098* (CM, MO); Río Punta Gorda, al este del la Corriente la Guitarrona, 11°31'N, 84°19'W, 24 February 1994, *Ricardo Rueda, Blas Hernández & Indiana Coronado 3413* (MO); Between 0.3 and 1.9 km N of Limbaika, swamps and dense swamp forest near Río Prinzapolka, 13°29'N, 84°13'W, 8–10 m, 26 April 1978, *W.D. Stevens 8213* (MO); Municipio de Nueva Guinea, Reserva Indio-Maiz, Río Pijibaye entre el caño Bijagua y el cerro Chiripa, 11°22'N, 084°01'W, 200–350 m, 15 January 1999, *Ricardo Rueda, Indiana Coronado, Oscar Caballero & Luis Ruiz 10160* (MO); West of Bluefields to Jackson Farm, forest, pasture and along brook [Seymour series], 12°00'N, 083°45'W, 0–100 m, 3 March 1971, *F.C. Seymour 4131* (MO); Monkey Point [Seymour series], 11°37'N, 083°40'W, 0 m, 5 March 1971, *J.T. Atwood 4226* (MO); Swamp near Bilwaskarma [Seymour series], 14°44'N, 083°46'W, 0–30 m, 14 March 1971, *J.T. Atwood 4676* (MO); El Bluff, Bluefields harbor [Seymour series], 12°00'N, 083°41'W, 10 m, 14 November 1973, *S.A. Marshall & D.A. Neill 6504a* (MO); Common in wet areas beside road to Rama near turn to El Recreo, 17 July 1975, *J.T. Atwood & D.A. Neill AN217* (MO); Río Punta Gorda, en barranca Punta Gorda, costa del Atlántico, Río Punta Gorda, veg. Pantano de Manicaria saccifera, Acoelorrhapha wrightii, Dalberia brownii y dunas costeras de Ipomoea pes-caprae, 16 November 1981, *O. Téllez, R. Riviere, J.C. Sandino, P.P. Moreno & L.C. Roth 5069* (MEXU, MO); En la Richard, Río Punta Gorda, El Diamante, 14 November 1981, *O. Téllez, R. Riviere, J.C. Sandino, P.P. Moreno & L.C. Roth 5019* (MEXU, MO); 0.5 km E of San Antonio on trail to and nearly reaching San Miguel, devastated tropical rain forest, now mostly pasture with scattered trees formerly of the forest, 11°45'N, 084°21'W, 180 m, 7 September 1983, *M. Nee & S. Vega 27876A* (MO); Estación Experimental “El Recreo”, ca 1.5 km al SE de la estación, bosque húmedo tropical, 12°11'N, 084°18'W, 100 m, 10 enero 1985, *D. Soza, A. Grijalva & D. Ríos 367* (MO); Bluefields, S end of airport, tropical wet forest, second growth, 12°00'N, 083°46'W, 0–5 m, 13 September 1977, *D.A. Neill 2613* (MO); Panamerican, 12 km NE of La Cruz de Río Grande, tropical wet forest, 13°09'N, 084°06'W, 10 m, 10 June 1978, *D.A. Neill 4369* (MO); Tumarín, Río Grande, bosque guamil, 13°00'N, 084°22'W, 15 m, 25 April 1949, *A. Molina R. 2412* (F). **PANAMA. Comarca Guna Yala.** Aligandí, 20 May 1989, *FLORPAN, Ana Jones, & Efraín Tejada 236* (MO). **Bocas del Toro:** Chiriquí Grande–Rambala, Along highway between Chiriquí Grande and Rambala, 10–100 m, 24 June 1986, *W.J. Kress et al. 86-2013* (MO, SEL); cultivated as Selby 91–0140, 25 June 1991, *Ingram 987* (SEL); Fortuna Lake–Chiriquí Grande, 8 km N of Continental Divide, 8°47'N, 82°12'W, 12 March 1985, *Hampshire & Whitefoord 489* (BM); Along road between Gualaca and Chiriquí Grande; 3 km N of Punta Peña, 4.2 mi S of Chiriquí Grande, near sea level, 8°55'N, 82°09'W, 25 June 1987, *T.B. Croat 66809* (MO); Cerro Brujo, N of Cerro Brujo and E of Bahía de Green on the mainland, moist tropical forest interspersed with *Theobroma cacao* and *Musa sapientum*, 5–80 m, 27 February 1989, *P.M. Peterson & C.R. Annable 7194* (MO, US); ca. 1 mi. S of Changuinola on the Changuinola River, banana plantation edge of river under Piper scrub, 19 April 1969, *Lazor, Tyson, Loftin 2662* (IBE); Isla San Cristobal, Bocatorito, in wet marsh with Araceae, 30 m, 3 February 1989, *P.M. Peterson & C.R. Annable 6569* (MO); Isla San Cristobal, E side of island just S of Pigeon Creek, moist tropical swamp, 1–2 m, 12 February 1989, *P.M. Peterson & C.R. Annable 6802* (MO); Isla San Cristobal, 2 km NE of Bocatorito, moist tropical swamp forest, 5 m, 6 February 1989, *P.M. Peterson & C.R. Annable 6671* (MO); Isla Colón, 1.5 km N of La Gruta, in or near wet meadow, open grassland (man-made), 40 m, 29 January 1989, *P.M. Peterson 6420* (MO); Rambala and vicinity, low muddy area, 08°53'N, 082°10'W, 50 m, 24 April 1988, *S.A. Thompson 4920* (MO); Out along the road to the Bomba Almirante, 15

October 1965, *Kurt E. Blum 1351* (MO); Rio Cricamola, between Finca St. Louis and Konkintoë, 10–50 m, 12 August 1938 – 16 August 1938, *R.E. Woodson, Jr, P.H. Allen & R.J. Seibert 1912* (MO); Isla Colón, Vicinity of Chiriquí Lagoon, 5 November 1940, *H. von Wedel 1506* (MO); Isla Colón, Vicinity of Chiriquí Lagoon, 19 November 1941, *H. von Wedel 2979* (MO); Water Valley, 17 September 1940, *H. von Wedel 820* (MO); Vicinity of Chiriquí Lagoon, 4 November 1940, *H. von Wedel 1360* (MO); In moist swampy area along roadside in Bocas, Island of Bocas Del Toro, 23 March 1971, *L.H. Durkee 71-143* (MO); Along RR track near station at Milla 5, 27 July 1971, *T.B. Croat & Duncan M. Porter 16484* (MO); Chiriquí Grande, near road, 08°57'N, 082°07'W, 0 m, 16 March 1985, *R.J. Hampshire & C. Whitefoord 672* (LL, MO). **Chiriquí:** 0.5 mi. N of Nueva California, rocky swampy area, 1350 m, 23 January 1968, *McDaniel 10238* (IBE); Chagres, Isthmus of Panama, March 1850, *A. Fendler 426* (MO); **Colón:** Portobelo/distrito de Santa Isabel, Costa Arriba, 2 febrero 1995, *FLORPAN, A. Espinosa, P. Solís, & F. Santamaria 1780* (MO); Lago Gatún, caño Ciricito, 09°00'56"N, 080°05'03"W, 40 m, 20 August 2001 – 21 August 2001, *Jorge Mendieta 6-18* (MO); Costa Arriba, San Antonio, 14 Noviembre 1990, *Florpan et al. 531* (MO); La Macha, 08°59'04"N, 080°32'35"W, 20 m, 18 Agosto 2001, *Jorge Mendieta 10-84* (MO); Portobelo–Nombre de Dios, Forest along Portobelo–Nombre de Dios road, 10 km W of Nombre de Dios, tropical wet forest, 09°32'N, 079°32'W, 0–20 m, 24 June 1982, *S. Knapp & J. Mallet 5680* (MO); Near Portobello at bridge over Rio Buenaventura, 27 August 1970, *H. Kennedy 465* (MO); María Chiquita, E of Río Piedras toward Portobelo, thickets near beach, 9 August 1967, *J.D. Dwyer & J.H. Kirkbride, Jr. 7809* (MO); Mosquera, forest, 15–50 m, 17 September 1974, *P.J.M. Maas & S. Mori 1750* (MO); Vicinity of Rio Indio on road from Portobelo to Nombre de Dios, 50 m, 23 March 1976, *T.B. Croat 33645* (MO); Thickets and pasture along Rio Viejo, between the Portobelo road and Quebrada Ruiz, 4 km NE of Puerto Pilon, 5 m, 29 September 1973, *M. Nee 7180* (MO); Strand vegetation along beach ca 3 mi. SW of Colón, growing in sandy area, 7 April 1971, *T.B. Croat 14165* (MO); Swamp Forest and bordering tierra firma, ca 0.5 km from the Rio Buenaventura, near Potobelo, 30 January 1973, *H. Kennedy & S. Gra 2223* (MO); 6 miles south of Portobello, 17 July 1970, *T.B. Croat 11404* (MO); Near Puerto Pilón, swampy pastures, 27 July 1969, *R.L. Dressler 3696* (MO); Coclé del Norte, forest on hills along river, 0–100 m, 23 August 1978, *B.E. Hammel 4450* (MO). **Darién:** El Real, Tuira–Alconorqui, Alconorqui swamp on Río Tuira, ca. 3 mi NW of El Real, 08°05'N, 077°45'W, 15 June 1962, *J.A. Duke 4819* (MO). **Guna Yala:** Lower Cangandi River from the ocean to the village of Cangandí, 9°27'N, 79°8'W, elev. 20 m., collected with S. Charnley, H. Herrera & R. Paredes, 9°27'N, 79°08'W, 20 m, 25 January 1985, *G. de Nevers 4629* (MO); Río Cangandi, pueblo Cangandi, camino hacia Mandi Yala, 09°27'N, 079°07'W, 30 m, 15 June 1987, *Heraclio Herrera 183* (MO); Playon Chico, camino de Suedi a Kariadi, tierra firme frente a Playón Chico, subiendo por Río Ailingandi, 9°20'N, 78°13'O, 0–50 m, 10 December 1989, *H. Herrera & Ovidio Guillen 662* (MO); Puerto Obaldia, vicinity of Puerto Obaldia, 24 June 1975, *S. Panamá Oeste Canal Area, Barro Colorado Island, forest along shore of Gatun Lake, east of Laboratories, 09°09'49"N, 079°50'11"W, 0–10 m, 24 November 1948, E.P. Killip 40037* (MO); Barro Colorado Island, Gross Point, 09°10'41"N, 079°50'37"W, 0–5 m, 2 July 1970, *T.B. Croat 11101* (MO); Barro Colorado Island, Western side of Gross point peninsula from point to S edge of central deep cove, 09°10'15"N, 079°50'40"W, 0–10 m, 25 April 1968, *T.B. Croat 5097* (MO); Barro Colorado Island, Gross Peninsula, 09°10'41"N, 079°50'37"W, 0–5 m, 10 August 1970, *T.B. Croat 11802* (MO); Barro Colorado Island, 09°09'N, 079°51'W, 10–100 m, 25 November

1938, *James Zetek 4320* (MO); Barro Colorado Island, Fred Miller Trail near light, 09°10'07"N, 079°51'07"W, 50 m, 13 December 1931, *Otis E. Shattuck 581* (MO); Barro Colorado Island, Orchid Island, 09°10'12"N, 079°50'24"W, 0–10 m, 10 August 1970, *T.B. Croat 11807* (MO); Barro Colorado Island, Hidden Cove north of B.C.I, 12 December 1981, *R.J. Schmalzel 226* (MO); Barro Colorado Island, shore near lighthouses, 22 February 1932, *R.H. Woodworth & P.A. Vestal 656* (MO); Barro Colorado Island, sand and silt deposit at end of Fuertes Cove to 2 m, 1 May 1968, *T.B. Croat 5258* (MO); Barro Colorado Island, shoreline S of Colorado Point, 11 February 1969, *T.B. Croat 7860* (MO); Barro Colorado Island, shoreline south of Gross Point, 11 June 1970, *T.B. Croat 10837* (MO); Northwestern part of Canal Zone (area west of Limón Bay, Gatun Locks and Gatun Lake), 11 November 1955, *I.M. Johnston 1651* (MO); Mojinga Swamp near mouth of R. Chagres, 0–1 m, 11 March 1935, *P.H. Allen 861* (MO); Vicinity of Juan Mina, hill at Canal Zone boundary, 27 July 1940, *H.H. Bartlett & T. Lasser 16583* (MO); Barro Colorado Island, Hydrilla Cove, 09°09'00"N, 079°50'24"W, 0–10 m, 21 November 1981, *R.J. Schmalzel & T.M. Aide 103* (MO); Barro Colorado Island, Fuertes Cove, 09°10'02"N, 079°51'11"W, 0–10 m, 24 September 1968, *T.B. Croat 6405* (MO); Barro Colorado Island, shoreline of large cove leading to Fuertes House, 09°10'02"N, 079°51'11"W, 0–10 m, 10 October 1968, *T.B. Croat 6827* (MO); Barro Colorado Island, shoreline from edge of #8 rear light clearing to front light; along south side of island opposite #8 front light, 09°10'10"N, 079°51'15"W, 0–5 m, 19 April 1968, *T.B. Croat 4951* (MO); Barro Colorado Island, cove at Fuertes House, 09°09'17"N, 079°50'53"W, 0–5 m, 1 May 1968, *T.B. Croat 5233* (MO); Barro Colorado Island, edge of cove near Fuertes House, 09°09'17"N, 079°50'53"W, 0–5 m, 30 April 1968, *T.B. Croat 5224* (MO); Barro Colorado Island, Orchid Island, 09°10'12"N, 079°50'24"W, 0–10 m, 7 August 1970, *T.B. Croat 11766* (MO).
CARIBBEAN. Cuba: Santa Clara Province: Soledad, August 1940, *Gunckel s.n.* (MU).

Cultivated plants: Costa Rica: Coto Brus. Las Cruces Biological Station. Wilson Botanical Garden, San Vito Java, 08°47'24"N, 082°57'00"W, 1275 m, 26 June 1994, *Kress & Alverson 94-3753* (US);

Spathiphyllum fulvovirens Schott, Oesterr. Bot. Z. 8: 179. 1858. — Type: COSTA RICA. Guacanaste: near Pedregal, 25 May 1857, *H. Wendland 939* (lectotype, GOET, designated by Dowe et al., 2022).

Terrestrial, 0.7–1.25 m tall; internodes short, (1)3–4 cm diam. LEAVES (22)35–119 cm long; **petioles** 46–76 cm long, sheathed (0.14)0.25–0.63 its length, sometimes possessing densely arrayed somewhat floccose stellate trichome clusters especially on the sheath when present; **sheath** 8.0–37.5 cm long, soon brown and dried, often fragmenting; free part of petiole 17–59 cm long, subterete, slightly thicker than broad, narrowly sulcate; geniculum sulcate to flattened, (1.0)1.5–3.0 cm long; **blades** oblique, typically ovate to ovate-elliptic, (22.5) 35–45 cm long, (9)17–20 cm wide, 1.9–2.8 times longer than wide, 0.50–0.73(0.93) times as long as petioles, acuminate at apex, (acumen 1.5–3.5 cm long), obtuse to subrounded at base, thin to thinly coriaceous, dark green and weakly glossy above, much paler and matte below, drying moderately paler dark brown to dark gray-brown and weakly glossy to semiglossy below; major

veins deeply sunken above; midrib sunken and slightly paler above, thicker than broad at base below, convex toward apex; **primary lateral veins** (13)20–30 per side, departing midrib at 60–70°, narrowly quilted-sunken above, convex-pleated, darker, and prominent below; minor veins distinct below. INFLORESCENCE held above leaves; peduncle 41–77 cm or more long; **spathe** 9–14(20) cm long, 2–3(5.5) cm wide, ± oblong to lanceolate or oblanceolate, narrowly long-acuminate at apex, clasping and not decurrent at base, erect-spreading to spreading, yellow-green to white and matte inside, pale to medium green and weakly glossy outside, erect, then sometimes recurled downward becoming pale green in fruit; **spadix** 6.8–11.5 cm long, smooth, short-stipitate 0.3–1.7 cm, greenish white, whitish, green or yellow-green to purplish; flowers (2)3(4) visible per spiral; perianth of separate segments, dark green to purplish violet to brownish purple, yellowish white in fruit; **pistils** mammiform at anthesis becoming truncate in fruit with the stigma dark and protruding; pistils obpyramidal, white to pale green, drying truncate, flat to concave at apex, the surface markedly granular; ovary 3-locular; style barely exerted, often recessed in depression on berries. INFRUCTESCENCE to 15 cm long, drying 1.2 cm diam., (stipe to 2.2 cm long), purplish violet with whitish pistils; **berries** white, at least at base; seeds 2 or 3 per locule, more or less turbinate with a narrowed, circular protrusion on one end, 2.0–2.4 mm long, subrounded medially, drying conspicuously ribbed-tuberculate on all sides, yellowish brown. **Figures 101–106.**

Distribution — *Spathiphyllum fulvovirens* ranges from Nicaragua, Costa Rica and Panama to Colombia at sea level to 1200(1550 m). The species is ecologically variable, ranging from *Tropical moist forest* to *Tropical wet forest*, *Premontane wet forest* and *Premontane rain forest* life zones.

Comments — *Spathiphyllum fulvovirens* is characterized by its typically weakly sheathed yellow-brown-drying petioles, narrowly ovate, prominently long-acuminate blades which dry typically grayish above and yellow-green below as well as by the narrow, green, spreading, clasping spathe and the stipitate, narrow, green spadix with white pistils and a barely exerted style. While not consistent another interesting feature of this species is the presence of somewhat floccose stellate trichome clusters which are usually densely arrayed on the petioles, especially on the sheath when present. Their presence seems not to be either geographically or elevationally consistent. In Costa Rica those with the stellate pubescence seem to be restricted to areas below 200 m elevation (Grayum, 2003). In Panama those with non-floccose petioles range from near sea level to 1000 m in Bocas del Toro, Veraguas, Coclé, Colon, Panama and Kunayla. Those with floccose trichomes range from (24)250 to 1000 m in Bocas del Toro, Veraguas, Coclé, Colón, Panamá Oeste and Panamá and Guna Yala.

Spathiphyllum fulvovirens is not easily confused with other species but would be closest to *S. kalbreyeri* and *S. patinii*, both of which differ in having the spathe usually white on the inner surface. *Spathiphyllum kalbreyeri* also differs by having typically smaller and proportionately narrower leaf blades while *S. patinii* also differs in having the spathe markedly narrowed at base and is only weakly attached to the peduncle.

Bunting (1960) argued that the original material of *Spathiphyllum fulvovirens* was destroyed, for which he designated *Wedel 2198* as a neotype. However, this idea was superseded due the presence of extant original material at GOET, which was designated as the lectotype by Dowe



Figure 101: *Spathiphyllum fulvovirens*, Habit. Photo: O. Ortiz

et al. (2022).

Additional specimens seen: **COLOMBIA. Antioquia:** cerca de Porcesito en el valle del Río Medellín, 1100 m, 19 May 1946, *Hodge 6870* (US); Vic. Planta Providencia, 07°13'N, 075°03'W, 400–700 m, 10 July 1976, *J.D. Shepherd 479* (HUA); Vic. of Planta Providencia, 28 km SW of Zaragoza. Valle of Río Anorí in areas surrounding the confluence of Quebrada La Tirana and Río Anorí, app. 3 km upriver from Planta Providencia, 400–700 m, 3 April 1977, *W.S. Alverson et al. 335* (COL); Amalfi, 8–15 kms. de Amalfi a Rumazon, sitios “Salazar” y “La Playa”, 06°56'N, 075°04'W, 1550 m, 28 Sept 1988, *J. Betancur, R. Roldan, O. Escobar 787* (HUA); Puerto Berrío, límites con la vereda el Prodigio (Mpio. San Luis), vereda Serranías, bosque primario perturbado, 6°6'N, 74°48'W, 300–500 m, 27 September 1990, *D. Cardenas et al. 3018* (JAUM, MO); San Luis, Ecoparque El Castellón, 1300–1500 m, 9 November 1995, *R. Fonnegra et al. 5704* (HUA, MO, NY); vereda La Estrella, 12 km NE of San Luis on road to Granada, 1550 m, 7 May 1989, *D.C. Daly & J. Betancur 5829* (HUA); 10 km S. of the entry to San Luis, on the way to Medellín-Bogotá, a 300 m, margen derecha de la carretera Quebradas-Naranjales y la Cristalina, 05°55'N, 074°50'W, 420–460 m, 24 June 1987, *R. Callejas et al. 4162* (HUA, MO); Parque ecológico El Castellon, 06.02N 075W, 1300 m, May



Figure 102: *Spathiphyllum fulvovirens*, Inflorescence. Photo: O. Ortiz



Figure 103: *Spathiphyllum fulvovirens*, Inflorescence. Photo: Ramon da Pena



Figure 104: *Spathiphyllum fulvovirens*, Inflorescence post-anthesis, Photo: O. Ortiz



Figure 105: *Spathiphyllum fulvovirens*, Gentry 41079, Colombia



Figure 106: *Spathiphyllum fulvovirens*, Herrera 1112, Panama

1999, *F. Alzate y estudiantes IAA San Luis 702* (HUA); Vereda Manizales, 06.05N 075W, 1440 m, 26 June 1987, *R. Callejas, et. al. 4315* (HUA, NY); Turbo, Carretera Tapón del Darién, Sector Río Leon–Lomas Aisladas, km 36, bosque primario perturbado, suelo muy húmedo, 20 m, 28 December 1983, *J. Brand & M. Escobar 795* (JAUM, MO); Tarazá, Corregimiento El 12, Vereda Barroblanco, Quebrada Purí, km N.O. de Medellín, 07°25'N, 075°20'W, 450 m, 17 May 1987, *Ricardo Callejas, J. Betancur & F.J. Roldán 3627* (HUA, NY). **Chocó:** Río Mecana, ca 10 km E of Mecana, mature forest on lateritic soil on ridge top, 06°15'N, 77°25'W, 100 m, 7 March 1983, *A.H. Gentry & Adrian Juncosa 41079* (COL, MO); Mecana, Quebrada Resaquita, primary forest, elev. 50 m. 6°16'N, 77°21'W, 6°16'N, 77°21'W, 50 m, 13 January 1984, *Adrian Juncosa 1895* (MO); Along highway 60 between Quibdó and Bolívar, 9 km W of bridge at Tutunendo, 05°43'52»N, 076°36'19»W, 50 m, 16 August 1997, *T.B. Croat & J.F. Gaskin 80918* (MO); rain forest on hill N of Alto Curiche, 300 m, 19 May 1967, *J.A. Duke & J. Idrobo 11219* (NY); hills behind logging camp below first rapids on Río Truandó, 40–200 m, 15 June 1967, *James A. Duke 13307* (NY). Nuquí: Corregimiento de Arusi, Estación Biológica EL AMARGAL, 05°34'N, 077°31'W, January 1999 – April 1999, *Jorge Jácome 422* (COL); San José del Palmar, Río Torito, 630–730 m, 13 March 1980, *Forero E. et al. 7235* (COL); **Putumayo:** Pto Porvenir, November 1940, *Cuatrecasas 10665* (COL). **Santander:** Barrancabermeja, Magdalena Valley, between Sogamoso and Carare Rivers, Amorilla creek, 150 m, 1 July 1936, *O. Haught 1895* (US). **Valle del Cauca:** Along road from Queremal to Buenaventura, 15.3 km W of junction to Queremal, along Río Ningaño, 03°32'00»N, 076°45'00»W, 730 m, 12 July 1997, *T.B. Croat & J.F. Gaskin 79724* (CUVC, MO); Buenaventura, Bajo Anchicayá, levantamiento, Parcela, 03°45'N, 76°50'W, 300 m, 19 October 1989, *A.H. Gentry, O. Rangel & Curso Postgrado-Botánico 68501* (COL, MO). **COSTA RICA.** **Alajuela:** San Carlos, Cuenca del San Carlos, Boca Tapada, Finca San Jorge, 10°43'12»N, 084°11'24»W, 100 m, 10 February 1996, *Alex Rodríguez Estrada 1069* (MO); San Ramon, R.F. San Ramón, Cordillera de Tilarán, Camino al Volcán Muerto, bosque primario, 10°12'36»N, 084°36'00»W, 1100–1200 m, 11 May 1993, *Flor Araya, Morales, Guzmán, Segura & Gutiérrez 292* (CR, INB, MO). **Heredia:** Tirimbina, in tropical wet forest, 10°24'00»N, 084°06'00»W, 700 ft, 29 May 1971, *G.R. Proctor 32119* (LL, MO); N of Puerto Viejo 10 km down road, then 7–8 km W in forest, 10°31'12»N, 084°05'24»W, 2 February 1983, *Garwood et al. 915* (BM); La Selva, Finca La Selva, OTS Field Station on Río Puerto Viejo just E of its junction with Río Sarapiquí, 10°25'12»N, 084°00'36»W, 100 m, *Wilbur 37992* (DUKE); *Wilbur 37406* (DUKE); *Wilbur 37389* (DUKE); La Selva, 10°25'12»N, 084°01'12»W, *Folsom 10034* (DUKE); Río Sarapiquí, Río Sarapiquí, W of San José across Río Sardinal, edge of Lomas Sardinal, 10°29'24»N, 084°03'00»W, 100 m, 4 February 1983, *Garwood et al. 1051* (BM); *Garwood et al. 1052* (BM); N base of hills to the S of the Río Sarapiquí, opposite Chilamate, 10°27'N, 84°04'W. Elev. 60–100 m, 10°27'00»N, 084°03'36»W, 60–100 m, 1 June 1985, *M.H. Grayum, T.Ray & B. Jacobs 5310* (MO); Parque Nacional Braulio Carrillo Estación Magsasay, bosque secundario, 10°24'00»N, 084°03'00»W, 200 m, 5 July 1990, *Daniel Acevedo en el curso II de parataxónomos 106* (MO); Near La Selva Biological Station, 100 m, 1 June 1985, *B. Jacobs, M.H. Grayum & T. Ray 3210* (DUKE); La Selva Biological Station, 10°26'00»N, 84°01'00»W, 50 m, 30 August 1996, *T.B. Croat 78729* (AAU, CAS, CM, COL, INB, K, MEXU, MO, NY, SEL); Zona Protectora, northern slopes Volcan Barba, between Río Peje and Río Guacimo, along Quebrada Cantarana, downstream from base camp located at abandoned sawmill, associated with *Heliconia pogonantha*, *Piper auritum*, *Colubrina* and *Myriocarpa*, in forest along creek, 190 m, 13 January 1983, *M.H.*

Grayum & *G. Schatz* 3095 (DUKE); El Uno Farm in remnant woods, La Virgen de Sarapiquí, 220 m, 8 May 1970, *R.W. Lent* 1939 (MO); Chilamonte, San José–Puerto Viejo, along road between San José and Puerto Viejo, vicinity of Chilamante, 11.6 mi N of Cariblanco, disturbed virgin forest west of road, along steep slopes and flat, marshy creek bed, 10°27'N, 84°05'W, 100 m, 1 October 1987, *T.B. Croat* 68378 (MO); La Selva, O.T.S. La Selva Reserve, 10°26'N, 84°01'W, 15 April 1986, *T.B. Croat* 61223 (MO); La Selva Biological Station, 10°25'53"N, 084°00'13"W, 100 m, 28 June 1984, *B. Jacobs* 2620 (DUKE); La Selva Biological Station, 10°25'53"N, 084°00'13"W, 100 m, 16 May 1985, *R. L. Wilbur* 36922 (DUKE); La Selva Biological Station, 10°25'53"N, 084°00'13"W, 100 m, 20 May 1985, *R. L. Wilbur* 37141 (DUKE); La Selva Biological Station, 10°25'53"N, 084°00'13"W, 100 m, 10 February 1981, *J.P. Folsom* 8856 (DUKE); La Selva Biological Station, 10°25'53"N, 084°00'13"W, 100 m, 4 December 1979, *R.L. Wilbur* 28164 (DUKE); L.R. Holdridge's Finca La Selva, Río Puerto Viejo at Quebrada El Sura and Quebrada El Salto, ca. 1 mi. above junction with Río Sarapiquí, 10°25'12"N, 084°00'00"W, 350 ft, 1961, *Rosbach, G.* 3716 (GH); La Selva Biological Station, the bank of the Río Salto on the CCL near the new metal bridge, 10°25'12"N, 084°00'36"W, 100 m, 11 February 1998, *R.L. Wilbur & G. Moore* 70035 (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 084°00'13"W, 100 m, 28 June 1981, *B.E. Hammel* 10927 (MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 084°00'13"W, 100 m, 9 April 1982, *B.E. Hammel* 11632 (LSCR); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 084°00'13"W, 100 m, 18 September 1982, *T. McDowell* 141 (MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 084°00'13"W, 100 m, 18 October 1982, *T. McDowell* 504 (MO); Finca La Selva, 27 February 1986, *F. Almeda, B. Anderson & N.J. Friedman* 5102 (MO); Finca La Selva, the OTS Field Station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 100 m, 21 March 1983, *Isidro A. Chacón G.* 527 (MO); Finca La Selva, 21 March 1983, *I.A. Chacón G.* 527 (MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 084°00'13"W, 100 m, 20 November 1982, *Tim McDowell* 837 (MO); Finca La Selva (field station of the Organization for Tropical Studies), 1 July 1978, *K.F. Grove* 4 (MO); Sarapiquí, Finca La Selva, OTS Field station on Río Puerto Viejo, just E of its junction with Río Sarapiquí, 10°25'12"N, 084°00'36"W, 100 m, 22 June 1995, *M.K. Whitson* 235 (DUKE); La Selva Field Station, Puerto Viejo de Sarapiquí, 10°25'12"N, 084°00'36"W, 100 m, 3 January 1978, *T.B. Croat* 44222 (MO); P.N. Braulio Carrillo, Llanura de San Carlos, Río Peje, Estación Magsasay, 10°24'00"N, 084°03'00"W, 200 m, 14 January 1994, *Ricardo Rueda, B. Hammel, Q. Jiménez & E. Lépiz* 1396 (CR, MO). **Limón:** Hills 2 airline km SSE of Islas Buena Vista in the Río Colorado, 14 airline km SW of Barra del Colorado, premontane wet forest on low hills, 10°39'36"N, 083°39'36"W, 10–120 m, 13 September 1986 – 14 September 1986, *G. Davidse & Gerardo Herrera* 31033 (MO); Parque Nacional Tortuguero Estación Agua Fría, 8 km al Sureste, Lomas de Sierpe, bosque primario, 10°27'00"N, 083°33'36"W, 70 m, 3 February 1988, *Rafael Robles* 1614 (CR, MO); Hacienda Tapezco-Hacienda La Suerte, 29 air km W of Tortuguero, primary rainforest in an area being selectively logged, area of low hills and mounds, a few small streams, 10°30'N, 083°47'W, 40 m, 15 August 1979, *C. Davidson & J. Donahue* 8331 (MO); Hacienda Tapezco-Hacienda La Suerte, 29 air km W of Tortuguero, primary rainforest in an area being selectively logged, area of low hills and mounds, a few small streams, 10°30'N, 083°47'W, 40 m, 7 March 1978, *C.*

Davidson, A. Kaminer, L. Middleton, & B. Rasnow 6774 (MO); Pococi, Cantón de Pococi Lomas de Sierpe, aprox. 20 km al noreste de Guácimo, bosque al lado del camino, 10°21'00"N, 083°34'48"W, 50 m, 3 June 1989, *B. Hammel, R. Evans & M.H. Grayum 17429* (MO); R.N.F.S. Barra del Colorado, Llanura de Tortuguero, sector Cororí, 10°35'24"N, 083°48'00"W, 100 m, 21 November 1990, *Elías Rojas 169* (MO). **NICARAGUA. Río San Juan:** Sobre el Río San Juan, a lo largo del Río Bartola, 10°58'N, 084°40'W, 50–200 m, 12 Julio 1994, *Ricardo Rueda, Blas Hernández y Edith Palma 1950* (MO); Reserva Indio-Maiz, Municipio de el Castillo, a lo largo del caño el Pavon, a 3 km de sa desembocadura en el Río Bartola, 11°01'N, 084°16'W, 1 enero 1997, *Ricardo Rueda, Indiana Coronado, Oscar Aráuz y Franklin Flores 5220* (MO); Reserva Indio-Maíz, Municipio de San Juan del Norte, sendero de cazadores, al lado sur de la Laguna de Silico, 10°51'N, 083°46'W, 2 agosto 1996, *Ricardo Rueda, Indiana Coronado y Norlan Tercero 4878* (MO); *Ricardo Rueda, Indiana Coronado y Norlan Tercero 4879* (MO); Reserva Indio-Maíz, Municipio de el Castillo, 3 km al norte de la desembocadura del Caño Chontaleño, 11°05'N, 084°15'W, 13 febrero 1997, *Ricardo Rueda, Indiana Coronado, Oscar Aráuz & Franklin Flores 5742* (MO); Reserva Indio-Maíz, Municipio de el Castillo, Cerro el Diablo, 11°01'N, 084°12'W, 400–609 m, 6 enero 1997, *Ricardo Rueda, Indiana Coronado, Oscar Aráuz & Franklin Flores 5454* (MO); Municipio del Castillo. Estación Biológica Bartola, Sobre el rio Bartola a 3 kilometre de le desembocadura, 10°58'00»N, 084°19'50»W, 50–100 m, 27 julio 1998, *Ricardo Rueda, Indiana Coronado & Walter Velásquez 8213* (MO); Reserva Indio-Maiz, Municipio de San Juan del Norte, Río Indio, Cerro Canta Gallo, 11°04'N, 083°51'W, 150–200 m, 15 septiembre 1998, *Ricardo Rueda, Indiana Coronado, Walter Velásquez y Yader Rubi 8612* (HNMN); Reserva Indio-Maiz, Municipio de San Juan del Norte, Río Indio, Cerro Canta Gallo, 11°04'N, 083°51'W, 150–200 m, 16 septiembre 1998, *Ricardo Rueda, Indiana Coronado, Walter Velásquez y Yader Rubi 8642* (HNMN); Reserva Indio-Maiz, Municipio de San Juan del Norte, Río Indio, Cerro Canta Gallo, 11°04'N, 083°51'W, 150–200 m, 17 septiembre 1998, *Ricardo Rueda, Indiana Coronado, Walter Velásquez y Yader Rubi 8714*; Municipio el Castillo, Reserva Indio-Maiz, Cerro Bolivar, 10°51'N, 084°10'W, 150–280 m, 30 noviembre 1998, *Ricardo Rueda, Franklin Flores, Walter Velásquez y Oscar Caballero 9306* (HNMN); Municipio de San Juan del Norte, Reserva Indio-Maíz, entre San Juan del Norte y la Finca de Chepelión, 11°04'N, 086°54'W, 50 m, 8 marzo 2002, *R. Rueda, D. Paguaga, N. Toval & J. Masis 16885* (MO). **Atlántico Sur:** Caño Montecristo, orillas del caño en Las Benitas y las faldas del Cerro Las Nubes, 11°37'N, 083°52'W, 10–60 m, 6 febrero 1982, *P.P. Moreno & J.C. Sandino 14993* (MO); *P.P. Moreno & J.C. Sandino 14996* (MO); Municipio de Nueva Guinea, Reserva Indio-Maiz, Río Pijibaye entre el caño Bijagua y el cerro Chiripa, 11°22'N, 084°01'W, 50–200 m, 13 enero 1999, *Ricardo Rueda, Indiana Coronado, Oscar Caballero y Luis Ruiz 10010* (HNMN); Municipio de Nueva Guinea, Reserva Indio-Maiz, Río Pijibaye entre el caño Bijagua y el cerro Chiripa, 11°22'N, 084°01'W, 200–350 m, 15 enero 1999, *Ricardo Rueda, Indiana Coronado, Oscar Caballero y Luis Ruiz 10224* (HNMN). **PANAMA. Bocas del Toro:** Fortuna Dam region, forested slope, near Chiriquí Grande, 8°45'N, 82°15'W, 200 m, 18 January 1986, *G.McPherson 8075* (MO); Road from Fortuna Dam to Chiriquí Grande, forested slopes, 8°50'N, 82°10'W, 400 m, 25 April 1986, *G. McPherson 9022* (MO); East 1.5 mi off road from divide to Chiriquí Grande, 250–300 m, forest and roadside, 250–300 m, 24 June 1986, *W.G. D'Arcy 16390* (MO); April 1941, *H. von Wedel* (GOET, MO); Along road from Fortuna Dam towards Chiriquí Grande, 10 miles from continental divide, 1 mile along side road. [Coordinates on original label: 8°55'N, 82°10'W], March 1986, *McPherson 8584* (MO); Fish Creek, vicinity of Chiriquí Lagoon, 9 April 1941,

H. von Wedel 2198 (MO); Punta Peña, vicinity of Chiriquícito, rain forest, 1000 ft, 7 June 1967, *W.H. Lewis, N. Escobar, B. MacBryde, R.L. Oliver & J.E. Ridgway* 2156 (MO); *W.H. Lewis, N. Escobar, B. MacBryde, R.L. Oliver & J.E. Ridgway* 2157 (MO); Entre sitio de presa y Valle La Esperanza, 30 March 1980, *Luis Carrasquilla & R. Mendoza* 1376 (MO); Chiriquí Grande: Chiriquí Grande–Fortuna, along road between Chiriquí Grande and Fortuna, 13.2 mi W of Chiriquí Grande, 8°45'N, 82°10'W, 310 m, 9 March 1985, *T.B. Croat & Michael H. Grayum* 60143 (MO). **Chiriquí:** Along road between Gualaca and Fortuna dam site, 10.1 mi NW of Los Planes de Hornito, 08°45'N, 082°17'W, 1260 m, 10 April 1980, *T.B. Croat* 50023 (MO); Fortuna Dam, along road from Fortuna Dam towards Chiriquí Grande 10 miles from continental divide, 1 mile along side road, slopes c. 120 m, 8°55'N, 82°10'W, 120 m, 5 March 1986, *G. McPherson* 8584 (MO); Punta Peña, vicinity of Chiriquícito, rain forest, 1000 ft, 7 June 1967, *W.H. Lewis, N. Escobar, B. MacBryde, R.L. Oliver & J.E. Ridgway* 2160 (GH). **Code:** Penonomé-Coclecito, 5.6 mi N of Llano Grande, along Río Cascajal 5.6 mi N of Llano Grande, 1.4 mi N of Continental Divide, 8°46'N, 80°27'W, 150 m, 11 Sept. 1987, *T.B. Croat* 67486 (MO); 7 km from Llano Grande on road to Coclesito near continental divide, 1200 ft, July 1979, *T.M. Antonio* 1377 (MO); Alto Calvario Region, vicinity of old saw mill works, 4.5 mi N of El Copé; 2.5 mi N of Escuela Barrigón, 8°38'N, 80°36'W, 580–740 m, 12 Sept. 1987, *T.B. Croat* 67492 (MO); Alto Calvario above El Copé, ca 6 km N of El Copé; atlantic slope, along trail through forest W off old lumber trail which leads down to Las Ricas, Limón and San Juan, 08°39'N, 080°36'W, 23 June 1988, *T.B. Croat* 68799 (MO); Along Llano Grande to Coclesito road, above Cascajal, near divide, c. 8°42'N, 80°28'W. Forest. c. 500 m, 8°42'N, 80°28'W, 500 m, 12 January 1986, *G. McPherson* 7975 (MO); Road to Coclesito, logging camp 12 mi from Llano Grande, alt. 200 m, 8°47'N, 80°28'W, 8°47'N, 80°28'W, 16 December 1983, *H.W. Churchill, A. Lier, W.S. Armbruster & A. Herzig* 4115 (MO); Road to Coclecito, logging camp 12 mi from Llano Grande, 8°47'N, 80°28'W, 200 m, 9 December 1983, *H.W. Churchill, A. Lier, W.S. Armbruster & A. Herzig* 3983 (MO); Coclecito Road, trail along continental divide, tropical wet forest, cloud forest, 8°42'N, 80°28'N, Elev. 500 m, 8°42'N, 80°28'W, 500 m, 11 January 1986, *G. de Nevers, G. McPherson & S. Armbruster* 6729 (MO); Alto Calvario, summit, montane ridge-type forest, 900 m, 9 April 1977, *J.P. Folsom* 2492 (MO); El Jordanal, Río Indio Arriba, 08°40'10"N, 080°07'01"W, 570–840 m, 23 July 2001 – 25 July 2001, *Jorge Mendieta* 5-116 (PMA); Along the Atlantic slope of the Continental Divide near sawmill (Whiskey) above El Copé, premontane or montane wet forest, 08°40'N, 080°16'W, 750–800 m, 13 February 1982, *S. Knapp & R.L. Dressler* 3424 (MO); 5–5.5 mi N of El Copé, trail along Continental Divide, 08°38'N, 080°35'W, 850 m, 7 April 1988, *S.A. Thompson* 4730 (MO); 6 mi N of El Copé, on Atlantic side of Continental Divide, 08°38'N, 080°35'W, 750–800 m, 8 April 1988, *S.A. Thompson* 4745 (MO); 7 km N of El Copé; near Rivera Sawmill, at Alto Calvario, Forgotten Hill, 700–850 m, 2 July 1977, *J.P. Folsom* 4093 (MO); 4 mi past Llano Grande on road to Cascajal, rocky faced cliff ca. 2 km W along continental divide, low cloud forest, 600 m, 6 May 1981, *K. Sytsma, L. Andersson, & D. Brenner* 4420 (MO); La Mesa road N of El Valle, along stream gorge, low cloud forest, 2700 ft, 6 May 1981, *K. Sytsma, L. Andersson, & D. Brenner* 4342 (MO); Above El Potroso sawmill at Continental Divide, N of El Cope, low cloud forest, 1200–1300 m, 13 May 1981, *K.J. Sytsma & L. Andersson* 4558 (MO); Ca 5 mi past Llano Grande on road to Cascajal, NW of Penonomé, disturbed riparian forest, 400–450 m, 9 April 1981, *K.J. Sytsma* 3856 (MO); Continental divide N of Penonomé on road to Coclesito, small patch of forest at roadside, 1600 ft, 25 July 1978 – 26 July 1978, *B.E. Hammel* 4050 (MO); 4 mi past Llano Grande on

road to Cascajal, rocky faced cliff ca. 2 km W along continental divide, low cloud forest, 600 m, 6 May 1981, *K. Sytsma, L. Andersson, & D. Brenner* 4417 (MO); Near continental divide along lumbering road 8.4 km above El Copé (1 km beyond sawmill), 900 m, 19 January 1978, *B.E. Hammel* 956 (MO); Trail from Río San Juan to Río Tife Falls, 1200–2500 ft, 10 June 1978, *B.E. Hammel* 3362 (MO); Alto Calvario, Vicinity of El Copé, N slope of Cordillera ca. 0.5 mi N of Continental Divide at Alto Calvario, ca. 5.6 mi N of El Copé, 08°39'N, 80°36'W, 800 m, 31 March 1993, *T.B. Croat* 75063 (IBE, MO); El Copé, Caribbean side of divide at El Copé, wet forest, 08°45'N, 080°35'W, 200–400 m, 3 February 1983, *C. Hamilton & G. Davidse* 2669 (MO). **Colón:** Santa Rita Ridge road, c. 8 miles E of Transisthmian highway, along trail N of road, c. 9°20'N, 79°45'W, forest, 350–440 m, 9°20'N, 79°45'W, 350–440 m, 2 February 1986, *G. McPherson & M. Merello* 8243 (MO); Along Río Guanache ca. 3–5 mi inland, 10–100 m, 3 August 1974, *T.B. Croat* 26138 (MO); Santa Rita lumber road, east of Colón, 28 January 1968, *R.L. Dressler* 3355 (MO); Santa Rita Ridge, in wet forest, ca. 12 km from Trans-Isthmian Highway, 28 June 1978, *B.E. Hammel* 3676 (MO); Coclé Del Norte, in forest east of town, 100 m, 24 August 1978, *B.E. Hammel* 4488 (MO); Ca 2–3 miles up the Río Guanache. Lowland rain forest, 10–20 m, 19 January 1973, *H. Kennedy & R. Foster* 2160 (MO). **Darién:** Nique, Alturas de Nique–Coasí, Lower slopes of Alturas de Nique along Río Coasí, 07°36'N, 077°47'W, 26 December 1980, *R.L. Hartman* 12245 (MO); Tres Bocas, Cuasí–Cana, Cuasí–Cana Trail on Cerro Campamiento east of Tres Bocas, headwater of Río Cuasí, cloud forest, 07°51'N, 077°45'W, 29 April 1968, *J.H. Kirkbride Jr. & J.A. Duke* 1235 (MO); Trail between Paya & Pucro, wet forested area, 12 June 1959, *W.L. Stern, K.L. Chambers, J.D. Dwyer, & J.E. Ebinger* 404 (GH, MO); Río Cocalito, up river and side stream on left hand side, high forest, 19 February 1982, *C. Whitefoord & A. Eddy* 252 (MO); Vicinity of upper gold mining camp of Tyler Kittredge on headwaters of Río Tuquesa ca. 2 air km from Continental Divide, recently cleared primary forest, 26 August 1974, *T.B. Croat* 27261 (MO); Vicinity of upper gold mining camp of Tyler Kittredge on headwaters of Río Tuquesa ca. 2 air km from Continental Divide, recently cleared primary forest, 26 August 1974, *T.B. Croat* 27229 (MO); Pirre–Cerro Pirre, Cerro Campamento, south of Cerro Pirre, elfin forest, 07°47'N, 077°43'W, 20 March 1968 – 22 March 1968, *J.A. Duke* 15695 (MO); Pirre, summit of Cerro Pirre, cloud forest, 07°51'N, 077°43'W, 1000–1400 m, 29 December 1972, *A.H. Gentry & A. Clewell* 7011 (MO). **Panamá:** Cerro Campana along trail to summit, high windswept ridge, cloud forest, elev. 850 m, 8.42°N, 79.56°W, 8°42'N, 79°56'W, 3 August 1983, *J.S. Miller & L. Miller* 964 (MO); Cerro Jefe Region, 0.8 mi beyond turn-off to Altos de Pacora (near branch in road to antennas to Cerro Jefe), 09°15'N, 79°29'W, 770 m, 4 July 1994, *T.B. Croat & G. Zhu* 76619 (MO); Cerro Campana, 6.1 miles above Pan-American Hwy, 3.2 miles beyond park entrance and Guarda Bosque Station, 08°41'N, 79°56'W, 800 m, 23 March 1993, *T.B. Croat* 74766 (CM, MO); Parque Nacional Cerro Campana, 2 km N of Hwy 707, cloud forest, elev. c. 850 m, 79°55'W, 8°42'N, 8°43'N, 79°55'W, 31 December 1982, *B.A. Stein & C.W. Hamilton* 1097 (MO); Sendero de Interpretación, 1 km al este del campamento de los guardabosques de INRENARE, bosque húmedo tropical premontano, 08°40'N, 79°55'W, 800–900 m, 15 April 1994, *M.D. Correria A. & E. Montenegro* 9436 (MO); Waimea 86216, El Llano–Cartí Road, 10 km, *T.B. Croat* 76169 (MO); Cerro Campana, 30 September 1967, *R.L. Dressler* 3044 (MO); Cerro Campana cloud forest, 8 August 1970, *J.L. Luteyn & H. Kennedy* 1832 (DUKE, MO); Near top of Cerro Campana above Florida State cabin, 3 September 1972, *A.H. Gentry* 5787 (MO); Trail to top of Cerro Pelado, 1000

m, 16 June 1979, *Thomas M. Antonio 1092* (MO); Along trail to top of Cerro Campana, 13 October 1974, *S. Mori & J. Kallunki 2492* (MO); Cerro Campana cloud forest, 850 m, 6 June 1973, *J.L. Luteyn 3984* (DUKE); Cerro Campana cloud forest, along trail to summit, lowland cloud forest, 1000 m, 19 June 1972, *J.L. Luteyn 3198* (DUKE); Woods around La Eneida, 1000 m, 5 August 1970, *J.L. Luteyn & H. Kennedy 1763* (DUKE); Cerro Campana, along trail to top, 08°40'N, 079°50'W, 850 m, 26 March 1988, *S.A. Thompson 4597* (MO); Cerro Campana along trail to Summit, 22 June 1972, *T.B. Croat 17171* (MO); La Eneida, region of Cerro Jefe, 8 July 1969, *R.L. Dressler 3647* (MO); El Llano–Cartí highway, 8–10 km north of El Llano, 31 August 1974, *R.L. Dressler 4705* (MO); Cerro Campana, trail leading to cross, cloud forest, 2800–3000 ft, 3 January 1981, *K.J. Sytsma 2940* (MO); Beyond La Eneida, 8 March 1968, *Mireya D. Correa A. 806* (MO); Cerro Campana, lower slopes above FSU cabin, 11 March 1973, *T.B. Croat 22798* (MO); Cerro Campana, trail leading to cross, cloud forest, 2700–2900 ft, 14 February 1981, *K.J. Sytsma 3544* (MO); Cerro Campana, tropical moist forest, trail leading to cross, 08°42'N, 079°55'W, 2700 ft, 18 September 1980, *Kenneth J. Sytsma 1213* (MO); Llano–Cartí Road, 1 mi past sawmill on dirt road, 1200 ft, 29 March 1980, *T. Antonio 3930* (MO); Summit of Cerro Campana, rain forest, 31 March 1969, *D.M. Porter, L.H. Durkee, M.R. Crosby & R.K. Baker 4930* (MO); El Llano–Cartí highway, 12–17 km north of El Llano, 3 January 1974, *Robert L. Dressler 4530* (MO); Middle slopes of Cerro Campana ca 1 mile from Interamerican Highway, 150 m, 15 June 1976, *T.B. Croat 35976* (MO); Primary forest, along El Llano Cartí–Tupile road, 12 mi above Pan-Am Hwy, 200–500 m, 26 March 1973 – 27 March 1973, *R.L. Liesner 1133* (MO); Cerro Campana in forest along trail from 2700 ft. to top (ca 3200 ft), 2 July 1978, *B.E. Hammel 3786* (MO); Area surrounding Rancho Chorro, mountains above Torti Arriba, Canazas mountain chain, 400–700 m, 3 December 1977, *J.P. Folsom, Leo Collins & Gregorio Alonzo 6616* (MO); La Eneida, 760 m, 15 January 1973, *D. Sucre, R.L. Dressler, T. Soderstron & P.I.S. Braga 165547* (K); 15 January 1973, *D. Sucre, R.L. Dressler, T. Soderstron, P.I.S. Braga 9864* (K). **Guna Yala:** caminando por el Río Diablo Antes de llegar a las cascadas del Sitio Sorgog, 9°23'N, 78°34'W, 50–70 m, 9 December 1993, *H. Herrera et al. 1450* (CM, MO, PMA); Comarca de San Blas, Playón Chico, Río Ukupseni, caminando por el Río Ukupseni, desde el campamento Neba Dummat hasta la cascada, 09°15'N, 78°15'W, 50–100 m, 30 octubre 1991, *Heraclio Herrera, Johny Morris y Jimmy Mojica 1031* (MO); Comarca de San Blas, Cordillera de San Blas, límite San Blas/provincia de Panamá, caminando hacia en lado Pacífico de la Cordillera entre el campamento Ilegandi y tributario del Río Piriati, Tierra continental de Playón Chico, 09°13'N, 78°16'W, 50–200 m, 8 noviembre 1991, *Heraclio Herrera, Jimmy Mojica y Johny Morris 1112* (MO); Caminando por el Río Diablo Antes de llegar a las cascadas del Sitio Sorgog, 09°23'N, 78°34'W, 50–70 m, 9 December 1993, *Heraclio Herrera, R. Paredes y B. Obaldia 1450* (MO); El Llano–Cartí Road, km 19.1.9°19'N, 78°55'W, elev. 350 m, tropical wet forest, steep, rocky stream banks, 9°19'N, 78°55'W, 350 m, 4 November 1985, *G. de Nevers, H. Herrera & S. Charnley 6211* (MO); Headwaters of Río Nergala along continental divide, 350 m, 11 January 1985, *G. de Nevers & H. Herrera 4505* (MO); Yar Bired (Cerro San José), continental divide between Cangandi and San José, tropical wet forest. 9°20'N, 79°8'W. elev. 400–500 m, 9°20'N, 79°08'W, 5 February 1986, *G. de Nevers & H. Herrera 6947* (MO); Comarca de San Blas, vecindad del Río Diablo, 8–9 km de la costa, 09°23'N, 78°34'W, 50 m, 10 agosto 1994, *Heraclio Herrera, C. Galdames, E. Montenegro y C. Chung 1730* (GB, MO, PMA, STRI, US); Trail from El Llano to Cartí–Tupile, 200 m, 23 February 1973, *H. Kennedy 2601* (MO);

Continental divide, trail along continental divide, 09°20'N, 078°56'W, 400 m, 23 July 1986, *J.F. McDonagh, B.A. Lewis, N.J. Gumpel & A.J. Plumpton* 330 (BM); Isla de Nargana, vecindad de Yannuadi, tierra firme frente a la Isla de Narganá, a 5 km de la costa, con Bejamin Obaldia y Demetrio Escobar, 9°22'N, 78°35'W, 50–100 m, 23 October 1992, *Herrera, H. et al.* 1237 (MO, PMA); Río Planyon Chico, Campamento agrícola NEBA DUMMAT, caminando por el filo de Suroeste, con Horacio Arosemena, José Grimaldo y Fidel Chiari, 9°15'N, 78°15'W, 90–200 m, 15 October 1993, *Herrera, H. et al.* 1389 (MO, PMA). **Veraguas:** Along the Santa Fé to Calovebora road beyond Escuela Agrícola Alto Piedra, along first major stream ca. 3 mi from fork in the road at the school, 700 m, 1 December 1979, *T.B. Croat* 48996 (MO); Valley of Río Dos Bocas, 11 km from Escuela Agrícola Alto Piedra (above Santa Fé) on road to Calovebora, primary forest along river, 450 m, 30 August 1974, *T.B. Croat* 27498 (MO); Guabal (Río Dos Bocas), about 16 km NW of Santa Fé, 500 m, 15–16 November 1974, *R.L. Dressler* 4782 (MO); Ca. 10 km NW of Santa Fé, on road to Calovebora (Panama Hwy 35), at first branch of Río Santa María, 4 August 1975, *S. Mori & A. Bolten* 7643 (MO); Atlantic slope, Río Concepción to Río Barrera, forest along stream, 200 ft, 16 October 1978, *B.E. Hammel* 5167 (MO); Forest at base of Cerro Tute, 6.5 km outside Santa Fé, 6 May 1977, *J.P. Folsom* 3038 (MO); On Carribean slope above Río Primario Brazo 5 mi NW of Santa Fé, primary forest. 700–1200 m, 18 March 1973 – 19 March 1973, *T.B. Croat* 23199 (MO); Vicinity of Escuela Agrícola Alto Piedra near Santa Fé, 0.3 mi beyond fork in road near the school toward Atlantic coast, near trail to top of Cerro Tute, along stream, 2200–2400 ft, 26 January 1980, *T. Antonio* 3553 (MO). Santa Fé–Río San Luis, vicinity of Santa Fé, along dirt road from Santa Fé to Río San Luis, past Escuela Circolo Alto de Piedra, at Río Segundo Brazo (2nd stream below school on Atlantic Coast), 8°33'N, 81°08'W, 480 m, 28 June 1987, *T.B. Croat* 66893 (MO, SCZ).

Spathiphyllum guadalupense Díaz Jim., **sp. nov.** — Type: MEXICO. Tabasco: Municipio Huimaguillo, Cerro de las Flores, Villa Guadalupe, 1028 m, 17°21'51"N, 93°37'34"W, 06/12/1 P. Díaz Jiménez & A. Javier Castillo 1215 (holotype, UJAT; isotype MO-6355178–6355180).

Diagnosis: The species is characterized by its modest size, petioles sheathed to the geniculum and faintly several-ribbed on the sides, an intact sheath, long geniculum (2.5–5.3 cm long), an oblong-ovate, gradually acuminate, grayish-drying blade which is rounded and weakly decurrent at base, 27–42 primary lateral veins per side, a yellowish green spathe, stipitate oblong spadix with fused tepals, a 3-locular ovary with each locule 2 or 3 ovulate.

Herb to 116 cm tall; understory herb, frequently growing scattered in low densities, stem with internodes short; **petioles** 25–68 cm long, 8–10 mm diam., sheathed to the geniculum, or with a free portion of 16–23 cm, drying light gray-brown, matte, faintly several-ribbed on the sides; **sheath** intact with firm margins; geniculum 2.5–5.3 cm long, drying darker; **blade** oblong-ovate or oblong-elliptic, 45–55 cm long, 24–29.5 cm wide, 1.8–2 times longer than wide, gradually acuminate at apex, rounded and weakly decurrent at base, dark green and semiglossy above, pale green and matte below, drying subcoriaceous, gray and weakly glossy above, grayish brown and semiglossy below; midrib drying deeply sunken and closely ridged, slightly

paler above, triangular, closely ribbed, slightly paler below; **primary lateral veins** 27–42 per side, departing midrib at 50–60° on one side, 60–70° on other side, weakly raised, narrowly rounded to convex, concolorous, barely distinguishable from interprimaries above, bluntly angular, darker below; minor veins densely punctiform-lineate below. INFLORESCENCE erect; peduncle 88–120 cm long; **spathe** elliptic, 20–32 cm long, 11–17 cm wide, 1.85 times longer than wide, yellowish green, drying moderately coriaceous, gray-brown, matte, enshrouding spadix; **spadix** 5.5–16 cm long, 1.8–2.5 cm diam., cream-yellowish, stipe 7–20 mm long, 4–7.5 mm diam., light green to yellowish-green at anthesis; tepals fused except for apical lobes; **pistils** ca. 1 cm long, prominently exserted, sharply pointed, 5–7 mm longer than tepals; ovary 3-locular, 2–3-ovulate. INFRUCTESCENCE with berries 3-locular; seeds 3–4 mm long, 1.4–1.6 mm diam., ellipsoid to narrowly obovoid, purplish brown, semiglossy, sparsely and conspicuously granular. **Figures 107–110.**

Distribution — *Spathiphyllum guadalupense* is endemic to Mexico, known only from the states of Tabasco and Chiapas at 900 to 1028 m.

Comments — *Spathiphyllum guadalupense* is similar to both *S. croatii* and *S. maldonadoanum* but differs from both by having its petioles sheathed to the geniculum and by having blades which are 1.8–2.2 times longer than wide. In contrast, the other two species have the petioles sheathed for only 0.5–0.7 of their length and have leaf blades which are usually 2.5–3.0 times longer than broad (sometimes to only 2 times longer than broad in *S. croatii*).

Etymology — This species is named for the “Ejido Villa de Guadalupe”, in the municipality of Huimanguillo, Tabasco where it was collected.

Paratypes: MEXICO: Chiapas: San Fernando–Maravillas, along dirt road between San Fernando and Maravillas (near Lago Malpaso), 4–66 mi NW of San Fernando, mesic area, in part with steep cliffs, veg. type “selva alta perennifolia”, 16°52′48″N, 93°15′36″W, 840–940 m, 15 February 1987, *T.B. Croat & D.P. Hannon 65001* (ENCB, G, MEXU, MO); Ocozocoautla de Espinosa. Ocozocoautla–Apitpac, 13 miles north of Ocozocoautla on gravel road to Apitpac, near km 21 marker, 16°54′N, 93°27′W, 900 m, 9 July 1977, *T.B. Croat 40630* (MO).

Spathiphyllum hannonii Croat, **sp. nov.** — Type: HONDURAS, Atlantica: vic. of Tela, along trail to dam for municipal water supply of Tela, Lancetilla Botanical Gardens, on road ca. 2 mi WSW of Tela and S of main main hwy, 15°44′48″N, 27°38″W, 50m, 10 February 1987, *T.B. Croat & D. Hannon 64631* (holotype MO-1043461).

Diagnosis: *Spathiphyllum hannonii* is characterized by its petioles being sheathed 0.54–0.62 their length, a sheath with a broad, whitish a somewhat undulated margin, moderately long-acuminate blades acute and weakly attenuate at base, 26–38 primary lateral veins per side,



Figure 107: *Spathiphyllum guadalupense*, Inflorescence. Photo: P. Díaz Jiménez



MISSOURI BOTANICAL GARDEN HERBARIUM



Nº 6355178

Sheet 1 of 3

Spathiphyllum guadalupense
 Diaz.-Jim. 2015
 Det. Tom Croat (MO)

MEXICO
 ARACEAE
Spathiphyllum Cochlearispathum [23]
 T. Croat 2012, 4.2015 Engl.
 Tabasco: Huimanguillo Municipio
 Cerro de las Flores, Villa Guadalupe.
 Selva conservada. ^{TROPICAL} 1028 m
 17°21'51"N 093°37'34"W ^{ESCONDIDO}
 Hierba terrestre de 116 cm de alto.
 Hojas; pecíolos de 25-49 cm de largo,
 ensanado hasta el genículo; genículo de
 4-5.3 cm de largo; lámina oblonga ovada
 de 45-55cm de largo por 24-29.5 cm de
 ancho, verde oscuro semilustroso en el
 haz y verde claro opaco en el envés,
 ápice acuminado, base redondeada.
 06 December 2011
 Pedro Díaz Jiménez & A. Javier Castillo
 1215
 MISSOURI BOTANICAL GARDEN HERBARIUM (MO)
 MISSOURI BOTANICAL GARDEN HERBARIUM (MO)

Figure 108: *Spathiphyllum guadalupense*, Díaz Jiménez, J & A. Javier Castillo 1215 (1) TYPE, Mexico



Figure 109: *Spathiphyllum guadalupense*, Díaz Jiménez, J & A. Javier Castillo 1215 (2), TYPE, Mexico



Figure 110: *Spathiphyllum guadalupense* Díaz Jiménez, J & A. Javier Castillo 1215 (3) TYPE, Mexico

clearly visible interprimary veins, weakly visible minor veins, the inflorescence held slightly above leaves, medium green, broadly lanceolate spathe, sessile, green spadix with sharply protruding pistils.

Terrestrial, to 1 m or more tall, growing along trail in forest near a stream; internodes short 1.7–3 cm diam; **petioles** 66–81 cm long, sheathed 39–46 cm, 0.54–0.62 its length; **sheath** broad, whitish along a broad band along margin 0.5–1 cm wide, the edges somewhat undulated, drying brownish, persisting intact; free part 19–27.3 cm long, subterete, slightly thicker than broad, geniculate, sharply sulcate toward apex; geniculum 4.7–5.5 cm long, slightly paler in life, drying dark brown, clearly demarcated at base; **blades** narrowly ovate-elliptic, 38.5–54 cm long, 13–22.5 cm wide, 2.3–2.9 times longer than wide, 0.64–0.78 times as long as petioles, gradually moderately long-acuminate at apex, acute and weakly attenuate at base, thinly coriaceous, dark green and semiglossy above, moderately paler and matte to weakly glossy beneath, drying dark gray-green and matte above, moderately paler, yellowish green and weakly glossy below; midrib obtusely and deeply sunken, concolorous above, narrowly rounded and paler, matte below; **primary lateral veins** 26–38 per side, arising at 65–70°, quilted-sunken, concolorous above, pleated-raised, concolorous, matte below; interprimary veins clearly visible, sometimes subequalling primaries, usually 1 alternating with primaries; minor veins only weakly visible in life, barely visible when dried, frequently undulated; upper surface drying sparsely and coarsely granular; lower surface finely pale-striate and minutely dark-dotted. INFLORESCENCE held slightly above leaves; peduncle 68–93 cm long, 7 mm diam., pale green, appearing to be dark green-speckled to naked eye, pale speckled on close-up view; **spathe** 25.5–29 cm long, 9.3–9.7 cm wide, 2.7–2.9 times longer than wide, medium green, broadly lanceolate, erect-spreading weakly backwards, acute at apex, oblique and narrowly acute at base, drying dark brown inside, medium dark-broad outside with prominently darker veins, sparsely dark-granular inside, densely dark brown-speckled outside; **spadix** sessile, darker green than spathe, 14.5–15 cm long, 1.3 cm diam. post-anthesis; **pistils** prominently exerted 2.5–3 mm above tepals, acute at apex; stamens emerging just above tepals; anthers white, 1.4 mm long and wide. **Figures 111–113.**

Distribution — *Spathiphyllum hannonii* is known only from the type locality in Honduras near Tela at the Lancetilla Botanical Garden.

Comments — *Spathiphyllum hannonii* is similar to *S. frailescanense* but differs from that species in having a white band along the margin, petiole sheath 19.0–27.3 cm from the geniculum (vs. 3.0–6.5 cm or up to geniculum), blade to 3 times longer than wide (usually approx. 2 times) and acute to weakly attenuate at base (vs. obtuse or rounded at base) and longer spadix (14.5–15.0 vs 5.5–10.2). It can be confused with *S. matudae*, but that species differs in having lanceolate or elliptic-lanceolate, sometimes subovate blades and fewer primary lateral veins per side (20–25 vs 26–38).

Etymology — The species is named in honor of American botanist and horticulturist Dylan Hannon, Curator, Conservatory and Tropical Collections of the Huntington Botanical Garden in California who assisted in collecting the type specimen. Dylan is in charge of the living collection at Huntington and is a member of the Missouri Botanical Garden Aroid Research Group and a noted authority on succulent plants. Formerly he worked at the Missouri



Figure 111: *Spathiphyllum hannonii* Croat, Habit, Croat & Hannon 64631, TYPE, Honduras

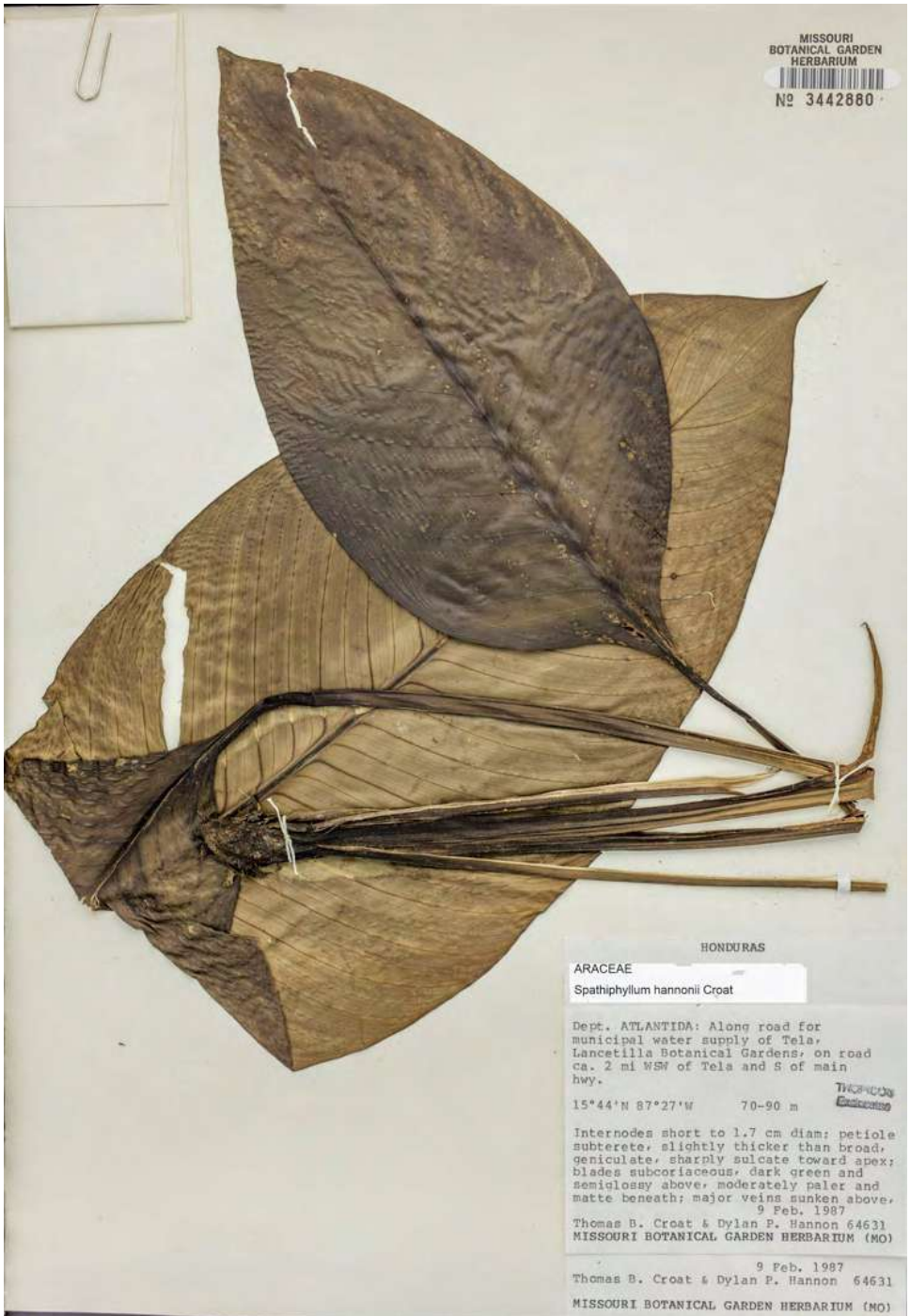


Figure 112: *Spathiphyllum hannonii* Croat, Leaf, Croat & Hannon 64631, TYPE, Honduras

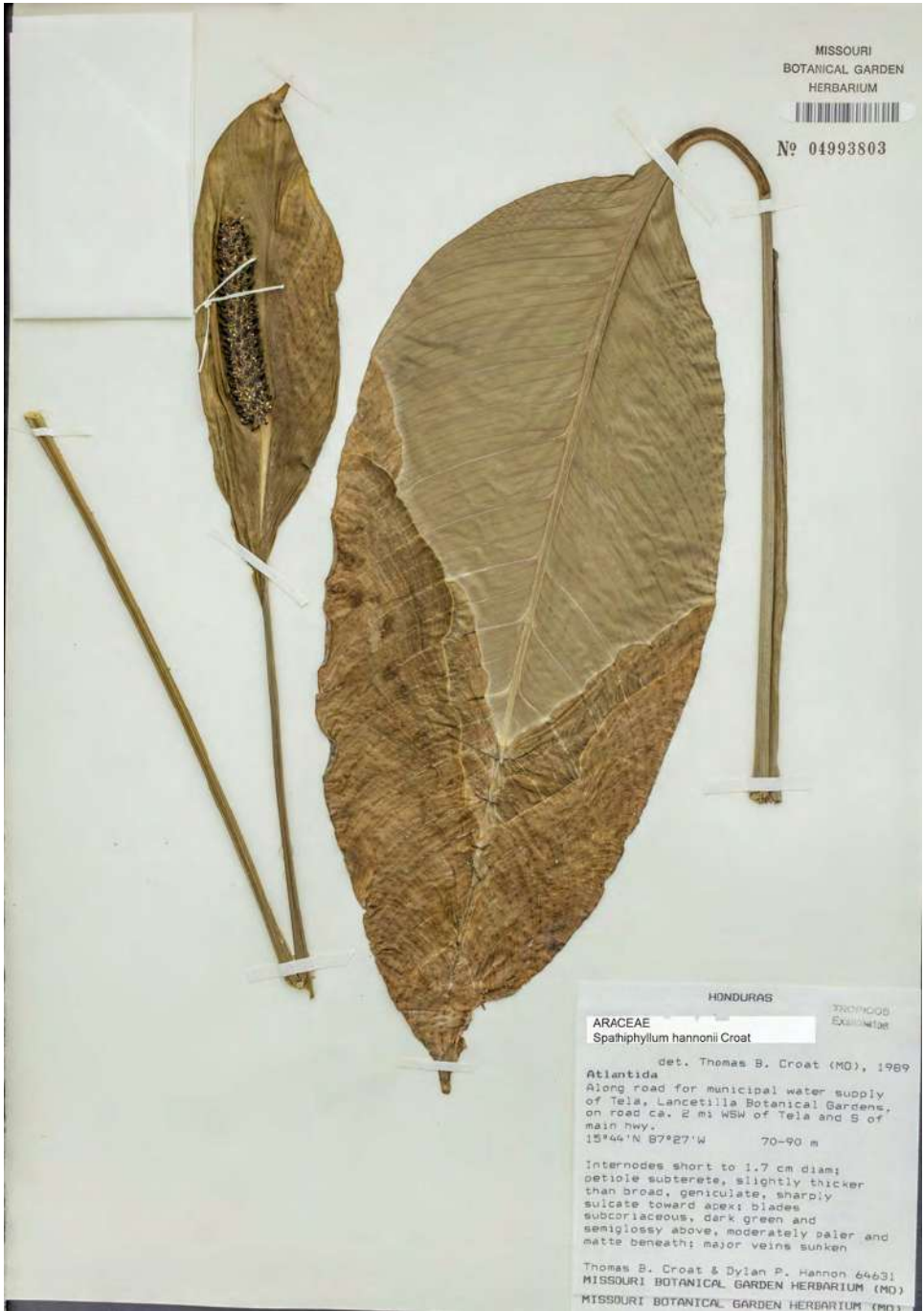


Figure 113: *Spathiphyllum hannonii* Croat, Inflorescence, Croat & Hannon 64631, TYPE, Honduras

Botanical Garden as Research Assistant with the senior author of this paper.

Spathiphyllum hentrichianum Díaz Jim., Taxon, 73(2): 436-446, f. 2A-J. 2024. — Type: MEXICO. Tabasco: Municipio Balancán, Ranchería El Limón, Cascadas de Reforma, 17°45'15"N, 91°19'32"W, 25 m, 19 August 2009, *Pedro Díaz Jiménez & A. M. de la Cruz López 928* (holotype, UJAT-37259, isotype, MO [2 sheets] MO-2356230 & MO-2356231).

Terrestrial understory herb or in open areas, 1.0–1.57 m tall; internodes short, to 3–5 cm diam. LEAVES 93–120, and up to 142 cm long; **petioles** longer than the blade, 52–70 or up to 92 cm long, sheathed 31–65 cm its length, the **sheath** and free portion finely pale-dotted with white, margins entire, inrolled towards the base, light green; geniculum 3–4.5 cm long, 2–4.8 mm diam.; **blades** narrowly oblong-lanceolate or oblong-elliptic, 30–44 (– 50) cm long, 7–13 (–15) cm wide, approx. 3–4 times longer than wide, widest at the middle, often inequilateral (with one side up to 1 cm wider), acuminate at the apex, attenuate or cuneate at base, subcoriaceous, dark-green opaque above, paler to light green below, drying greenish-dark to brown above and greenish-dark lighter to brown and semi-glossy below; midrib sunken, green above, yellowish-green below, weakly dotted with white; **primary lateral veins**, 10–17 per side, separated 0.8–2.5 cm, departing midrib at 40–60°, sunken above, yellowish-green below; minor veins few, visible, dark-green. INFLORESCENCE erect, 30–50 cm above the level of the leaves; peduncle 100–152 cm long, 4 mm diam.; **spathe** cucullate, oblanceolate or elliptic, adnate to 3.5 cm long, decurrent to 3 cm on the peduncle, 12–21 cm long, 5–9 cm wide, narrowly long-acuminate at the apex, bending forward, being almost horizontal, attenuate base, light green to yellowish-green in anthesis; **spadix** cylindric, 4.5–10 cm long, 1.5–1.8 cm diam., creamy-white in anthesis, light green in fruit, sweet and pleasant scent in anthesis, on a stipe 1–1.5 cm long, up to 2.5 mm diam., perianth of 6 free tepals, 1.8–2.1 mm long; 4–5 anthers, 0.4 mm long; **pistils** sharply emergent, elongate-conic to sub-conic, 5–6.7 mm long, style 2.8–3.5 mm long, 1.5–1.7 mm diam. at the middle; ovary 3-locular, 1–2 ovules per locule, 3–5 ovules per ovary. INFRUCTESCENCE to 5–10 cm long; berries obovoid, rostrate, 9–14 mm long, 3.3–5 mm wide, yellowish at maturity; seeds 1–5 per fruit, irregularly oblong-ovoid to ± pyriform, 2.3–3.2 mm long, 1.4–1.8 mm wide, drying dark, surface areolate-granular, sometimes with ridges. **Figures 114–119.**

Distribution — *Spathiphyllum hentrichianum* is endemic to the municipality of Balancán, Tabasco, Mexico, up to 75 m above sea level, from the “Puckté forest” (*Terminalia buceras* (L.) C. Wright, Combretaceae) or riparian vegetation. The type locality corresponds to the ecological reserve Cascadas de Reforma. The species forms large populations on the banks of rivers. It is possible that it also occurs in the other types of vegetation found in the reserve, such as “selva baja perennifolia de tinto” or “acahuales” (areas of secondary vegetation) of different ages (Díaz Jiménez et al., 2024).

Comments — *Spathiphyllum hentrichianum* can be confused with *S. cochlearispathum*, an endemic species from Mexico, but differs from that species in having the petiole not sheathed up to the geniculum (*vs.* sheathed up to the geniculum), leaf blades with fewer basal lateral veins (up to 21 *vs.* up to 31), a fewer number of ovules per locule (1–2 *vs.* 2–6) and ovules per ovary (3–5 *vs.* 6–16).

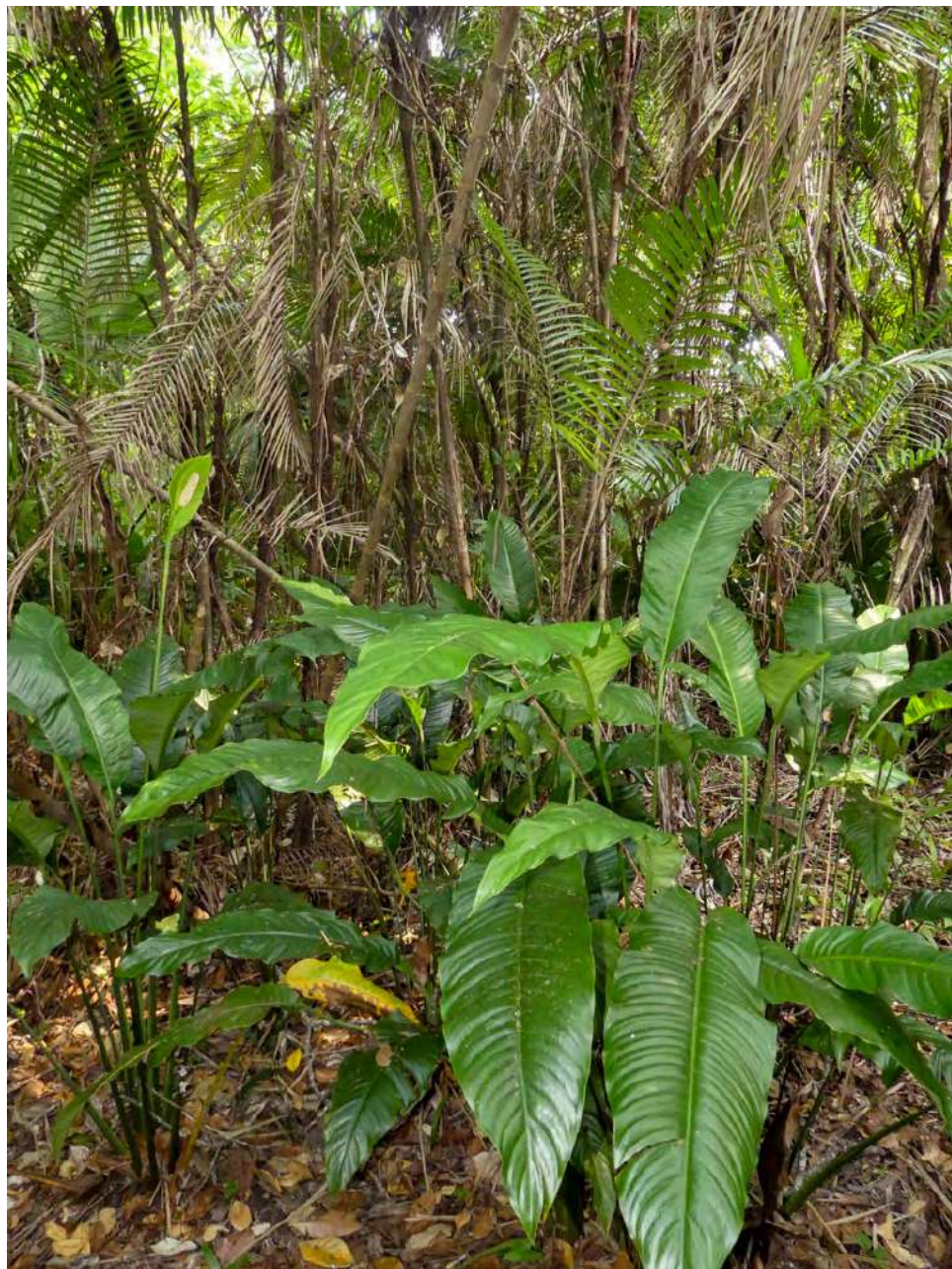


Figure 114: *Spathiphyllum hentricianum*, P. Díaz Jiménez et al. 1798, habit of flowering plant. Photo: Díaz Jiménez



Figure 115: *Spathiphyllum bentrichianum*, Habit of flowering plant. Photo: P. Díaz Jiménez

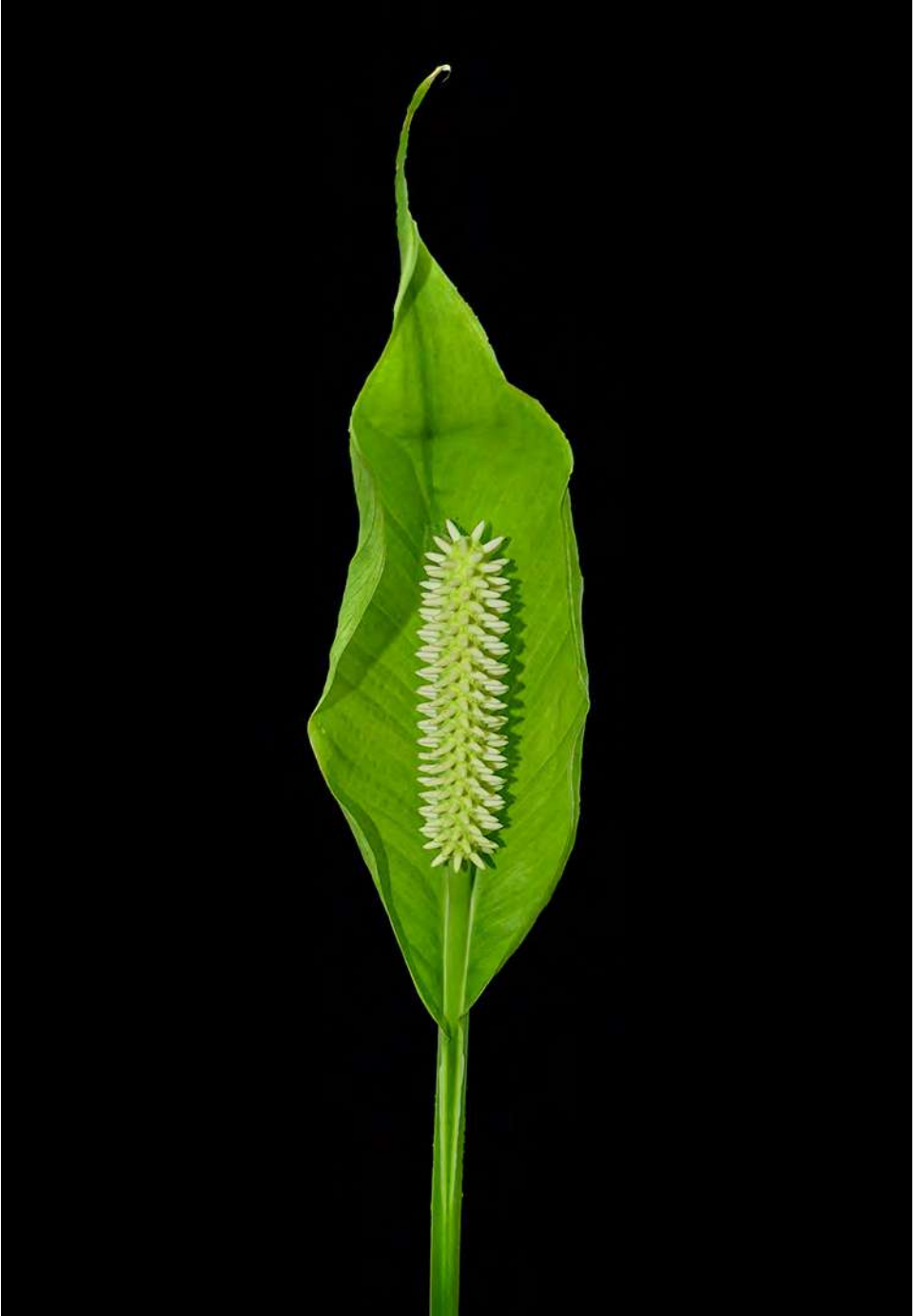


Figure 116: *Spathiphyllum hentrichianum*, Inflorescence face view. Photo: P. Díaz Jiménez



Figure 117: *Spathiphyllum hentricianum*, Inflorescence side view. Photo: P. Díaz Jiménez



Figure 118: *Spathiphyllum hentrichianum*, P. Díaz Jiménez & AM de la Cruz 912 TYPE, Mexico



Figure 119: *Spathiphyllum henrichianum*, P. Díaz Jiménez & AM de la Cruz Lopez 912, TYPE, Mexico

Spathiphyllum hentrichianum might also be confused with *S. matudae* which occurs on the western slope of Mexico as well as in Guatemala and El Salvador at 100–1180(1800) m elevation and differs by having the leaf blades 13–26 cm wide and 1.8–3.7 times longer than wide with the primary lateral veins (14)20–25 per side and departing the midrib at 60–70°. In contrast, *S. hentrichianum* occurs at lower elevations of up to about 30 m and has the leaf blades usually 7–13 cm wide and 3–4 times longer than wide as well as having the primary lateral veins 10–17 per side and departing the midrib at 40–60°.

Additional Specimens Seen: **MEXICO. Tabasco:** Rancho La Ceiba, 32 km al SE de Emiliano Zapata, sobre camino a Tenosique, orilla de arroyo, bosque tropical subperennifolio, perturbación media, 60 m, 5 March 1983, *R. Fernández N. Guadarrama-Zamudio 1380* (MO); Balacán, R/a El Limón colindante a Cascadas de Reforma, 17°45'15"N 091°19'32"W, 25 m, *P. Díaz Jiménez 929* (MO, UJAT); Transecto Provincia–San Miguelito, 17°44'55"N, 91°15'44"W -17°44'57"N, 91°14'51"W, 29 m, 10 August 2014, *C. M. Burelo Ramos, M. A. González Aguilar, S. G. Rodríguez Trinidad & E. E. Córdova Hernández 298* (UJAT); Sobre el río San Pedro, 1 km antes de llegar a las cascadas El Encanto, 17°45'44"N, 91°18'10"W, 27 m, 12 November 2022, *P. Díaz Jiménez & M. E. Sosa 1778* (HEM); Isla Maya, en los límites con la R/a. El Limón, 17°45'27"N, 91°19'33"W, 74 m, 09 February 2023, *P. Díaz Jiménez, M. E. Sosa & Alfredo E. Caballero Abreu 1798* (HEM); Ejido Miguel Hidalgo Sacaolas, 17°38'11"N, 91°08'19"W, 55 m, 09 February 2023, *P. Díaz Jiménez & M. E. Sosa 1802* (HEM). Municipio Comalcalco (cultivated), R/a. Independencia 2da Sección, 18°17'26"N, 93°09'30"W, 8 m, 03 July 2020, *P. Díaz Jiménez 912b* (UJAT).

Spathiphyllum hubertkrusei Croat, **sp. nov.** — Type: MEXICO. Oaxaca: Putla. Putla de Guerrero: Pinotepa Nacional–Tlaxiaco, Along Highway 125 between Pinotepa Nacional and Tlaxiaco, 5.8 mi N of Putla de Guerrero, 17°02'24"N, 97°52'48"W, 1000 m, 17 January 1979, *T.B. Croat 45887* (holotype, MO-386330; isotypes, CAS, CR, HUA, K, MEXU, PMA, US, XAL).

Diagnosis: *Spathiphyllum hubertkrusei* is characterized by its small size, greenish drying vegetation, petioles sheathed about 40 to 90 percent of its length, with the sheath minutely speckled not at all undulate and ending imperceptibly at apex, a long geniculum (5–9 cm long), ovate-lanceolate narrowly and gradually acuminate blades, 11–15 primary lateral veins per side, an inflorescence about as long as the leaves, an elliptic usually light green slightly decurrent spathe and a sessile or stipitate (2–4 mm) spadix with tepals free to the base and the pistils sharply but weakly emergent.

Terrestrial herbs, less than 1 m tall, typically in wet areas or stream banks in full shade in dry areas; stem less than 20 cm long; internodes mostly less than 3 mm long, 2.0–2.5 cm diam., dark green and weakly glossy; petiole scars moderately conspicuous. LEAVES densely clustered, erect-spreading, rosulate; **petioles** 35–46 cm long, sheathed for 0.39–0.90 their length, dark green, semiglossy; **sheath** 16.8–36.0 cm long, minutely speckled, the margin drying gray-green, thin, smooth, not at all undulate, ending imperceptibly and narrowly and very narrowly acute and difficult to discern at apex (rarely rounded and weakly free-ending at apex); free part of petiole oval, 4–49 cm long, 5 mm thick, 3 mm wide; geniculum 5–9 cm long, slightly



Figure 120: *Spathiphyllum huberkrusei*, Habit, *Croat 45887* TYPE, Mexico. Photo in MBG greenhouse by L. Jankowski



Figure 121: *Spathiphyllum huberkrusei*, Inflorescence, *Croat 45887*, TYPE. Mexico



Figure 122: *Spathiphyllum hubertkrusei*, Leaves, Croat 45887, TYPE, Mexico. Photo in MBG greenhouse by L. Jankowski



Figure 123: *Spathiphyllum hubertkrusei*, Croat 45887, Blade abaxial, TYPE, Mexico. Photo in MBG greenhouse by L Jankowski



Figure 124: *Spathiphyllum hubertkrusei*, Hubert Kruse 823, Mexico



Figure 125: *Spathiphyllum hubertkrusei*, Hubert Kruse 823, Mexico



Figure 126: *Spathiphyllum hubertkrusei*, Close-up of Infructescence, *Hubert Kruse 4729*, Mexico



Figure 127: *Spathiphyllum hubertkrusei*, Inflorescence, Hubert Kruse 4729, Mexico



Figure 128: *Spathiphyllum hubertkrusei*, Croat 45887, Mexico



Figure 129: *Spathiphyllum hubertkrusei*, Croat 45887. TYPE, Mexico

whitish spadix.

Etymology — The species is named in honor of Mexican botanist Hubert Kruse who collected the first known collection of the species at Rincón de la Via in Guerrero State.

Paratypes: **MEXICO. Guerrero:** Chilpancingo, Rincon Viejo, 17°17' 40"N, 99°30'0"W, 850m, 17 March, 1964, *Kruse 823, 4729* (UNBIO); San Pedro Cuitlapa, 3.5 km al S. Municipio Metlatonoc, 680 m, *F. Lorea H. 4072* (MEXU). **Oaxaca:** Municipio Villa Corzo, Ejido Sierra Morena, south of Oaxaca and SE of San Cristobal de las Casas, 1150 m, *A. Reyes-García 4805*(MEXU).

Spathiphyllum kalbreyeri G.S.Bunting, Mem. New York Bot. Gard. 10(3): 21, f. 5. 1960. — Type: COLOMBIA. 15 February 1880, *G. Kalbreyer 1413* (holotype, K).

Terrestrial herb, 40–75 cm tall. LEAVES erect, subrosulate; **petioles** 32–43 cm long, sheathed 0.50–0.86 their length, free part (2.5)7.0–26.0 cm long, sulcate; **sheath** (10)16–30 cm long, often somewhat loosened at least near apex, drying finely ribbed, densely granular, often dark-spotted (spot rounded to ellipsoid) but lacking floccose trichomes; free part (3)12–26 cm long, terete; geniculum 1–2 cm long, subterete, drying finely and irregularly ribbed, darker than petiole shaft; **blades** oblong or lanceolate-elliptic, (22)33–40 cm long, (8)9–12 cm wide, 2.2–3.6(4.5) times longer than wide, 0.6–1.4 times as long as petioles, narrowly acuminate at apex, acute at base, dark green and semiglossy above, thinly coriaceous, moderately paler and weakly glossy below, drying dark brown to gray-green and matte above, slightly paler gray-green to yellow-brown below; midrib sunken and marginally discolored above, narrowly rounded and slightly paler below, drying slightly paler to concolorous below; **primary lateral veins** 12–15 per side, departing midrib at 35–45°, weakly sunken above, narrowly raised and slightly paler below. INFLORESCENCE subequalling or greatly exceeding leaves; peduncle 40–69 cm long; **spathe** (9.5)13.5–15.0 cm long, (1.7)2.5–3.0 cm wide, spreading at anthesis, narrowly ovate to oblong-ovate, green outside, white to cream and somewhat veined with green inside, sometimes white on both surfaces with green veins, drying dark brown to greenish, attenuate-acuminate at apex, acute at base; **spadix** 5.0–12.2 cm long, often somewhat curved, greenish or yellowish to olive-green; flowers 3–4(5) visible per spiral; perianth tan to yellow or green; tepals free to base, yellow, the upper margins drying dark brown, narrow, mostly subtriangular; **pistils** obpyramidal, cream-colored, truncate at apex, drying often deeply sunken; stigma weakly protruding; ovary 3-locular, cream. INFRUCTESCENCE with berries white, truncate at apex; seeds 6 per berry, wedged-shaped, (1.2)2.4–3.0 mm long, (0.8)2.0–2.5 mm wide, 0.6–1.4 mm thick, drying light yellow-brown, rounded on outside margin with 3–5 coarse ribs, flattened in inner margin, conspicuously warty or ridged. **Figures 130–134.**

Distribution — *Spathiphyllum kalbreyeri* ranges from Panama to Colombia at 100–1050 m in *Tropical wet forest* and *Premontane wet forest* life zones and less frequently in wetter parts of *Tropical moist forest* life zones.



Figure 130: *Spathiphyllum kalbreyeri*, Habit with inflorescence



Figure 131: *Spathiphyllum kalbreyeri*, Close-up of infructescence



Figure 132: *Spathiphyllum kalbreyeri*, Kalbreyer 1413 TYPE, Colombia



Figure 133: *Spathiphyllum kalbreyeri*, Dressler 4196, Panama



Figure 134: *Spathiphyllum kalbreyeri*, Dressler 3208, Panama

thickened in life but not paler fresh, drying darker but not thickened; **blades** 26–36.7 cm long, (6)8.6–13.2 cm wide, 2.6–3.6 times longer than broad, (0.65)1.0–1.4 times longer than petiole, narrowly and gradually acuminate at apex, narrowly acute at base, dark green and to weakly glossy to matte above, moderately paler and semiglossy below, drying greenish gray to dark green and matte above, greenish to yellowish green and semiglossy to weakly glossy below; midrib obtusely sunken and concolorous above, narrowly and concolorous below, drying concolorous or slightly darker; **primary lateral veins** (9)11–15 per side, departing midrib at an acute angle then spreading at 30–50°, slightly paler and only weakly visible above, paler and weakly raised below, mostly apparent only in lower 2/3; minor veins obscure above, distinct and irregular, minutely granular below on magnification. INFLORESCENCE erect, held about as high as leaves or above leaves; peduncle to 48 cm long; **spathe** 3.8–16 cm long, (1.9)2.6–6.0 cm wide, 2.1–3.6 times longer than broad, elliptic, light green, hooding, persisting erect, narrowly acuminate at apex, acute at base, only slightly decurrent on petiole; **spadix** 3.5–8.0 cm long, 0.9–1.3 cm diam., usually light green (drying dark brown), sessile or stipitate 2–4 mm; tepals free to the base, the apex broadly and obtusely triangular, drying moderately dark brown with a smooth pale margin; stamens held at or slightly below the level of the tepals, drying almost white; anthers 0.8–1.0 mm long and wide; thecae scarcely divaricate; **pistils** sharply but weakly emergent to 2 mm above tepals on dried material; ovules 3(4) per locule (to 11 per ovary), 0.4–0.6 mm long, 1.5 mm diam., attached to funicle at one end with the ovule usually hanging somewhat downward from funicle, the funicle sometimes branched, the ultimate branch 1.3 mm long. INFRUCTESCENCE with immature berries green, seeds up to 8 per berry; young seeds subreniform to oblong, 2.4 mm long x 1 mm. **Figures 120–129.**

Distribution — *Spathiphyllum hubertkrusei* is endemic to Mexico, known for certain only from West Central Oaxaca and in eastern Guerrero at 1000–2150 m in *Tropical dry forest* life zones (Bosque tropical casucifolio (Flores, et al. 1971). Another collection by A. Reyes-García 4805 was made in Oaxaca in Municipio Villa Corzo at the Ejido Sierra Morena, SE of San Cristobal de las Casas, 1150 m. It appears to also be this species but the specimen is reported to have a white spathe. In Oaxaca, the species is known from the region of Putla Gutiérrez at 1000 m and in Guerrero it was collected 2150 m. Note that Francisco Lorrea's label reported this site to be at only 680 m. The area 3.5 km S of Metlatonoc was shown to be 2150 m on Google Earth (2022).

Yet another collection [*H. Kruse* 823 (MEXU, NCU)] from Guerrero at Rincón Viejo (Rincón de la Via), is possibly also this species, but it dried much darker than other specimens and that locality must be reinvestigated to be sure that it is the same species. Hubert Kruse reported that the species he collected inhabits springs on the slopes of a hill and that it forms large populations with leaves to 75 cm tall and inflorescences to 60 cm long with an aromatic, white spadix. In contrast, the type collection of *S. hubertkrusei* has a light greenish spadix and during the many years cultivating the type plant of *S. hubertkrusei* at the Missouri Botanical Garden no strong sweet scent was ever noticed> sweet scent.

Comments — *Spathiphyllum hubertkrusei* has been confused with *S. cochlearispathum* with which it shares a long geniculum but which differs in being a much larger plant with blackish drying blades, more prominent primary lateral veins and a larger spathe and a larger and more

Comments — *Spathiphyllum kalbreyeri* is characterized by its small stature, slender, poorly sheathed, yellowish brown stems, prominently dark-drying geniculum, slender, narrowly acuminate blades with only 12–15 primary lateral veins per side, as well as by the slender, long-acuminate, clasping spathe which is often whitish with green veins on the inner surface and the stipitate, green spadix with prominent, truncate, whitish pistils and a barely protruding style.

Spathiphyllum kalbreyeri is most easily confused with *S. fulvovirens* owing to their similarly drying blade color and general blade shape as well as by similar inflorescences. *Spathiphyllum fulvovirens* differs in being more robust (to 1.25 m), in having substantially larger leaf blades and spathes that are green on both surfaces. Moreover, while the petioles of *S. kalbreyeri* dry densely granular and often have conspicuous dark dots they lack the floccose pubescence on the petiole sheaths that is often present on *S. fulvovirens*.

Additional specimens seen: **COLOMBIA. Antioquia:** Gómez Plata, 10–15 km en la vía Barbosa-Porce-Amalfi, N de Barbosa, en límites con el Municipio de Yolombó a orillas del Río Medellín, 06°40'N, 075°12'W, 1010–1030 m, 4 December 1989, *R. Callejas et al.* 8920 (HUA, MO, NY) San Rafael, Vereda de Quebrada Honda, 4 km en aval de la desembocadura de la Quebrada Churimo en la desembocadura del Río Guatepé, 15 October 1981, *C.I. Orozco et al.* 925 (COL). Tarazá, 7°20'N, 75°20'W, 150 m, 31 enero 2001, *F. Cardona et al.* 1049 (HUA). **Caldas:** La Dorada, Río de la Miel, 1963, *Hutchison* 3194 (US). **Santander:** Magdalena Valley, Sogamoso–Carare Rivers, Amariela Creek, vicinity of Barranca, Magdalena Valley, between Sogamoso and Carare Rivers, 100–500 m, 1 July 1936, *Oscar Haught* 1894 (US). **PANAMA. Canal Area:** Río Paraiso, above East Paraiso, 07 January 1924, *Standley* 29846 (US); Río Pedro Miguel, along the Río Pedro Miguel, Madden Road forest preserve, 2 December 1967, *R.L. Dressler* 3208 (MO, US). **Coclé:** Río Tucué above Tucué, 12 July 1972, *R.L. Dressler* 4196 (MO). **Colón:** Along tributary between Caño Rey and San Lucas, south of Coclé del Norte, 19 August 1972, *R.L. Dressler* 4213 (MO); Río San Lucas, south of Coclé del Norte, 19 August 1972, *R.L. Dressler* 4215 (MO); Donoso, Campamento Botija, camino a Canoa, desde Coclecito, al norte, 11 July 1996, *J. Polanco, A. Zapata, D. Mosquera, & W. Martínez* 1992 (MO). **Guna Yala:** Río Kwadi, about 6 air miles SW of Mulatupu, 100 m, 20 September 1967, *J.A. Duke* 14226 (MO).

Cultivated: UNITED STATES. **Hawaii:** Lyon Arboretum: *T.B. Croat* 73962 (MO).

Spathiphyllum kennedyae Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: hill behind Almirante, first ridge, 16 November 1971, 09°16'36"N 082°23'36"W, *H. Kennedy & R.L. Dressler* 1263 (holotype, F-1787077).

Diagnosis: *Spathiphyllum kennedyae* is characterized by its robust size, dark brown-drying, weakly sheathed petioles, the sheath weakly and narrowly ending at apex, brownish semiglossy-drying, narrowly ovate-elliptic, narrowly acuminate, moderately bicolorous blades with the surfaces drying finely and minutely ridged as well as by the long-pedunculate inflorescence with a broad, oblong-elliptic, narrowly acuminate, bicolorous, green spathe and the massive, green, cylindroid infructescence with small, barely perceptible pistils.

Terrestrial herb, to 1.65 m tall; internodes short, 3 cm diam. LEAVES 189 cm long, erect-



Figure 135: *Spathiphyllum kennedyae*, Kennedy & Dressler 1263, TYPE, Panama



Figure 136: *Spathiphyllum kennedyae*, Kennedy & Dressler 1263 (2), TYPE, Panama

arching; **petioles** 124 cm long, drying dark brown, finely ribbed, densely granular, sheathed to 33 cm, ca. ¼ its length; **sheath** drying darker brown, matte, persisting intact, the sheath to 1 cm high midway; geniculum to perhaps 5 cm long but scarcely apparent; **blades** narrowly ovate-elliptic, 65.5 cm long, 23.5 wide, 2.7 times longer than wide, about half as long as petioles, narrowly and gradually acuminate at apex, subrounded-obtuse and inequilateral at base, slightly decurrent on the petiole, dark green and weakly glossy above, dull gray-green and semiglossy below, drying dark gray-brown and weakly glossy above, moderately paler, grayish yellow-brown and semiglossy below; midrib obtusely and weakly raised and concolorous above, convex, coarsely ribbed and narrowly rounded, concolorous below; **primary lateral veins** ca. 30 per side, departing midrib at 40–50°, narrowly raised and concolorous above, irregularly and narrowly raised, darker below; interprimary veins alternating thick and thin with 1 or 2 pairs of interprimaries between each pair of primary lateral veins, the intervening area tightly ribbed and concolorous above, thicker pale-ribbed throughout below; upper surface minutely granular and sparsely short pale-lineate; lower surface minutely granular, both surfaces lacking any areolate cells. INFLORESCENCE 142 cm long, held among the leaves; peduncle 108 cm long, drying light brown, closely ribbed, densely granular, matte, 3.5 mm diam.; **spathe** 34 cm long, 12 cm wide, dark green outside, pale yellowish green inside, closely veined, the veins thin, dark, frequently branched; **spadix** 15.5 cm long, 3.5 cm diam., stipitate 1 cm, fused to the spathe for 13 cm at base, light yellow-green; **pistils** probably not prominently exerted in living condition, cylindroid, drying to 1 mm diam. INFRUCTESCENCE with berries subovoid; seeds 3.2–3.4 mm long, 2.0–2.4 mm wide, outer surface yellowish brown, purplish spotted, faintly several-ribbed, densely covered with imbedded pale crystals just under surface, inner surface smooth, paler, tan and glossy. **Figures 135 & 136.**

Distribution — *Spathiphyllum kennedyae* is endemic to Panama, known only from the type locality in Bocas del Toro Province at 100–200 m, in a *Premontane wet forest* life zone.

Comments — *Spathiphyllum kennedyae* is seemingly closest to *S. morii* which also has weakly emergent pistils but that species differs by having a shorter stature (to 1.65 m), petioles more prominently winged (sheathed 0.7–0.8 their length) and proportionately longer and smaller (less than 50 cm long), more ovate blades that are more rounded at the base as well as a smaller spathe (less than 27 cm long) that is decurrent 2–3 cm at the base.

Etymology — The species is named for American botanist, Dr. Helen Kennedy who, along with Bob Dressler, collected the type specimen. Helen was a frequent field companion with Dressler while she worked on her Ph.D. thesis at the University of California at Davis and also spent a year during this time as the Curator of Summit Garden while working for the Missouri Botanical Garden at the field station in Panama. Helen is the world's authority on the neotropical Marantaceae.

Spathiphyllum laeve Engl., Bot. Jahrb. Syst. 37: 120. 1905. — Type: COSTA RICA. Puntarenas: Île Cocos, Vallé Gissler, Pacifique, 18 June 1898, *H. Pittier 12370* (holotype, B 10 0247017; isotypes, CR-12370, US-936741).



Figure 137: *Spathiphyllum laeve*, Habit of flowering plant. Photo O. Ortiz



Figure 138: *Spathiphyllum laeve*, Inflorescence. Photo O. Ortiz

February 1983, *Garwood et al. 1153* (BM); Río Sarapiquí, W of San José, across Río Sardinal, 10°29'24"N, 084°03'00"W, 100 m, 4 February 1983, *Garwood et al. 1053* (BM); N base of hills to the S of the Río Sarapiquí, opposite Chilamate, 10°27'00"N, 084°03'36"W, 60–100 m, 1 June 1985, *M.H. Grayum, T. Ray & B. Jacobs 5314* (MO); La Selva Biological Station, 10°26'00"N, 84°01'00"W, 50 m, 30 August 1996, *T.B. Croat 78735* (INB, MBM, MO, TEX, WU, Z); "Starkey's woods," across river from Puerto Viejo, 15 August 1974, *R.L. Dressler 4679* (MO); La Selva, Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 84°00'13"W, 100 m, 2 December 1982, *T. McDowell 1024* (MO); Finca La Selva (field station of the Organization for Tropical Studies), 18 August 1978, *K.F. Grove 18* (MO). **Limón:** Cerro Coronel, E of Río Zapote, along and above new road, 10°39'36"N, 083°39'36"W, 10–100 m, 24 January 1986, *W.D. Stevens 23972* (MO); Cerro Coronel, E of Río Zapote, from E of new road to *Raphia* swamp, within 1 km of Río Colorado, tall evergreen forest and edge of *Raphia* swamp, on gentle to moderate slopes, 10°39'36"N, 083°39'36"W, 10–40 m, 12 March 1987, *W.D. Stevens, G. Herrera & O.M. Montiel 24700* (MO); Fila Matama, PILA buffer zone, 09°49'02"N 083°10'00"W, 1200 m, 28 October 2007, *Monro 5885* (MO); Reserva Biol. Hitoy Cerere Valle de la Estrella, bosque primario, bosque secundario, 09°40'12"N, 083°01'12"W, 100 m, 25 July 1991, *Gerardo Carballo 409A* (MO); Cerro Coronel, E of Río Zapote, along and above new road within 1 km of Río Colorado, tall evergreen forest and edge of *Raphia* swamp on gentle to moderate slopes, collected with O.M. Montiel, 10°39'36"N, 083°39'36"W, 10–40 m, 13–14 September 1986, *W.D. Stevens 24251* (MO); Parque Internac. La Amistad Subiendo por la



Figure 139: *Spathiphyllum laeve*, Habit of flowering plant, Croat 78735,



Figure 140: *Spathiphyllum laeve*, Habit of flowering plant, *Monro 5885*, Costa Rica



Figure 141: *Spathiphyllum laeve*, Inflorescence, Croat 78735, Costa Rica



Figure 142: *Spathiphyllum laeve*, Pittier 12370, TYPE, Costa Rica



Figure 143: *Spathiphyllum laeve*, Dressler 4157, Costa Rica



Figure 144: *Spathiphyllum laeve*, Grayum 3522, Costa Rica

Terrestrial herb, 0.6–1.0 m tall; internodes short to 1.5 cm, to 0.5–3.0 cm diam. LEAVES erect-spreading with **petioles** 20–65 cm long, sheathed in lower ½ to 2/3, medium to dark green, reddish to pinkish brown at base of petioles, semiglossy; sheath 15–39 cm long, 0.8–1.8 times longer than the free part, margin persisting semi-intact, pale red-brown, erect, later scarious; free part 18–38 cm long, more or less terete; geniculum 1.2–2.5 cm long, reddish, sharply flattened-sulcate, drying dark brown; **blades** inequilateral, oblong-elliptic, (15)29–41 cm long, (5.4)8.5–14.0 cm wide, 2.4–3.8 times longer than wide, acuminate at apex, acute at base, marginally undulate, thinly coriaceous, dark green and semiglossy above, moderately paler and weakly glossy below, drying gray-green to dark brown and matte to weakly glossy above, gray-green to dark yellow-brown to grayish green and semiglossy to weakly glossy below; midrib more or less flat and slightly paler above, thicker than broad and paler below; **primary lateral veins** 12–15 per side, departing midrib at 55–65°, quilted to weakly quilted-sunken above, pleated-raised below; minor veins few, distinct. INFLORESCENCE as long as or moderately longer than leaves; peduncle 71–92(103) cm long; **spathe** 16–20 cm long, (2.1)2.7–3.8(–5.0) cm wide, oblong, marginally undulate, attenuate-acuminate at apex, acute at base and decurrent on peduncle 0.5–2.4 cm, pale green or greenish yellow, sometimes medium green above, paler below, erect to spreading, the margins rolled under; **spadix** (4.0)8.4–12.0(16.5) cm long, stipitate (0.5)1.0–1.8(3.0) cm; flowers 3 visible per spiral; perianth fused to form a membranous, 4-6-sided cup, yellow-green to pale green to green or olive-green, sometimes cream-colored; **pistils** obpyramidal, apex truncate, only the elevated stigma exceeding the perianth, white; style short; ovary 3-locular, ovules 1 per locule. INFRUCTESCENCE with spadix smooth; berries subcylindric or with a constriction near center, maturing succulent, white with green apex; seeds located above the constriction, maturing with 1 per locule, reniform-rotund in profile, slightly furrowed and foveolate, verrucose on surface. **Figures 137–144.**

Distribution — *Spathiphyllum laeve* ranges from El Salvador and Nicaragua to Costa Rica, Panama and Colombia (Chocó) at 100 to 1200 m (mostly below 200 m) in areas of *Tropical wet forest* and *Premontane wet forest* life zones. In Costa Rica, the species occurs on the entire Caribbean slope and on the Pacific slope in the area of the Osa Peninsula.

Comments — *Spathiphyllum laeve* is characterized by its mediocre size, slender, poorly sheathed, brownish drying petioles with some loosening of the sheath and frequently also with the surface densely covered with appressed stellate scales, the oblong-elliptic, mostly brownish green-drying, short-acuminate leaf blades with weak, moderately close primary lateral veins and acute leaf bases as well as by usually narrow, moderately decurrent, green spathes and especially by the greenish to cream-colored spadices with the tepals fully fused into a distinct ring around the pistils.

Spathiphyllum laeve is probably most easily confused with *S. kalbreyeri* which differs by having petioles that lack appressed-stellate scales, having narrower leaf blades and having tepals that are free from one another, not fused into a ring around the pistil. *Spathiphyllum laeve* is similar to *S. fulvovirens* and also *S. silvicola*. Both of the latter species differ in having glabrous petioles and briefly decurrent spathes.

Additional specimens seen: **COLOMBIA. Chocó:** East side, Serranía del Darién, approached

from Acandi, along Guati River, disturbed forest but with many large trees, 8°30'N, 77°20'W, 200 m, 10 January 1983, *Adrian Juncosa 607* (MO); Trail from Río Tigre base camp up Serranía del Darién W of Unguía, 300–600 m, 17 July 1975, *A.H. Gentry & L.E. Aguirre 15239* (COL, MO); Nuquí, Corregimiento Arusí, Estación Biológica El Amargal, along trail to Arusí, 05°34'15"N, 077°30'00"W, 20–50 m, 19 June 2000, *T.B. Croat & M.M. Mora 83692 (=Mora 311)* (MO, COL); Corregimiento de Arusí, Estación Biológica El Amargal, 05°34'N, 077°30'W, 50 m, July 1998 – September 1998, *M. Marcela Mora 5* (MO). **COSTA RICA**
Alajuela: Reserva Forestal San Ramón, sendero Miramar, 10°12'36"N, 084°36'00"W, 2 November 1986, *Gerardo Herrera Ch, Victor Mora & Daniel Hernández 173* (MO); Reserva Biológica Monteverde San Ramón, Río Peñas Blancas, Quebrada El Murciélago, Campo 3, 10°19'48"N, 084°40'48"W, 1000 m, 7 November 1989, *E. Bello 1480* (MO); Disturbed primary forest on hilltop, ca. 1 km SE of La Balsa de San Ramón, 10°10'N 84°29.5'W 1140–1190 m, 10°09'36"N, 084°29'24"W, 1140–1190 m, 3 February 1986, *M.H. Grayum, A. Carvajal, J. Dickie, A.R. Smith & T. Beliz 6352* (MO); Reserva Monteverde, 13 km South Fortuna, 10°21'00"N, 084°40'48"W, 700–900 m, 20 August 1989, *W. Haber & W. Zuchowski 9349, 9439* (CR, MO); Monteverde Cloud Forest Reserve, Peñas Blancas river valley, Atlantic slope, premontane rain forest, 10°19'48"N, 084°39'36"W, 840 m, 24 July 1986, *W.A. Haber, E. Bello C. & A. Clagget 5430* (MO); Reserva Biológica Monteverde, Río Peñas Blancas, Parcela de los Enanos, 10°18'N, 84°44'W, 850 m, 2 September 1988, *E. Bello 333* (MO); 15 km NW of Arenal by air, 2 km NW of Nuevo Arenal on road to Tilarán, then 3 km NE on road to San Rafael de Guatuso, then 2 km W on road to Finca Cote, primary forest on N side of road, 10°33'36"N, 084°54'00"W, 700 m, 30 April 1983, *R. Liesner, E. Judziewicz & B. Pérez G. 15110* (MO); 15 km WNW of Quesada by air 1 km W of Jabillos, disturbed primary forest. 150–200 m alt. 10°23'N, 84°33'W, 10°22'48"N, 084°33'00"W, 150–200 m, 29 April 1983, *R. Liesner, E. Judziewicz & B. Pérez G. 15163* (MO); Along road between San Ramón and Bajo Rodríguez, vicinity of km 19.5 NW of San Ramón, 10°11'N, 84°30'W, 925 m, 3 September 1996, *T.B. Croat 78840* (INB, MO); Pasturelands at edge of forest, about 17 kilometers north of San Ramón, beyond Los Angeles, 2900 ft, 10 July 1972, *J.L. Luteyn 3375* (MO); Remnant evergreen forest and forest edge in the tropical wet forest formation about 5 km south of Canalete near the Río Zapate and along the new road to Upala, 10°48'N, 085°02'W, 100–200 m, 12 November 1975, *W. Burger & R. Burger 9953* (MO); Primary forest, 2 km NE of La Balsa de San Ramón, 10°11'N, 084°29'W, 900 m, 26 September 1976, *R. W. Lent 3895* (MO); Finca Los Ensayos, ca. 11 mi NW of Zarcero, primary forest and perimeter, 10°15'36"N, 084°27'00"W, 850 m, 15 August 1977, *T.B. Croat 43596* (MO); Reserva Biológica Monteverde, Estación Eladios, 10°18'00"N, 084°42'36"W, 820 m, 2 October 1990, *N. Obando et al. 179* (MO); San Ramón, Cordillera de Tilarán, along road between San Ramón and Bajo Rodríguez, 36–37 km NW of San Ramón, 10°15'N, 84°34'W, 500–515 m, 27 September 1987, *T.B. Croat 68197* (MO). San Ramón, Bosque Eterno De Los Niños, Cordillera de Tilarán, Río Peñas Blancas Campo 3, 10°19'12"N, 084°41'24"W, 900 m, 28 June 1991, *E. Bello & Eladio Cruz 2851* (CR); R.B. Monteverde, Cordillera de Tilarán, Estación Eladios, 10°18'36"N, 084°42'36"W, 820 m, 2 October 1990, *E. Bello 2447* (CR). **Cartago:** Cantón de Turrialba 6 km W of La Suiza on the road to Pacayitas, small wet forest remnant, 09°53'24"N, 083°40'12"W, 1200 m, 8 September 1990, *H. Kennedy & J. Solomon 4630* (MO). **Heredia:** N of Puerto Viejo, 10 km down the road then 7–8 km W in forest, 10°31'12"N, 084°05'24"W, 2 February 1983, *Garwood et al. 845* (BM); N of Puerto Viejo, 12 km to ferry, then 6 km along road, 10°27'00"N, 084°00'00"W, 100 m, 3 February 1983, *Garwood et al. 995, 996* (both BM); S of Puerto Viejo, 2 km S of Magsasay Penal Colony, 10°22'48"N, 084°03'36"W, 200 m, 3

Quebrada Chaho, Croriña, 09°20'24"N, 082°58'48"W, 700 m, 24 July 1989, *Abelardo Chacón 270* (MO); South end of Lomas de Sierpe, NE of terminus of road from Villa Franca, collected with Brian Jacobs, George Schatz and Pam Sleeper, 10°18'36"N, 083°33'36"W, 40 m, 18 July 1984, *M.H. Grayum 3522* (MO); Hills 3 1/2 airline km SW of Barra del Colorado, Premontane wet forest on low hills, 10°39'00"N, 083°40'12"W, 10–120 m, 15 September 1986 – 16 September 1986, *Gerrit Davidse & Gerardo Herrera 31256* (MO); Parque Nacional Tortuguero Estación Agua Fría, aproximadamente 12 km al Noreste, pasando el Río Pueblo Nuevo, sobre las Lomas de Sierpe, bosque primario con pendientes pronunciadas, 10°25'48"N, 083°31'48"W, 80–100 m, 2 March 1988, *Rafael Robles 1673* (CR, MO); Parque Tortuguero Estación Agua Fría, 600 m al sureste de la casa-estación, bosque primario, 10°24'36"N, 083°33'36"W, 40 m, 3 November 1987, *Rafael Robles 1212* (MO); Parque Nacional Tortuguero Estación Agua Fría, 8 km al Sureste, Lomas de Sierpe, bosque primario, 10°27'00"N, 083°33'36"W, 70 m, 3 February 1988, *Rafael Robles 1608* (MO); Parque Tortuguero Estación Agua Fría, de la casa-estación, 600 m sobre el Sendero Real, 1 em al este, aproximadamente, por otro Sendero, bosque primario, 10°24'36"N, 083°33'36"W, 40 m, 4 November 1987, *Rafael Robles 1232* (MO); Parque Nacional Tortuguero Estación Agua Fría, segunda loma aproximadamente 7 km al sureste, Cerros Azules, 10°27'00"N, 083°33'36"W, 70 m, 21 January 1988, *Rafael Robles 1562 & 1568* (both MO); Suretka, 09°34'12"N, 082°56'24"W, 200 m, 18 June 1982, *Gomez, J. 8783* (F); 7 km SW of Bribri, 100–250 m, 4 May 1983, *L.D. Gómez, R. Liesner, & E. Judziewicz 20480* (MO); Hacienda Tapezco-Hacienda La Suerte, 29 air km W of Tortuguero, primary rainforest in an area being selectively logged, area of low hills and mounds, a few small streams, 10°30'N, 083°47'W, 40 m, 15 August 1979, *C. Davidson & J. Donahue 8302* (MO); 3.2 km east of Finca Waldeck (Milla 28), 25 February 1972, *R.L. Dressler, R. Andrews, & H. Kennedy 4157* (MO); 7 km SW of Bribri, 100–250 m, 4 May 1983, *L.D. Gómez 20384* (MO). Pococi, Cuenca del Sarapiquí, Guápiles, Reserva Biológica Bosque Lluvioso, INBio, alrededores de las instalaciones, 10°11'52"N, 083°51'24"W, 500 m, 30 October 1998, *Luis Diego Vargas, Alex. Rodríguez & V.H. Ramírez 239* (MO); Siquirres, forests near river, 1 March 1972, *R.L. Dressler, R. Andrews, & H. Kennedy 4162* (MO). **Puntarenas:** Foothills of the Cordillera de Talamanca, lower montane forest along the Río Bella Vista, NW of Las Alturas, 08°57'00"N, 082°51'00"W, 1450–1600 m, 30 August 1983, *G. Davidse 24251* (MO); Esquinos, 13 October 1982, *B.E. Hammel 10928* (MO); Osa Peninsula, along abandoned "high road" W of Rincón de Osa, 8°42'N, 83°31'W, 200–400 m, 4 March 1985, *T.B. Croat & M.H. Grayum 59840* (MO); Osa, Agua Buena, Rincón, sector del tanque de agua del pueblo, al Norte de BOSCOA, 08°40'48"N, 083°30'36"W, 50–75 m, 3 Sept. 1990, *Carlos Morales 130* (MO); P.N. Isla del Coco, Isla del Coco, Cascada, 05°32'24"N, 087°03'00"W, 1–100 m, 16 June 1994, *Eduardo Lépiz 380* (CR, INB, MO, US); N. Isla del Coco, Isla del Coco, Mirador, 05°32'24"N, 087°03'00"W, 1–100 m, 13 June 1994, *Eduardo Lépiz 352* (CR); Isla del Coco. Parque Nacional Isla del Coco, sendero a Cerro Iglesias, entre la base y la punta de Cerro Pelon, 05°31'48"N, 087°04'12"W, 530 m, 20 June 1997, *A. Rojas 3632* (INB, MO). **EL SALVADOR.** **La Libertad:** Antiguo Cuscatlán, JBLL zona 31, 13°49'N, 089°56'W, 23 October 1995, *Edy A. Montalvo 6391* (LAGU, MO). **NICARAGUA. Río San Juan:** Orillas del Río Santa Cruz, afluente del Río San Juan; 11°02'N, 84°24'W, elev. aprox. 42 m, 11°02'N, 84°24'W, 42 m, 22 March 1985, *Pedro P. Moreno 25548* (MO); Reserva Indio-Maíz, Municipio de el Castillo, a 5 km de la cabecera del Río Bartola, en dirección hacia el Cerro el Diablo, 11°01'N, 084°14'W, 100 m, 2 enero 1997, *Ricardo Rueda, Indiana Coronado, Oscar Aráuz & Franklin Flores 5237* (HNMN); "Los Filos" near Loma Los Filos, Río Santa Cruz, recently logged lowland moist

forest on clay soils, 11°08'N, 084°20'W, 6 September 1993, *Salick 8121* (MO); Municipio el Castillo, Reserva Indio-Maíz, Cerro Bolivar, 10°51'N, 084°10'W, 150–280 m, 29 noviembre 1998, *Ricardo Rueda, Franklin Flores, Walter Velásquez y Oscar Caballero 9234* (HNMN); Municipio el Castillo, Reserva Indio-Maíz; Cerro el Diablo, 11°01'N, 084°13'W, 100–200 m, 7 diciembre 1998, *Ricardo Rueda, Indiana Coronado, Franklin Flores, Walter Velásquez y Oscar Caballero 9481* (MO). **Rivas:** Slopes of Volcán Maderas above coffee plantations above Balgüe, Isla de Ometepe, cloud forest–rain forest, 11°28'N, 085°31'W, 600–800 m, 14 September 1983, *M. Nee & W. Robleto T. 28073* (MO); Isla Ometepe–Volcán Maderas, bosque muy humedo, 11°27'N, 85°29'W, 900–1200 m, 5 June 1985, *Walter Robleto 2118* (MO). **Zelaya:** Along Río Sucio, ca. 0.5 km E of first suspension bridge E of Bonanza, gravel bars and gallery forest, 14°01'N, 84°34'W, 140 m, 24 April 1978, *W.D. Stevens 8045* (MO); Reserva Bosawas, Municipio de Bonanza, Cerro Cola Blanca, 14°06'N, 084°31'W, 700–880 m, 2 June 1997, *Ricardo Rueda & Indiana Coronado 6521* (MO); 7 km W of Bonanza [Seymour series], 14°00'N, 084°38'W, 260 m, 7 January 1974, *J.T. Atwood et al. 6993* (MO). **PANAMA.** **Chiriquí:** Slope NW of confluence of Río Hornito and Río Chiriquí, cloud forest, 08°44'00"N, 082°13'00"W, 1050–1100 m, 11 November 1980, *W.D. Stevens 18313* (MO); Along the road to the Fortuna Dam site, N of Gualaca, 22.7 mi beyond the bridge over the Río Estí, 11.8 mi N of Los Planes de Hornito, 10.7 mi N of jct. to tunnel, 1400 m, 26 November 1979, *T.B. Croat 48666* (MO); Camp Hornito, Fortuna dam site, camino a Finca Landau, 08°44'N, 082°18'W, 1000–1200 m, 13 August 1976, *R.L. Dressler 5353* (MO, US). **Coclé:** Vicinity el Valle de Antón, at forested flat area near Finca Macarenita at La Mesa, 08°36'N, 80°07'W, 800 m, 6 July 1994, *T.B. Croat & Guanghua Zhu 76668* (MEXU, MO); Vicinity El Valle de Antón, La Mesa, base of Cerro Gatital, 5 mi N of turn-off to La Mesa in El Valle, 08°37'N 080°08'W, 860 m, 7 July 1994, *T.B. Croat & Guanghua Zhu 76700a* (MO); Cloud forest, Cerro Pilon, El Valle, 3000 ft, 04 January 1968, *J.A. Duke 14973* (MO); Foothills and summit of Cerro Caracoral, near La Mesa, N. of El Valle de Anton, cloud forest and elfin forest, 800–1100 m, 10 September 1981, *S. Knapp 1074* (MO); Along the trail from Continental Divide near the sawmill above El Copé to Río Blanco del Norte, premontane wet forest, 08°40'N, 080°36'W, 350–700 m, 20 February 1982, *S. Knapp, J. Mallet & R. Dressler 3648* (MO); Between Continental Divide above El Copé and El Petroso sawmill and the Río Blanco to the north, a 5 hour hike, 08°38'N, 080°36'W, 900 ft, 13 December 1980, *K. Sytsma, W. Hahn, & T. Antonio 2421* (MO); La Mesa, 4 km N of El Valle, 875 m, tropical wet forest, 12 February 1974, *M. Nee & M. Hale 9631* (MO); La Mesa, El Valle de Antón Region, at La Mesa, 3.2 mi above El Valle, small patch of cloud forest on flat area, 0.1 km E of Finca Macarenita, 08°36'N, 80°07'W, 775 m, 25 March 1993, *T.B. Croat 74798* (MO). **Darién:** Río Cocalito, high forest on steep hillside, 15 February 1982, *C. Whitefoord & A. Eddy 199* (MO); Pirre, Cerro Pirre–Rancho Frío, Parque Nacional Darién, caminando entre Campamento Rancho Frío No. 2 hacia la cima de Cerro Pirre, 08°00'N, 77°45'W, 700–1000 m, 7 February 1991, *Heraclio Herrera, L. Rojas y N. Bristán Jr. 871* (MO). **Panamá:** Cerro Campana, ca. 10 km SW of Capira, tropical wet forest (cloud forest), on trail to summit, 870–1000 m, 7 December 1974, *S. Mori & J. Kallunki 3573* (MO); Cerro Campana, moist forest on steep slope near FSU building, 10 September 1970, *T.B. Croat 12160* (MO); Cerro Campana, along trail to summit, 780–875 m, 20 July 1974, *T.B. Croat 25201* (MO); Cerro Campana, 25 October 1968, *N.H. Williams s.n.* (MO); Cerro Campana, cloud forest, 26 July 1969, *R.L. Dressler 3693* (MO); Cerro Campana, N slope, 850 m, 15 September 1974, *S. Mori, J. Kallunki, R.L. Dressler, & P.J. Maas 1918* (MO); 5–9 mi N of Pan-American Highway on El Llano–Cartí Road, 09°15'N, 078°59'W, 200–250 m, 30 March 1988, *S.A. Thompson 4645* (MO). **Guna Yala:** El Llano–

Cartí Road, 17.4 km from Interamerican Hwy, 9°19'N, 78°55'W, elev. 325 m, 9°19'N, 78°55'W, 325 m, 27 August 1984, *G. de Nevers 3776* (MO, NY). **Veraguas:** Vicinity of Escuela Agricultura, Alto Piedra near Santa Fé, 0.3 mi beyond the fork in the road near the school, toward Atlantic slope along trail to top of Cerro Tute, 3200–3400 ft, 26 January 1980, *T. Antonio 3489* (MO); Traditional campsite, 1 km past Agricultural School, forested slope to the rear, 1000–1200 m, 5 February 1977, *J.P. Folsom & L. Collins 1622* (MO); Valley of Río Dos Bocas along road between Escuela Agrícola Alto Piedra and Calovebora, 15.6 km northwest of Santa Fé, primary forest; along trail to Santa Fé, steep forested hill east of river, 450–550 m, 31 August 1974, *T.B. Croat 27578* (MO); Ca. 15 km NW of Santa Fé, on road to Calovebora (Panama Hwy. 35), near continental divide, 5 August 1975, *S. Mori & A. Bolten 7671* (MO); Vicinity of Continental Divide, third branch of Río Santa María to drop-off to lowlands, 12–15 km NW of Santa Fé, 650–750 m, 16–17 November 1974, *R.L. Dressler 4822* (MO).

Cultivated: UNITED STATES. **Missouri:** Saint Louis City, Missouri Botanical Garden, in Research Greenhouses on Garden grounds, cultivated collection, 38°36'N, 090°15'W, 160 m, 29 June 1999, *H.H. Schmidt 3628* (MO).

Spathiphyllum luteynii Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Panamá: Donoso, Minera Panamá copper-mining concession, slopes and ridges in drainage of Quebrada Brazo. 08°48'38"N 080°38'18"W, 243 m, 30 August 2014, *M.H. Grayum, G.McPherson, Christel Ramos, Irving Vergara-Pérez & Luis Rojas 13244* (holotype, MO-6636356; isotype, PMA).

Diagnosis: *Spathiphyllum luteynii* is characterized by its modest size, petioles sheathed to near or above the middle, a terete free portion, oblanceolate to oblanceolate-elliptic, prominently veined, narrowly acuminate blades which are attenuate at the base, closely spaced prominently ascending primary lateral veins with prominent interprimary veins as well as by the green, prominently decurrent, narrowly elliptic spathe and prominently long-stipitate, green, cylindroid spadix with free tepals.

Terrestrial herb to 75 cm tall; internodes short, 2–3 cm diam.; cataphylls 7–12 cm long, persisting intact or as fibers. LEAVES semi-erect, 38–76 cm long; **petioles** 11–37 cm long, 1.3–1.9 times longer than peduncle, matte, sheathed 0.45–0.82 its length; sheath 9–25 cm, persisting mostly intact, concolorous; free part 7–27 cm long, terete, sometimes weakly ribbed; **blades** obovate-elliptic to broadly oblanceolate, 25.5–53.5 cm long, 7–18 cm wide, broadest above middle, 2.8–3.8 times longer than broad, 1.1–2.7 times longer than petioles, gradually acuminate at apex, narrowly acute at base, matte, moderately bicolorous, drying dark gray-brown to dark brown and matte above, yellow-brown to gray-brown and semiglossy below, inequilateral, one side 6–11 mm wider; midrib drying broadly convex, conspicuously pale-dotted above, thicker than broad, drying finely ridged, densely and minutely granular below; **primary lateral veins** 15–30 per side, closely spaced, mostly less than 1 cm apart, departing midrib at a steep angle, then spreading at 25–30°, deeply impressed above, with interprimary veins almost as prominent, sometimes with 1 or 2 interprimary veins branching from near the base; upper surface smooth; lower surface finely ribbed, pale-speckled. INFLORESCENCE erect; peduncle 24–57 cm long; **spathe** green, narrowly elliptic, 13.5–21.5 cm long, 3.1–8.5



Figure 145: *Spathiphyllum luteynii*, Habit of flowering plant, Escudo de Veraguas Island, Caribbean coast, Panama. Photo: O. Ortiz

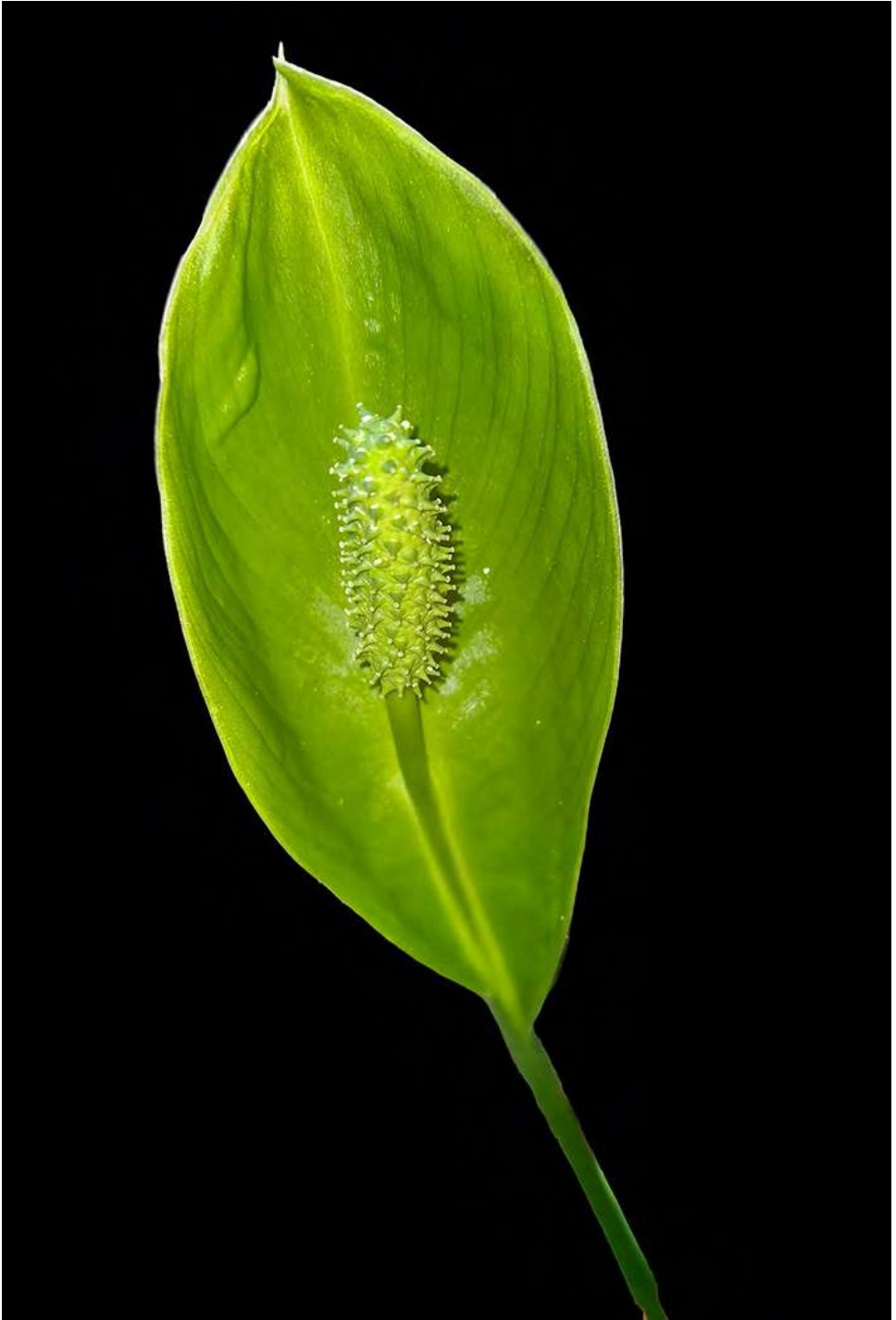


Figure 146: *Spathiphyllum luteynii*. Inflorescence, Escudo de Veraguas Island, Caribbean coast, Panama. Photo: O. Ortiz



Figure 147: *Spathiphyllum luteynii*, Systsma 2908, Panama



Figure 148: *Spathiphyllum luteynii*, Dressler 5647, Panama



Figure 149: *Spathiphyllum luteyui*, Grayum 13244, TYPE, Panama.

cm wide, prominently decurrent (3.3)4–6(8) cm below the point of fusion to the peduncle; **spadix** 4.6–8.6 cm long, 8–12 (20) mm diam., stipitate 1.0–3.7 cm, matte, green, cylindroid; flowers 6–7 visible per spiral, 3–4 mm long and broad; tepals free, matte, minutely granular; lateral tepals 1.3–1.5 mm wide, inner margin straight to concave, outer margin 3-sided; **pistils** 3 mm long with a prominently exerted, slender style 1–2 mm long; ovary 3-locular; ovules 1 per locule; ovules 1.2–2.0 mm long, 0.6–0.8 mm diam.; stamens 1 mm long, 0.5 mm wide, thecae oblong, parallel; pollen white. INFRUCTESCENCE 5–6 cm long, 2.5–3.5 cm diam. on drying; seeds 3–5 per berry, 2.6–2.7 mm long, 1.4–2.0 mm diam., drying brownish with prominent pale circular cellular inclusions. **Figures 145–149.**

Distribution — *Spathiphyllum luteynii* is endemic to Panama, known only from Coclé and Panamá Provincese at 100–792 m in *Premontane wet* and *Tropical wet forest* life zones.

Comments — *Spathiphyllum luteynii* is most similar to *S. dressleri* but that species differs by having usually smaller (usually less than 20 cm long), ovate-elliptic, paler-drying leaves with many fewer primary lateral veins (fewer than 15 per side), a more ovate spathe (less than 13 cm long) and a proportionately broader spadix (1.5–2.2 cm long, 8–10 mm diam.). In the Central American *Spathiphyllum* key in this paper, the species is close to *S. almirantense* from Bocas del Toro at 200 m elevation which differs by having elliptic leaf blades which dry gray. In contrast, *Spathiphyllum luteynii* has obovate-elliptic to broadly oblanceolate leaf blades which dry dark gray-brown to dark brown above and yellow-brown below.

Etymology — The epithet honors American botanist James Luteyn, a graduate of Duke University who spent his career at the New York Botanical Garden. Jim had a strong interest in Araceae and collected many new species while still a graduate student. His major work was with Ericaceae where he became the dominant neotropical specialist in the family. He is now living in retirement on Beaver Island in Lake Michigan.

Paratypes: **PANAMA. Bocas del Toro:** Changuinola. Bosque Protector Palo Seco. Charco La Pava. Comunidad de Guayacán., 09°09'31"N 082°30'35"W, 424 m, 04 February 2014, *Orlando Ortiz 2107* (PMA); **Chiriquí:** Volcán. Vivero de Carla Black. Planta cultivada de origen desconocido., 12 March 2016, *Orlando Ortiz 2610* (PMA); **Coclé:** La Mesa above El Valle; 6 km from El Valle main road along La Mesa., 08°37'30"N 080°08'30"W, 27 Sep 1977, *James P. Folsom & Dr. Raul 5647* (MO); Cerro Gaitel above El Valle. Near end of dirt road., 08°22'12"N 080°04'12"W, 1100 m, 24 July 1983, *James S. Miller, Leslie Miller, Clem W. Hamilton & Karen Krager 798* (MO); El Valle de Anton. Monumento Natural Cerro Gaital., 08°37'30"N 080°07'00"W, 11 mayo 2013, *Orlando Ortiz 1317* (MO, PMA); Slopes of Cerro Gaital, north of El Valle de Antón., 08°37'N 080°08'W, 22 Dec 1976, *Robert L. Dressler 5539* (MO); North of El Copé on trail to San Juan del Turbe, on Atlantic slope., 08°41'48"N 080°36'24"W - 08°42'24"N 080°36'25"W, 500 - 600 m, 1 May 1977, *Robert L. Dressler 5647* (MO); Vicinity of El Valle de Antón; at La Mesa, 0.2 mi from jct. of Finca Macarenitas and Finca Adela at Finca Gabriella, along water lines to reservoir., 08°38'N 080°09'W, 7 July 1994, *Thomas B. Croat & Guang Hua Zhu 76744A* (MO, NY); **Colón:** Eastern Access Road, Plant Site., 08°50'46"N 080°37'55"W, 175 m, 22 noviembre 2014, *Christel Ramos, Santamaria & Gonzáles, E. 401* (MO); Donoso. Coclé del Norte, area del helipad T02A, caminando hacia la ruta norte., 08°54'00"N 080°40'44"W, 17 julio 2012, *Alex*

per locule, 6–11 ovules per ovary. INFRUCTESCENCE 18–21 cm long, 2.7–3.3 cm diam.; berries obovoid to oblong, rostrate, 10–17 mm long, 3.3–6 mm wide, yellowish at maturity; seeds oblong, obovoid or oblique-ovoid, 2.3–3.8 mm long, light brown or dark brown and glossy when fresh. **Figures 150–155.**

Distribution — *Spathiphyllum maldonadoanum* is endemic to Mexico, known only from the Sierra region of the state of Tabasco. It grows mainly as an understory species in evergreen tropical forests, sometimes on riverbanks, often scattered or in small populations of few individuals, between 40 and 800 m. Due to its proximity to the northern highlands of Chiapas, *S. maldonadoanum* may be also present in the state of Chiapas.

Comments — *Spathiphyllum maldonadoanum* can be confused with *S. cochlearispathum*, but it differs from that species in having the petiole longer than the blades and not sheathed up to the geniculum (*vs.* as long as the blade and sheathed near or up to the geniculum), its blades are almost twice as wide and the blade with up to 47 primary veins per side (*vs.* less than 40), pistils up to 15 mm long (*vs.* less than 10 mm) and up to 11 ovules per ovary (*vs.* up to 16). All specimens collected in the type locality of *S. maldonadoanum* and its surroundings, Sierra del Madrigal between Teapa–Tacotalpa, were mistakenly determined and for a long time reported as *S. cochlearispathum* (Pérez *et al.* 2005; Díaz Jiménez 2006; Díaz Jiménez *et al.* 2015).

Flowering occurs in February and March, and from June to September. From the early hours of the morning, the spadices of *S. maldonadoanum* emit a strong and pleasant floral scent, sometimes perceptible several meters away. In the afternoon, the scent is less intense. In the morning, when the scent is most intense, the spadices of *S. maldonadoanum* are visited by male euglossine bees (*Euglossa* sp.; and stingless bees (*Plebeia* sp.) (Díaz Jiménez *et al.*, 2022)

MEXICO. Tabasco: Mun. Tacotalpa, ejido Lázaro Cárdenas, 12 May 80, *C. Cowan* 2989 (CSAT); 0.2 km abajo (NW) de, y antes de entrar a Tapijulapa, hasta 0.5 km arriba del camino por el arroyo a pie, 17°28'N, 92°46'W, 43 m, 30 May 1982, *C.P. Cowan et al.* 3531 (CSAT); A 1 km al NE del ejido Xicotencatl, ladera exposición W. Sierra Poaná, 22 May 1985, *E.S. López-Hernández* 153 (UJAT); A 3 km después de Tapijulapa por el camino a la Provincia, 28 June 1985, *E.S. López-Hernández* 273 (UJAT); Selva cuesta chica, 10 June 2004, *N.H. García* 19 (UJAT); Ejido Agua Blanca, 31 March 2004, *N.H. García & S.G. Ramírez* H. 31 (UJAT); Tacotalpa, R/a. Madrigal 5ta., Sierra el Madrigal, 17°30'N, 92°49'W, 200 m, 23 March 2009, *P. Díaz Jiménez & A.M. de la Cruz López* 726 (MO, UJAT); ejido Pomoquita, 17°22'N, 92°43'W, 109 m, 05 June 2021, *P. Díaz Jiménez & P.A. Aguilar-Rodríguez* 1582 (UJAT); Ejido Pomoquita, 17°22'N, 92°43'W, 109 m, 23 July 2021, *P. Díaz Jiménez* 1586 (UJAT); Mun. Teapa, parte W del cerro El Madrigal, 16 May 1981, *G. Ramos et al.* 699 (UJAT); A 2 km del ejido Sta. Rosa hacia el ejido Lázaro Cárdenas, 17°32'N, 92°08'W, 40–50 m, 25 February 1983, *M.A. Magaña et al.* 1020 (CSAT, MO, UJAT); Cerro del Madrigal, arriba del Centro Puyacatengo, Chapingo, al lado del Río Puyacatengo, 3 km de la carretera Teapa–Tacotalpa, 17°31'N, 92°55'W, 330 m, 18 June 1983, *C.P. Cowan et al.* 3968 (MO); 7 km SE of Teapa on road to Tacotalpa, Rancho San Eneas, Sierra el Madrigal, 17°35'N, 92°50'W, 70 m, 30 September 1986, *B.E. Hammel & M. Merello* 15522 (MO); Vicinity of Teapa, along road between Teapa and Tacotalpa, 3.1 m; E of Teapa, ca. 0.25 miles S of Highway, 17°33'N,

Espinosa 6003 (MO, PMA); Cocle del Norte, area del helipad C22, tomando la ruta norte., 08°50'21"N 080°45'35"W, 108 m, 23 julio 2012, *Álex Espinosa 6041* (MO, PMAMPSA Concesion. Valle Grande. Sierra 19. (UTM 534653, 976261) Collected with: J. De Gracia, J. Martínez, H. Quiel, & M. Merello, 08°49'54"N 080°41'05"W, 291 m, 17 May 2012, *Barry E. Hammel 26234* (MO); Donoso. Construcción Campamento Santa Fé., 09 November 2012, *Juan F. Carrión 888* (PMA); Area de Concesion Minera Panama. Coastal Road. Km 16. Coordenadas en UTM: 0537499 0985005., 08°54'39"N 080°39'32"W, 108 m, 30 junio 2013, *Orlando Ortiz 1353* (MO, PMA); Afueras del area de la concesion de Minera Panama. Al Norte del Helipad C13., 08°48'15"N 080°47'16"W, 46 m, 26 agosto 2012, *Orlando Ortiz 840* (MO, PMA); Area fuera de la concesion de Minera Panama. Helipad C10. Area del Rio Belencillo., 08°48'26"N 080°43'08"W, 102 m, 28 agosto 2012, *Orlando Ortiz 873* (MO, PMA); **Panamá:** Capira. Cerro Campana cloud forest., 08°41'N 079°54'W, 600 m, 8 Aug 1970, *James L. Luteyn & Helen Kennedy 1828* (DUKE, MO); Cerro Campana, trail leading to cross., 08°41'N 079°55'W, 2600 ft, 03 January 1981, *Kenneth J. Sytsma 2908* (MO); Cerro Campana, trail to summit, 08°41'21"N 079°54'54"W, 600 m, 31 Aug 1975, *Robert L. Dressler 5140* (MO); Cerro Campana, 08°41'21"N 079°54'54"W, 600 m, 26 July 1969, *Robert L. Dressler 3695* (MO).

Spathiphyllum maldonodanum Díaz Jim., Phytotaxa 566(1): 123-126, f. 2A-E, 3A, B. 2022. — Type: MEXICO. Tabasco: Municipio Teapa, Sierra el Madrigal, San José Puyacatengo, 17°31'N, 92°55'W, 188 m, 13 August 2008, *Pedro Díaz Jiménez 604* (holotype UJAT).

Terrestrial; understory herb, to 2.3 m tall frequently growing scattered in low densities; internodes short, to 5.0 cm diam. LEAVES 166–250 cm long; **petioles** up to as long as the blade, 65–148 cm long, 8–10 mm diam., sheathed near the middle, or above to 11.5–60.0 cm from the geniculum, free portion terete, the **sheath** and free portion pale green and covered in white dots, sheath margins strongly wrinkled with a white edge up to 5 mm wide, straight or wavy, sometimes inrolled, light green; geniculum 3.5–7.5 cm long, 9–12 mm diam., yellowish-green and weakly covered in white dots; **blades** oblong, oblong-ovate or oblong-elliptic, widest at or just below the middle, 52–83 cm long, 22–32.3 cm wide, approx. 2.5–3 times longer than wide, cuspidate at apex, sometimes inrolled apically and forming a thin elongated tip of up to 5 cm, obtuse or rounded at base, subcoriaceous, dark green and glossy above, light green semi-glossy below, drying green to dark brown above, light brown below; midrib sunken and weakly covered in white dots, thicker than broad, dark green and glossy above, and light green to whitish below; **primary lateral veins** 38–47 per side, separated 6.5–25 mm, departing midrib at 60–80°, sunken and dark green above, light green below; minor veins dark green below. INFLORESCENCE erect, equal or taller than the leaves; peduncle 119–170 cm long, 7.2–13 mm diam., covered in white dots, green to light yellowish-green; **spathe** cucullate, oblanceolate or elliptic, 21–44 cm long, 15.3–17.4 cm wide, acuminate to narrowly acuminate apex, subcuneate, attenuate, oblique or sub-rounded at the base, decurrent up to 18 mm at the base, yellowish-green at anthesis, dark green at post-anthesis; **spadix** 10–21 cm long, 2.3–2.8 cm diam., cream-yellowish, emitting a strong and pleasant floral scent at anthesis, stipe 5–15 mm long, 8–10 mm diam., light green to yellowish-green at anthesis, dark green at post-anthesis; flowers with 6 free tepals, 2.2–3 mm long; up to 6 anthers, 1.8–2.1 mm long; stamens with thecae oblong, 1–1.5 mm long; **pistils** sharply emergent, elongate-conic, 5–15 mm long, style 4.6–5.5 mm long, 1.5–2 mm diam. at the base; ovary 3-locular, 3–5 ovules



Figure 150: *Spathiphyllum maldonodanum*, Habit of flowering plant. Photo: P. Díaz Jiménez



Figure 151: *Spathiphyllum maldonodanum*, Inflorescence. Photo: P. Díaz Jiménez



Figure 152: *Spathiphyllum maldonodanum*, Habit of flowering plant, P. Díaz Jiménez 562, Mexico. Photo: P. Díaz Jiménez

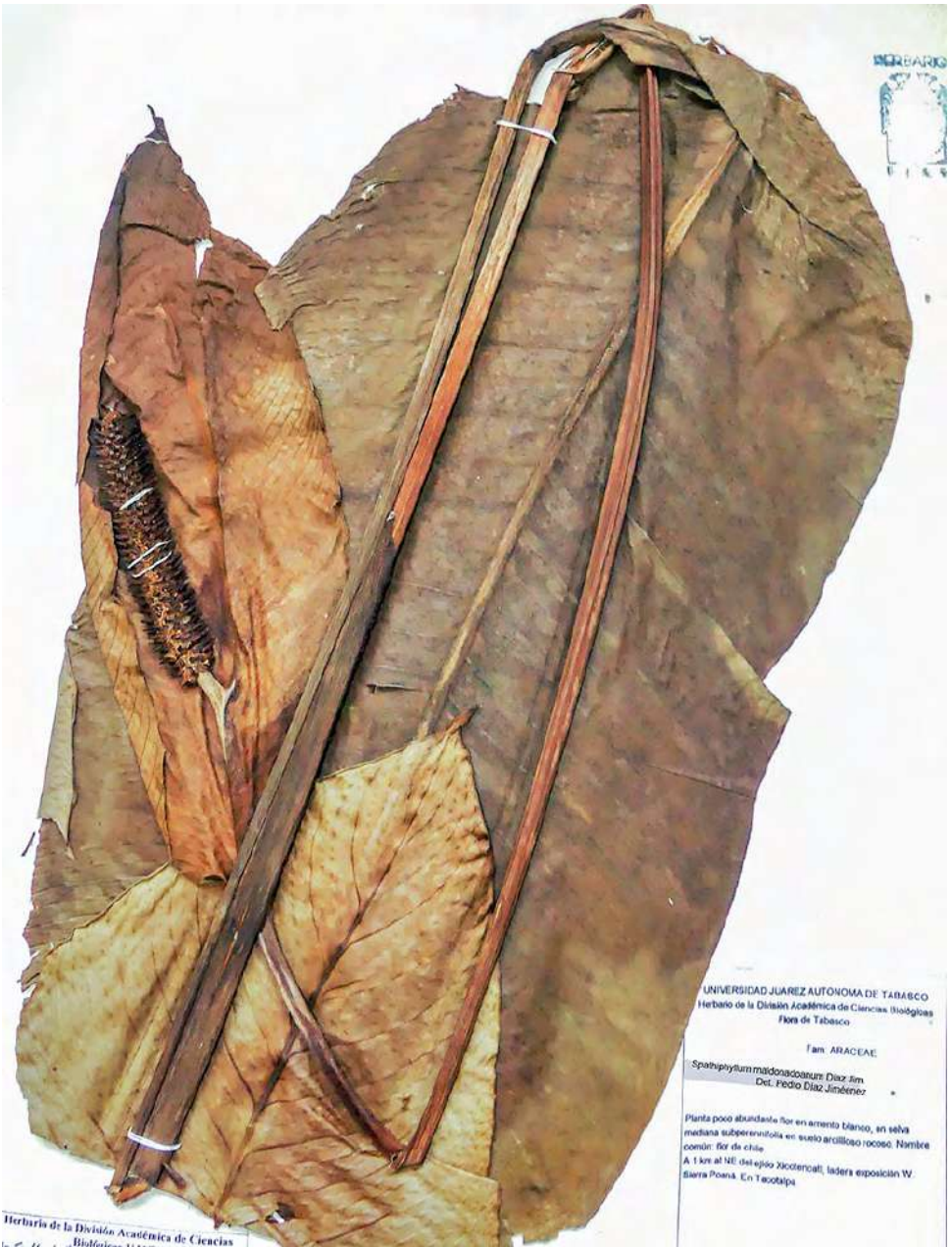


Figure 153: *Spathiphyllum maldonodanum*, E. Lopez 153, Mexico



Figure 154: *Spathiphyllum maldonodanum*, P. Díaz Jiménez 539, Mexico



Figure 155: *Spathiphyllum maldonodanum*, E. Lopez 273, Mexico

92°58'W, 150 m, 19 February 1987, *T.B. Croat & D.P. Hannon 65372* (MO); San José Puyacatengo, evergreen tropical forest, 17°31'N, 92°55'W, 188 m, 14 May 2008, *P. Díaz Jiménez 539* (MO); Sierra el Madrigal, San José Puyacatengo, 17°31'N, 92°55'W, 237 m, 28 May 2008, *P. Díaz Jiménez 562* (XAL).

Spathiphyllum matudae G.S. Bunting, Mem. New York Bot. Gard. 10(3): 38–40, f. 8. 1960. — Type: MEXICO. Chiapas: Cacaluta, Escuintla, 29 March 1948, *E. Matuda 17645* (holotype, NY; isotype, F, sheet 1287993, barcode V0045037F).

Terrestrial herb, 1.0–2.5 m tall; internodes short, 3–4 cm diam.; **petioles** 35–50(78) cm long, usually much longer than blades, sheathed 3/5–2/3 of length, dark green, matte, minutely pale-speckled; **sheath** 21–33(46.2) cm long, deciduous to ca. middle, erect-incurled, the margin conspicuously and minutely undulate; free part 14–17(31.8) cm long, oval above; geniculum 2.5–4.5 (5.5) cm long, sulcate; **blade** lanceolate or elliptic-lanceolate, 36–48(62) cm long, 13–26 cm wide, 1.8–3.7 times longer than wide, inequilateral (one side 1–2 cm broader), marginally undulate, acute-acuminate at apex, obtuse-subrounded to acute and usually weakly attenuated at base, moderately thin, matte, conspicuously bicolorous, dark green and semiglossy above, moderately paler and matte below, drying dark brown to grayish, matte to weakly glossy above, medium gray-brown to yellowish green to grayish green, semiglossy below; all veins sunken; midrib deeply sunken above, thicker than broad and paler below, dark green with the upper edge paler below; **primary lateral veins** (14)20–25 per side, departing midrib at 60–70°, concolorous and conspicuously sunken above, convex and slightly paler below; interprimary veins thick and pale only near base; minor veins fine. INFLORESCENCE erect, long-pedunculate; peduncle 50–70(105) cm long; **spathe** whitish to yellowish or greenish white, cucullate, elliptic to oblong-elliptic, (13)15–27(33) cm long, 5–8(10) cm wide, attenuate-acuminate at apex (acumen 3–5 cm long), acute at base, decurrent on peduncle for 2.5–5.5(9.0) cm at base; **spadix** 4.5–9.5 (11.5) cm long, green, cream to greenish yellow; stipe 0.6–2.0(2.5) cm long; **pistils** acute, green, often constricted between ovary and style; ovary (2)3-locular; locules 2–5 ovulate; berries obovoid or ellipsoid, short to long-rostrate, 4–5 mm diam. at apex, drying dark brown to blackened, drying pale brown on sides of ovary; seeds 3 per locule, 4 mm long, 2 mm diam., drying dark brown, smooth. **Figures 156–159.**

Distribution — *Spathiphyllum matudae* ranges from southern Mexico (Chiapas & Oaxaca) to Guatemala and El Salvador at 100–1180(1800) m in *Tropical moist forest* to *Premontane dry forest* life zones.

Comments — The species is characterized by its petioles sheathed 2/3 to 3/4 their length with a long geniculum, usually to ca. 5 cm long, narrowly ovate to ovate-elliptic, acuminate, frequently grayish drying leaf blades which are briefly attenuated at base with the primary lateral veins spaced 1.5–2.0 cm apart as well as by the whitish to greenish white spathe which is long-decurrent on the peduncle and a whitish to yellowish white spathe with long-protruding styles.

Spathiphyllum matudae is most closely related to *S. cochlearispathum*. Both share the very long geniculum but the blades of *Spathiphyllum cochlearispathum* are larger and typically



Figure 156: *Spathiphyllum matudae*. Photo: Amith



Figure 157: *Spathiphyllum matudae*, Croat 42137, El Salvador



Figure 158: *Spathiphyllum matudae*, Croat 43814, Mexico



Figure 159: *Spathiphyllum matudae*, Croat 43814, Mexico

proportionately narrower. Moreover, *Spathiphyllum matudae* has a white spathe whereas the spathe of *S. cochlearispathum* is greenish.

Spathiphyllum matudae can be confused with *S. frailescaense*, a morphologically similar species that is also found in the Sierra Madre of Chiapas. However, *S. frailescaense* differs from *S. matudae* in having longer petioles (55–69 *vs.* 35–50 cm), oblong-elliptic or oblong-ovate blades (*vs.* lanceolate or elliptic-lanceolate, sometimes subovate for *S. frailescaense*), more primary lateral veins per side (26–32 *vs.* 20–25 for *S. frailescaense*), a sessile spadix or with a short stipe (less than 12 mm *vs.* stipitate spadix with a stipe up to 20 mm for *S. frailescaense*) and the pistils constricted between the ovary and the style (*vs.* not constricted between the ovary and the style for *S. frailescaense*).

Common names for this species are *bushna* (Mexico); *gusnay*, *bushnay*, *huisnay*, *güisnay* (Guatemala), *huisnay* (El Salvador).

Additional specimens seen: **EL SALVADOR: Ahuachapán:** Along road from San Francisco Menéndez to Tacuba, 1–3 miles above intersection with road to Río Cara Sucia, roadsides and steep slopes in cultivated area. 13°52'01"N 089°57'24", 1000–1250 m, 28 July 1977, *T.B. Croat 42137* (HUA, MOU); Río Aceituno, near bridge over Río Aceituno on CA-2, muddy banks of the Río Aceituno, 14°16'03"N, 090°52'11"W, 300 m, 27 May 1970, *W.E. Harmon 2409* (MO); Escuintla–El Triunfo, along road from Escuintla to El Triunfo, ca. 1 miles N of Escuintla, 15°19'12"N, 092°38'24"W, 100 m, 21 August 1977, *T.B. Croat 43814* (MO). **GUATEMALA. Guatemala:** Amatitlán, Barranca de Eminencia, 1400 ft, February 1892, *J. Donnell Smith 2790* (US). **Sacatepequez:** Alotenango. 6 miles SW of Alotenango on road to Escuintla, deep gorge with steep sides, 14°25'22"N, 090°49'16"W, 1000 m, 27 July 1977, *T.B. Croat 42033* (MO). **Suchitepequez:** Pueblo Nuevo. Near Pueblo Nuevo, 14°38'51"N, 091°32'25"W, 750 m, 1 March 1939, *P.C. Standley 66857* (F). **MEXICO. Chiapas:** Cacaluta, Escuintla, 29 March 1948, *E. Matuda 17645* (NY). **Chiapas:** Arriag. Cañada al Espadañal, Rancho Bonito, veg. selva mediana subcaducifolia, 16°20'16"N, 093°52'21"W, 342 m, 23 May 2002, *Emerit Meléndez L, Cristian Chavarria, Ma. Nerey da Moreno 237* (MO); Sobre la carr. Arriaga–Tuxtla Gutiérrez, el el puente Toronjal, veg. Selva mediana perennifolia, riparia, 16°19'07"N, 093°52'16"W, 400 m, 24 February 2002, *A. Reyes-García 4002-b* (MO); Escuintla, Esperanza, 160 m, 16 May 1947, *E. Matuda 16561* (F); Turquía, Escuintla–Monte Ovando, along road between Escuintla and Monte Ovando, 2.8 km NW of Turquía, 15°21'N, 092°39'W, 100 m, 13 February 1979, *T.B. Croat 47478* (MEXU, MO); Tapachula, Finca Experimental “La Novia” Quinta Calle Poniente 9, 26 February 1964, *G.B. Ross s.n.* (BH, MO); Unión Juárez, Puente Monte Perla, Tapachula–Unión Juárez, along highway between Tapachula and Unión Juárez, 1 mi N of Puente Monte Perl, along ravine below waterfall, 15°02'24"N, 092°04'48"W, 1100 m, 10 February 1979, *T.B. Croat 47203* (MO, WU). **Oaxaca:** Mpio. Sta. María Chimalapa, Cerro de la Fortuna, un cerro de 1000 m en el SO de la Sa. Tres Picos, al lado N de la cabecera del Río Verde, ca. 15 km en línea recta al NE de Sta. Maía, cima, 17°01'12"N, 094°36'36"W, 1000 m, 28 April 1987, *T. Wendt et al. 5678* (CHAPA, MO).

Cultivated: UNITED STATES. **Missouri:** Saint Louis City, Climatron, bed 8, 2, 16, 23 July 1986, *George Rogers 167* (MO); April 1996, *T.B. Croat 78313* (MO). **Pennsylvania:** Pittsburgh, cultivated at Phipps Conservatory, 13 June 1990, *E. York 2606* (MO).

Spathiphyllum mixtecorum Díaz Jim. & Pérez-Farr., *Nordic J. Bot.* e03926: 1-6, f. 2A-C, 3. 2023. — Type: MEXICO. Oaxaca: Municipio Santa María Yucuhiti, San Isidro Paz y Progreso, 17°02'54"N 97°50'01"W, 1200 m, 04 March 2022, *P. Díaz Jiménez, M. Á. Pérez-Farrera & D. Villar-Morales 1618* (holotype, HEM).

Terrestrial, to 60 cm tall, riparian or rupicolous, growing sparsely or form large aggregations with dozens of individuals along streams; internodes short, up to 2 cm diam. LEAVES 25.5–47.3 cm long; **petioles** shorter than the blades, 10.5–19.5 cm long, 5.2–8.5 mm diam., sheathed to the geniculum, the **sheath** covered in white dots, sheath margins often entire, inrolled; geniculum 1–4 cm long, 2.0–3.5 mm diam., weakly sulcate; **blades** lanceolate or narrowly lanceolate, widest more or less in the middle, 14.5–27.5 cm long, 4–8 cm wide, approx. 3 to 3.5 times longer than wide, acuminate to narrowly acuminate at apex, attenuate at base, subcoriaceous, green and glossy above, pale below, drying black to dark greenish above, dark greenish below; midrib sunken, green or dark green above and yellowish-green below; **primary lateral veins** 9–12 per side, separated 5–15 mm, departing midrib at 30–40°, sunken and dark green above; minor veins faintly visible. INFLORESCENCE erect, equal to or taller than the leaves, sometimes shorter than the leaves; peduncle 27.5–45.5 cm long, 1.2–2.2 mm diam.; **spathe** cucullate, elliptic or oblanceolate, 8.2–12.0 cm long, 3–5 cm wide, decurrent on the peduncle, 5–7 cm long, acuminate apex, attenuate, subrounded or oblique at the base, green at anthesis, rarely white, green at post-anthesis; **spadix** 2.2–5.0 cm long, 10–16 mm diam., whitish-cream at anthesis, emitting a sweet and pleasant scent at anthesis, stipe up to 15 mm long, 1.5–3.0 mm diam., yellowish-green at anthesis; perianth up to 6 free tepals, 1.8–2.0 mm long; 4 or 6 anthers, 1.2–1.6 mm long, thecae oblong; **pistils** short, sub-conic, 3.8–6.5 mm long, style 1.5–2.2 mm long, 1.7–2.1 mm diam. at the base; ovary 2- or 3-locular, 6–12 ovules per locule. INFRUCTESCENCE, immature up to 3.5 cm long, 11 mm diam.; berries obovoid, rostrate, up to 4.3 mm long, 3.6 mm wide, green and glossy. **Figures 160–164.**

Distribution — *Spathiphyllum mixtecorum* is endemic to the state of Oaxaca, Mexico, known only from the municipality of Putla Villa de Guerrero and Santa María Yucuhiti, in the upper Mixtec part of the Sierra Sur of Oaxaca. It grows between 1000 and 1200 m elevation, in high evergreen rainforest and riparian vegetation. On the banks of rivers in fragments of riparian vegetation it forms dense populations with many individuals, while on the banks of rivers in the undergrowth of the high evergreen rainforest it grows sparsely.

Comments — *Spathiphyllum mixtecorum* is characterized by having lanceolate to narrowly lanceolate blades, sheathed petioles up to the geniculum, a long geniculum, inflorescence with mainly green spathe at anthesis, rarely with white spathe and short pistils.

Spathiphyllum mixtecorum is most easily confused with *S. hubertkrusei* which occurs in the same region of Oaxaca at 1200 m. That species differs by having larger leaves with petioles more than 35 cm long and sheathed 40 to 90% of their length, a longer geniculum (5 to 9



Figure 160: *Spathiphyllum mixtecorum*, Habit, P. Díaz Jiménez et al. 1619. Photo: P. Díaz Jiménez

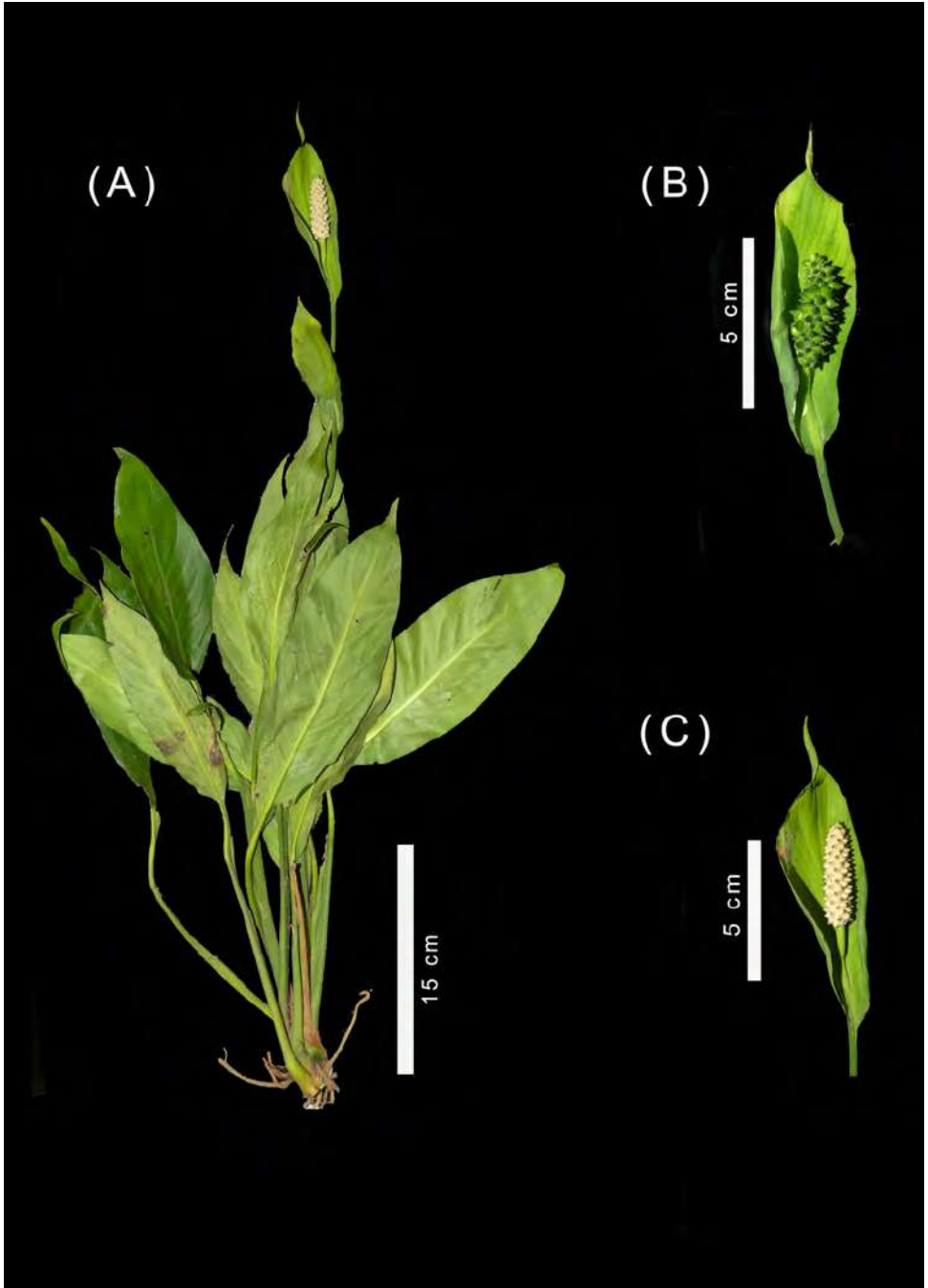


Figure 161: *Spathiphyllum mixtecorum*, Details plate. Credit: P. Díaz Jiménez



Figure 162: *Spathiphyllum mixtecorum*, Inflorescence. Photo: P. Díaz Jiménez



Figure 163: *Spathiphyllum mixtecorum*, Inflorescence and Leaf. Photo: P. Díaz Jiménez



Figure 164: *Spathiphyllum mixtecorum*, Inflorescence and leaf. Photo: P. Díaz Jiménez

cm long), larger leaf blades (26–36.7 cm long and 6–13.2 wide) which dry greenish gray to dark green above and have more primary lateral veins (9)11–15 per side) as well as a larger inflorescence (spathe to 16 cm long x 6 cm wide) and a less stipitate (sessile or stipitate to 4 mm), light green spadix.

Spathiphyllum mixtecorum is morphologically similar to *S. uspanapaense*, which also has blades that reach a size of up to 60 cm but that species differs in having petioles not sheathed to the geniculum (*vs.* sheathed to the geniculum), a shorter geniculum (up to 1.5 long cm *vs.* up to 4 cm) a narrower blade (3.3–6.0 *vs.* 4–8 cm wide), and a white spathe at anthesis (*vs.* green, rarely white). Furthermore, *S. uspanapaense* grows below 200 m, while *S. mixtecorum* grows above 1000 m.

Additional specimens cited: **MEXICO. Oaxaca:** Mun. Llano de San Vicente, Putla Villa de Guerrero, 17°05'17"N 097°52'12"W, 1050 m, 04 March 2022, P. Díaz Jiménez, M. Á. Pérez-Farrera & D. Villar Morales 1619 (HEM).

Spathiphyllum montanum (R.A.Baker) Grayum, Phytologia 82(1): 50. 1997. — *Spathiphyllum wendlandii* subsp. *montanum* R.A.Baker, Phytologia 33(7): 450. 1976. — Type: COSTA RICA. Puntarenas: about 2 km S of Monteverde, 31 October 1975, W. Burger & R. Baker 9688 (holotype, F sheet 1756913, barcode V004500F; isotype, US).

Terrestrial herb, 60–70(100) cm tall; internodes short, 1–2 cm diam. LEAVES 45–78 cm long; **petioles** 22–52 cm long, medium green, weakly glossy, sheathed (0.37)0.57–0.80 its length; **sheath** 17–31 cm long, margins erect midway, spreading toward apex, persisting intact; free part 5.0–13.5 cm long, oval to terete in cross-section, sometimes finely ribbed; geniculum 2.5–3.5 cm long, sharply sulcate, drying blackened, often shrunken; **blades** elliptic to oblong-lanceolate or lanceolate-ovate, 19–35(53) cm long, 8.1–19.5(25.0) cm wide, 2.1–3.3 times longer than wide, more or less equalling petioles, usually acute to moderately attenuate, sometimes subtruncate at base, moderately bicolorous, dark green and matte above, moderately paler and weakly glossy below, drying dark brown and matte above, yellow-brown to gray-brown and semiglossy below, thinly coriaceous; midrib sunken and slightly paler to concolorous above, 3-ribbed to narrowly raised and paler below; **primary lateral veins** 12–25(28) per side, departing midrib at a steep angle, then spreading at 55–70°, sunken above, pleated-raised below; minor veins obscure. INFLORESCENCE erect, 33–49 cm long, held above leaves; peduncles 15–62(119) cm long; **spathe** erect, more or less hooded, white with a green midrib at anthesis, becoming green, finally dark green outside, paler green within, (3)8–24 cm long, 4–8 cm wide, elliptic to narrowly ovate or obovate; **spadix** ca. 2.4–9.0 cm long, 0.7–1.5 cm diam., green to white, cylindroid; flowers 5–6 per spiral; tepals free; **pistils** acute and prominently protruding, white; ovary white becoming green; style narrowly acute and prominently exerted 2.5 mm or more. **Figures 165–172.**

Distribution — *Spathiphyllum montanum* ranges from Costa Rica to Western Panama (Bocas del Toro & Chiriquí) at (820)1100–2020 m in *Tropical wet forest* and *Premontane rain forest* life zones. In Costa Rica, it is known from both slopes of the Continental Divide near the summit.

Comments — *Spathiphyllum montanum* is recognized by its small size, its typically cloud forest habitat at elevations above 1100 m as well as by its moderately small, mostly elliptic,



Figure 165: *Spathiphyllum montanum*, Habit. Photo: Ramón da Pena



Figure 166: *Spathiphyllum montanum*, Habit of flowering plant, La Mina Fortuna, Croat 76341, Panama



Figure 167: *Spathiphyllum montanum*, Inflorescence. Photo: Ramón da Pena



Figure 168: *Spathiphyllum montanum*, Plant with inflorescence, *Croat 76371*, Panama



Figure 169: *Spathiphyllum montanum*, Croat 76371, Panama



Figure 170: *Spathiphyllum montanum*, Grayum & Sleeper 3835, Costa Rica



Figure 171: *Spathiphyllum montanum*, Mori 6752, Panama



Figure 172: *Spathiphyllum montanum*, Croat 75006, Panama

brown-drying, moderately bicolorous leaf blades, the numerous close primary lateral veins and a broad, erect, white, decurrent spathe with sharply emergent pistils.

Spathiphyllum montanum was initially considered to be a subspecies of *Spathiphyllum wendlandii* Schott by Richard Baker during his studies of the Costa Rican Araceae (Baker & Burger, 1976) but was elevated to the species level by Grayum (Grayum, 1997) for his treatment of the Araceae for the Costa Rican Manual. *Spathiphyllum wendlandii* differs by being more consistently a larger plant, occurring at lower elevations (usually from near sea level to about 600 m (sometimes ranging up to 1000 m), by having the petioles fully winged to the apex with the winged margins undulate and by having leaf blades drying paler yellow-brown or sometimes paler grayish brown to grayish green below.

Additional specimens seen: **COSTA RICA. Alajuela:** 15 km NW of San Ramón by air, Cerro Azahar, headwaters of Río San Pedro, by road 9 km NW of San Ramón to Piedades Norte, then 3 more km NW to La Paz, then left on jeep road 1.7 km to cluster of houses, then left again on jeep road 4–5 km to top of ridge, 10°09'00"N, 084°34'48"W, 1400–1500 m, 14 May 1983, *R. Liesner et al. 15584* (MO). **Puntarenas:** Boundary between Provinces Puntarenas and Alajuela, Monte Verde Reserve, Cordillera de Tilarán, Cerros Centinelas, 10°18'N 084°47'W, 1550–1600m, 19 August 1984, *M.H. Grayum & Sleeper 3835* (MO, CR). **San José:** Tarrazu, San Marcos de Tarrazu between Cerro Toro and Cerro Hormiguero along the road between Basuero de Tarrazu and Esquipulas, vicinity of Cerro Hormiguero, 09°33'30"N, 84°03'15"W, 1100–1200 m, 5 September 1996, *T.B. Croat 78898* (CR, INB, MO). **PANAMA. Bocas del Toro:** Chami Copper Mines camp, below Cerro Colorado, 15 km from camp, 1600 m, 20 June 1986, *W.J. Kress, H. Luther, L. Besse & J. Halton 86-1934* (MO, SEL); Changuinola, PILA. Point 9, ridge above camp, close to pasture, 9°03'42" N, 82°42'35" W, 20–80 m, 20 April 2008, *Monro et al. 6052* (CR, MO, PMA). **Chiriquí:** Cerro Colorado, along road to old copper mine development N of San Felix, 18.6 mi N of bridge over river near San Felix, 6.6 mi beyond Chame and road to Escopeta, 08°30'N, 81°46'W, 1475–1485 m, 30 March 1993, *T.B. Croat 75006* (B, K, MO, US); Camp Hornito, Fortuna Dam site, 08°44'N, 082°18'W, 1000–1200 m, 26 September 1976, *R.L. Dressler 5493* (MO); Los Planes de Hornito, Gualaca-Chiriquí Grande, 7.2 mi beyond Los Planes de Hornito, 8°44'N, 82°14'W, 1165–1200 m, 19 Sept. 1987, *T.B. Croat 67812* (MO); Fortuna Dam Area, Fortuna–Chiriquí Grande, 5.3 miles N of center of Fortuna Dam, then 1.4 miles W along gravel road to Continental Divide Trail, 08°44'N 082°17'W, 1000m, 23 June 1994, *T.B. Croat 76341, 76371* (MO); La Fortuna hydroelectric project, in clearing forest, and along river near camp as indicated, 1040 m, 19 March 1978, *B.E. Hammel 1993* (MO). **Veraguas:** Cerro Tute, ca. 10 km NW of Santa Fé, on ridgetop in cloud forest, 08°28'56"N 081°05'53"W, 1000 m, 19 June 1975, *S. Mori 6752* (MO).

Spathiphyllum morii Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Veraguas: NW of Santa Fé, 8.8 km from Escuela Agrícola Alto de Piedra, on road to Calovebora, 08°32'23"N 081°09'26"W, 580 m, 17 June 1975, *S. Mori 6664* (holotype, MO-2275339).

Diagnosis: *Spathiphyllum morii* is characterized by its robust habit to 2 m tall, matte-drying, finely ridged, yellowish brown-drying petioles which are much longer than the blades and sheathed to (45)70–85% its length, narrowly ovate-acuminate blades which are attenuate at the base, drying brownish green above, yellowish brown to grayish green below with numerous



Figure 173: *Spathiphyllum morii*, Habit, O. Ortiz 3574, Panama. Photo: O. Ortiz

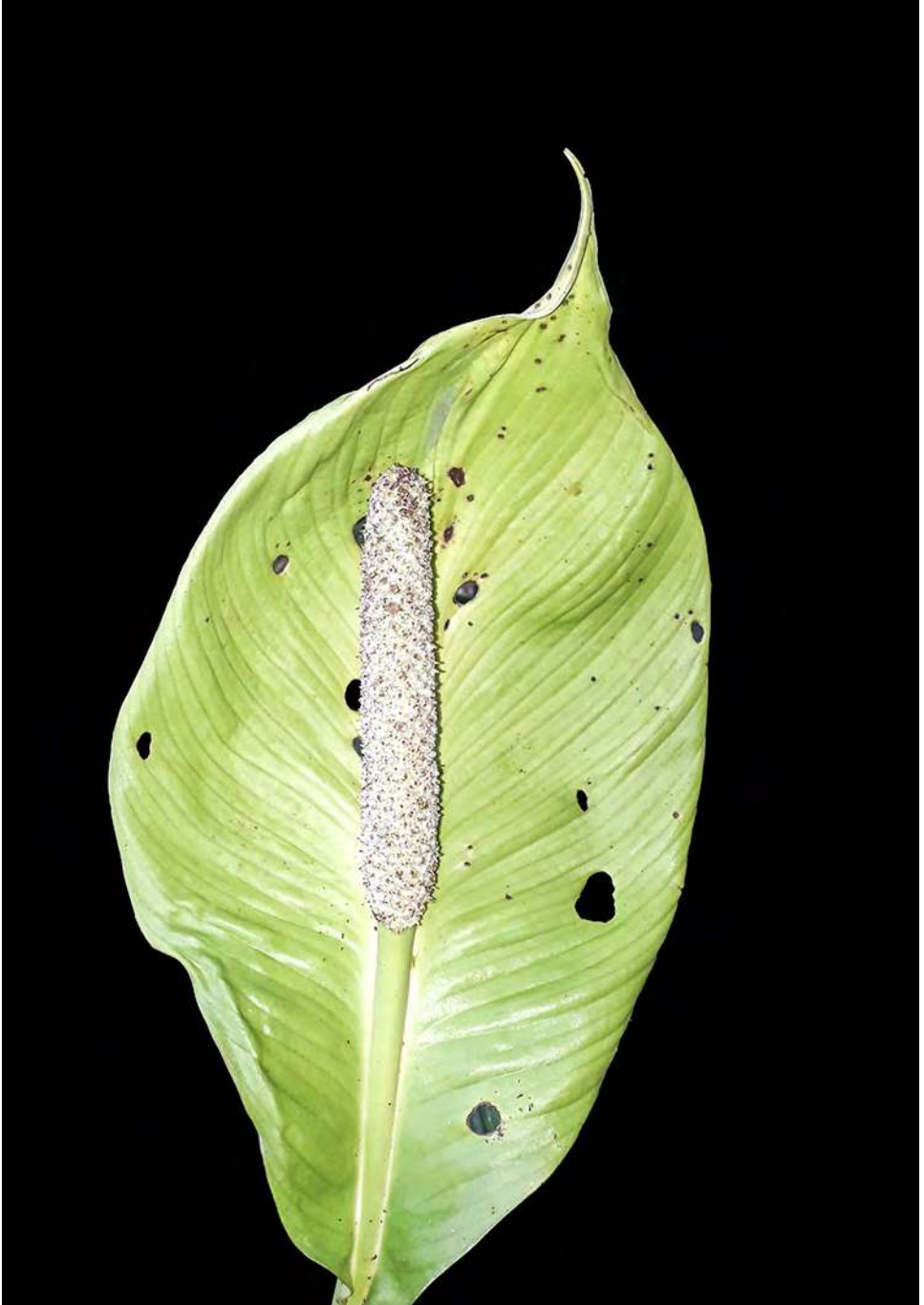


Figure 174: *Spathiphyllum morii*, Inflorescence, face view, O. Ortiz 3574. Photo: O. Ortiz



Figure 175: *Spathiphyllum morii*, Mori & Bolton 7615, Panama



MISSOURI BOTANICAL GARDEN HERBARIUM
 No 2807335
 MISSOURI BOTANICAL GARDEN
 copyright reserved

(Scott A. Mori & Jacquelyn A. Kallunki 6250)
 ARACEAE [23]
Spathiphyllum morii Croat & O. Ortiz
 det. Thomas B. Croat (MO) 2023

PANAMA
 Province of Veraguas
 Family: Araceae

Spathiphyllum wendlandii Schott ssp. *montanum* R. Baker
 NW of Santa Fe, 2 km from Escuela Agrícola Alto de Piedra, Ridge below Cerro Mate. Cloud forest, 1070-1150 m alt. J. Leonard 1988
 Terrestrial. Spathe green.

S. Mori & J. Kallunki 6250 19 May 1975
 MISSOURI BOTANICAL GARDEN HERBARIUM

Figure 176: *Spathiphyllum morii*, Mori & Kallunki 6250, Panama



Figure 177: *Spathiphyllum morii*, Mori 6664, TYPE, Panama

close veins as well as by the inflorescence which is nearly as long as the leaves with a narrowly ovate, long-acuminate, green spathe which is markedly decurrent at the base, and the green, stipitate, cylindroid spadix which is much shorter than the spathe with narrowly pointed protruding pistils.

Terrestrial, to 2 m tall; internodes short, drying 2.5–3.5 cm diam.; cataphylls to 12 cm long, persisting more or less intact. LEAVES with **petioles** 61.5–76.5 cm, much longer than the blades, sheathed (45)70–83% their length, drying matte, finely ridged, yellowish brown; sheath 37.5–58.5 cm long, thin, brown-drying, persisting intact; geniculum 3.5–5.5 cm long, drying somewhat darker, not swollen; **blades** 35.5–48.5 cm long, 21.5–31.5 cm wide, 1.5–1.6 times longer than wide, 0.53–0.68 times as long as petioles, narrowly ovate, gradually acuminate at apex, rounded and attenuate at base, thinly coriaceous, dark green and matte above, moderately paler and weakly glossy below, drying brownish green above, yellowish brown to grayish green below; midrib sunken and concolorous above, narrowly rounded and paler below; **primary lateral veins** 22–28 per side, departing midrib at a steep angle then spreading at 45–60°, scarcely more prominent than interprimary veins, drying weakly raised and concolorous above, narrowly raised and darker below; minor veins fine, finely pale-speckled on magnification. INFLORESCENCE erect, 78–112 cm long, almost as long as leaves; peduncle 61–90 cm long; **spathe** 17.5–26.5 cm long, 6.5–10.5 cm wide, green, narrowly ovate; **spadix** green, cylindroid, 7.0–8.5 cm long, 1.3–2.0 cm diam.; flowers 8–10 visible per spiral, 2–3 mm wide; tepals fused into a ring around pistil; **pistil** short-emergent, narrowly pointed to 3 mm long; stamens 1.4 mm long, 1.2 mm diam., held at level of tepals, tan on drying; thecae more or less parallel. **Figures 173–177.**

Distribution — *Spathiphyllum morii* is endemic to Panama, known only from the type locality in Veraguas Province at 600–1200 m in *Lower montane rain forest* or *Premontane rain forest* life zone.

Comments — *Spathiphyllum morii* has been confused with *S. wendlandii* Schott, but that species differs by having petioles which are shorter than the blades and winged to the geniculum, and also with *S. montanum* which differs by having smaller and proportionately narrower blades, shorter petioles and a white spathe. The species may also be confused with *S. phrynifolium*, but that species has proportionately much longer leaf blades (2.5–4.5 times as long as wide) that are less bicolorous on drying with the lower surface less pale and with the leaf base less conspicuously decurrent at the base.

The species is similar to *Spathiphyllum kennedyae* from Bocas del Torro Province at 200 m elevation which differs in being a somewhat shorter plant with petioles sheathed 0.25 their length, in having leaf blades narrowly ovate-elliptic and more than 60 cm long and which are subrounded and inequilaterally obtuse at base and also scarcely attenuated at the base, as well as by having the spathe decurrent 13.5 cm at base. In contrast, *S. morii* occurs in Veraguas Province at 1150–1900 m, grows up to 2 m tall, has petioles sheathed 0.7–0.8 their length, leaf blades narrowly ovate and less than 50 cm long while being rounded and attenuate at the base while the spathe is narrowly ovate, measures less than 27 cm long and is decurrent 2–3 cm at the base.

Etymology — The species is named in honor of American botanist and good friend, the late

Dr. Scott Mori who spent most of his career at the New York Botanical Garden. Scott was responsible for collecting all of the known specimens of this species while he worked for the Missouri Botanical Garden as a collector for the Flora of Panama during 1975.

Paratypes: **PANAMA**: **Veraguas**: 14 km NW of Santa Fé on road to Calovebora, Panama Hwy. 35, 08°32'58"N, 81°09'58"W, 600–800 m, 4 August 1975, *S. Mori & A. Bolton* 7655 (MO); Ca. 10 km NW of Santa Fé on road to Calovebora, 08°31'26"N, 81°07'46"W, 600 m, 4 August 1975, *S. Mori & A. Bolton* 7615 (MO); NW of Santa Fé, 2 km NW of Escuela Agrícola Alto de Piedra, ridge below Cerro Tute, 08°30'28"N, 81°08'42"W, 1070–1150 m, 19 May 1975, *S. Mori & J. Kallunki* 6250 (MO).

Spathiphyllum munniae Croat, **sp. nov.** — Type: MEXICO. Oaxaca: Municipio Santa María de Chilchotla, NE de la comunidad de Agua de Gancho, Agencia Municipal María Chilchortla, ladera con exposición, 18°12'N, 96°49'W, 1474 m, growing on limestone substrate, 1 April 2001, *X. Munn-Estrada, E. Juárez & J. Juárez* 956 (holotype, TEX).

Diagnosis: *Spathiphyllum munniae* is characterized by its modest size, calcareous habitat, moderately short petioles sheathed about $\frac{3}{4}$ their length, weakly visible, short geniculum, greenish drying, ovate-elliptic, weakly acuminate blades with broadly spreading primary lateral veins as well as the broad, greenish, attenuated spathe and the weakly tapered, stubby, sessile spadix with acutely protruding pistils.

Terrestrial herb to ca. 1 m tall. LEAVES with **petioles** 42 cm long, sheathed 0.78 its length, 0.56 as long as blade, drying light brown, weakly many ribbed, densely and inconspicuously short pale-lineate, matte; sheath 33 cm long, the margin concolorous, persisting intact, narrowly acute at apex; free part 12 cm long; geniculum not apparent, seemingly 2 cm long; **blade** 62 cm long, 25 cm wide, 2.5 time longer than wide, 1.5 times longer than petiole, ovate-elliptic, almost acute at apex (slightly short-acuminate), inequilateral at base, one side rounded, the other obtuse, downturned and decurrent for 1.5–2.0 cm at base, slightly inequilateral (one side 1.5 cm wider), drying medium grayish green and weakly glossy above, much paler weakly gray-green and weakly glossy below; midrib drying deeply and narrowly sunken in lower $\frac{1}{2}$, broadly flattened, slightly darker and broadly raised toward apex above, thicker than broad, medium brown, finely ribbed and matte below; **primary lateral veins** 27 per side, departing midrib at 70–85° near base, then promptly spreading at 60° near the apex, mostly drying dark brown, interprimary veins usually a single pair between each pair of primaries with yet another intermediate pair of lateral veins, at least the latter undulate on drying. INFLORESCENCE 52 cm long, held below the leaves; peduncle 40 cm long, drying 4 mm diam., medium brown, dark brown toward apex; **spathe** 14.2 cm long, presumably green, drying dark brown and semiglossy on both surfaces, narrowly long-attenuated; **spadix** 8.5 cm long, 1.3 cm diam., sessile, greenish at anthesis, drying dark brown; flowers 7–8 per spiral; **pistils** prominently protruding, to 1.5 mm long; tepals fused into a tube, the apical lobes free, densely granular, 2 mm wide, inner margin rounded, thin and scarious, outer margin 2–3-sided; reconstituted ovary difficult to observe, ovules seemingly 2 per locule. INFRUCTESCENCE not seen. **Figure 178.**



Figure 178: *Spathiphyllum munniae*, Munn-Estrada 956, TYPE, Mexico

Distribution — *Spathiphyllum munniae* is endemic to Mexico, known only from the type locality in the Sierra de Mazateca in northern Oaxaca State at 1474 m in montane cloud forest (Rzedowski, 2006).

Comments — *Spathiphyllum munniae* is most easily confused with *S. cochlearispathum*, which differs by having typically much longer, darker brown-drying blades with the geniculum conspicuous and typically more than 4 cm long.

Etymology — The epithet honors Mexican botanist Diane Xochitl Munn-Estrada. Her study of the plants of the Sierra Mazateca de Oaxaca was a major accomplishment (Munn-Estrada, 2017). It was during this study that she made the collection of the type specimen of this species.

Spathiphyllum ortgiesii Regel, Gartenflora 19: 39. 1870. — Type: None cited in the protologue and no original material found. — Regel, Gartenflora 21: t. 738. 1872, (neotype, designated here).

Terrestrial herb, forming a tight rosette 0.5–1.0 m tall; internodes short, 2–4 cm diam. LEAVES with **petioles** (20)32–48(92) cm long, sheathed throughout including on geniculum; sheath erect, spreading slightly and undulate below base of blade, matte, medium green and faintly striate outside; geniculum 1.5–3.0 cm long, usually winged; **blades** (25)31–60(70) cm long, 15–26 cm wide, 1.6–2.8 times longer than broad, 1.0–2.1 times longer than petioles, elliptic-oblancheolate to broadly elliptic, usually moderately inequilateral, abruptly to gradually acuminate at apex, attenuate at base and finally decurrent onto geniculum (forming a crinkled wing continuous with the wing of the petiole), thinly coriaceous, dark green and semiglossy above, much paler and matte below, concolorous to slightly paler, drying frequently dark brown to blackened and semiglossy to matte above, nearly blackened to yellow-brown and matte to weakly glossy below, sometimes drying gray-green above, yellow-brown below; midrib broadly sunken and slightly paler above, thicker than broad, much paler and faintly striate below; **primary lateral veins** 16–20 per side, departing midrib at 45–60°, weakly quilted-sunken above, pleated-raised below; minor veins few, visible but not distinct, usually moderately short pale-lineate on upper surface, finely and closely pale-striate interspersed with intermittent, subrounded, slightly elevated humps. INFLORESCENCE erect-spreading, held at the level of the leaves or well above the leaves; peduncle (35)55–68(105) cm long; **spathe** 12–33.5 cm long, 5–9 cm wide, oblanceolate or oblong-elliptic, apex short-acuminate, base cuneate and decurrent on the peduncle (3)5–8(10) cm, spreading, light green pre-anthesis, becoming dark green, matte, somewhat hooded, slightly darker inside; **spadix** 5–10(16) cm long, stipitate 0.5–1.8 cm; flowers with tepals separate, entire at apex, apical portion erect and forming a collar around pistil, medium green to light green; **pistils** often constricted between the style and ovary, white at anthesis, early emergent, turning pale green post-anthesis, exerted and sharp; ovary 3-locular with ovules 6–8 per ovule, 2 or 3 per locule, these affixed near base; berries 3.5–4.0 mm long, green with seeds more or less reniform to oblong, 3.5 mm long, 1.5–2.1 mm wide, flattened and unribbed on outer margin, moderately warty throughout, light brown, glossy, drying light brown. **Figures 179–185.**

Distribution — *Spathiphyllum ortgiesii* is known from Mexico and Honduras at 20–1500 m in *Tropical wet forest* life zones. It is certainly to be expected in Guatemala.



Figure 179: *Spathiphyllum ortgiesii*, Habit, Díaz Jiménez 1322, Photo: P. Díaz Jiménez

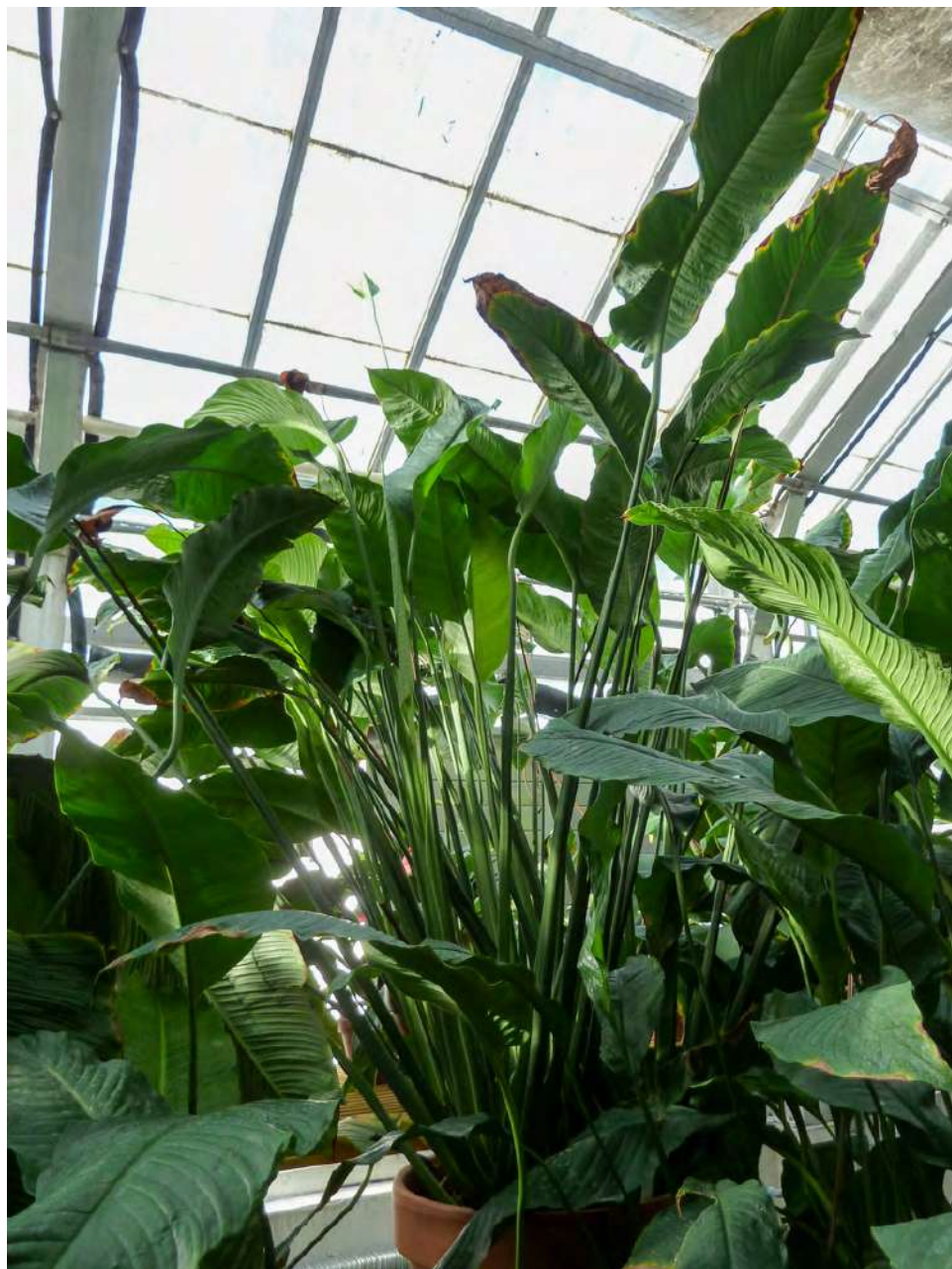


Figure 180: *Spathiphyllum ortigiesii*, Croat 78696, Originally collected from Catemaco, Mexico. Photo in MBG greenhouse by: Randy Headrick



Figure 181: *Spathiphyllum ortgiesii*, Close-up of inflorescence, *Croat 78696* Originally collected from Catemaco, Mexico. Photo in MBG greenhouse by: Randy Headrick



Figure 182: *Spathiphyllum ortgiesii*, Croat 78696, Mexico



Figure 183: *Spathiphyllum ortgiesii*, Croat 78696, Mexico



Figure 184: *Spathiphyllum ortgiesii*, Hammel 15505, Mexico



Figure 185: *Spathiphyllum ortigiesii*, Croat 64397, Honduras

Comments — *Spathiphyllum ortgiesii* is characterized by its rosulate habit, fully winged petioles which have the wing usually extending across the geniculum, the mostly elliptic-oblongate blades with moderately few primary lateral veins as well as by the green, decurrent spathe and the stipitate, greenish white spadix with prominently protruding green pistils which are constricted between the style and ovary.

The only other species with fully winged petioles are *Spathiphyllum wendlandii* from Costa Rica which differs by having a white spathe and *S. almirantense* which differs by having the petioles with the sheath margins conspicuously narrowed and weakly visible toward the apex.

It is somewhat suspicious that plants collected mostly in the region of Tuxtla fall into two groups in terms of drying color with some drying nearly blackened and others much paler and grayish. This needs further investigation.

Spathiphyllum ortgiesii was introduced to European cultivation by the rapacious Czech orchid collector Benedikt Roehl (1824–1885), and validly named by von Regel in 1870 in a discursive note in *Gartenflora* (loc. cit.). Two years later von Regel (loc. cit.) described the plant again in *Gartenflora*, this time in more detail and accompanied by a clear illustration. Bunting (1860) claimed that the name was typified by the “original description”, though the description he cited was not in fact the original one. As no original material of *S. ortgiesii* has been located, we here neotypify the name with von Regel’s plate.

Additional specimens seen: **HONDURAS. Copán:** San Antonio, Cerro Azul, on south slopes of Cerro Azul, 12 Km NE of Florida, Cerro Azul National Park, dense mixed hardwood forest approx, 35 years old, 15°06’N, 088°55’W, 1530 m [1956 m *vide* Google Earth], 11 February 1992, *T. Hawkins & Darío Mejía 238* (MO); San Esteban, San Esteban–Bonito Oriental, along Río Olancho, on road between San Esteban and Bonito Oriental, 14.8 mi NE of San Esteban, primary forest remnants in ravine, 15°25’N, 85°47’W, 635 m, 7 February 1987, *T.B. Croat & D.P. Hannon 64397* (ENCB, MO). **Yoro:** Cordillera Nombre de Dios, hills S of San José de Texíguat, evergreen rainforest on steep slopes, 15°29’N, 087°27’W, 300–400 m, 17 May 1991, *G. Davidse, Ramón Zúñiga & Paul R. House 34473* (MO). **MEXICO. A. Engler 79** (US). **Chiapas:** Ocosingo, Lago Lacanjá a 15 km de la comm. Lacandona Lacanjá Chanjayab, 16°49’48”N, 091°49’48”W, 278 m, 25 October 1985, *Ramírez P. 187* (MEXU). **Distrito Federal:** Ixtapalapa, cultivated, 9 May 1969, *M. de la Cerda L. 109* (MEXU). **Oaxaca:** Ixtlan–Valle Nacional, 16 mi above Valle Nacional, 17°39’36”N, 096°24’36”W, 1530 m [1956 m *vide* Google Earth], 20 June 1969, *Webster & Breckon 15367* (DAV). **Veracruz:** vic. Playa Escondida, 12 air mi NNW of Sontecomapan, 18°33’36”N, 095°06’00”W, 20 m, 13 Sept 1975, *Holstein & Armbruster 20426* (DAV); Los Tuxtlas, Catemaco–Montepio, along road between Catemaco and Montepio, 2.6 km S of Los Tuxtlas Field Station, 9.3 beyond end of asphalt highway, 19.4 km N of Catemaco, 18°36’36”N, 095°03’36”W, 50 m, 25 August 1996, *T.B. Croat 78696* (CF, ENCB, F, MEXU, MO, NY); Catemaco, near Playa Escondida, 10 km N of Sontecomapan, selva alta perennifolia, tropical evergreen forest on slopes above the Gulf of Mexico, 18°35’24”N, 095°03’00”W, 50 m, 22 April 1983, *M. Nee & K. Taylor 26711* (F, NY, XAL); Wet E facing slopes 5.7–6 miles from Catemaco on road to Sontecomapan,

18°26'24"N, 095°02'24"W, 380 m, 27 September 1961, *H.E. Moore, Jr. & Bunting 8932* (BH, MO); Barra de Sontecomapan, selva alta perennifolia, 18°33'00"N, 094°58'48"W, 10 m, 19 July 1967, *L. Nevling & A. Gómez-Pompa 178* (XALU); At highest point on road from Catemaco to Sontecomapan, 5 km N of junction with road around Laguna Catemaco, 8 km (by air) NE of Catemaco, selva alta perennifolia, forest on slopes, 18°28'48"N, 095°03'36"W, 500–550 m, 31 October 1981, *M. Nee & J.I. Calzada 22550* (F); Entre Bastonal y arroyo Claro, 14 km E of Lago Catemaco, selva alta perennifolia, veg. primaria, MAPA 21.0 58.5, 18°22'48"N, 094°54'36"W, 900 m, 10 June 1972, *J.H. Beaman 6122* (F); Mecayapan, base of Volcán Santa Marta, above Tatahuicapan, primary forest selectively logged during last 10 years, now being opened to subsistence farming, 18°14'24"N, 094°45'36"W, 250 m, 15 May 1986, *J.V. LaFrankie 1248* (GH); Las Tuxtlas Range, very steep river gorges dissecting the slopes of Volcán Santa Marta, 400 m, 16 May 1986, *J.V. LaFrankie 1261* (GH); San Andrés Tuxtla, road from Estación Biológica Los Tuxtlas to Playa Montepio, ca. 7.8 km N of Estación Los Tuxtlas, in forest along stream west of road, 18°34'48"N, 095°09'36"W, 120 m, 29 Sept 1986, *B.E. Hammel, M. Merello & S. Sinaca 15505* (MO); Estación Biológica de los Tuxtlas, selva alta perennifolia, primaria, suelo-arcilloso, 18°34'48"N, 095°03'36"W, *Juan I. Calzada 389* (F, XALU); Estación Biológica, Los Tuxtlas, MAPA 24.0 56.5 selva alta perennifolia, veg. secundaria, 18°34'48"N, 095°03'36"W, 140 m, 26 May 1969, *G. Martinez C. 1908* (A, F); Playa Escondida, 28 km NE of Catemaco, 18°34'12"N, 095°03'36"W, 27 September 1974, *M.T. Madison 1731* (GH); Estación de Biológica Tropical "Los Tuxtlas", Vigía 5, Lote 67, selva alta perennifolia, 18°34'N, 095°04'W, 450 m, 19 April 2005, *T. Krömer, A. Acebey, & E. Velasco Sinaca 1964* (MO); Santiago Tuxtla, steep wet ravine slopes 1.5 miles below Santiago Tuxtla, 18°27'36"N, 095°17'24"W, 240 m, 11 April 1952, *H.E. Moore, Jr. 6270* (BH, MO, NY).

Cultivated: UNITED STATES. **Missouri:** Saint Louis City, Missouri Botanical Garden, in Research Greenhouses on Garden grounds, 38°36'N, 090°15'W, 160 m, 29 June 1999, *H.H. Schmidt 3626* (MO). **Pennsylvania:** Pittsburgh, cultivated at Phipps Conservatory, Orchid Room, 7 April 1989, *S.A. Thompson 6375* (MO).

Spathiphyllum ortizii Croat, **sp. nov.** — Type: PANAMA. Darién: Distrito de Chepigan, Parque Nacional Darién, camino hacia cima de Cerro Sapo, 08°15'10"N 078°21'37"W, 130 m, 14 April 2014, *O.O. Ortiz, J. Aranda, J. Batista & J. Moreno 2313* (holotype, MO-6576191; isotype, PMA).

Diagnosis: *Spathiphyllum ortizii* is characterized by its slender, short internodes, long-petiolate leaves, narrowly lanceolate, greenish drying, acuminate blades which are weakly attenuate at base with close primary lateral veins, as well as by the long-pedunculate inflorescence with an olive-green, erect spathe and a light green spadix with barely exerted pistils.

Epilithic herb to less than 70 cm tall; internodes short, to 1.5 cm diam. LEAVES with **petioles** (9)16–18 cm long, sheathed to 0.56–0.66 its length; **sheath** 11.5–15.8 cm long, erect, acute at apex; free part 4.3–7.0 cm long; geniculum 1.8–2.0 cm long, drying darker but about as thick as petiole; **blades** (11.5)23.7–24.3 cm long, (3.3)5–6.1 cm wide, 4.0–6.6 times longer than broad, lanceolate, gradually and narrowly acuminate at apex, acute to attenuate at base, concolorous, drying gray-green on both surfaces, matte above, weakly glossy below,



Figure 186: *Spathiphyllum ortizii*, O. Ortiz 2313, Habit, TYPE. Photo: O. Ortiz

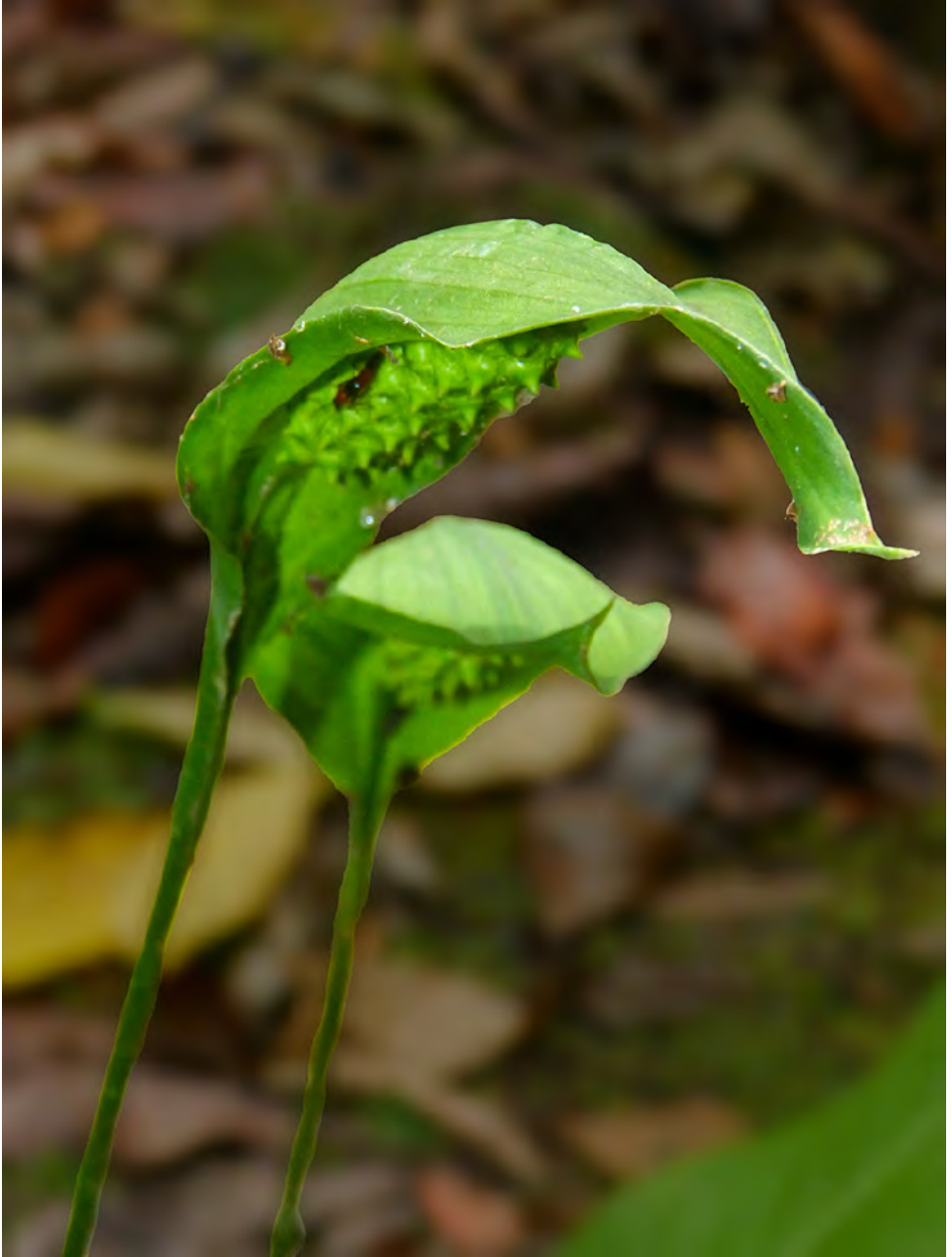


Figure 187: *Spathiphyllum ortizii*, O. Ortiz 2313, Inflorescence, TYPE, Panama. Photo: O. Ortiz



Figure 188: *Spathiphyllum ortizii*, O. Ortiz 2313, TYPE, Panama

lower surface finely striate; midrib narrowly sunken and concolorous above, narrowly rounded, drying several ribbed below; **primary lateral veins** 13 or 14 per side, departing midrib at 25–30°; interprimary veins sometimes present; lower surface drying with interprimary veins darker; minor veins striate, close; upper surface drying minutely granular and weakly short pale-lineate; lower surface alternating with pale and darker parallel ridges. INFLORESCENCE held above the leaves; peduncle 44 cm long, ca. 5 mm diam.; **spathe** 10.5 cm long, 3 cm diam., green, erect, decurrent 3 cm at base; **spadix** 4.1 cm long, 1.4 cm diam., light green; flowers 3–4 visible per spiral; **pistils** 2.0–2.5 mm long, 3-lobed with a short style ca. 1 mm long, stigma subrounded, 0.6 mm diam.; ovary 3-locular; ovules 1 per locule. INFRUCTESCENCES with berries light green; 3–4 mm diam.; seeds 2.5 mm long, 1.8 mm wide, light greenish brown, faintly pock-marked. **Figures 186–188.**

Distribution — *Spathiphyllum ortizii* is endemic to Panama, known only from the type locality in Darién Province on Cerro Sapo at 130 m.

Comments — *Spathiphyllum ortizii* is similar to *S. kalbreyeri* and *S. laeve* in having more or less lanceolate leaves. It differs from *Spathiphyllum laeve* and *S. kalbreyeri* in having spathes less than 6 cm wide. Additionally, it differs from *Spathiphyllum laeve* in having tepals free, not forming a ring. It differs from *S. kalbreyeri* in having the lower midrib smooth, not pustular-sublenticellate.

Etymology — The species is named for Orlando Ortiz who collected the type specimen. Orlando is rapidly becoming the authority on Araceae of Panama and is a superb field collector. He has made expeditions to many parts of Panama and has found many new species. Orlando received his Master's degree at the University of Panama and is now a graduate student working on his Ph.D. at the Freie Universität Berlin working on the taxonomy of *Philodendron*. The species epithet was selected by the senior author of this work.

Spathiphyllum patinii (B.S.Williams ex R.Hogg) N.E.Brown, Gard. Chron. 2: 783. 1878 ('*patini*'). — *Anthurium patinii* B.S.Williams ex R.Hogg., Gard. Year Book 16: 123. 1875. [but see also Mast., Gard. Chron., n.s., 3: 524–525, f. 109. 1875, '*patini*'.] — *Amomophyllum patinii* (B.S.Williams ex R.Hogg) Engl., Gard. Chron., n.s. 7: 139. 1877 ('*patini*'). — Type: COLOMBIA. Antioquia: Gomez Plata, Cuenca del río Porce, hacienda Vegas de La Clara, 6°37'00"N, 75°15'00"W, 950 m, Aug 2003, *F. Cardona et al.* 1171 (neotype, HUA; isoneotype MO-6924608, designed by Cardona, 2004).

Moderately small, terrestrial herb, 35–50 cm tall, often growing near streams, sometimes rupicolous, growing in sand among boulders; rhizome creeping, densely rooted; internodes short, 1.0–1.5 cm diam.; cataphylls 1-ribbed, persisting. LEAVES clustered at apex of stem, erect to spreading; **petioles** 18–37 cm long, slender and flexible, 0.96–1.8 times longer than the blade, dark green and semiglossy, sheathed 0.26–0.67 its length; **sheath** 10.5–22.5 cm long, inconspicuous and narrowly ending at apex; free part terete, 7.2–36.7 cm long; geniculum 1.0–2.5 cm long, sulcate, drying darker than shaft; **blades** 13.4–35.3 cm long, 1.8–8.0 cm wide, 2.5–7.4 times longer than wide, 0.28–0.94 times as long as petioles, lanceolate-elliptic or oblong-elliptic, moderately inequilateral, gradually and narrowly long-acuminate at apex, acute



Figure 189: *Spathiphyllum patinii*, Habit. Photo: F. Cardona



Figure 190: *Spathiphyllum patinii*, Habit and inflorescences. Photo: J. Harrison

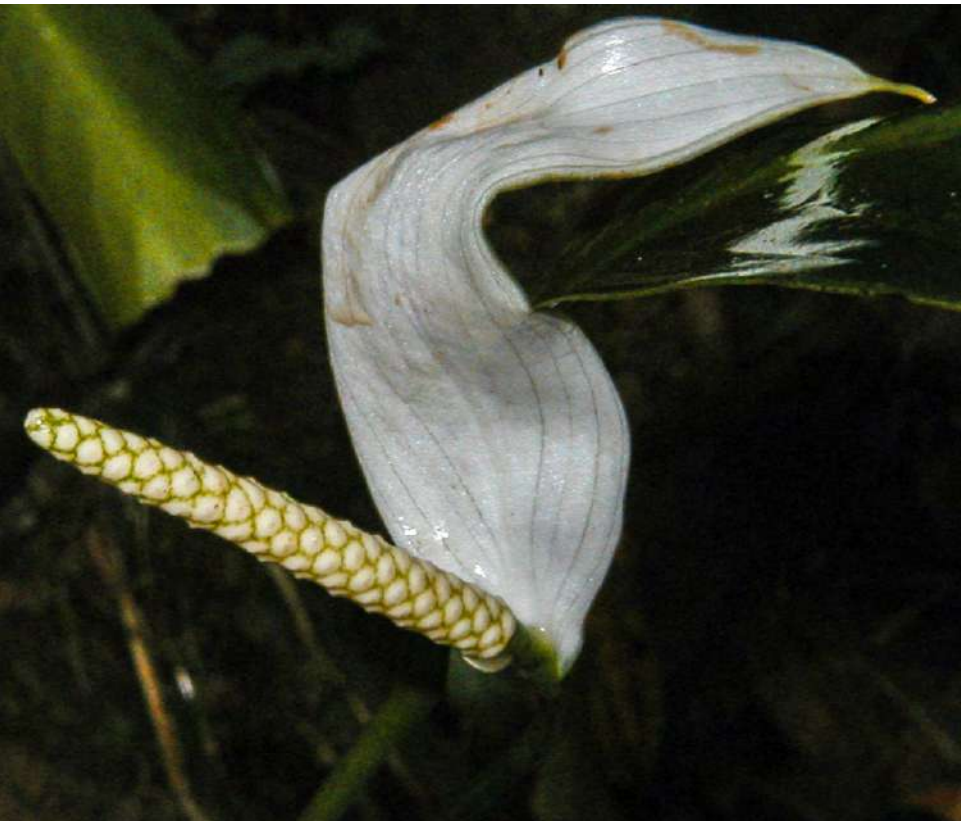


Figure 191: *Spathiphyllum patinii*, Close-up of inflorescence. Photo: F. Cardona



Figure 192: *Spathiphyllum patinii*, Cardona 1171, TYPE, Colombia



Figure 193: *Spathiphyllum patinii*, Callejas 3246, Colombia



Figure 194: *Spathiphyllum patinii*, Orozco 720, Colombia



Figure 195: *Spathiphyllum patinii* Orozco 614, Colombia



Figure 196: *Spathiphyllum patinii*, Sugden 547, Panama



Figure 197: *Spathiphyllum patinii*, Hartman 12297, Panama

or sometimes attenuate at base, marginally undulate, membranaceous, moderately bicolorous, dark green and matte, slightly velvety or sometimes glossy above, much paler, matte to weakly glossy below, drying grayish to dark brown, matte above, greenish to yellowish brown, weakly glossy below; midrib flattened and concolorous to slightly paler above, bluntly acute and slightly paler below; **primary lateral veins** ca. (4–)6–11 per side, departing midrib at 20–40°, drying darker than surface below; minor veins moderately obscure below. INFLORESCENCE erect, held among the leaves or slightly above the leaves; peduncle (13)27–45(62) cm long, terete; **spathe** 4.0–8.3(10.8) cm long, (0.6)1.2–2.3 cm wide, lanceolate to oblong-elliptic, erect-spreading to reflexed, narrowly long-acuminate at apex, acute to obtuse and clasping and weakly affixed at its narrow base, sometimes decurrent, white inside, often with acumens green, creamy white outside with green midrib; **spadix** 2.5–5.7 cm long, stipitate 0.3–1.2 cm, white or green with white pistils; flowers 2–3 visible per spiral; tepals yellowish green, speckled with purple-violet, free or sometimes confluent in age; **pistils** truncate at apex, white, obpyramidal, apically truncate, only the nipple-like stigma exceeding the perianth; ovary cream-colored, 3-locular. INFRUCTESCENCE to 8 cm long, smooth, creamy yellow to orange-brown or maroon; berries white, angular-spheroid, apically truncate; seeds 1 or 2 per locule, ovoid, surface verruculose, ridged and furrowed. **Figures 189–197.**

Distribution — *Spathiphyllum patinii* ranges from Panama (Darién, San Blas) to Colombia (Antioquia, Santander and Valle Departments) at (100)200–950(1400) m in *Tropical wet forest* to *Premontane rain forest* or rarely in *Tropical moist forest* life zones.

Comments — *Spathiphyllum patinii* is characterized by its small size, slender, flexible, weakly sheathed, brownish drying petioles, small, lanceolate-elliptic or oblong-elliptic, often greenish drying, narrowly long-acuminate leaf blades with few primary lateral veins as well as by the slender peduncle, the spreading, whitish, long-acuminate, narrowly lanceolate spathe which is weakly clasping and very narrow at base and the narrowly cylindrical, stipitate, white, cylindrical spadix with truncate, cream-colored pistils and white berries.

Spathiphyllum patinii is most similar to *S. floribundum* (Linden & André) N. E. Br. from Colombia. That species differs by having broader more elliptic blades with the primary lateral veins departing midrib at (45)60–70° and a spathe that is typically white to greenish white or pale green, reflexed to spreading, lanceolate to oblong-elliptic, 4–8(10.4) cm long, 1.2–3.0 cm wide, attenuate to cuspidate at apex, acute and broader at the base, usually subtruncate and clasping the peduncle.

Nomenclatural note — The basionym, *Anthurium patinii*, seems first to have appeared in a report of a Royal Horticultural Society meeting in London in November 1874 where an extremely brief description of the plant, displayed by the (predominantly orchid) botanist and horticulturalist B.S. Williams (1822–1890), was given: ‘a species with small white spathes’ (T. Moore & Masters, Gard. Chron., n.s., 2: 626. November 14, 1874). It is highly doubtful that so meagre a description can be considered sufficient to validate the name, which was then published in 1875 by Robert Hogg (loc. cit.) with more, and certainly validating, descriptive detail and reference to the aforementioned publication of the name the previous year. It was also published in the same year (1875) by Masters (loc. cit.) as a ‘new species’, again with validating descriptive detail. Priority is given to Robert Hogg’s valid publication of the name in the International Plant Names Index ([https://www.ipni.org/?q=Anthurium patinii](https://www.ipni.org/?q=Anthurium+patinii), accessed

17 March 2024), which we follow here. We take it that the name was originally coined by Williams, and therefore attribute it to B.S. Williams ex R. Hogg.

Additional Specimens Seen: **COLOMBIA. Antioquia:** Margen izquierda del Río Guatapé entre San Rafael y la Holanda, 950 m, 13 Oct 1981, *C.I. Orozco et al. 720* (COL); Remnants of recently cut forest along creek affluent to Río Guatapé, ca. 1.5 km from Presa Punchiná along road to Alto Samaná, Río Magdalena valley, 06°15'N 075°05'W, 870 m, 5 July 1986, *M.H. Grayum et al. 7612* (MO); Primary forest along Quebrada Negra, tributary to Punchiná reservoir, Río Guatapé (Río Magdalena valley), 06°15'N 075°05'W, 770–820 m, 6 July 1986, *M.H. Grayum et al. 7627* (MO); 1.5 km from Presa Punchina, along road to Alto Samana, remnant forest along creek to Río Guatapé, 870 m, *SEL 86-771* (MO); 1.5 km from Presa Punchina, along road to alto Semana, 870 m, 7 March 1991, *S.W. Ingram 869* (SEL); Río Claro, along hwy. between Pto. Triunfo and Medellín, along rocky cliffs and banks near the river S of the hwy., ca. 1 km., 05°53'52"N 074°51'29"W, 305 m, 8 May 1983, *T.B. Croat 56547* (MO); Gómez Plata, Cuenca del Río Porce, hacienda Vegas de La Clara, 06°37'N 075°15'W, 950 m, agosto 2003, *Felipe Cardona et al. 1171* (HUA, MO, NY); Cuenca del Río Porce, hacienda Vegas de La Clara., 06°37'N 075°15'W, 950 m, *Felipe Cardona et al. 1170* (HUA, MO); Maceo, 06°35'N 074°38'W, 500–900 m, abril 2001, *Felipe Cardona 1085* (HUA); San Luis, Parque ecológico, Cañón del río Claro, sector norte, margen derecha, 05°53'20"N 074°51'18"W, 325–400 m, 17 Aug 1983, *Álvaro Cogollo P. 706* (JUAM, MO); vereda Manizales, a orillas del Río Dormilón, 1400 m, 12 oct 1981, *C.I. Orozco et al. 614* (COL); San Luis, Corregimiento de El Prodigio, Caño el Tigre, 06°06'N 074°48'W, 350 m, 26 Jun 1990, *Dairon Cárdenas L. et al. 2886* (JAUM, MO); Río Claro, alrededores del refugio, 05°55'00"N 074°52'00"W, 500 m, 11 octubre 2003, *Felipe Cardona et al. 1186, 1187* (HUA, MO); San Luis, Región Río Claro, Refugio 3 hours SE of Medellín, via Medellín–Bogotá, bosque húmedo, 06°30'N 074°45'W, 800 m, 18 February 1987, *Ricardo Callejas 3246* (MO, NY); Valley of Río Claro, 27 km E of Entrada for San Luis, 53 km E of Río Calderas., 05°53'30"N 074°51'20"W, 500 m, 21 April 2007, *T.B. Croat & Felipe Cardona 97899* (MO); Tarazá, Corr. "El 12", via el 12 Barroblanco, 3 km S Barroblanco a lo largo de quebrada Purí, 07°28'N 075°24'W, 410 m, 11 Oct 1986, *Ricardo Callejas & Jacques Jangoux 2581* (HUA); **Santander:** 12 leguas al SE de Barranca Bermeja, 5 km de la margen derecha del Río Opón, 200 m, 20 Sep 1954, *R. Romero Castañeda 4860* (MO, US). **Valle del Cauca:** Calima-Valle., 50 m, 2 Aug 1975, *Castro 26* (CUVC); Nova Granata, *H.G.A. Engler 229* (MO, NY, US); between 1769 and 1808, *J.C.B. Mutis 1123* (MA, US). Bajo Calima, 03°53'36"N 077°04'11"W, 60 m, 26 Aug 1975, *Giraldo 19* (CUVC); Bajo Calima, 03°53'36"N 077°04'11"W, 50 m, 16 Aug 1975, *Ramirez 28* (CUVC); Cali, 1000 m, October 1968, *S.M. Giraldo s.n.* (JUAM). **PANAMA. Darién:** Parque Nacional del Darién, ridge between Río Topalisa and Río Pucuro, ca. 9–17 km E of Pucuro, 08°03'N 077°19'W, 450–900 m, 29 Oct 1987, *B.E. Hammel et al. 16581* (MO); W side of SW ridge leading to Alturas de Nique, headwaters of Río Coasí, 07°41'N 077°47'W, 350 m, 27 December 1980, *Ronald L. Hartman 12297* (MO); **Guna Yala:** Studies of evergreen lowland seasonal rainforest on the Aila Terrain (Río Acla), 08°48'30"N 077°40'30"W, 25–100 m, 11 March 1979, *A.M. Sugden 547* (MO).

Cultivated plants: UNITED STATES. **Missouri: Boone County :** plants cultivated at the greenhouse at the University of Missouri., 38°57'06"N 092°19'43"W, 740 ft, 12 DEC 1972, *R.R. Pries UMO 108137* (UMO).

Spathiphyllum phryniifolium Schott, Oesterr. Bot. Wochenbl. 7(20): 159. 1857. — Type: PANAMA. Isthmus of Panama, Chagres, January 1850, *A. Fendler* 425 (holotype, K).

Terrestrial herb in low, damp forests, often near streams; internodes short, 1–4 cm diam. LEAVES with **petioles** (15)69–90(105) cm long, sheathed 0.28–0.95 its length, sometimes to near the geniculum, tinged brownish pink; **sheath** 28–38 cm long, greenish white, margins weakly and narrowly crinkled, thin and undulate, usually acute to slightly rounded, sometimes weakly free-ending and inturred at apex (*Croat* 32980); free part of petiole 9–29 cm long, terete, sometimes oval and narrow-ribbed adaxially, medium green, weakly glossy; geniculum 1–3 cm long, sharply sulcate in apical 2/3; **blades** (17)22–77 cm long, (5)8–16(28) cm wide, 2.6–3.1(4.5) times longer than wide, 0.45–1.1 as long as petioles, typically lanceolate, sometimes oblong-elliptic, conspicuously inequilateral, gradually acuminate at apex, obtuse to subtruncate at base, thinly coriaceous to thinly subcoriaceous, dark green and semiglossy above, moderately paler and weakly glossy below, drying dark brown to greenish and matte to weakly glossy above, yellow-brown or rarely greenish and semiglossy below, margins minutely crinkled; midrib sunken and slightly paler above, thicker than broad and paler below, minutely speckled; **primary lateral veins** 20–25 per side, departing midrib at (40)55–70°, narrow and weakly sunken above, convex and slightly paler below; minor veins few, weakly visible. INFLORESCENCE slightly shorter than leaves; peduncle 1–3 times longer than blades, 35–90(128) cm long, tinged brownish pink; **spathe** cucullate, typically lanceolate, varying to oblong-elliptic, 10–26(33) cm long, 3–9(11) cm wide, usually 5–11(15) cm longer than spadix, attenuate at apex, oblique, subtruncate to cuneate and decurrent on peduncle at base 2.0–4.5(7.0) cm, medium green to dark green outside, yellow-green inside, tinged brownish pink toward margin, erect, slightly hooding; **spadix** 2.5–8.0(11.5) cm long, stipitate 0.4–1.3(2.0) cm; tepals free, yellow-green to green; **pistils** elongate-conic, medium green to pale green, acutely protruding; ovary (2)3-locular, ovules 1 or 2 per locule, affixed near base of locules; fruiting spadix rough; berries obovoid, green to white at maturity, conspicuously beaked; seeds typically as many as ovules, oblique-ovoid or reniform to oblong in profile, surface smooth or somewhat foveolate. **Figures 198–210.**

Distribution — *Spathiphyllum phryniifolium* ranges from Mexico to Belize, El Salvador, Guatemala, Honduras, Nicaragua, Costa Rica, Panama and northern Colombia and Venezuela at 0–1700 m elevation. The species was not previously reported for Venezuela but a single collection by A.H.G. Alston (#3812) from the Parque Nacional Henri Pittier above Guamitas at 800 m clearly fits the characteristics of this species. [The observation on this collection was made by the senior author but the collection is not in the exsiccatae].

Comments — *Spathiphyllum phryniifolium* is characterized by its frequently large size, the petioles sheathed variably from about 1/4th to nearly throughout with a greenish white, thin sheath margin which is weakly and narrowly crinkled or undulate. It has narrowly ovate, often greenish drying, typically lanceolate blades which are often obtuse or rounded or subtruncate at the base and 2.5–3.0 (4.5) times longer than broad as well as by its large, boat-shaped, green spathe and green spadix with berries maturing green or whitish and prominently beaked.



Figure 198: *Spathiphyllum phrynifolium*, Habit of flowering plant, O. Ortiz 2947. Photo: O. Ortiz



Figure 199: *Spathiphyllum phyrniifolium*, Habit, Panama. Photo: Ramón da Pena



Figure 200: *Spathiphyllum phrynifolium*, Croat 106229, Panama, Los Altos de Cerro Azul



Figure 201: *Spathiphyllum phrynifolium*, Close-up of inflorescence. Photo: Ramón da Pena



Figure 202: *Spathiphyllum phryniifolium*, Croat 106229, Panama, Los Altos de Cerro Azul



Figure 203: *Spathiphyllum phrynifolium*, Inflorescence, O. Ortiz 2947. Photo: O. Ortiz



Figure 204: *Spathiphyllum phrynifolium* Croat 79323-1 Orig. from Rio Grande, Colón, Panama. Photo in MBG greenhouse by: Randy Headrick

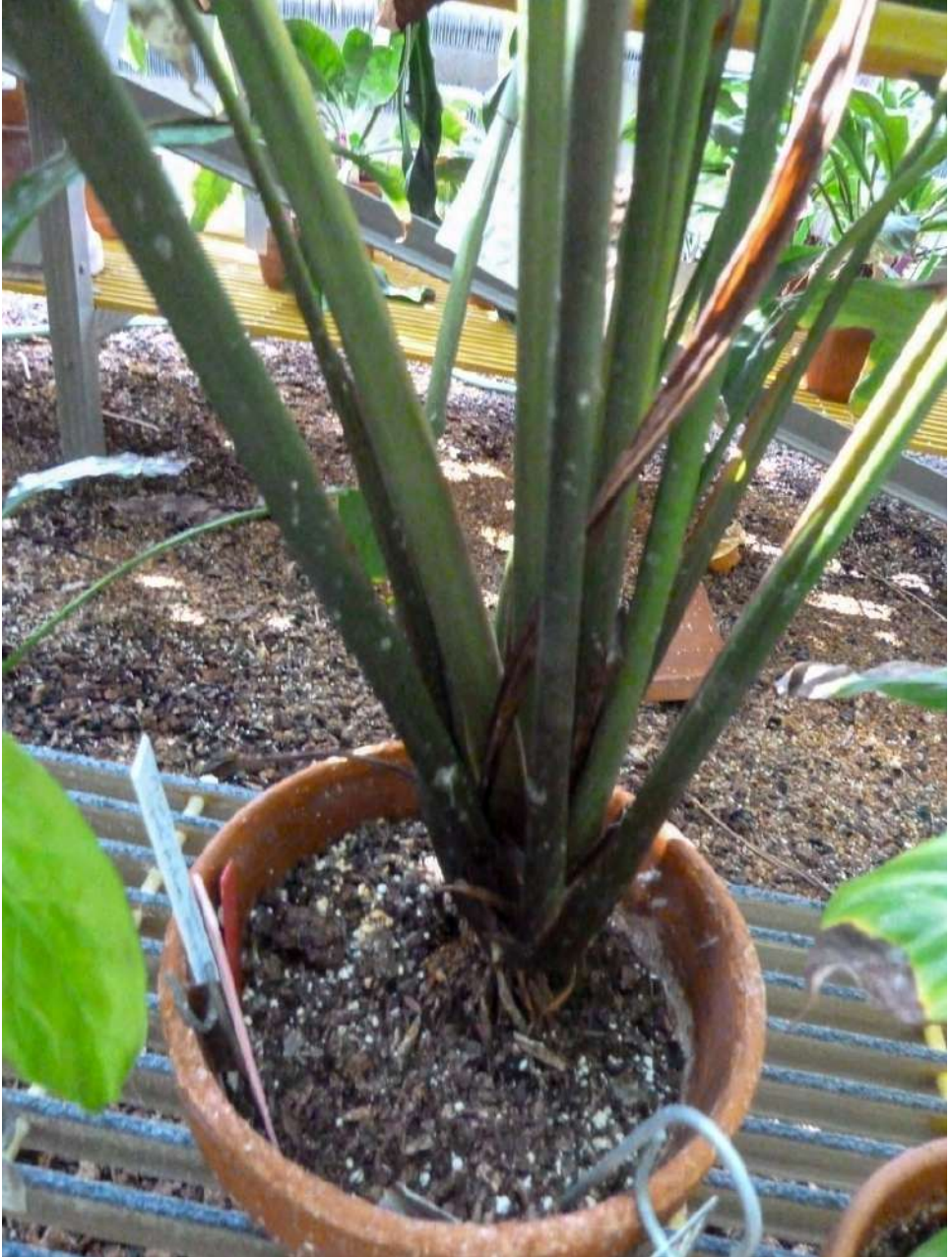


Figure 205: *Spathiphyllum phrynifolium*, Croat 79323, Orig. From Río Guanche, Colón, Panama, Photo in MBG greenhouse by: Randy Headrick



Figure 206: *Spathiphyllum phrynifolium*, Close-up of inflorescence, Croat 79323, Panama



Figure 207: *Spathiphyllum phrynifolium*, Croat 76227, Panama



Figure 208: *Spathiphyllum phrynifolium*, Croat 68729, Panama



Figure 209: *Spathiphyllum phrynifolium*, Davidse 32084, Belize



Figure 210: *Spathiphyllum phrynifolium*, Behrensohn 1323, El Salvador

Specimens from Belize and areas to the north of Nicaragua are often confused with *Spathiphyllum blandum*. That species differs by having a white rather than a green spadix. *Spathiphyllum phryniifolium* can be confused with *S. cochlearispathum* which also has both a green spathe and green spadix but that species differs in having sometimes a slightly paler spadix which may be described erroneously as white. Moreover, *Spathiphyllum cochlearispathum* can be distinguished by its very long geniculum, usually 4 to 5 cm long or more and the leaf blades which dry considerably blackened in contrast to *S. phryniifolium*.

Additional specimens seen: **BELIZE.** **Cayo:** Guacomallo bridge: 1.5 Miles S Guacomallo bridge, edge of track through jungle, 16°50'47»N, 089°02'37»W, 550 m, 28 August 1980, *Sutton, Tebbs, Whitefoord & Williams* 289 (BM). **Toledo:** Solomon Camp, vicinity of the junction of Richardson Creek and Bladen Branch, foothills of the Maya Mountains, 16°32'N, 088°45'W, 80–420 m, 5,7,9,12 March 1987, *G. Davidse & A.E. Brant* 32084 (MO); Maya Mountains, canyon along Bladen Branch from Richardson Creek to Quebrada de Oro, 16°31'N, 088°46'W, 100–200 m, 12 March 1987, *G. Davidse & A.E. Brant* 32368 (MO); Southern Maya Mountains, Bladen Nature Reserve, Ridge just south of the Main Divide of the Maya Mountains, “Augusta Divide Camp”, ridgetop, soils derived from volcanic rocks, 16°29'22»N, 088°59'33»W, 920 m, 22 May 1997, *G. Davidse & D.L. Holland* 36716 (BRH, MO). **COLOMBIA.** **Antioquia:** Salgar–El Dauró, along road from Salgar to El Dauró (Chocó) near border with Chocó; montane wet forest, 5°59'N, 76°07'W, 1830 m, 24 January 1990, *T.B. Croat* 69892 (MO); Carepa, Tulenapa, 7°48'N, 76°40'W, 100 m, 9 December 2002, *F. Cardona et al.* 1120 (HUA). **Chocó:** Acandí, Unguía, 100 m, 9 June 1976, *Forero et al.* 1986 (COL, MO); Nuquí, Corregimiento Arusí, Estación Biológica El Amargal, trail from station to Arusí, along side trail to Río Arusícito, 05°34'15»N, 077°30'01»W, 50–60 m, 22 June 2000, *T.B. Croat & M.M. Mora* 83710 (=Mora 328) (MO, COL). **COSTA RICA.** **Alajuela:** Bijagua, Canas–Upala, along road between Cañas and Upala, 8 km north of Bijagua, primary forest, 10°48'00»N, 085°03'00»W, 300 m, 26 June 1976, *T.B. Croat* 36497 (MO). **Cartago:** Forest along Río Reventazón behind main building, CATIE, Turrialba, elev. ca. 600 m, 09°54'N, 83°39'W, collected with Héctor, Hernández, Alina Chacón & Pam Sleeper, 09°54'00»N, 083°39'00»W, 600 m, 15 August 1984, *M.H. Grayum* 3819 (MO). **Guanacaste:** Parque Nacional Guanacaste Estación Mengo, sendero al potrero, lado sur, 10°54'36»N, 085°27'36»W, 1100 m, 15 July 1989, *II INBio* 184 (MO); Parque Nacional Rincón de la Vieja, the SE slopes of Volcán Santa María, above Estación Hacienda Santa María, evergreen montane forest, 10°46'48»N, 085°18'36»W, 900–1200 m, 27 January 1983 – 28 January 1983, *G. Davidse, L.D. Gomez, M. Sousa, C.J. Humphries, N. Garwood, R. Hampshire & M. Gibby* 23393 (MO); Parque Nacional Guanacaste Estación Maritza, trail from Maritza to Cerro Cacao, tropical dry forest transitional to moist forest, 10°57'00»N, 085°28'48»W, 600 m, 31 August 1990, *J.C. Solomon* 19100 (INB, MO); Secondary forest northwest of Lake Arenal, 13 July 1965, *T.B. Croat* 258 (MO); Parque Nacional Guanacaste, Parque Nacional Guanacaste La Cruz 9 Km al sur de Santa Cecilia Estación Pitilla, 10°59'24»N, 085°25'12»W, 700 m, 28 September 1990, *Carlos Chávez en el curso II de Parataxónomos* 211 (CR, MO); Parque Nacional Guanacaste, Parque Nacional Guanacaste La Cruz 9 Km al sur de Santa Cecilia Estación Cacao, 10°55'12»N 085°28'12»W, 085°25'12»W, 700 m, 03 October 1990, *Carlos Chávez en el curso II de Parataxónomos* 211A (CR); Parque Nacional Guanacaste, Estación Mengo, sendero al potrero, 10°54'36»N, 085°27'36»W, 1100 m, 15 July 1989, *INBio* 184 (MO). **Heredia:** La Selva Biological Station, 10°26'00»N, 84°01'00»W, 50 m, 30 August 1996, *T.B. Croat* 78728 (CM, INB, MO, NY); La Selva, Finca La Selva, the OTS field station on the Río

Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 084°00'13"W, 100 m, 31 May 1981, *B.E. Hammel & J. Trainer 10773* (MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 084°00'13"W, 100 m, 28 June 1981, *B.E. Hammel 10929* (MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 084°00'13"W, 100 m, 1 July 1981, *B.E. Hammel 10937* (MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 084°00'13"W, 100 m, 6 August 1981, *B.E. Hammel & J. Fraser 11105* (MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N, 084°00'13"W, 100 m, 22 September 1980, *B.E. Hammel 9812* (MO). **Limón:** Parque Nacional Tortuguero Estación Cuatro Esquinas, Cerro Tortuguero, bosque primario y secundario, 10°34'48"N, 083°30'36"W, 119 m, 3 July 1990, *Ulises Chavarría en el curso II de Parataxónomos 113* (MO); South end of Lomas de Sierpe, NE of terminus of road from Villa Franca, 10°19'N, 83°34'W, collected with Brian Jacobs, George Schatz and Pam Sleeper, 10°18'36"N, 083°33'36"W, 40 m, 18 July 1984, *M.H. Grayum 3521* (MO); In and around large swamp at Manzanillo de Talamanca, elev. ca. 5 m. 9°38'N, 82°39', northwestern end of swamp, 09°37'48"N, 082°39'00"W, 5 m, 2 November 1984, *M.H. Grayum & W. Burton 4350* (MO); 7 km SW of Bribrí, 09°35'24"N, 082°52'12"W, 100–250 m, 4 May 1983, *L. Gómez et al. 20403* (INB, MO). **Puntarenas:** Along Quebrada Benjamín, ca. 2 km NW of Palmar Norte, 8°58.5'N 83°28'W 100–300 m, 08°58'12"N, 083°27'36"W, 100–300 m, 24 May 1986, *M.H. Grayum, B.E. Hammel & G. de Nevers 7544* (MO); Along N fork (known locally as "Quebrada Mona") of Quebrada Bonita, Carara reserve, 09°46'48"N, 084°36'00"W, 35–40 m, 11 June 1986, *M.H. Grayum, P. Sleeper & R. Sleeper 7596* (MO); Parque Nacional Corcovado Sirena Río claro trail, 08°27'36"N, 083°34'48"W, 0–200 m, 3 July 1991, *Piero Delprete 5155* (MO); Parque Nacional Corcovado Lower Lookout Trail, 08°27'00"N, 083°33'00"W, 10 m, 31 July 1988, *C. Kernan 734* (MO); Parque Nacional Corcovado Sirena, Monkey Woods, 08°27'00"N, 083°33'00"W, 0 m, 7 April 1988, *C. Kernan 378* (MO); Parque Nacional Corcovado, Sirena station, in primary forest on ridge E of station (Olla trail) and secondary woods N of station (*Anacardium* trail), 08°28'48"N, 083°33'36"W, 5 m, 5 April 1988, *B.E. Hammel & C. Kernan 16658* (MO); Interamerican Highway km marker 122, patch of forest west of road, 10°03'N, 84°45'W, 100 m, 4 August 1985, *B.E. Hammel & J. Trainer 14366* (MO); 2–4 km N of Sta. Elena, near Monteverde Reserve, 10°20'24"N, 084°49'12"W, 1500–1600 m, 5 May 1984, *H. Murphy, & D. Whetstone 873* (DUKE); Las Cruces Tropical Garden, San Vito de Java, cultivated at Waimea as 89–p179, 08°47'24"N, 082°57'00"W, *T.B. Croat 75200* (MO); Parque Nacional Corcovado, Sirena, Pavo trail to old airstrip, 08°27'36"N, 083°34'48"W, 1–50 m, 21 June 1989, *C. Kernan & P. Phillips 1171* (CR, MO); Coto Brus, Reserva de la Biosfera de la Amistad, Reserva de la Biosfera de la Amistad, Cerca Estación Biológica Las Alturas de Coton, 08°55'48"N, 082°49'48"W, 1900 m, 8 July 1994, *Kress & Dew 94-4065* (US). **San José:** Zona Protectora La Cangreja Slopes on W side of Quebrada Grande, ca. 1.5 km NNE of Mastatal de Puriscal, 09°41'24"N, 084°21'36"W, 400 m, 23 July 1988, *M.H. Grayum, María Marta Chavarría & Nelson Zamora 8647* (MO); Cantón de Pérez Zeledón along Carretera Interamericana between km 122 and km 123, vicinity of La Ese, 09°26'24"N, 083°42'36"W, 1200–1300 m, 19 August 1990, *M.H. Grayum, H. Kennedy & N. Murakami 9948* (MO); Cerros de Puriscal, Z.P. La Cangreja, Santa Rosa de Puriscal, bosque primario en las faldas de Fila La Cangreja, 09°41'24"N, 084°22'48"W, 500 m, 27 August 1992, *J.F. Morales 540* (CR); Vazquez de Coronado, Braulio Carrillo National Park, along Hwy. San José to Siquierres Hwy, along trail to Río Sucio, site of the Old Carillo Station, 10°09'50"N, 83°57'10"W, 600–700

m, 30 August 1996, *T.B. Croat* 78773 (CAS, CM, CR, ENCB, INB, MEXU, MO, SEL). **ECUADOR. Pichincha:** Rio Palenque, cultivated at Selby Gardens SEL account 77-2213, 16 August 1985, *T. Plowman* 14112 (F). **EL SALVADOR. Ahuachapán:** El Imposible, bosque el Pacayal, Quebrada el Pacayal, 13°52'N, 89°59'W, 400 m, 11 December 1990, *Berendsohn et al.* 1323 (MO); P.N. El Imposible, San Benito, río Aguachapío al E del nac., 13°49'N, 89°56'W, 3 February 1993, *Sandoval & M. Sandoval s.n.* (B, LAGU, MO). **GUATEMALA. Izabal:** Modesto Mendez, 1 km N of Modesto Méndez, rainforest along N side of Río Gracias a Dios, 15°54'13"N, 089°13'48"W, 10 m, 26 June 1970, *W.E. Harmon & J.D. Dwyer* 2674 (UMO 97791). **HONDURAS. Colón:** Trujillo, Puerto Arturo, Pat O'Mara's property, lower slopes of [Cerro de] Puerto Arturo, 15°54'27"N, 085°56'51"W, 18 January 1981, *J. Saunders* 897 (MO). **Copán:** Dulce Nombre de Copan, 3 km south of Dulce Nombre de Copán, mixed secondary forest in ravine, 1000 m, 30 December 1973, *L.O. Williams, Antonio Molina R, Terua P. Williams & Albertina de Molina* 42980 (MO). **MEXICO. Chiapas:** Berriozábal, limestone fissured ridge, lower montane rain forest, *Quercus*, *Billia*, *Persea*, *Nectandra*, *Mirandaceltis*, *Turpinia* and *Calatola*, 13 km north of Berriozábal near Pozo Turipache and Finca El Suspiro, 900 m, 21 April 1972, *D.E. Breedlove* 24790 (MO); Venustiano Carranza, wooded slope at Rancho Nacimiento along the road between Chiapilla and San Lucas, 16°34'48"N, 092°43'12"W, 2000 ft, 25 February 1966, *Laughlin R.M.* 286 (DS); Villa Corzo, steep slopes with *Pinus*, *Quercus* and *Liquidambar* and montane rain forest at the east base of Cerro Tres Picos near Cerro Bola along a logging road southwest of Colonia Agronomos Mexicanos, 1500 m, 9 February 1972, *D.E. Breedlove* 24072 (MO). **Oaxaca:** Putla, Putla de Guerrero, Pinotepa Nacional–Tlaxiaco, along Highway 125 between Pinotepa Nacional and Tlaxiaco ca. 8.4 mi S of Putla de Guerrero, [Originally reported from State of Guerrero], 16.57N 097.55.12W, 1000 m, 16 January 1979, *T.B. Croat* 45806 (MO). **NICARAGUA. Chontales:** 4 km NNW of Cuapa, ridgetops and summits of Cerro Oluma; cloud forest, 12°18'00"N, 085°23'30"W, 700–775 m, 23 September 1983, *M. Nee* 28434 (MO); Cerro Oluma. remnant wet premontane forest near top of Cordillera Amerisque, 12°18'N, 85°24'W, 840 m, 3 January 1984, *Al Gentry, W.D. Stevens, A. Grijalva & P.P. Moreno* 43911 (MO); 5 km N of Cuapa, Cerro Buenavista; premontane moist forest, cloud forest like in appearance [Seymour series], 12°17'N, 085°22'W, 700 m, 14 July 1976, *D.A. Neill* 653 (7480) (MO, UCA). **Jinotega:** Municipio de Wiwili. Reserva Cerro Kilambé, 13°33'N, 085°41'W, 1100–1200 m, 29 Agosto 2000, *R. Rueda, M. Garmendia y N. Toval* 14665 (HNMN); *R. Rueda, M. Garmendia & N. Toval* 14768 (MO); Municipio de Bocay. Reserva Natural Kilambé, 13°34'N, 085°39'W, 1200–1700 m, 12 January 2001, *R. Rueda, D. Paguaga, H. Mendoza, A. Rivera, N. Toval & M. Garmendia* 15669 (MO). **Nueva Segovia:** Along Río Solonlí (or Río Arriba de Jalapa), ca 5 km N of Jalapa; gallery forest and riverine vegetation, 13°57'N, 086°08'W, 700–950 m, 5 April 1977, *D.A. Neill* 1650 (MO). **Río San Juan:** 1.5 km W of (above) and 0.5 km N of Delta, Río San Juan, 10°47'N, 083°47'W, 0–20 m, 13 September 1982, *Rivière, R.* 319 (MO). **Zelaya:** Cerro Baká, ca 6.5 km E of Río Coperna; lower mountain slopes and secondary areas, 13°40'N, 84°30'W, 200–320 m, 19 March 1979, *J. Pipoly* 4953 (MO); Along the road ca 2 km W of Nueva Guinea. Elev. ca. 200 m. 11.42°N, 84.26–27°W. Tropical wet forest, 11°42'N, 84°27'W, 200 m, 21 August 1983, *J.S. Miller & Juan Carlos Sandino* 1229 (MO); "Kurinwacito"; 13°08'N, 84°55'W, elev. aprox. 80 m, 13°08'N, 84°55'W, 80 m, 30 April 1984, *Pedro P. Moreno* 23971 (MO, US); Municipio de Rositas. Cerro Banacruz, 13°48'N, 084°24'W, 200–350 m, 10 julio 1997, *Ricardo Rueda & Indiana Coronado* 6652 (MO). **Atlántico Norte:** Camino a Limbaika, ca 5 km al SE de El Empalme; bosque húmedo tropical, 13°30'30"N, 84°15'35"W, 100 m, 27

Octubre 1982, *A. Grijalva & F. Bustos 1625* (MO). **PANAMA. Bocas del Toro:** Along road to Chiriquí Grande, c. 8°48'N, 82°10'W. Forested slopes c. 700 m, 8°48'N, 82°10'W, 700 m, 30 April 1986, *G. McPherson 9150* (MO); Along pipeline road in area of Fortuna Dam, c. 8°48'N, 82°15'W. Forested slopes 900–950 m near end of road, 8°48'N, 82°15'W, 900–950 m, 8 March 1986, *G. McPherson 8693* (MO); Fortuna Dam area. Oleoducto Road near Continental Divide. Forest near road. Alt. 1000 m. 8°48'N, 82°12'W, 8°48'N, 82°12'W, 1000 m, 7 February 1984, *H.W. Churchill, G. de Nevers & H. Stockwell 4702* (MO); Bocas & Chiriquí. Cerro Colorado mine area; in elfin woods on divide road, along trail into Bocas and in woods on Pacific slope; from Chami station to ca. 9 miles along road, 8°35'N, 81°54'W, 1100–1750 m, Mar/27–31/1986, *BE. Hammel & J. Trainer 14973* (CM, MO); *B.E. Hammel & J. Trainer 14931* (MO); Shepherd Island, vicinity of Chiriquí Lagoon, 17 Sept 1941, *H. von Wedel 2690* (MO); Forest on hill above RR station at Milla 7.5, 27 July 1971, *T.B. Croat & D.M. Porter 16386* (MO); Forest above RR stop at Milla 7.5, 26 July 1971, *T.B. Croat & D.M. Porter 16248* (MO); Vicinity of Chiriquí Lagoon. Old Bank Isl, 11 February 1941, *H. von Wedel 2068* (MO); Vicinity of Chiriquí Lagoon, 17 September 1941, *H. von Wedel 2688* (MO); Chiriquí Grande: Chiriquí Grande - Fortuna, Along road between Chiriquí Grande and Fortuna, 13.2 mi W of Chiriquí Grande, 8°45'N, 82°10'W, 310 m, 9 March 1985, *T.B. Croat & Michael H. Grayum 60144* (MO); Isla Escudo de Veraguas: north coast of Escudo de Veraguas Island, 09°06'N, 081°33'W, 5 m, 8 August 1987, *G. McPherson 11432* (MO). **Canal Area:** Barro Colorado Island, 09°09'N, 079°51'W, 10–100 m, 3 August 1940 – 20 August 0940, *R.E. Woodson Jr. & R.W. Schery 968* (MO); Barro Colorado Island, Thomas Barbour Trail, 09°09'30"N, 079°49'20"W, 10–100 m, 25 June 1971, *T.B. Croat 15113* (MO); Barro Colorado Island, Allison Armour Trail, 09°09'10"N, 079°51'30"W, 10–100 m, 24 July 1971, *T.B. Croat 16217* (MO); Barro Colorado Island, 09°09'47"N, 079°50'14"W, 20 m, 30 April 1970, *T.B. Croat 10118* (MO); Gatun Locks–Ft. Sherman, Along road between Gatun Locks and Ft. Sherman, 1.4 mi E of Ft. Sherman, elevation less than 30 m, lowland forest with elevated ridges, 9°18'N, 79°38'W, 20 January 1990, *T.B. Croat 69862* (MO); Vicinity of Curundu Housing area of Albrook Air Force base, Parque Metroropolitano, 08°58'00"N, 79°32'55"W, 17 June 1994, *T.B. Croat & G. Zhu 76201* (MO, HUA); Along road between Gatun Locks and Fort Sherman, ca 1 mi E of Fort Sherman, 09°19'00"N, 79°57'30"W, < 25 m, 20 June 1994, *T.B. Croat & G. Zhu 76273* (MO); Navy Pipeline Road, 11 km from gate at Gamboa; secondary forest; tropical moist forest, 300 ft, 5 March 1976, *T.B. Croat 32980* (MO); Barro Colorado Island. Nemesia Trail 400. At edge of trail, 7 December 1967, *T.B. Croat 4152* (MO); Low forested area near Summit Hills Golf Course, 20 June 1970, *T.B. Croat 10967* (MO); Vicinity of Ft. Sherman Front Gate; strand vegetation; collected with Botany 432 Class from Washington University, 8 April 1971, *T.B. Croat 14152A* (MO); Barro Colorado Island: Barbour Trail 9–10, 22 July 1970, *R.L. Dressler 3876* (MO); Barro Colorado Island. B-L Trail 100, 25 May 1968, *T.B. Croat 5870* (MO); Barro Colorado Island, Gatún Lake. Along William Morton Wheeler Trail, 09°09'25"N, 079°51'30"W, 0–170 m, 08 August 1940 – 10 August 1940, *H.H. Bartlett & Tobias Lasser 16726* (MO); Barro Colorado Island. James Zetek Trail, 09°09'31"N, 079°52'05"W, 10–100 m, 12 June 1971, *T.B. Croat 14976* (MO); Barro Colorado Island. William Morton Wheeler Trail, 09°09'20"N, 079°51'10"W, 10–170 m, 29 July 1970, *T.B. Croat 11657* (MO); Barro Colorado Island: David Fairchild Trail, 09°09'50"N, 079°50'15"W, 10–100 m, 24 June 1960, *John E. Ebinger 163* (MO); Barro Colorado Island. Barbour-Lathrop Trail, 09°09'30"N, 079°49'25"W, 10–100 m, 30 June 1971, *T.B. Croat 15174* (MO); Barro Colorado Island. William Morton Wheeler Trail,

09°09'20"N, 079°51'10"W, 10–170 m, 27 August 1971, *T.B. Croat 17050* (MO); Barro Colorado Island. William Morton Wheeler Trail near Tower Clearing, 09°09'22"N, 079°50'55"W, 160 m, 19 June 1970, *T.B. Croat 10930* (MO); Barro Colorado Island. Barbour-Lathrop Trail, 09°09'30"N, 079°49'25"W, 10–100 m, July 1931, *D.E. Starry 326* (MO). **Chiriquí:** Boquete, Boquete, along shaded brook, 1170–1270 m, 21 May 1971, *G.R. Proctor 32000* (LL, MO); Ca 5 km N of Fortuna Dam, trail along Continental Divide, 08°45'N, 082°15'W, 1200–1300 m, 25 April 1988, *S.A. Thompson 4956* (MO); Al norte del sitio de presa de Fortuna, en el bosque al frente del campamento a la otra orilla del río Chiriquí, 08°45'N, 082°15'W, 1000–1200 m, 24 September 1976, *M.D. Correa A., R. Dressler, N. Salazar, J. Mendieta, C. Garibaldi, F. Farnum, & T. Béliz 2664* (MO, PMA); Fortuna Dam Area. Stream to W of road near Quebrada Bonito. Alt. 1100 m. 8°45'N, 82°13'W, 8°45'N, 82°13'W, 1100 m, 2 April 1984, *H.W. Churchill 5005* (MO); Fortuna Dam area; N of reservoir, ridge along Continental Divide and southward from Quebrada de Arena, 1100–1500 m, August 1984, *W.G. D'Arcy & C. Todzia 15965* (MO); Boquete area, ca. 18 km NW of Boquete; in woods along Río Caldera and slopes above; on road past Horqueta, 8°51'N, 82°29'W, 1600–1700 m, Feb/08/1986, *B.E. Hammel, M.H. Grayum, G. McPherson & A. Smith 14413* (MO); Top of the mountain above and S of the Fortuna Dam site, 1700 m, 11 September 1977, *J.P. Folsom, R. Dressler & K. Dressler 5262* (MO); Along road from Gualaca to Fortuna dam site, 5.9 mi NW of Los Planes de Hornito, 08°43'N, 082°15'W, 1370 m, 9 April 1980, *T.B. Croat 49882* (B, CAS, K, MO); Forest behind Vivero Forestal, 9 miles N of Los Planes de Hornito, IRHE Fortuna Hydroelectric Project, Premontane rainforest, 08°45'N, 082°12'W, 1000 m, 13 March 1982, *S. Knapp, W.J. Kress & B. Hammel 4095* (MO); Near site of dam, lower slopes of Cerro Fortuna, IRHE Fortuna Hydroelectric Project, Premontane rainforest, 1150 m, 18 June 1982, *S. Knapp & M. Vodicka 5587* (MO); Along road between Gualaca and the Fortuna Dam site, at 10.1 mi NW of Los Planes de Hornito, 1300 m, 8 April 1980, *T. Antonio 4064* (MO); Disturbed cloud forest at Monte Rey above Boquete, 21 July 1971, *T.B. Croat & D.M. Porter 15688* (MO); Camp Hornito, Camp Hornito, Fortuna Dam site, 08°44'N, 082°18'W, 1000–1200 m, 13 August 1976, *R.L. Dressler 5352* (MO); Camino hacia la finca Landau, N.E. del camp. de Fortuna, 1100 m, 13 August 1976, *M.D. Correa et al. 2361* (PMA); Fortuna Dam, Vicinity of Fortuna Dam in valley of Río Chiriquí; along aqueduct to water source for IRHE facilities at dam, 8°45'N, 82°18'W, 1200–1300 m, 20 June 1987, *T.B. Croat 66534* (MO). Boquete. Chiqueío: Rain forest, 5500 ft, 11 April 1938, *D.E. Davidson 565* (MO, US). **Cocle:** Vicinity of El Cope, 4.1 mi N of village in vicinity along road which leads down into lowlands, straight ahead of the end of the saw mill grounds, 08°39'N, 80°36'W, 680–770 m, 25 March 1993, *T.B. Croat 74841* (B, MO, VDB); Alto Calvario above El Copé, ca 6 km N of El Copé; atlantic slope, along trail which leads W off old lumber trail which leads down to Las Ricas, Limón and San Juan, 08°39'N, 080°36'W, 710–800 m, 22 June 1988, *T.B. Croat 68729* (MO); Vicinity el Valle de Antón, at forested flat area near Finca Macarenita at La Mesa, 08°36'N, 80°07'W, 800 m, 6 July 1994, *T.B. Croat & Guanghua Zhu 76698* (MO); El Potroso, Summit of Mt. Mist Forest, along mountain ridge, trees fairly short on the ridge top, but not slopes, forgotten works, Alto Calvario, 1 February 1977, *J.P. Folsom & L. Collins 1547* (MO); Eastern slopes of Caracoral, ca. 3 km NE of El Valle on road to Mata Ahogada, 700 m, 15 June 1975, *Scott Mori, K. Dumont, S.E. & S.M. Carpenter 6645* (MO); North rim of El Valle, 4 June 1939, *A.H.G. Alston & P.H. Allen 1850* (MO). **Colón:** Río Guanache, between Puerto Pilón and Portobello; ca. 1.5 mi S of road, 09°27'N, 79°40'W, < 100 m, 19 June 1994, *T.B. Croat & Guanghua Zhu 76227* (MO, HUA); Santa Rita ridge; 8 miles

from trans-isthmian highway; in primary forest along small stream, slopes N of rd, 9°25'N, 79°40'W, 420 m, Feb/02/1986, *B.E. Hammel, G. McPherson & M. Merello 14385* (MO); Santa Rita ridge road; ca. 22 km from transisthmian highway; in forest on ridges, slopes and draws near end of road, 9°25'N, 79°40'W, 500 m, Feb/17–18/1986, *Barry Hammel, G. McPherson & D. Roubik 14481* (MO); Along Río Guanache, 3–5 km above bridge on Colón-Portobello Road, 09°30'N, 79°30'W, 30–100 m, 22 September 1996, *T.B. Croat 79323* (B, F, K, MO, PMA, TEX, VDB, US, WU); Río Boqueron–Río Escandaloso, Trail from head waters of Río Boqueron back to fork with Río Escandaloso, area route of abandoned railroad, wet forest, 250–500 ft, 21 July 1978, *Barry Hammel 3985* (MO); Distrito de Donoso: Campamento Botija, camino a río Medio, al 60° SE de Botija, 10 Julio 1996, *J. Polanco et al. 1929* (MO); Portobelo - Nombre de Dios, Along road between Portobelo and Nombre de Dios, 1.2 mi. beyond the junction of the road to Isla Grande. Virgin forest on slopes above the road, 09°36'N, 079°35'W, 5 April 1980, *T.B. Croat 49789* (MO); Guanache, 14 March 1996, *FLORPAN: C. Guerra & D. Luque 2493* (MO, PMA); Santa Rita lumber road, east of Colón, 10 July 1969, *R.L. Dressler 3660* (MO); Along Río Guanache about 1–2 km from Portobelo Highway toward Cerro Bruja. Tropical wet forest, 0–50 m, 11 April 1982, *M. Huft & S. Knapp 1797* (MO).

Darién. Alturas de Nique: Nique - Coasi, W side of SW ridge leading to Alturas de Nique, headwaters of Río Coasí, 07°37'N, 077°45'W, 500 m, 27 December 1980, *Ronald L. Hartman 12272* (MO); 110 mi. from Bayano Dam Bridge. Vicinity of Canglon. Trail to the south from road to good forest, 50 ft, 14 May 1980, *Thomas M. Antonio 4603* (MO); Near Rompío, about 1 hour walk up Río Sambú from Puerto Indio, 29 April 1976 – 30 April 1976, *R.L. Dressler 5305* (MO); North slope of Cerro Pirre, S of El Real; flowered in cultivation 10 April 1978, 375 m, *Robert L. Dressler s.n.* (MO); Ensenada El Guayabo: El Guayabo–Jacque, ridge to the NE of Ensenada El Guayabo, along trail to Río Jaqué, tropical wet forest, 07°27'N, 078°03'W, 0–300 m, 23 January 1982, *S. Knapp & J. Mallet 3046* (MO); Pirre, Rancho Frio, Vicinity Cerro Pirre, along trail from base camp to Rancho Frio on slopes of Cerro Pirre, 07°58'N, 77°43'W, 200–450 m, 27 July 1994, *T.B. Croat & G. Zhu 77153* (CAS, MO, WU).

Los Santos: Loma Prieta, Cerro Grande. Cloud forest and disturbed margins, 2400–2800 ft, 8 June 1967, *W.H. Lewis, R.K. Baker, B. MacBryde & R.L. Oliver 2206* (MO).

Panamá: Cartí Road, 15 km from main road, 1000 ft, *B.E. Hammel & J. Kress 13394* (DUKE); Guna Yala (formerly San Blas) Nusigandi, along El Llano–Cartí Road, 0.7 mi beyond Cuna Headquarters, located 10.9 mi N of Pan-American Highway, 11.6 mi N of Pan-American Highway, 09°18'N, 79°59'W, 450 m, 3 April 1993, *T.B. Croat 75133* (CM, MO); Cerro Jefe Region; 0.8 mi beyond turn-off to Altos de Pacora (near branch in road to antennas to Cerro Jefe), 09°15'N, 79°29'W, 770 m, 4 July 1994, *T.B. Croat & G. Zhu 76643* (MO); Trail behind Peluca meteorological station. Old secondary forest, mature, 25 March 1973, *H. Kennedy & R.L. Dressler 2985* (MO); Vicinity of Cerro Jefe, Altos de Cerro Azul subdivision, Municipio Chilibré, 09°12'13"N 079°24'47"W, 3 March 2015, *T.B. Croat & Harrison 106229* (MO); Piria–Cañasas trail near Piria, elev. ca. 100 m, 100 m, 22 September 1967, *J.A. Duke 14353* (MO); From Torti to the Pilota del Toro, the Mt. overlooking Torti Arriba, 27 August 1977, *J.P. Folsom, Gregorio Alonzo & relatives 5117* (MO); Vicinity of Cerro Campana, along trail near tower, 3000 ft, 29 May 1980, *Thomas M. Antonio 4853* (MO); Tocumen Marsh, SE of Aeropuerto Omar Torrijos H. Marshes and second growth, 09°05'N, 078°27'W, 0 m, 3 May 1982, *S. Knapp 4938* (MO); About 3–4 miles upstream on Río Pasiga, semideciduous forest, 28 October 1971, *H. Kennedy 1196* (MO); Cerro Azul. Roadside woods and thickets, 24 March 1969, *D.M. Porter, J.D. Dwyer, L.H. Durkee, M.R. Crosby, T.B. Croat, J.R. Castillon, &*

R.K. Baker 4095 (MO); Cerro Azul, 2000 ft, 1 September 1963, *J.D. Dwyer 3112* (MO); Cerro Campana, montane rain forest, 08°40'N, 079°55'W, 2700–2800 ft, 11 June 1971 – 12 June 1971, *Grady L. Webster & Gary Breckon 16495* (MO); Road from El Llano to Cartí, the deep ditch; 12.4 km north of Pan- American Highway, 300–400 m, 31 October 1977, *J.P. Folsom, Gordon Small, & Kim (ABCI student) 6181* (MO); Cerro Campana at end of road beyond Su Lin Hotel; growing in open area, 9 April 1971, *T.B. Croat 14215* (MO); Cerro Campana, 31 December 1939, *P.H. Allen 2090* (MO); Near Chimán; flowered in cultivation 8 June 1976, *Robert L. Dressler s.n.* (MO); Cerro Jefe, forest near river, 700 m, 17 July 1969, *Robert L. Dressler 3676* (MO); Cerro Campana, 24 June 1969; 22 February 1969, *Robert L. Dressler s.n.* (MO); La Eneida, region of Cerro Jefe, 3 March 1973, *Robert L. Dressler 4289* (MO); El Llano–Cartí highway, 8–10 km north of El Llano, 31 August 1974, *Robert L. Dressler 4706* (MO); Tocumen, 26 June 1963, *John D. Dwyer 4014A* (MO). Capira: Orillas del Río Perequeté, Región conocida como La Pita, 24 May 1970, *R. Villamil 10* (MO). Chepo: El Cantar, hacia el norte, Cerro Azul, P.N. Chagres. Sendero del Tube PVC, lateral al sendero, 21 Mayo 1992, *L. Carrasquilla & V. Moreno 3392* (MO). **San Blas:** Playon Chico, road to Isisukun, 9°20'N, 78°13'W, 0–10 m, 26 November 1989, *Herrera 588* (MO); (Comarca de Guna Yala); Nusigandí, El Llano–Cartí Road, between Nusigandí and 1 mi N of Nusigandí, 09°20'N, 79°00'W, 275–300 m, 2 July 1994, *T.B. Croat & Guanghua Zhu 76589* (MO); Mainland opposite Playon Chico, 0–3 mi from Caribbean, 0–200 m, 4 October 1972, *Al Gentry 6375* (MO); Rio Cangandi, camino entre el pueblo Cangandi y el aeropuerto de Mandinga, 09°27'N, 079°07'W, 0–20 m, 7 September 1987, *Heraclio Herrera 356* (MO); Forest southeast of Puerto Obaldia, 18 August 1971, *T.B. Croat 16787* (MO); Playon Chico: Tierra firme frente a Playón Chico, camino a Isisukun, 9°20'N, 78°13'O, 0–10 m, 26 November 1989, *H. Herrera 588* (MO). **Veraguas:** Azuero Peninsula: Mountains of southern Azuero Peninsula, near proposed route of road from El Cortezo (Prov. Los Santos) to Arenas (Prov. Veraguas) Azuero (Veraguas Prov.), “El Pavo” ridge above river Los Changuales, ca 10 km SW of El Cortezo, Los Santos, 1500–2000 ft, 28 October 1978, *Barry Hammel 5448* (MO); Cerro Tute; E slopes; 1 km beyond Escuela Agricola Alto Piedra above Santa Fé; low cloud forest, 900–1200 m, 14 May 1981, *K. Sytsma & L. Andersson 4712* (MO); Trail between Cañazas and the foot of the Cordillera Central, headwaters of Río Cañazas, 300–600 m, 8 February 1937, *P.H. Allen 203* (MO); Alto de Piedra: ALto de Piedra - Río San Luis, Alto de Piedra, vicinity of Santa Fé, along ridge which extends to summit. Trail begins from edge of a plantation along the road less than 1 km from the Escuela Circo Alto de Piedra, on road to north going to Río San Luis, 8°33'N, 81°08'W, 800–950 m, 29 June 1987, *T.B. Croat 66990* (MO).

Cultivated: UNITED STATES. **Missouri:** St Louis. Received from Selby Botanical Gardens, Sarasota, 26 June 1992, *T.B. Croat 73916* (MO), *T.B. Croat 75201* (MO). Cultivated at MO: Climatron U850, 29 September 1975, *Smith J. 55* (MO);

Spathiphyllum quindiuense Engl., Bot. Jahrb. Syst. 37(1): 120. 1905. — Type: COLOMBIA. Quindío Province: 05°12'N, 74°54'W, 1000 m, *J.J. Triana 693* (holotype, BM; isotype, P)

Terrestrial herb along river courses or epipetric on rocks in river; internodes short, 7–12 mm diam. LEAVES with **petioles** equalling or shorter than blade, 8–25(58) cm long, sheathed



Figure 211: *Spathiphyllum quindiuense*, Panama, Veraguas Rio Dos Bocas, Photo ?Ramon de Pena



Figure 212: *Spathiphyllum quindiuense*, Habit, Panama. Photo: Ramon de Pena



Figure 213: *Spathiphyllum quindiuense*, Leaves, Panama. Photo: Ramon da Pena



Figure 214: *Spathiphyllum quindiuense*, Stem & petioles, Panama. Photo: Ramon da Pena



Figure 215: *Spathiphyllum quindiense*, Croat 27222, Panama



Figure 216: *Spathiphyllum quindiuense*, Antonio 3622, Panama



Figure 217: *Spathiphyllum quindiuense*, Dressler 4295, Panama

(0.20)0.50–0.75 its length, the **sheath** ending almost imperceptibly on petiole; free part 5.1–25.0 cm long, dark green and semiglossy, oval; geniculum 1.0–1.8 cm long, positioned 1–2 cm below where the blade appears to end, drying only slightly darker than the petiole shaft; **blades** 12–31(40) cm long, 2.0–5.2(6.5) cm wide, 6.0–7.5(9.6) times longer than wide, 0.54–1.70 times longer than petioles, narrowly elliptic-oblong or lanceolate-oblong, usually widest at the middle and narrowed equally toward either end, sometimes broadest slightly below middle, weakly inequilateral, narrowly long-acuminate at apex, acute at base, thinly coriaceous, dark green and semiglossy above, moderately paler and weakly glossy below, drying gray-green to dark brown and weakly glossy to matte above, gray-brown to yellow-brown or greenish and matte to weakly glossy below; midrib barely sunken and concolorous above, 3-ribbed and convex below; **primary lateral veins** 4 or 5 per side, departing midrib at ca. 20–35°, barely sunken above, narrowly rounded and darker below. INFLORESCENCE erect, usually held among the leaves or sometimes slightly overtopping the leaves; peduncle 16–50(64) cm long; **spathe** (4)7.5–14(16) cm long, 1–3 cm wide, elongate-lanceolate to narrowly oblong-elliptic, attenuate at apex, acute at base, somewhat clasping or decurrent to 1 cm, white to greenish white within, light green outside, greenish white at anthesis; **spadix** 2.0–7.3 cm long, stipitate 0.5–2.0 cm, cream-colored to whitish; perianth of separate segments; **pistil** obpyramidal, angular, white, apically truncate, slightly constricted between the annular style and the ovary, only the coronate stigma exceeding the perianth, ovary 3-locular, fruiting spadix smooth, green; berries subglobose, ca. 3 mm high, apically truncate, white, the style drying dark brown; seeds fewer than ovules, oblique-ovoid, surface slightly roughened or verruculose, somewhat furrowed and foveolate. **Figures 211–217.**

Distribution — *Spathiphyllum quindiuense* is known only from Colombia and Panama, ranging from 100–1100(1400) m in *Tropical moist forest*, *Tropical wet forest* and *Premontane wet forest* life zones.

Comments — *Spathiphyllum quindiuense* is recognized by its small size, more or less aquatic habitat, narrow and graceful leaves with the geniculum seemingly remote from the base of the blade, few and only weakly visible primary lateral veins and moderately short inflorescence with a lanceolate spathe, green outside and white inside.

Owing to its small size, slender leaves and riparian habit the species is not easily confused with any other species though there are other riparian species in South America.

Additional specimens seen: **COLOMBIA. Antioquia:** Camino de San Luis al Rio Dormilón, charco La cascada, 1000 m, 20 August 1981, *Saulo E. Hoyas Marín 93* (HUA); Rio Pocune (Puente Machuca, El Bagre), 100 m, 9 May 1992, *Efrain H. Rondón R. ODC-M-062* (HUA); Mpio. San Francisco: corregimiento Aquitania, Rio Venado, 1150 m, 4 April 1992, *Fonnegra et al. 4225* (HUA). Amalfi: Vereda Chorritos, La María, Montebello, km 15–25 en la vía a Chorritos-Los Monos, SNE de Amalfi, 06°40'N, 074°52'W, 1550–1180 m, 6 December 1989, *R. Callejas et al. 9040* (HUA, MO). Cáceres: Cabecera municipal El Doce, Bajo Cauca, 200–400 m, 30 April 1977, *R. Callejas 227* (HUA); Cabecera municipal El Doce, Bajo Cauca, 200–400 m, 25 March 2978, *R. Callejas 466* (HUA); Vereda Bodegas, sitios San Juan de Bedout, quebrada de San Juan, 300 m, 04 March 1990, *R. Callejas et al. 9341* (HUA);. **Nariño:** Rio San Pedro: 800–1400 m, December 1891, *F.C. Lehmann 7590* (GH, US). Puerto

Berrió, vereda Alicante, finca Penjamo, en la vía de San Juan de Bedout-La Cabana, 1 km S de la finca, 06°39'N, 074°32'W, 500 m, 2 March 1990, *R. Callejas et al.* 9278 (HUA, NY); vereda Alicante, 06°39'N, 074°32'W, 380–410 m, 1 March 1990, *R. Callejas et al.* 9246 (HUA, NY); vereda Alicante, finca Penjamo en la vía que conduce de San Juan de Bedout La Cabana, 06°39'N, 074°32'W, 380–410 m, 1 March 1990, *R. Callejas, E. Roldán & V. Maza* 9247 (HUA); Carretera Cisneros Puerto Berrió, Sitio La Carlota, Quebrada El Vapor, 06°37'00"N, 074°27'00"W, 150 m, 4 February 2001, *F. Cardona, A. Idarraga & J. Benavides* 1066 (MO); Remedios, Río Tucupe: 14–17 km NW of Remedios, region of Cerro Cabeza, 07°20'N, 074°30'W, 250–350 m, 15 Sept. 1987, *R. Callejas et al.* 5159 (HUA). San Carlos: Corregimiento Alto Samaná, Veredas El Silencio-Jardín, camino de Samana a Miraflores, 06°10'N, 074°50'W, 600–800 m, 24 October 1989, *R. Callejas et al.* 8523 (HUA, MO, NY); Quebrada La Miranda: Corregimiento Alto de Samaná, Vereda Miraflores, Quebrada La Miranda, 820–900 m, 13 June 1989, *R. Fonnegra et al.* 2991 (HUA, MO). San Luis: vereda Manizales, a orillas del Río Dormilón, 1400 m, 12 October 1981, *C.I. Orozco et al.* 616 (COL, HUA); 1000 m, 20 August 1981, *Marín* 93 (HUA). Zaragoza: trayecto del Río Tigui a Zaragoza, 07°35'N, 074°50'W, 130–140 m, 12 July 1987, *R. Callejas et al.* 4621 (HUA). Tarazá: Corregimiento El Doce, carretera entre El Doce y Barroblanco, quebrada Puri, 07°25'00"N, 075°20'00"W, 3 November 2000, *F. Cardona et al.* 1048 (MO). **PANAMA.** **Comarca Guna Yala:** Playón Chico, Río Ukupseni, caminando por el Río Ukupseni; desde el campamento Neba Dummat hasta la cascada, 09°15'N, 78°15'W, 50–100 m, 30 octubre 1991, *Heraclio Herrera et al.* 1037, 1038, 1040, 1041 (all MO); Trail from mouth of Río Irgandí to a tributary of Río Cartí Senni, two hours through second growth, one hour through forest, 9°25'N, 78°51'W, 9°25'N, 78°51'W, 20 December 1985, *G. de Nevers & H. Herrera* 6588 (MO); El Llano–Cartí Rd. 19.1 km from Interamerican Hwy. Elev. 350 m. 9°19'N, 78°55'W. Tropical wet forest, 9°19'N, 78°55'W, 350 m, 12 February 1985, *G. de Nevers et al.* 4844 (MO); Headwaters of Río Cuadí Diablo (Drill Site 22), N. 82.2, E. 87.8. Seasonal evergreen forest along river, 243.4 ft, 18 December 1967, *J.A. Duke et al.* 3633 (MO); Ailigandí area along trail from ocean to water fall on river, 0–200 ft, 7 October 1978, *B.E. Hammel & W.G. D'Arcy* 4985 (MO); Isla Nargana: Isla Nargana. Quebrada afluente de Río Diablo, 09°22'N, 78°34'W, 65 m, 10 August 1994, *C. Galdames et al.* 1526 (MO); Proyecto financiado por la Organización de los Estados Americanos (DEA). Aligandí, 30 May 1989, *Florpan et al.* 272 (PMA). **Bocas del Toro:** Chiriquícito to 5 miles S along Río Guarumo. Rain forest by river, 5 June 1967 – 7 June 1967, *W.H. Lewis et al.* 2057 (MO); 10–15 miles inland (S) from mouth of Changuinola River. Banks of river and adjacent rain forest, 18 December 1966, *W.H. Lewis et al.* 870 (MO). **Canal Area:** Parque Nacional Soberanía, Pipeline Road N of Gamboa, 6 mi N of Gamboa, Río Mendoza, 09°11'N, 79°46'W, 23 July 1994, *T.B. Croat & G. Zhu* 77081 (MO); Pipeline Road, vicinity of Río Mendoca, premontane wet forest, 100–200 m, 17 May 1973, *A.H. Gentry* 7472 (MO); Gamboa, 8 km N on pipeline road, 21 August 1971, *H. Kennedy & R.L. Dressler* 1131 (DUKE); Navy Reservation, north of Gamboa, along Río Mendosa, 12 July 1969, *R.L. Dressler* 3669 (MO); Navy Reservation, north of Gamboa; upper Río Mendosa, 7 February 1969, *R.L. Dressler* 3602 (MO). **Code:** On the Atlantic, ca 5 hr. walk from sawmill at El Cope, all plants collected along the river, 450 ft, 2 February 1980, *T. Antonio* 3622 (MO); Western slope and summit of C. Valle Chiquito, 700–800 m, 25 July 1935, *R.J. Seibert* 507 (MO); 29 km N of Penonome on road to Coclesito, (9 km N of turnoff of Llano Grande), along small stream west of road, 500 ft, 22 February 1978, *B.E. Hammel* 1737 (MO); Quebrada Amarillo, N of El Valle, 17 October 1975, *J.T. & F. Witherspoon* 8760 (MO); Along river leading up mountain to Alto Calvario and trout stream from La Junta near

Limón, 800–1000 m, 12 October 1977, *J.P. Folsom 5887* (MO); Rio Tucué, above Tucué, 12 July 1972, *R.L. Dressler 4195* (MO). **Colón:** Rio San Lucas, south of Coclé del Norte, 19 August 1972, *R.L. Dressler 4216* (MO); Rio Indio/Madden Dam, *R.L. Dressler s.n.* (MO); 9 km W of Llano Grande in forest along sawmill stream just S of Cascajal. On rocks in stream, 800 ft, 11 October 1978, *B.E. Hammel & W.G. D'Arcy 5102* (MO). **Darién:** Vicinity of upper gold mining camp of Tyler Kittredge on headwaters of Rio Tuquesa ca 2 air km from Continental Divide; recently cleared primary forest, 26 August 1974, *T.B. Croat 27222* (MO). **Panamá:** Pipeline road, N of Gamboa, upstream of the tenth bridge (Río Guacharo), beyond the big waterfall; 9°10'N, 79°45'W, elev. 100 m, 9°10'N, 79°45'W, 100 m, 4 August 1984, *G. de Nevers & D. Hews 3630* (MO); Vertiente Pacífica de la Cordillera de San Blas, 09.11.5N 78.16W, 150–200 m, 12 Junio 1994, *Heraclio Herrera 1616* (CAS, MEXU, MO, PMA, STRI, US); Río Espave–Agua Clara, E of Cañitas, between Río Espavé and Agua Clara, 6 March 1973, *R.L. Dressler 4295* (MO); Tributary of Río Terable, about 8–10 km from Pan-American Highway (by El Llano–Cartí road), 1 August 1974, *R.L. Dressler 4678* (MO); Gallery along Río Terable, near Pan Am Highway & El Llano, 21 September 1962, *J.A. Duke 5677* (MO).

Cultivated. UNITED STATES. Hawaii. Wahiawa Botanic Garden: Oahu, 14 April 1986, *Lau & Cory 2235* (MO). Waimea Arboretum and Botanical Garden. Waimea 77p762, *Croat 76168* (MO);

Spathiphyllum silvicola R.A.Baker, *Phytologia* 33(7): 448–449. 1976. — Type: COSTA RICA. Puntarenas: Osa Peninsula and the adjacent Golfo Dulce region, forest near Esquinas Experiment Station, area between Río Esquinas and Palmar Sur de Osa, 200 m, 22 May 1950, 60 m, *P.A. Allen 5538* (holotype, F-1741645; isotypes, CR-61628, EAP, K, NY, US).

Terrestrial herb, 0.5–1.0 m tall; rhizome erect or spreading; internodes short, to 1.7–2.0 cm diam.; rhizome erect or spreading. LEAVES with **petioles** (13)19–76 cm long, sheathed 0.2–0.6(0.8) their length; **sheath** 7.5–25.0 cm long, turned inward; free part terete to elliptical (laterally compressed), 5–47 cm long; geniculum 1.0–2.2 cm long, paler and narrowly sulcate, drying darker; **blades** 17–42 cm long, 5.1–16.3 cm wide, 1.7–2.5 times longer than wide, 0.4–0.9 times as long as petioles, ovate-elliptic to narrowly elliptic, weakly to moderately inequilateral, narrowly acuminate to long-acuminate, weakly coriaceous, bicolorous, dark green and semiglossy to glossy above, matte to weakly glossy and moderately pale below, drying brownish green to dark gray-brown and matte above, moderately paler and yellow-brown to gray-green and semiglossy below; midrib sulcate, broadly sunken above, thicker than broad, narrowly rounded to round-raised below; **primary lateral veins** 12–22 per side, departing midrib at (50)60–75°, weakly quilted-sunken above, pleated-raised below, darker than surface; interprimary veins weakly raised; minor veins visible. INFLORESCENCE erect, held above leaves; peduncle (35)40–88(96) cm long; **spathe** 9.8–14.5 cm long, 2.0–4.2 cm wide, long-acuminate at apex, usually decurrent 1.0–1.5 cm at base, erect to erect-spreading, finally recurved, pale green to yellow-green, rarely cream-colored with green veins; **spadix** 5.3–10.0 cm long, 5–8 mm diam., stipitate 0.7–1.6(3.7) cm, creamy white, green post-anthesis; **pistils** weakly exerted, area between the styles pale green; tepals fused in lower ½, otherwise free; style very short; stigma 3-sided. INFRUCTESCENCE with spadix 5.7–12.5 cm long; berries white or white at base, yellow at apex, broadly obovoid, exerted above tepals at maturity, caviform or truncate at apex; seeds drying light brown, 2 per locule, somewhat ear-shaped with a narrow



Figure 218: *Spathiphyllum silvicola*, Habit of flowering plants. Photo: O. Ortiz



Figure 219: *Spathiphyllum silvicola*, Habit, Croat 67593, Costa Rica



Figure 220: *Spathiphyllum silvicola*, Inflorescence. Photo: O. Ortiz



Figure 221: *Spathiphyllum silvicola*, Inflorescence



Figure 222: *Spathiphyllum silvicola*, Close-up of Infructescence, Croat 67593 Costa Rica



Figure 223: *Spathiphyllum silvicola*, Allen 5538, TYPE, Costa Rica



Figure 224: *Spathiphyllum silvicola*, Dressler 4782, Panama



Figure 225: *Spathiphyllum silvicola*, Grayum 3984, Costa Rica



Figure 226: *Spathiphyllum silvicola*, Croat 67593, Costa Rica

elongate cavity on the inside margin, prominently warty-ribbed on outer margin, with the ribs close. **Figures 218–226.**

Distribution — *Spathiphyllum silvicola* ranges from Costa Rica to Panama (Veraguas, Coclé) at 0–500(900) m in *Tropical wet forest* and *Premontane wet forest* life zones.

Comments — *Spathiphyllum silvicola* is characterized by its moderately small size, petioles sheathed from the middle to the distal 2/3 with a weak sheath, moderately small, ovate-elliptic, brownish drying, markedly acuminate leaf blades with moderately few primary lateral veins as well as by its long inflorescence with a slender, mostly reflexed, mostly pale green spathe and the stipitate, slender, creamy white, narrowly cylindroid spadix with truncate pistils and white berries topped with yellow.

Spathiphyllum silvicola is similar to *S. fulvovirens* which occurs on the Caribbean slope and which differs by having scale-like stellate trichomes on the petioles, longer and much broader leaf blades with more primary lateral veins, a spathe that is usually not decurrent at the base and a much longer spadix with the tepals completely separated.

Spathiphyllum silvicola may be confused with *S. abelianum* but that species differs in having the petiole sheathed only 1/3 to 1/2 its length, in having proportionately narrower, more short-acuminate blades 2.5–3 times longer than broad, 28–30 pairs of primary lateral veins that spread at no more than 55° angle with much less quilted primary lateral veins, a broadly spreading spathe and a medium green spadix (versus usually creamy white for *S. silvicola*).

COSTA RICA. Puntarenas: old Paul Allen property, NW of Piedras Blancas, 08°48'36"N, 083°16'48"W, 2 m, 26 July 1977, *Webster 22064* (DAV); Osa Península: Osa Península. Marengo Biological Station, along foot trail in SE sector of Sendero Camino Publico and W to coast via Río Claro, 08°40'12"N, 083°42'00"W, 60–120 m, 14 March 1986, *Almeda et al. 5560* (CAS); Osa Península. Marengo Biological Station, behind Punta San José, 08°40'48"N, 083°42'00"W, 50–100 m, 16–20 February 1988, *Burger et al. 12365* (F); Rincón de Osa: Rincón de Osa, area north of airport; secondary growth and remains of virgin forest, 08°41'24"N, 083°30'00"W, 40–80 m, 22 July 1974, *J. & K. Utley 1181* (DUKE, MO); Parque Nacional Corcovado Jiménez, Dos Brazos de Río Tigre. Cerro Rincón. Fila Matajambre, 08°31'12"N, 083°27'36"W, 744 m, 4 August 1990, *Abelardo Chacón 965* (MO); Along new road from Piedras Blancas to Rincón de Osa; elev. ca. 200 m. 8°45'N, 83°21'W. Collected with Brian Jacobs, George Schatz, John Kress and Pam Sleeper, 08°45'00"N, 083°21'00"W, 200 m, 2 July 1984, *M.H. Grayum 3406* (MO); Slightly disturbed primary forest at N side of Carretera Interamericana, KM 287 (ca. 3 km NW of Chacarita and 30 km S of Palmar Sur), 08°48'00"N, 083°16'48"W, 20–40 m, 25 May 1986, *M.H. Grayum, B.E. Hammel & G. de Nevers 7548* (CR, MO); Rincón de Osa, along ridge between Quebrada Aparicio and Quebrada Aguabuena, elev. 200–400 m. 8°42'N, 83°31'W, 08°42'00"N, 083°30'36"W, 200–400 m, 7 October 1984, *M.H. Grayum, G. Herrera, G. Schatz & F. Chavarria 3984* (MO); Along road between Chacarita and Rincón de Osa, ca. 6 km W of Interamerican Highway at Chacarita; elev. ca. 160 m, disturbed primary forest and along road through forest. ca. 8°45'N, 83°18'W, 8°45'N, 83°18'W, 160 m, 2 March 1985, *T.B. Croat & M.H. Grayum 59736* (CM, CR, MO); Reserva Forestal Golfo Dulce, 37 km from bridge over Río Rincón toward junction with Pan

Am Highway, forest on steep slope, 08°45'00"N, 083°18'00"W, 115 m, 14 August 1990, *H. Kennedy 4565* (MO); Parque Nacional Corcovado Llorona Forest, 08°35'24"N, 083°42'36"W, 0 m, 29 May 1988, *C. Kernan, P. Phillips, D. Cornejo & M. Bonness 551* (MO); Parque Nacional Corcovado Llorona to Los Planes, 08°36'00"N, 083°43'48"W, 100 m, 25 March 1989, *C. Kernan & P. Phillips 1017* (MO); Along highway from Interamerican Highway to Rincón, 10 km W of Interamerican Highway, 08°45'08"N, 83°18'00"W, 200 m, 10 September 1996, *T.B. Croat & D. Hannon 79168* (CM, MO); Vicinity of Boscosa, at Quebrada Aguabuena, 08°42'01"N, 83°30'48"W, 50 m, 11 September 1996, *T.B. Croat & D. Hannon 79242* (AAU, INB, JBGP, KRAM, LE, MO, VDB, Z); Parque Nacional. Sector Esquinas, vicinity of Fila Gamba hills behind Esquinas Rain Forest Lodge, along Quebrada Negra, at end of side road off of Villa Bricena to Golfito Road, 08°42'00"N, 83°12'30"W, 200–300 m, 12 September 1996, *T.B. Croat & D. Hannon 79289* (INB, MO); Along road between Palmar Norte and Panamerican Border, 3 km N of turn-off to Rincón, 08°48'39"N, 83°16'18"W, 110 m, 10 September 1996, *T.B. Croat & D. Hannon 79187* (INB, K, MEXU,MO,US); About 6 miles from Golfito in forest along highway to Río Claro, 100 ft, 22 July 1978, *W. John Kress 78-1006* (MO); Forested foothills of the mountains east of Quepos, Pacific Slope of the Talamanca Range. Evergreen tropical wet forest formations with a dry period from December to April. Unusually dry at this time with very little flowering in the forest understory, 09°29'N, 084°03'W, 150–250 m, 19 February 1977, *Wm. Burger, G. Visconti & J. Gentry 10580* (F); La Llanora, Corcovado National Park, Osa Peninsula, 08°36'N, 083°42'W, 0–200 m, 12–17 August 1978, *D.H. Janzen 11093* (MO); Golfito: Golfito - Villa Briceno, Along road between Golfito and Villa Briceno, 3.1 mi NW of center of Golfito, 08°39'N, 083°11'W, 30 m, 15 September 1987, *T.B. Croat 67641* (MO); Parque Nacional Corcovado: Parque Nacional Corcovado; Estación Sirena. Los Patos: trail to Río Pavón, 08°27'36"N, 083°34'48"W, 1–50 m, 26 June 1989, *C. Kernan 1179* (CR, MO); Parque Nacional Corcovado, Sirena, Los Patos Forest, 08°27'36"N, 083°34'48"W, 1–50 m, 27 May 1989, *C. Kernan & P. Phillips 1141* (CR, MO); Reserva Forestal Golfo Dulce, Península de Osa, Cantón de Sierpe, near Rancho Quemado, high forest along the way to Quebrada Quebradon, 08°39'36"N, 083°33'36"W, 140–180 m, 6 February 1991, *P.J.M. Maas, H. Maas, B.E. Hammel, & M.M. Chavarria 7854* (MO, U); Río Claro: Río Claro–Golfito, along highway to Golfito from Panamerican Hwy at Río Claro, 2.5 mi SE of Golfito, 08°36'00"N, 083°03'36"W, 60 m, 14 September 1987, *T.B. Croat 67593* (MO); Río Terraba, between Golfo Dulce and Río Terraba, 08°46'48"N, 083°24'36"W, 20 m, 27 November 1947, *Al.F. Skutch 5257* (MO). Golfito, Jiménez, Cercanías de Río Piro, aguas arriba a partir del camino que va a Playa Carate, 08°24'00"N, 083°19'48"W, 10–50 m, 31 August 1990, *Carlos Morales, C. Kernan, R. Soto & A. Chacón 106* (MO); Península de Osa, P.N. Corcovado, Estación Los Patos, alrededores, 08°33'36"N, 083°30'36"W, 200 m, 1 September 1993, *Reinaldo Aguilar 2144* (CR); P.N. Corcovado, Valle de Coto Colorado, Estación Esquinas, sendero a la Calathea, 08°45'36"N, 083°15'00"W, 100 m, 27 June 1993, *M. Segura & F. Quesada 95* (CR); R.F. Golfo Dulce, Osa Peninsula, Estacion Agujas, Sendero Sapo, 08°31'48"N, 083°25'12"W, 300 m, 15 July 1996, *A. Azofeifa 209* (INB, MO). Osa, Cantón de Osa, Los Mogos, 08°45'00"N, 083°22'48"W, 20 m, 10 January 1991, *Vanessa Ramirez 29* (CR,MO); Osa Peninsula, Rincon area, ca. 300 m past the bridge near end of runway on road to gravel pits, along a stream, 08°41'24"N, 083°28'48"W, 4 Sept. 1971, *H. Kennedy 1140* (MO); Quebrada Aparicio, 08°42'36"N, 083°30'00"W, 220 m, 25 June 1995, *M. Madrigal 83* (INB); Rincón de Osa, streams and slopes adjacent to airfield, disturbed primary forest, 08°42'00"N, 083°30'36"W, 20–200 m, 6 February 1974, *R.L. Liesner 1775* (MO); Corcovado National Park, trail from base of hills to Los Chiles,

08°30'36"N, 083°30'36"W, 20–400 m, 9 July 1977, *R. Liesner 3110* (MO); Primary forest and forest margins along the Camino al Pacifico, west of Rincon de Osa, Osa Peninsula, 100 ft, 7 August 1967, *P.H. Raven 21586* (F); Palmar Norte: Palmar Norte–Jalisco, Hills north of Palmar Norte, along trail to Jalisco, 08°58'48"N, 083°25'12"W, 50–700 m, 21 May 1976, *T.B. Croat 35185* (MO). **San José:** Western part of Montañas Jamaica, ca. 3 km NE of Bijagal de Turrubares, Carara reserve. 9°45.5'N, 84°33'W. Elev. 500–600 m, 09°45'00"N, 084°33'00"W, 500–600 m, 7 August 1985, *M.H. Grayum, R. Warner, J.C. French & P. Sleeper 5881* (MO); ZP La Cangreja Forests along Río Negro, ca. 1.5 km E of Santa Rosa de Puriscal, 09°42'00"N, 084°23'24"W, 320 m, 14 May 1987, *M.H. Grayum, G. Herrera, G. Umaña & N. Zamora 8347* (MO); Zona Protectora La Cangreja Along Quebrada Grande and on adjacent ridges, ca. 2 km N of Mastatal de Puriscal, 09°42'00"N, 084°22'12"W, 340 m, 22 July 1988, *M.H. Grayum, B.E. Hammel, N. Zamora & M.M. Chavarría 8616* (MO); Tarrazú Faldas del Cerro Nara, ca. Esquipulas, límite Quepos (Puntarenas) y Tarrazú, 09°28'48"N, 084°03'00"W, 350 m, 11 July 1987, *Jorge Gómez-Laurito, J. López & H. Gómez 11603* (MO); Z. P. La Cangreja, Santa Rosa de Puriscal, bosque primario y secundario en las márgenes del río Negro, 09°42'00"N, 084°23'24"W, 350 m, 29 July 1992, *J.F. Morales 285* (MO); Reserva Biológica Carara Sector Carara, Sitio Sendero Lalo Barboza, 09°45'36"N, 084°34'48"W, 300 m, 17 September 1991, *Rodolfo Zúñiga 445* (INB, MO); Reserva Biológica Carara, Sitio Sendero Lalo Barboza, 09°45'36"N, 084°31'48"W, 300 m, 2 October 1990, *Rodolfo Zúñiga & Gerardo Varela 295* (MO). **PANAMA. Coclé:** South of Cascajal along Continental Divide, tropical wet forest-premontane forest, 08°45'N, 080°25'W, 800–900 m, 7 November 1981, *S. Knapp 1947* (MO); Continental divide ridge, Coclesito rd, 20 April 1978, *B.E. Hammel 2557* (MO); Continental divide on road to Coclesito in patch of forest near road, 1500 ft, 20 June 1978, *B.E. Hammel 3501* (MO); Road from Penonome to Coclecito, 9 km N of Llano Grande, streamside forest on tributary of Río Caseaja, 11 October 1978, *W.G. D'Arcy & B.E. Hammel 12275* (MO); Along road between La Pintada and Coclecito, 5.2 mi N of stream at Llano Grande, Atlantic slope, along edge of stream, 513 m, 7 December 1979, *T.B. Croat 49244* (MO); 27 km N of Penonome on road to Coclesito in forest reserve at continental divide, 1500 ft, 20 February 1978, *B.E. Hammel 1636* (MO). **Panamá:** Distrito de Chepo, Llano–Cartí, carretera hacia Nusagandi, km. 2. Finca privada frente a la reserve privada Burbayar, 9°19'31"N, 78°59'29"W, 363m, 17 December 2012, *O. Ortiz 1083, 1087* (MO,PMA). **Veraguas:** Dos Bocas del Río Caloveborita, 1617 km NW of Santa Fe, 500 m, 3 June 1976, *R.L. Dressler 5317* (MO); Vicinity of continental Divide, 3rd branch of Río Santa María to drop-off to lowlands, 12–15 km NW of Santa Fe, 650–750 m, 17 May 1975, *R.L. Dressler 5029* (MO).

Spathiphyllum uspanapaense Matuda, Cact. Suc. Mex. 21: 74. 1976. — Type: MEXICO. Veracruz: Municipio Minatitlán, orillas del Río Uspanapa, campamento Hidalgotitlan, sobre rocas calcáreas, 75 m, *E. Matuda 38660* (holotype, MEXU-184916; isotype, MEXU-180734).

Terrestrial or rupicolous herb, occurring along steams or on limestone, 30–60 cm tall; stem repent to erect; internodes very short, 1.0–1.5 cm diam. LEAVES erect; **petioles** 9–35 cm long, sheathed 0.36–0.80 its length; **sheath** 6–26.5 cm, free portion 2.5–9.5 cm long; **blades** 11.5–26.5 cm long, 3.3–6.0 cm wide, 2.8–5.2 times longer than wide, somewhat inequilateral (one side 2–8 mm side wider), 0.7–1.4 longer than petioles, narrowly ovate-lanceolate to narrowly lanceolate, widest in lower 1/3 to just below the middle, narrowly acuminate at the apex, acute



Figure 227: *Spathiphyllum uspanapaense*, Wendt 5246



Figure 228: *Spathiphyllum uspanapaense*, Vasquez 1620



Figure 229: *Spathiphyllum uspanapaense*, Wendt 5247

and attenuate at base, drying more or less matte, gray to grayish green above, weakly glossy and yellowish gray-green on the lower surface; midrib sunken and weakly concolorous above, drying weakly raised and closely striate beneath, paler than the surface; **primary lateral veins** 3–5 per side, departing midrib at 25–45°; interprimary veins usually one between each pair of primary lateral veins; upper surface smooth; lower surface with raphide cells between the minor veins. INFLORESCENCE held above the leaves; peduncle 27.0–46.2 cm long, 3.4–4.6 times longer than the spathe; **spathe** white, 6.3–10.0 cm long, 2.5–3.2 cm wide; **spadix** 2.5–3.2 cm long, 6–10 mm wide, green, stipitate 0.5–1.8 cm or rarely stipe absent; flowers 3–4 visible per spiral; tepals free; **pistils** emerging prominently, narrowly pointed at the apex; ovary narrowly ovoid, 3–locular, ovules 2 per locule, 0.8 mm long; berries green with persistent styles prominently protruding above the tepals 4–5 mm diam.; seeds 6 per berry, 1.8–3 mm long, 1–1.8 mm wide, 0.6–0.8 mm thick, light brown with an indistinct dark brown reticulation, prominently pointed at the apex. **Figures 227–229.**

Distribution — *Spathiphyllum uspanapaense* is endemic to Mexico, known from the States of Veracruz and Oaxaca, occurring at 75–150 m in a *Tropical moist forest* life zone.

Comments — *Spathiphyllum uspanapaense* is characterized by its very small size, semi-aquatic to calcareous habit, weakly sheathed petioles, narrowly lanceolate, acuminate blades with few primary lateral veins as well as by the long-pedunculate inflorescence, slender white spathe and slender green spadix.

The unpublished herbarium name *S. hidalgotitlanum* Matuda sometimes appears on herbarium material of this species, e.g. *M. Vasquez et al. 1620* (US). The species epithet has occasionally been ‘corrected’ from Matuda’s original orthography to ‘*uxpanapense*’ based on modern accepted spelling of the locality, but this is not warranted under any of Art. 60 of Turland et al. (2018).

Additional specimens seen: **MEXICO. Oaxaca:** Mpio. Matías Romero. Arroyo Azul (Agua Azul), +/- 5.5 km en línea recta al NNE del Aserradero Río Escondido, 17°07'N 094°42'W, 120.m, 10 April 1986, *T.L. Wendt, Heriberto Hernández G. & V. Sánchez 5246* (OAX,MO), 5247 (MO). **Veracruz:** Mun. Hidalgotitlan, SW del Campamento Hermanos Cedillo, Río Solosuchil, *F. Ponce C. 244* (MEXU, XAL); Camino a Agustín Melgar a 2 km del campamento Hermanos Cedillo, *B. Ortiz 99* (XAL); Río Solosuchil, *B. Vasquez 281* (MEXU, XAL); Camino Campamento Hermanos Cedillo-Agustín Melgar, *O. Téllez V. & G. Flores F. 515* (MEXU, XAL); SW del Campamento Hermanos Cedillo, Río Solosuchil, *M. Vasquez T. et al. 1620* (XAL), ±1.5–2 horas a pie al SE de Ejido Agustín Melgar, cerca del potrero de Ejido Pancho Villa, *T. Wendt et al. 3735* (MO); Mun. Jesús Carranza, ribera del Río Chalchijapan, entre el Poblado El Nopal y Francisco Villa Viejo, *D. Jimeno S. 1046* (MEXU, XAL, MO).

Spathiphyllum wendlandii Schott, Oesterr. Bot. Z. 8(6): 179. 1858 — Type: COSTA RICA. Cuesta de Congo, between Cariblanco and San Miguel, 10 May 1857, *H. Wendland 772* (lectotype GOET, designated by Dowe et al., 2022).

Terrestrial herb to 75 cm tall; internodes short, to 2 cm diam. LEAVES with **petioles** 18–45(–61) cm long, sheathed usually to the geniculum and often prominently alate throughout



Figure 230: *Spathiphyllum wendlandii*, habit of flowering plant. Photo: O. Ortiz



Figure 231: *Spathiphyllum wendlandii*, inflorescence. Photo: O. Ortiz



Figure 232: *Spathiphyllum wendlandii*, Antonio 750, Costa Rica



Figure 233: *Spathiphyllum wendlandii*, Croat 34178, Panama

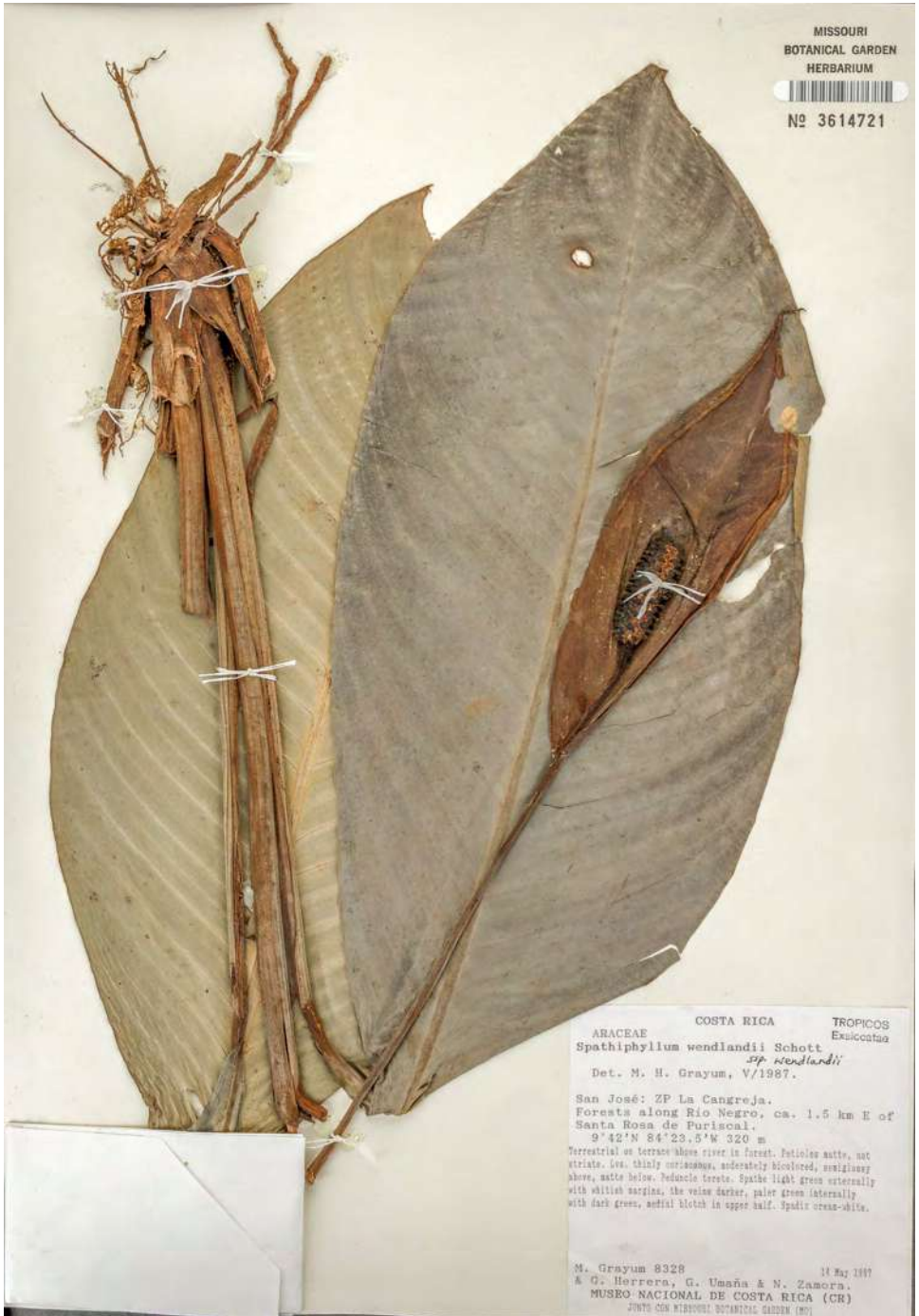


Figure 234: *Spathiphyllum wendlandii*, Grayum 8328, Costa Rica



Figure 235: *Spathiphyllum wendlandii*, Liesner 2949, Costa Rica

its length, the wing continuous with the decurrent base of the blade; geniculum 1.2–2.0 cm long, alate, to 3 cm or more wide and marginally involute and minutely undulate; **blades** (24)35–83 cm long, (8.5)13.5–17.0(28.0) cm wide, (2.1)3.0– 3.2(4.5) times longer than wide, 0.84–2.25 times longer than petioles, oblanceolate to elliptic, short-acuminate at apex, attenuate and decurrent onto the geniculum at base, dark green and matte above, medium green and paler below, drying dark gray-brown to greenish brown and matte to semiglossy above, yellowish brown and semiglossy below; **primary lateral veins** 19–42 per side, departing midrib at 45–60°. INFLORESCENCE usually overtopping leaves; peduncle (35)45–82 cm long; **spathe** 14–23(29) cm long, 5.0–9.8 cm wide, elliptic to oblong-oblanceolate, acuminate at apex, attenuate at base and decurrent on the peduncle 3–6(9) cm, white with green midrib; **spadix** (2.5)3.5–7.5(11.5) cm long, 1.2–1.6 cm diam., sessile or on stipe 0.4–1.8 cm long; flowers with tepals green, free to apex, sometimes partially confluent at the base (at least in age), apex fimbriate or erose and often deeply notched in the center; **pistils** white, narrowly elongate, moderately exerted beyond the perianth, eventually green; ovary (2)3-locular, ovules affixed near the top of locules, superposed, varying from (–1) 2–4 in each of the 3 locules; berries whitish in lower 2/3, green at apex, drying light brown, 5–6 mm diam.; seeds 2 per locule, 3.2–3.4 mm long, 1.6 mm diam., subrounded in cross-section, drying light brown, moderately smooth. **Figures 230–235.**

Distribution — *Spathiphyllum wendlandii* ranges from Costa Rica to Panama and Colombia at 0–1150 m in *Tropical wet forest*, *Premontane wet forest* and *Premontane rain forest* life zones.

Comments — *Spathiphyllum wendlandii* is characterized by its moderately small stature, its growing in wet areas, the moderately long fully sheathed petioles, its many-veined, short-acuminate blades, its long-pedunculate inflorescences with a white, prominently decurrent spathe with a green midrib and a stipitate, more or less cylindroid spadix with white, prominently protruding pistils.

Grayum (2003) reported that populations of this species on the Pacific slope differ from populations on the Caribbean slope by consistently having proportionately thicker spadices, tepals which are subentire instead of being fimbriate as well as shorter and thicker styles. These populations are also in primary forest rather than in areas of secondary forest as is the case in the populations on the Caribbean slope. Grayum also reported that *Spathiphyllum wendlandii* has been collected at elevations above 650 m only in the Fila Costeña on the Pacific slope.

Bunting (1960), stated that the original material of *S. wendlandii* was lost. Due to this, he designated *L.M. Pacheco 93* (F) as a neotype. Nevertheless, a duplicate of this collection is extant at GOET which was chosen as a lectotype by Dowe et al. (2022).

Additional specimens seen: **COLOMBIA. Chocó:** Quibdó, barrio Bahía Solano, 4 Nov. 1985, *R. Moreno et al.* 27 (COL); **COSTA RICA. B.A. Krukoff 29839** (MO); Near San Vito and the Las Cruces Forest, understory vegetation on edge of forest bordering cattle pasture in Las Cruces forest reserve, mature secondary forest with lots of light specks on the lower loop trail near first stream, 31 Jan 2003, *M.M. Mayfield s.n.* (MO); **Alajuela:** Peñas Blancas, a orilla del camino, 10°21'18"N 084°38'58"W, 18 junio 1985, *W.A. Haber & E. Bello C. 1783A* (MO);

Cartago: In forest in the mountains above Río Pacuare, near Platanillo., 800 m, 03 May 1956, *L.O. Williams & Antonio Molina R. 19509* (EAP, MO); **Heredia:** La Selva Biological Station., 10°25'53"N 084°00'13"W, 100 m, 7 May 1980, *B.E. Hammel 8611* (DUKE, MO, US); La Selva Biological Station., 10°25'53"N 084°00'13"W, 100 m, 23 April 1981, *J.P. Folsom 9837* (DUKE); Finca La Selva, the OTS Field Station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí., 10°25'53"N 084°00'13"W, 100 m, 30 July 1980, *J.M. MacDougal 953* (DUKE); Finca La Selva, the OTS Field Station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí., 10°25'53"N 084°00'13"W, 100 m, 23 June 1979, *J. Sperry 578* (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí., 10°25'53"N 084°00'13"W, 100 m, 19 August 1979, *M.H. Grayum 2471* (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí., 10°25'53"N 084°00'13"W, 100 m, 13 July 1986, *R.L. Wilbur 39892* (DUKE); La Selva Biological Station., 10°25'53"N 084°00'13"W, 100 m, 7 June 1985, *R.L. Wilbur 38021* (DUKE); La Selva Biological Station., 10°25'53"N 084°00'13"W, 100 m, 20 May 1985, *R.L. Wilbur 37151* (DUKE); La Selva Biological Station., 10°25'53"N 084°00'13"W, 100 m, 24 May 1985, *R.L. Wilbur 37323* (DUKE); La Selva Biological Station., 10°25'53"N 084°00'13"W, 100 m, 24 May 1984, *R.L. Wilbur & B. Jacobs 34908* (DUKE); La Selva Biological Station., 10°25'53"N 084°00'13"W, 100 m, 19 May 1984, *R.L. Wilbur & B. Jacobs 34735* (DUKE); O.T.S. La Selva Reserve, 10°26'N 084°01'W, 100 m, 15 Apr 1986, *T.B. Croat 61219* (MO); Finca La Selva, Puerto Viejo de Sarapiquí, 10°25'12"N 084°00'36"W, 100 m, 5 Jan 1978, *T.B. Croat 44301* (MO); Sarapiquí. La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 23 Marzo 1983, *Isidro A. Chacón G. 544* (DUKE,MO); La Selva Biological Station. Sendero: CES 50m. 40 grados 15 metros., 10°25'53"N 084°00'13"W, 100 m, 6/5/2001, *Orlando Vargas 685* La Selva Biological Station. Sendero: STR 70m., 10°25'53"N 084°00'13"W, 100 m, 4/3/2003, *Reinaldo Aguilar RA007663*(CR); Estación Biológica La Selva., 10°25'49"N 084°00'26"W, 61 m, 07 July 2007, *R.C. Moran & Felipe Cardona 8148* (NY); Puerto Viejo, 10°27'00"N 084°00'00"W, 06 Mar 1965, *R.S. Blaisdell 253* (FSU); Near Puerto Viejo along road near the Río Sucio., 10°27'36"N 083°59'24"W, 20 m, 27 May 1976, *T.B. Croat 35699* (MO); **Limón:** Res. Biológica Hitoy-Cerere Alrededores de la Estación, Valle de la Estrella, bosque primario, 09°40'12"N 083°01'12"W, 100 m, 17 January 1992, *Alberth Moreno 94* (MO); Hacienda Tapezco-Hacienda La Suerte, 29 air km W of Tortuguero, 10°30'00"N 083°46'48"W - 10°30'N 083°47'W, 40 m, *C. Davidson & J. Donahue 8308* (LAM); Cordillera de Talamanca Along ridge descending to main fork of Quebrada Cañabral from divide between basin of Río Madre de Dios and that of Río Barbilla., 10°01'48"N 083°24'36"W, 280–400 m, 06 September 1988, *M.H. Grayum, Gerardo Herrera Ch. & Rafael Robles 8841* (MO); Along Hwy. 32 from Turrialba to Limón, ca. 11 miles south of Siquirres, 10°00'00"N 083°34'12"W, 650 m, 13 August 1977, *T.B. Croat 43337* (MO); Evergreen premontane wet and tropical moist forest formations, secondary formations, and cocoa plantations 1 to 3 km N of Bribri, Río Sixaola drainage., 09°37'12"N 082°49'48"W, 20–200 m, 28 Oct 1978, *Thomas M. Antonio 750* (MO); Evergreen premontane wet and tropical moist forest formations, secondary formations, and cocoa plantations 1 to 3 km N of Bribri, Río Sixaola drainage., 09°37'12"N 082°49'48"W, 20 - 200 m, 9 Sep 1978 - 10 Sep 1978, *W.C. Burger & T. M. Antonio 10958* (MO); Limón. R.B. Hitoy Cerere; Valle de la Estrella. Sendero Espavel, parte alta., 09°39'36"N 083°01'12"W, 520 m, 14 April 1994, *Gerardina Gallardo 139* (PCR, MO, MA); Río Segundo, Asunción. Limón, 09°52'48"N 083°11'24"W, 300–400 m, 26 Apr 1985, *Luis Diego Gómez P. & Gerardo*

Herrera Ch. 23453 (CR, MO); Talamanca, Colline de Sikurbeta, 09°48'N 083°01'W, Feb 1895, *A. Tonduz 9398* (BR); S of Limón, along road inland through Penhurst, from about 5 km through end of driveable portion. Roadsides, forest, river edge, 09°46'12"N 082°54'00"W, 50–200 m, 26 Feb 1985, *C.M. Taylor & C. Skotak 4500* (DUKE); 7 km SW of Bribri., 09°35'24"N 082°52'12"W, 100–250 m, 04 May 1983, *Luis Diego Gómez P. et al. 20403A* (MO, WIS); **Puntarenas:** San Vito de Coto Brus to Ciudad Neily; northeastern slopes of Fila de Cal; forest on limestone ridge., 08°41'00"N 082°56'30"W, 500 - 620 m, 12 July 1985, *B.E. Hammel & M.H. Grayum 14170* (MO); Parque Nacional Corcovado. Sirena station; lower Olla trail (just NE from station; on slopes and ridge in undisturbed primary forest., 08°28'48"N 083°33'36"W, 25 m, 4 April 1988, *B.E. Hammel, C. Kernan & P. Phillips 16652* (MO); Parque Nacional Corcovado Sirena, Look out Trail, 08°27'36"N 083°34'48"W, 100 - 250 m, 26 April 1989, *C. Kernan 1051* (MO); Parque Nacional Corcovado Sirena, Pavo Trail to old airstrip., 08°27'36"N 083°34'48"W, 1 - 50 m, 21 June 1989, *C. Kernan & P. Phillips 1171A* (MO); Eastern base of Fila Barriganes. Ca. 1 km S and 2 km W of Cañasas, (ca. 12 km S of Rincón de Osa), 08°34'N 083°25'W, 60 m, 04 March 1985, *T.B. Croat & M.H. Grayum 59822* (CM, CR, MO); Along short cut-road to Golfito from Villa Briceño on Interamerican Hwy., W side of Fila Gamba, ca. 6 km from Golfito airport., 08°41'30"N 083°12'00"W, 100 m, 06 March 1985, *T.B. Croat & M.H. Grayum 59928* (MO); Coto Brus. Finca Loma Linda, Cañas Gordas, rich forest, 08°43'48"N 082°54'36"W, 1140 m, 26 Feb 1973, *P. Busey 647* (MO); Finca Loma Linda, 1 mile southwest of Cañas Gordas, primary forest and forest edge, premontane wet forest basal belt transition, 08°44'17"N 082°55'30"W, 1150 m, 26 Feb 1973 - 27 Feb 1973, *T.B. Croat 22236* (MO); Golfito, Puerto Jimenez, Finca Gollo, Quebrada Victoria, 08°33'00"N 083°21'00"W, 0-100 m, 7 June 1998, *Alejandro Azofeifa 721*; R.F. Golfo Dulce, Península de Osa, La Torre, cabeceras del Río Agujas, Finca de los Azofeifa, Puerto Jiménez., 08°31'48"N 083°25'48"W, 300–400 m, 6 May 1993, *Reinaldo Aguilar 1847* (CR); P.N. Corcovado, Península de Osa, Sendero Naranja, 08°28'50"N 083°35'30"W, 10 m, 9 Dec 1998, *Reinaldo Aguilar 5536* (MO); Osa, Corcovado National Park, on hills 0–2 km W of the park headquarters at Sirena, 08°29'N 083°36'W, 0–200 m, 05 July 1977, *R.L. Liesner 2949* (CR, MO); Corcovado National Park. Collected by G. Vega along trail and in forest between headquarters at Sirena and Pavo., 08°30'N 083°36'W, 0–10 m, 5 July 1977, *R.L. Liesner & G. Vega 2895* (CR, MO); Puntarenas, R.B. Monteverde, Cordillera de Tilarán, Río Veracruz, 10°20'24"N 084°43'12"W, 1300 m, 4 May 1991, *E. Bello C. et al. 2725* (CR, MO); **San José:** Acosta, Fila Bustamante, Fila San Jerónimo, bosque primario en el camino al bajo del río cabeceras, Quebrada San Jerónimo., 09°42'36"N 084°16'48"W, 90–1000 m, 24 June 1995, *J. F. Morales 4482* (CR); Along Río Parritilla, ca. 1 km east of Zoncuano, 09°41'24"N 084°13'48"W, 580 m, 28 January 1997, *M.H. Grayum, B.E. Hammel & J. F. Morales 11177* (MO); Pérez Zeledón, along road between San Isidro del General and coastal town of Dominical, southwest of San Isidro, 4.8 miles from the Río Pacuare, remnants of virgin forest along road, 09°18'00"N 083°46'12"W, 1000 m, 22 May 1976, *T.B. Croat 35252* (MO); About 1 mile beyond divide between San Isidro del General and coastal town of Dominical., 09°16'12"N 083°51'36"W, 900 m, 22 May 1976, *T.B. Croat 35291* (MO); Along road between San Isidro General and Dominical, Fila Tinamastes, 09°18'24"N 083°46'11"W, 990–1100 m, 9 September 1996, *T.B. Croat & D.P. Hannon 79098* (CM, CR, MO, SEL, WU); Puriscal, Zona Protectora La Cangreja, forests along Río Negro, ca. 1.5 km east of Santa Rosa de Puriscal, 09°42'00"N 084°23'30"W, 320 m, 14 May 1987, *M.H. Grayum et al. 8328* (CR, MO); Turrubares, Reserva Biológica Carara, Cuenca del Río Grande de Tárcoles, Puesto Carara, Río Carara abajo de la unión con Río del Sur, 09°46'12"N 084°31'48"W, 100–200 m, 5 April 1993, *B.E. Hammel & M.H. Grayum*

18954 (CR); Western part of Montañas Jamaica, ca. 3 km northeast of Bijagual de Turrubares, Carara Reserve., 09°45'30"N 084°33'00"W, 500–600 m, 7 August 1985, *M.H. Grayum et al.* 5856 (MO); **PANAMA. Bocas del Toro:** Changuinola, forest near Luzon. Swamp forest and secondary vegetation on tierra firma., 09°23'N 082°28'W, 20 Jun 1973, *H.Kennedy* 3251 (MO); Hills behind Almirante, first ridge., 09°16'36"N 082°23'36"W, 15 Nov 1971, *H. Kennedy & R.L. Dressler* 1242 (MO); Bosque Protector Palo Seco. Rio Changuinola arriba. Charco La Pava. Bosque trasero de la casa del señor Ernesto Quintero., 09°12'21"N 082°28'06"W, 358 m, 04 febrero 2013, *Orlando Ortiz* 1220 (MO, PMA); Along road between Gualaca and Chiriquí Grande, 6.6 mi N of middle of bridge over Fortuna Lake, steep slope in forest above highway. [Coordinates on original label: 08°45'N, 82°18'W], 08°47'18"N 082°11'54"W, 780 m, 24 June 1987, *T.B. Croat* 66731 (MO); **Chiriquí:** Puerto Armuelles: San Bartolo límite, Chorogo, trocha cerca al límite con Costa Rica., 03 May 1996, *Alvin Zapata* 828 (PMA); Along road from Puerto Armuelles to San Bartolo Limite, 7 miles west of Puerto Armuelles., 08°16'N 082°56'W, 120 m, 19 May 1976, *T.B. Croat* 35060 (MO); Baru, Punta Burica, El Chorogo. Alrededores de la Finca de Fernando Chavarría, adyacente al límite fronterizo. Cabecera del Río San Bartolo., 08°10'15"N 082°35'08"W, 300–400 m, 15 May 2007, *Fermín Hernández* 321 (PMA); **Darién:** Cocalito (near Panama-Colombia border, Pacific side), 07°17'N 077°59'W, 0 - 20 m, 13 Aug 1963, *J.D. Dwyer* 4702 (MO); **Veraguas:** Sante Fe. El Pantano, Parque Nacional Sante Fe, Alto Los Gonzales. Bosque nuboso con muchas pendientes y muy humedo, 08°33'34"N 081°04'39"W, 842 m, 22 November 2012, *Álex Espinosa et al.* 6119 (MO); Along base of Cerro Tute, just past Escuela Agrícola up from Santa Fe, 08°32'N 081°07'W, 1200 m, 10 September 1982, *C.W. Hamilton, W.G. D'Arcy & D.W. Roubik* 1303 (MO); Santa Fe. Serranía de Tute., 08°33'N 081°07'W, 860–1020 m, 04 June 1996, *Carmen Galdames* 3063 (PMA); 6.4 km outside of Santa Fé on the road that passes the agriculture school, headed toward the cordillera, 08°31'00"N 081°07'12"W, 800 m, 05 May 1977, *J.P. Folsom* 2953 (MO); Área de bosque alto; laderas del Cerro San Antonio., 1100 m, *José A. Polanco J.* 3646 (PMA); Alto de Piedra, PN Santa Fe, Cerro Mariposa., 08°30'45"N 081°07'13"W, 992 m, 27 September 2014, *Juvenal Batista* 1177 (PMA); Lower slopes of Cerro Tute, Escuela Agrícola Alto Piedra, 7–8 km NW of Santa Fe; very wet forest, 08°31'28"N 081°07'50"W, 750–850 m, 2 Aug 1975, *R.L. Dressler* 5041 (MO, PMA); Cerro Tute, 8–10 km. northwest of Santa Fé, 08°28'56"N 081°05'53"W, 1200–1300 m, 3 Aug 1975, *R.L. Dressler* 5062 (MO); "Los Girasoles", Escuela Agrícola Alto Piedra, aprox. 5 m NW Santa Fé, 08°30'47"N 081°06'54"W, 800 m, 7 Sep 1974, *R.L. Dressler* 4715 (MO); Guabal (Río Dos Bocas), ca. 16 km NW of Santa Fé, 08°34'40"N 081°11'32"W, 500 m, 16–17 May 1975, *R.L. Dressler* 5028 (MO); Cerro Tute, ca. 10 km NW of Santa Fe, on ridgetop in cloud forest (Lower Montane Rain Forest), 08°28'56"N 081°05'53"W, 1000 m, 19 Jun 1975, *S.A. Mori* 6773 (MO); N of Santa Fé, on property of Escuela Agrícola Alto de Piedra., 08°30'47"N 081°06'54"W, 800 m, 17 October 1974, *S.A. Mori & J.A. Kallunki* 2532 (MO); Above Santa Fé beyond Escuela Agrícola Interamericana, 1.8 miles beyond fork in road on Pacific slope; above rocky ravine on side of Cerro Tute., 08°30'49"N 081°02'11"W, 700–1000 m, 05 April 1976, *T.B. Croat* 34178 (MO, PMA); Valley of Río Dos Bocas along road between Escuela Agrícola Alto Piedra and Calovebora, 15.6 km northwest of Santa Fé, along trail to Santa Fé, steep forested hill east of river., 08°33'03"N 081°10'17"W, 450–550 m, 31 August 1974, *T.B. Croat* 27693 (MO); Vicinity of Escuela Agrícola Alto Piedra near Santa Fe, 0.3 mi beyond the fork in the road near the agricultural school toward Atlantic coast, along trail to top of Cerro Tute, 08°30'20"N 081°07'14"W, 1050–1150 m, 29 Nov 1979, *T.B. Croat* 48910 (MO, PMA); 5 miles W of Santa Fé on road past Escuela Agrícola Alto Piedra on Pacific side of divide.,

08°30'47»N 081°06'54»W, 800–1200 m, 18 March 1973, *T.B. Croat 23044* (MO); Valley of Río Dos Bocas on road between Alto Piedra (above Santa Fé) and Calovebora, along road., 08°33'03»N 081°10'17»W, 350 - 400 m, 29 August 1974, *T.B. Croat 27416* (MO); Vicinity of Santa Fé, along road between Alto Piedra and Calovebora, 0.5 mi N of Alto Piedra, on slopes of Cerro Tute, Parque Nacional Cerro Tuté., 08°30'28»N 081°07'20»W, 800 - 1030 m, 15 July 1994, *T.B. Croat & G. Zhu 76866* (MO); Vicinity of Escuela de Agricultura Alto Piedra, near Santa Fé, along trail to the top of Cerro Tute, 08°28'56»N 081°05'53»W, 2800 - 3200 ft, 03 April 1980, *Thomas M. Antonio 4020* (MO).

Cultivated: Honolulu, Hawaii., August 1992, *T.B. Croat 74079* (MO);

Spathiphyllum wilfridoanum Díaz Jim., *Phytotaxa* 566(1): 126-128, f. 4A-E. 2022. — Type: MEXICO. Tabasco: Municipio Centro, communal land Dos Montes, Centro de Interpretación y Convivencia con la Naturaleza “Yumka”, 17°45'N, 92°45'W, 7 m, 16 November 2009, *P. Díaz Jiménez & A. Garduza 1092* (holotype UJAT).

Terrestrial; understory herb, up to 2.15 m tall; internodes short, up to 6 cm diam. LEAVES 122–167 cm long; **petioles** up to twice as long as the blades, 70–104 cm long, 6–8 mm diam., sheathed near the middle, or above to 33–73 cm from the geniculum, free portion terete; **sheath** and free portion pale green and covered in white dots, sheath margins entire, light green or dark green; geniculum 2.5–5.3 cm long, 7–9.5 mm diam., light green and covered in white dots; **blades** oblong or oblong-elliptic, widest almost in the middle, 50–65.5 cm long, 14–29 cm wide, approx. 3 times longer than wide, acuminate at apex, attenuate (rarely sub-rounded) at the base, subcoriaceous, dark green to yellowish-green and semi-glossy above, light green semi-glossy below, drying green dark to dark brown above, greenish-brown to light brown and below; midrib sunken, dark green above, and covered in white dots, light green to whitish below, thicker than broad; **primary lateral veins**, 24–30 per side, separated 7–20 mm, departing midrib at 40–55°, sunken and dark green above, whitish below; minor veins dark green below. INFLORESCENCE erect, taller than the leaves; peduncle 139–168 cm long, 5.5–8.5 mm diam., covered in white dots, green to light yellowish-green; **spathe** cucullate, oblong or oblong-elliptic, 24–40 cm long, 12–15 cm wide, acuminate apex, subcuneate or attenuate, and oblique at the base, almost not decurrent on the peduncle, yellowish-green at anthesis, dark green at post-anthesis; **spadix** 11–13 cm long, 2–2.5 cm diam., cream-yellowish, emitting a sweet and pleasant scent at anthesis, stipe short, 5–8 mm long, 6 mm diam., yellowish-green at anthesis, yellowish-green at anthesis; perianth with 6 free tepals, 1.5–2.5 mm long; 6 anthers, 3.5–4 mm long, thecae oblong, 1–1.8 mm; **pistils** sharply emergent, conic, 5–7.3 mm long, style 1.8–3.1 mm long, 1.3–1.5 mm diam. at the base; ovary 3-locular, 1–4 ovules per locule, 4–7 ovules per ovary. INFRUCTESCENCE 18–21 cm long, 2.5–3.3 cm diam.; berries obovoid to oblong, rostrate, 10–17 mm long, 3.3–6 mm wide, yellowish at maturity; seeds oblong to oblique-ovoid, dark to dark brown when dry and glossy when fresh.

Figures 236–238.

Distribution — *Spathiphyllum wilfridoanum* is endemic to Mexico, known only from the type locality from the Centro de Interpretación y Convivencia con la Naturaleza “Yumka” in Tabasco at 7 m elevation.



Figure 236: *Spathiphyllum wilfridoanum*, habit of flowering plant. Photo: P. Díaz Jiménez



Figure 237: *Spathiphyllum wilfridoanum* , Inflorescence. Photo: P. Díaz Jiménez



Figure 238: *Spathiphyllum wilfridoanum*, P. Díaz Jiménez & A. Garduza 1092, TYPE, Mexico

Comments — Flowering has been observed in November in the wild; in March, June, and November in cultivated plants. Díaz Jiménez et al. (2022) reported that the species has spadices which emit a strong and pleasant floral scent, most intense between 6:00 a.m. and 12:00 noon.

Spathiphyllum wilfridoanum had been mistakenly identified as *S. cochlearispathum*. However, *S. wilfridoanum* has a petiole almost twice as long as the blade and is sheathed almost to the middle, the margin of the sheath is entire and not wrinkled, its blades are narrower with an attenuated base (rarely sub-rounded), the angle of the primary veins is less than 60°, and the number of ovules per ovary is less than that recorded in *S. cochlearispathum* (Bunting 1960; Díaz Jiménez et al. 2021a). *Spathiphyllum wilfridoanum* is a rare species, only known from its type locality, growing below 10 m in tropical forests, while *S. cochlearispathum* has been collected mostly above 800 m in coffee crops and montane cloud forests (Díaz Jiménez et al. 2021). The new species represents the seventeenth species for Mexico and the third species for Tabasco (Díaz Jiménez et al. 2021). On the other hand, unlike *S. maldonadoanum*, *S. wilfridoanum* has entire sheath margins, shorter geniculum, narrower blades with attenuated base, fewer primary veins per side, shorter pistil, and fewer ovules per ovary.

Paratypes: — **MEXICO. Tabasco:** Mun. Centro, ejido Dos Montes, Centro de Interpretación y Convivencia con la Naturaleza Yumka, 17°45', 92°45', 7 m, 16 November 2009, *P. Díaz Jiménez & A. Garduza 1093* (MO); Mun. Comalcalco, R/a. Independencia 2da. Sección (cultivated), 18°17'N, 93°09'W, 8 m, 09 March 2021, *P. Díaz Jiménez 1496* (UJAT).

Spathiphyllum zetekianum Standl., Ann. Missouri Bot. Gar. 27: 267. 1940. — Type: PANAMA. Canal Zone, Barro Colorado Island, Zetek trail, July 1931, *D.E. Starry 27* (holotype, F).

Terrestrial herb 0.6–1.5 m tall; internodes short, 2 cm diam. LEAVES in a loose rosette; **petioles** 46–59 (70) cm long, terete, drying dark brown, sheathed to midway, the **sheath** slightly darker than shaft; free part 3.8–10.5 cm long; geniculum 0.8–1.5 (4) cm long, sulcate, drying slightly darker than petiole; **blades** 39–54 cm long, 9.5–15.5 cm wide, 3.5 times longer than wide, lanceolate, asymmetrical with one side up to 1 cm wider, acute at apex, obtuse at base, dark green above, moderately paler below, drying dark brown above, light brown below; midrib sulcate above, narrowly rounded below, drying concolorous above, darker below; **primary lateral veins** 16–20 per side, spaced 1.8–2.0 cm. apart, departing midrib at 45–55°, moderately sunken and concolorous above, narrowly rounded and slightly paler below, drying concolorous above, darker below. INFLORESCENCE longer than leaves; peduncle 63–67 cm long, 1.5 times longer than blades, drying concolorous with petioles; **spathe** (13)20–28 cm long, 5–7 cm wide, 3–4 times longer than wide, green, lanceolate-elliptic, attenuate at apex, acute and decurrent onto the peduncle at base for 2.0–5.5 cm; **spadix** 4–9 cm long, 7–9 mm. diam., cylindrical, green or white at anthesis, white in fruit, stipitate 1.2–1.8 cm, perianth of 6 free tepals; anthers exerted at anthesis; **pistils** cylindrical with the pyramidal styler region exceeding the perianth by 4.8 mm, 1.2 mm diam.; stigma rounded apically; ovary 3-locular, ovules 1 per locule, each oblong, 2 mm long, less than 1 mm diam. INFRUCTESCENCE



Figure 239: *Spathiphyllum zetekianum*, Croat 66998, Panama

with berries obovoid, rostrate at apex, 6 mm long, 3 mm diam.; seeds elongate-ovoid, 3 per berry, 1 per locule, 2.8–3.0 mm. long, 1.5–2.0 mm. diam., 1.6–1.8 mm thick, drying medium brown, chalazal surface broadly concave, surface moderately smooth to foveolate. **Figure 239.**

Distribution — *Spathiphyllum zetekianum* ranges from Panama to Colombia from sea level to 600(900) m in *Tropical moist forest* and *Tropical wet forest* life zones. In Colombia, the species is known from the western slope of the Cordillera Occidental in Chocó Department along the Pacific coast and in the northern part of the Department near the Panamanian border.

Comments — *Spathiphyllum zetekianum* was considered only a juvenile or depauperate example of *S. phryniifolium* by Bunting (1960) but Cardona (2004) resurrected the species based on its lanceolate leaf with an acute blade base and an obtuse stylar region.

Additional specimens seen: **COLOMBIA. Chocó:** Acandí, corregimiento de Sapzurro, 5 m, 08°31'00" N, 77°17'00" W, 10 julio 1997, *Estudiantes de botanica taxonomica MEDEL 100* (MEDEL); Nuquí, Corregimiento de Arusí, estacion biologica El Amargal, 05°34'00" N, 77°31'00" W, enero-abril 1999, *Jorge Jacome 314* (COL, HUA), *363* (COL, HUA); Unguía, resguardo de Arquía, 200 m, 08°00'00" N, 77°10'00" W, 25 abril de 1993, Giraldo, Izquierdo & Pinto 45GIP (COL); Carmen de Atrato, carretera entre el Carmen y Quibdó, 600 m, 05°45'00"N, 76°30'00"W, 7 July de 2000, *F. Cardona, R. Callejas, et al. 1018* (HUA). **PANAMA. Veraguas:** Alto de Piedra, vicinity of Santa Fé, Cerro Tute, along ridge which leads to summit, 08°33'N, 81°08'W, 29 June 1987, 800-950 m, *T.B. Croat 66998* (MO).

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Appendix 1. List of accepted names of *Spathiphyllum* for Central America. .

- S. abelianum* A.F.Rojas & J.M.Chaves-Fallas
S. almirantense Croat
S. atrovirens Schott
S. ayalae Croat & O.Ortiz
S. blandum Schott
S. bobdressleri Croat & O.Ortiz
S. bonyicense Croat
S. brevirostre (Liebm.) Schott
S. cardonanum Croat & Grayum
S. clewellii Croat
S. cochlearispathum (Liebm.) Engl.
S. cotonense M.Cedeño & O.Ortiz
S. croatii Díaz Jim. & Pérez-Farr.
S. darienense Croat & O.Ortiz
S. dressleri Croat & F.Cardona
S. floribundum (Linden & André) N.E.Br.
S. frailescanense F.J.-Pérez, Díaz Jim. & Pérez-Farr
S. friedrichsthalii Schott
S. fulvovirens Schott
S. guadalupense Díaz Jim.

- S. hannonii* Croat
S. hentricii Díaz Jim.
S. hubertkrusei Croat
S. kalbreyeri G.S.Bunting
S. kennedyae Croat
S. laeve Engl.
S. luteynii Croat & O.Ortiz.
S. maldonadoanum Díaz Jim.
S. matudae G.S.Bunting
S. mixtecorum Díaz Jim. & Pérez-Farr
S. montanum (R.A.Baker) Grayum
S. morii Croat & O.Ortiz
S. munniae Croat
S. ortgiesii Regel
S. ortizii Croat
S. patinii (B.S.Williams ex R.Hogg) N.E.Brown
S. phryniifolium Schott
S. quindiuense Engl.
S. silvicola R.A.Baker
S. uspanapaense Matuda
S. wendlandii Schott
S. wilfridoanum Díaz Jim.
S. zetekianum Standl.