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Revision of *Stenospermation* (Araceae—Monsteroideae—Anepsiadeae) for Central America

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ABSTRACT

A review of all Central American species of *Stenospermation* is given. The treatment consists of 68 species in Central America with 58 species being published as new, including one new combination: *S. adsettiorum* Croat, O.Ortiz & J.Harrison, *S. bocachirensense* Croat, *S. brakoae* Croat, *S. brewsterense* Croat, *S. calvarioense* Croat, *S. castanoanum* Croat, *S. cerrofríoense* Croat, *S. chagrense* Croat & O.Ortiz, *S. chucantiense* Croat & O.Ortiz, *S. copense* Croat, *S. darienense* Croat, *S. dasae* Croat, *S. donosoense* Croat & O.Ortiz, *S. dressleri* Croat, *S. dukei* Croat & Castaño-Rub., *S. filamatamense* Croat, *S. folsomii* Croat, *S. fortunense* Croat, *S. gaitalense* Croat, *S. hageniorum* Croat, *S. hampshireae* Croat, *S. heraclioi* Croat, *S. herrerae* Croat, *S. hodelii* Croat, *S. kamemotoanum* Croat, *S. loiselleae* Croat, *S. luisgomezii* Croat, *S. luteynii* A.P. Gómez & Croat, *S. maloneanum* Croat, *S. martinezii* Croat & O.Ortiz, *S. mcphersonii* Croat, *S. mesaense* Croat, *S. monroi* Croat, *S. morii* Croat, *S. multicostatum* Croat, *S. niquense* Croat & O.Ortiz, *S. nusigandense* Croat, *S. ortizii* Croat, *S. palosecense* Croat, *S. pamsleeperae* Croat, *S. pirrense* Croat & O.Ortiz, *S. pucuroense* Croat, *S. purulhaense* Croat, *S. quichense* Croat, *S. ramonense* Croat, *S. santamariae* Croat, *S. sapoense* Croat, *S. solanoi* Croat, *S. sullivanii* Croat, *S. terrabaense* Croat, *S. topalisense* Croat, *S. tuerckheimii* (Engl. & K.Krause) Croat, *S. vallense* Croat, *S. veraguense* Croat, *S. whitefordiae* Croat & O.Ortiz, *S. wongiae* Croat & O.Ortiz, *S. zapatae* Croat & O.Ortiz and *S. zurquiense* Croat. The species are fully described, illustrated, and compared with their closest congeners. This work is the first modern revision of the genus published for Mexico and Central America.

Key Words: *Stenospermation*, Central America, Monsteroideae, Anepsiadeae, new species.

INTRODUCTION

Stenospermatum Schott of the family Araceae is one of twelve genera in the subfamily *Monsteroideae* and belongs to the tribe Anepsiadeae. The genus currently consists of 240 species. Adolf Engler & Kurt Krause (Engler & Krause, 1908) first monographed the genus *Stenospermatum* Schott in 1908. The monograph had 21 species from Central and South America along with the first taxonomic key for the genus. There are currently only 58 published species of *Stenospermatum*, which is approximately one fifth of the estimated total species number which are likely to exist. Most of the species in the genus occur in Costa Rica, Panama, Colombia, Ecuador, and Peru with relatively few inhabiting eastern South America or the Amazon basin. The center of species diversity for *Stenospermatum* is in Andean South America, especially in Ecuador and Colombia. Perú is a secondary center of diversity.

A revision of Central American *Stenospermatum* species was completed in 1983 by Alcira Gómez de Pérez in an unpublished Master's Degree thesis at St. Louis University. The thesis treated 8 species, including one new species.

The most recently completed work with *Stenospermatum* was done by Ángela Natalia Castaño-Rubiano in 2011 as a Master's Degree project at the Universidad Nacional in Bogota. (Castaño, 2011). That work purportedly revised all the Colombian species. It reported 28 species, four of which were new to science.

In this revision of *Stenospermatum*, 68 species are recognized in Central America, 58 (84%) of which are new in this treatment. This tremendous increase in the number of species in the genus since the last revision in 1983, from ten species to 68 is at least in part owing to considerable collecting activity in areas on the Caribbean slopes of Panama that were not previously available.

The revision here presented is based on approximately 3,600 herbarium specimens. Several species are currently growing at the Missouri Botanical Garden. These specimens were used in some cases to describe live material and form the description of flowering behavior and other biological aspects for certain species. Herbarium specimens and live material were examined.

HISTORY OF THE GENUS

Revisionary work with *Stenospermatum* began in 1830 with the first of a series of monographic works on the family Araceae by H.W. Schott of Vienna. Schott laid the foundation of the generic classification of the family based largely on floral morphology. His studies culminated in the *Genera Aroidearum* (1858) and *Prodromus Systematis Aroidearum* (1860). The latter was a monograph of the entire family and included descriptions of 104 genera and 972 species. He commissioned the preparation of more than 3,000 illustrations of aroids, which rank among the finest botanical illustrations known. They are housed in the Museum of Natural History in Vienna.

The genus *Stenospermatum* first appeared in 1858 (Schott, 1858). However, Schott used the alternative spelling of *Stenospermatium*, with the Latin neuter ending, in his final monograph of the family in *Prodromus Systematis Aroidearum* (1860: 346–349). The genus name today

is spelled *Stenospermatum*, as that name was validly published first, giving it precedence by the principle of seniority. The *Prodromus Systematis Aroidearum* contained the description of the genus and four species. Schott's monograph serves as an important record of the early collections of *Stenospermatum*.

Following Schott's death in 1865, Adolf Engler became the world specialist on the Araceae. He twice monographed the family in its entirety, first in 1879 as the second volume of DeCandolle's *Monographiae Phanerogamarum*, and later in a series of volumes of *Das Pflanzenreich* published between 1905 and 1920.

In 1885, Hemsley (1885) published two new species (*Stenospermatum. angustifolium* and *S. marantifolium*) in *Biologia Central America*. Engler's monograph, published in *Botanische Jahrbucher Systematik* (Engler, 1905) described 14 new species. His treatment of *Stenospermatum*, published with K. Krause in 1908, provided a key to all the species. This was the first key written for the genus (Schott had not produced one) and the number of recognized species was increased from the four described by Schott to 22. Engler's studies of *Stenospermatum* resulted in the monograph written with K. Krause and published in *Das Pflanzenreich* (Engler & Krause, 1908) and represented considerable progress over earlier efforts.

In 1908, Sodiro published *Sertula Florae Ecuadorensis* (Sodiro, 1908) in which he described nine new species of *Stenospermatum* but he did not write a key. In 1914, Krause published one new species (*Stenospermatum ulei* K.Krause) and in 1932 another (*S. archeri* K.Krause) from Colombia.

In the last 90 years various accounts of *Stenospermatum* have appeared in floristic works. Macbride (1931) reduced the genus *Stenospermatum* to *Rhodospatha* Poeppig when he stated, "The genus (*Rhodospatha*) may well be amended to include plants that have been referred to as *Stenospermatum* Schott, since the latter in general has no distinction except the basal instead of lateral attachment of the ovules. If this character properly forms a basis of generic definition, other groups in the family now included under one name (as *Philodendron*, for example) should be segregated." Despite Macbride's opinion, the two genera can be recognized easily from a distance owing to their leaf blade venation alone and are recognized as distinct today due to many more distinguishing features. A few of these distinguishing features are as follows. The genus *Rhodospatha* has a 2-celled ovary with axile placentation, blades with conspicuous primary lateral veins, and flat lentil-shaped seeds. The genus *Stenospermatum*, on the other hand, has a one-celled or very incomplete 2-celled ovary with a basal, annular placenta, blades with inconspicuous primary lateral veins, and clavate-cylindrical seeds. In most cases *Rhodospatha* species are massive, epiphytic appressed-climbing or terrestrial plants with thick stems, long-petiolate leaves with "banana-like" blades, often to about a meter long and the blades have distinct, spreading, primary lateral veins which have a distinct repetitive pattern of primary lateral veins interrupted by 1–3 interprimary lateral veins with yet smaller lateral minor veins alternating in diminishing then increasing size pattern throughout the extent of the leaves. In this respect *Rhodospatha* is more like *Spathiphyllum* than it is to *Stenospermatum*. In contrast *Stenospermatum* rarely exhibits any pronounced primary lateral veins and most species are small, mostly epiphytic plants though terrestrial *Stenospermatum* tend to be somewhat larger and a couple of species are rather massive. For more information

about the morphological characteristics see the section on morphology in this paper. Other works which have included floristic revisions of *Stenospermatum* include the *Flora of Costa Rica* (Standley, 1937), *Flora of Panama* (Standley, 1944), *Flora of Surinam*, (Jonker-Verhoef & Jonker, 1953), *Flora of Guatemala* (Standley & Steyermark, 1958) and *A Synopsis for Venezuela Araceae* (Bunting, 1979). In addition, species were described in a variety of separate works by Steyermark (1951), Bunting (1963), and Madison (1977).

Recent analysis of relationships within the Monsteroideae used three main datasets: the morpho-anatomical dataset and study by Mayo et al. (1997), a molecular sequence dataset by Cabrera et al. (2008), and restriction-site data from chloroplast DNA from French et al. (1995). These three datasets were used to make a phylogeny that was primarily the molecular sequence dataset (it had the most statistical support and the other two did not resolve into neat phylogenies), although the other two datasets were used to map synapomorphies onto the phylogeny (Cusimano et al., 2011).

The highest supported phylogeny was the molecular sequence that was done using, “ML analysis of a molecular data set of 117 species and 4494 nucleotides from four chloroplast markers based on Cabrera et al., (2008)” (Cusimano et al., 2011). This phylogeny had morpho-anatomical and chloroplast marker data mapped onto it, as this gives the clades distinct synapomorphies with the support of the molecular data. According to the most recent report, *Stenospermatum*, with *Rhodopatha*, *Alloschemone* and *Heteropsis*, is clearly in a clade which should be recognized as a neotropical tribe of its own for which the Anepsiadeae is the oldest available name (with *Heteropsiadeae* as a synonym) (Haigh et al., 2023). *Stenospermatum* had the following morpho-anatomical synapomorphies: chromosome numbers $x=14$, laticifers absent or infrequently scattered in cells, sporopollenin present, zonate pollen aperture, reticulate (or other) exine surface, and no zonation of female and male parts on the spadix (bisexual) (Cusimano et al., 2011).

GENERIC RELATIONSHIPS

Stenospermatum is a member of the subfamily *Monsteroideae* of the Araceae is a well-defined and easily recognized subfamily with an estimated 573 species, many of which remain unpublished. The majority are scandent or subscandent epiphytes of wet tropical forests and contain in their vegetative and flowering parts numerous needle-like or H-shaped trichosclereids. The leaves have two pulvini, one at each end of the petiole and the lamina often exhibits natural perforations. The spadix consists of closely aggregated, perfect, naked flowers, each with four stamens.

The apportioning of the extant species into genera has been disputed for more than 100 years (e. g. Koch, 1856; Schott, 1858; Macbride, 1931; Steyermark, 1951; Bakhuizen van den Brink, 1958; Bunting, 1962; Nicolson, 1968a, 1968b; Hotta, 1970). Extreme positions are the recognition of 12 genera (Schott, 1860) or the inclusion of all of the species in one or two large genera (Koch, 1856; Bakhuizen van den Brink, 1958). The difference among these treatments reflects differences in philosophies of classification rather than in the kinds of characters used. All of these authors refer to the same few generic characters: placentation (axile, parietal or basal), septation of the ovary (unilocular or bilocular) and geography (Asian or neotropical).

Stenospermatum Schott is typical of the tribe Anepsiadeae; its members have in common peduncles which are often cernuous near the apex. Its flowers are borne on a spadix. All have entire, coriaceous leaves which are glossy.

Morphology

Since many species of *Stenospermatum* have short internodes and heavily sheathed petioles, the actual stem surface is often not available for viewing except by dissection, but stem surfaces when seen are variable in terms of their drying color, degree of ribbing and the presence of short pale lineations (some form of cellular inclusions easily visible with minor magnification). Epiphytic scandent species on the other hand have stems that are easily viewed and often provide reliable taxonomic differences with the characters mentioned. Plants with a terrestrial habit usually have short internodes since they must remain moderately short to avoid falling over, although the same species typically have stout roots which help them to remain erect. Scandent species with long internodes usually climb up the sides of their support but in many cases, they send lateral branches out to distances of a meter or more before reaching flowering stage. In these instances, the inflorescence is often pendent with the spathe turned down. Most species grow and flower between one meter and four meters from the ground with those with long slender internodes being the ones growing highest in the trees.

Petioles are invariably sheathed with the sheath extending most commonly to above the middle of the petiole. Many species have sheaths that extend to the geniculum or almost to the geniculum. The sheath margins are typically erect and curled inward with the margins remaining intact (although sometimes fragile and thin, even brittle) quite unlike *Rhodospatha* where the sheath margin provides a good taxonomic character owing to the variability of decomposition of the margin.

The geniculum on *Stenospermatum* is less conspicuous than on some genera of Araceae such as *Anthurium* or even *Rhodospatha* but when it is evident it may appear as a paler, often thicker area than the remainder of the petiole. Most frequently it is sulcate to some extent.

Leaf blades of *Stenospermatum* are simple and entire, mostly quite elongated, and aside from some variation in size and shape the leaf does not offer much of taxonomic value in its live condition because the blades have little relief, the midribs are nearly all sunken above and narrowly rounded below while the primary lateral veins are often not visible at all. On the other hand, the dried upper blade surfaces provide the most characteristic differences with a myriad of different forms of ribbing between the midrib and the margin while the midrib itself is less variable. The surface ribbing can be variably spaced, continuous or discontinuous, parallel, or variously reticulate and interconnecting with the cross-veins at different distances or angles. It is not at all certain if the surface ribs have any actual relationship to the internal structure of the veins but the nature of these ribs, their degree of proximity and the characteristics of the interveinal areas provide something akin to fingerprints that enable nearly every species to be differentiated. It is for this reason that this revision presents micro images of the upper leaf surface. In addition, the individual cells in the epidermis are often readily visible and aligned in regular parallel rows (referred to as rowed-areolate). Independently the readily visible short pale-lineations (presumably some form crystal deposits) form another highly variable character both in terms of their presence but also their position between the ribs and their quantity as

well as their degree of prominence. Most species are sufficiently distinct to be classified by a view of the upper dried blade surface. In contrast, this unique feature is altogether absent for viewing on the fresh leaves. The lower blade surface by contrast has few important differences other than drying color since they are quite similar, usually dominated by the presence of closely spaced raphides which give the blade a regular pattern of intermittent striations, often associated with an admixture of granulations.

The inflorescences of *Stenospermatum* also provide fewer taxonomic characters than do those of other genera. The typically boat-shaped spathes are usually white to cream, often greenish and sometimes tinged yellow or orange. Unfortunately, the spathes when in bud are always green and anthesis in the genus does not last long with the spathe loosening for a few hours prior to the night of anthesis and often falling off by morning, infrequently seen at all when in flower. Rarely does the spathe persist and dry on the peduncle as in the South American species, *S. ulei* K.Krause.

Pollination is effected by night flying insects, likely beetles, scarab beetles or the smaller beetles like *Cychocephalus corveninus* in Nitidulidae which are found pollinating *Monstera* (Prieto & Cascante-Marin, 2018). During the second phase of flowering, male anthesis, the pollen is shed, usually in viscous threads which easily adhere to the visiting insects. Pollen is extruded in strands and is not fully zonate, is medium sized (mean 46 µm) with the exine shallowly foveate (Mayo et al., 1997)

Infructescences in *Stenospermatum* are not particularly attractive or colorful in most cases but the fruiting spadix, though enlarging with the pistils becoming orange and dislocated, seems not to be further modified to attract fruit dispersing organisms. Perhaps what appears to be uninteresting and unattractive to fruit dispersers has something such as a strong scent that readily attracts them, because in all my years in the field the senior author has never seen an infructescence that appeared fully mature with attractive or scented berries.

TAXONOMY

Stenospermatum Schott, Gen. Aroid. 70. 1858. — Type: *Stenospermatum mathewsii* Schott (lectotype, designated by Nicolson, 1967).

Epiphytic, usually appressed-climbing, rarely scandent, frequently terrestrial; caudices rooting at the nodes, short or moderately elongate, slender to stout, sometimes providing stilt-roots on smaller terrestrial species; leaves distichous; petioles moderately long, prominently sheathed, geniculate at apex; blades oblong to oblong-elliptic or lanceolate, moderately coriaceous to subcoriaceous; midrib narrowly sunken on upper surface, often marginally discolorous, prominently raised on the lower surface; primary lateral veins inconspicuous, often scarcely visible, scarcely more prominent than the interprimary lateral veins when dried, often drying weakly raised and appearing numerous, straight or weakly arcuate to the margin and not forming a collective vein. INFLORESCENCE erect, shorter than the leaves, the peduncle usually cernuous near the apex, later erect; **spathe** usually white, moderately coriaceous to subcoriaceous, promptly deciduous, usually naviculiforme and cuspidate at the apex,

convolute or nearly so at base; **spadix** sessile or stipitate, usually uniform, white; flowers perfect and naked; stamens four, the filaments flattened, abruptly narrowed at apex into a slender connective, about as long at the ovary but never exerted; anthers with thecae oblong-ovoid, acute, dehiscent by lateral slits that do not reach the base of the cell; ovary obpyramidal to prismatic, truncate at apex, (1)2-celled, ovules four to many per locule, collateral, anatropous, arranged in two rows; funicles long, the style short, thicker than the ovary, the stigma linear-oblong, slightly raised; **fruits** scarcely enlarged from the pistils, baccate, obovoid; seeds three or more per cell, clavate-cylindric, slender, with a thick testa; endosperm copious. Species estimated to total 300, 68 of which occur in Central America.

Distribution — The distribution of species of *Stenospermatum* in North America shows considerable endemism, with no species known from Mexico, Belize, El Salvador, or Honduras, while Guatemala has three species, all of which are endemic. Aside from Costa Rica relatively few species are endemic to Middle America (Guatemala, Belize, Honduras, Nicaragua, and Costa Rica) with 13 species known for that region, only three of which are not in Costa Rica. Costa Rica is relatively rich in species with a total of 12 species of which nine are endemic. Species diversity is greatest in Panama where there a 39 species, of which 31 species (79%) are endemic. This leads to the conclusion stated elsewhere that greatest species diversity will be found in northwestern South America, not only in the Andes but in the Pacific lowlands. These areas need to be collected soon while there is still hope to collect in a significant portion of the forest occurring there. For a detailed analysis of distribution of *Stenospermatum* in Central America refer to [Appendix #2](#). [Appendix #3](#) shows the endemism in each country.

Links to Species Description

<i>S. adsettiorum</i>	<i>S. folsomii</i>	<i>S. multicostatum</i>	<i>S. topalisense</i>
<i>S. angustifolium</i>	<i>S. gaitalense</i>	<i>S. niquense</i>	<i>S. tuerckheimii</i>
<i>S. bocachirens</i>	<i>S. hageniorum</i>	<i>S. nusigandense</i>	<i>S. vallense</i>
<i>S. brakoae</i>	<i>S. hampshireae</i>	<i>S. ortizii</i>	<i>S. veraguense</i>
<i>S. brewsterense</i>	<i>S. heraclioi</i>	<i>S. palosecense</i>	<i>S. whitefoordiae</i>
<i>S. calvarioense</i>	<i>S. herrerae</i>	<i>S. pamsleeperae</i>	<i>S. wongiae</i>
<i>S. castanoanum</i>	<i>S. hodelii</i>	<i>S. pirrense</i>	<i>S. zapatae</i>
<i>S. cerrofríoense</i>	<i>S. kamemotoanum</i>	<i>S. pteropus</i>	<i>S. zurquiense</i>
<i>S. chagrense</i>	<i>S. loiselleae</i>	<i>S. pucuroense</i>	
<i>S. chucantiense</i>	<i>S. luisgomezii</i>	<i>S. purulhaense</i>	
<i>S. copense</i>	<i>S. luteynii</i>	<i>S. quichense</i>	
<i>S. coques</i>	<i>S. majus</i>	<i>S. ramonense</i>	
<i>S. darienense</i>	<i>S. maloneanum</i>	<i>S. robustum</i>	
<i>S. dasae</i>	<i>S. martinezii</i>	<i>S. santamariae</i>	
<i>S. donosoense</i>	<i>S. mcphersonii</i>	<i>S. sapoense</i>	
<i>S. dressleri</i>	<i>S. mesaense</i>	<i>S. solanoi</i>	
<i>S. dukei</i>	<i>S. monroi</i>	<i>S. sullivani</i>	
<i>S. filamatamense</i>	<i>S. morii</i>	<i>S. terrabaense</i>	

KEY TO STENOSPERMATION OF CENTRAL AMERICA

1a.	Inflorescence with spadix sessile or appearing to be sessile (stipe less than 1 mm long on drying)	2
1b.	Inflorescence with spadix noticeably stipitate	24
2a.	Leaf blade both large (more than 9 cm wide) and drying brown, often coriaceous	
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3a.	Petiole sheathed to very near apex	4
3b.	Petioles sheathed usually to middle or the distal 2/3 rd their length.....	5
4a.	Leaves with petioles sheath usually broadly rounded or free-ending at apex; leaf blades 2.6–3.2 times longer than wide; upper blade surface finely ridged to ridged-areolate and finely low-striate, lacking short pale lineations; Panama (Colón, Panamá, and Guna Yala, 200–1160(1900) m).....	<i>S. luteynii</i> A.P.Gómez & Croat
4b.	Leaves with petiole sheath acute at apex; leaf blades 1.6–2.5 times longer than wide; upper surface coarsely and irregularly ribbed, lacking fine close striations but conspicuously sunken pale-lineolate; Panama (Chiriquí, 1170–1250 m).....	<i>Stenospermation</i> sp. #1
5a.	Free portion of petiole (the unsheathed part) 8.5–28 cm long; spadix yellow to orange to yellow-orange; Panama (Darién) to Colombia (Valle del Cauca).....	<i>S. ellipticum</i> Croat & D.C.Bay
5b.	Free portion of petiole (the unsheathed part) 2–12 cm long; spadix usually white, sometimes yellowish in age	6
6a.	Petiole sheath margins with a thin, brittle, light brown margin on drying, this sometimes breaking up; spadix white (sometime pale yellowish)	<i>S. sessile</i> Engl.
6b.	Petiole sheath margins not thin or brittle the margin not discolored; spadix white (or not known).....	7
7a.	Free portion of petiole (the unsheathed part) 8.5–28 cm long; blades elliptic to weakly obovate-elliptic, coriaceous, broadly rounded to obtuse to rounded and abruptly acuminate to weakly short acuminate at apex, 23.5–35.5 cm long, 8.3–17 cm wide, 1.7–3.1 times longer than broad.....	<i>S. ellipticum</i> Croat & D.C.Ba
7b.	Free portion of petiole (the unsheathed part) less than 2 cm long; blades narrowly elliptic to oblong-elliptic, drying very thin, narrowly acuminate at apex, acute to obtuse or weakly attenuate at base, less the 21 cm long, less than 7 cm wide, 3.1–3.5 times longer than broad.	<i>S. niquense</i> Croat & O.Ortiz
8a.	Leaf blades 3.5–10 times longer than broad.....	9
8b.	Leaf blades 2.5–3.5 times longer than broad.....	17
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- 80b.** Leaf blades less than 20 cm long, 1.9–3.5 times longer than wide; Panama (Chiriquí to Panamá Prov., 800–1200 m) **81**
- 81a.** Leaf blade with intervening areas between minor veins surfaces smooth with areolate cells evenly spread and uniform; spathe 11.3–12.7 cm long, 2–3 cm longer than spadix, long-acuminate; spadix orange; Panama, (Chiriquí to Panamá Prov. 900–1200 m) *S. multicostatum* Croat
- 81b.** Leaf blade with intervening areas between minor veins surfaces coarsely veined with subparallel ridges nearly as high as minor veins, densely granular but lacking any obvious areolate cells; spathe 5.5 cm long, scarcely longer than spadix; spadix white; Panama (Coclé, 860 m.) *S. sullivanii* Croat
- 82a.** Leaf blades drying subcoriaceous, short pale-lineate on upper surface; spadix thickly cylindroid, 3–4 times longer than wide (spadix oblong and more than 9 cm times longer than wide for *S. dukei*, *S. filamatamense* & *S. sullivanii*) **83**
- 82b.** Leaf blades drying coriaceous, lacking short pale lineations on upper surface (present but inconspicuous and minute on *S. wongii*) ; spadix 9–14 times longer than wide **86**
- 83a.** Spadix thickly cylindric, 3–4 times longer than wide *S. kamemotoanum* Croat
- 83b.** Spadix narrowly cylindroid, (7)9–11 times longer than wide **84**
- 84a.** Leaf blades narrowly lanceolate, 4.7–5.6 times longer than wide, upper surface conspicuously rowed-areolate; Panama (Bocas del Toro, 1100 m.) *S. cerrofríoense* Croat
- 84b.** Leaf blades elliptic to narrowly elliptic, 2.2–5.3 times longer than wide; Costa Rica (Limón, 1100 m) or Panama (Coclé 800–1000 m) **85**
- 85a.** Blades narrowly elliptic, 12.2–19.4 cm long, 2.3–5.35 times longer than broad, drying grayish brown, minor veins scarcely raised, slightly darker, intervening area uniformly densely fine-granular-striate; Costa Rica (Limón, 1400 m.) *S. filamatamense* Croat
- 85b.** Blades elliptic, 8.5–13 cm long, 2.2–2.4 times longer than broad, drying greenish gray, minor veins merely rounded but noticeably raised, intervening area with any ribs transverse or irregular to oblique, not finely striate-granular; Panama (Coclé, 800–1000 m) *S. dukei* Croat

- 86a.** Leaf blades 2.4–2.5 times longer than broad; Panama (Veraguas, Cerro Pelado, 1000–1100 m) *S. wongiae* Croat & O.Ortiz
- 86b.** Leaf blades 3.4–4.6 times longer than wide.. **87**
- 87a.** Leaf blades 4.6 times longer than wide; minor veins closely and narrowly raised with the intervening area also irregularly ridged, not markedly granular; Panama (Panamá, Cerro Jefe, 1000 m)..... *S. castanoanum* Croat
- 87b.** Leaf blades 3.4–3.7 times longer than wide; minor veins scarcely raised with the intervening area densely granular and minutely dark-punctate; Panama (Chiriquí, Fortuna area, 1700 m)..... *S. folsomii* Croat

SPECIES DESCRIPTIONS

Stenospermation adsettiorum Croat, O.Ortiz & J.Harrison, **sp. nov.** — Type: PANAMA. Panamá: vicinity of Cerro Jefe, Altos de Cerro Azul subdivision, Municipio Chilibré, property of Bill Adsett, remnants of virgin forest, 09°12'40"N 079°24'53"W, 857 m, 3 March 2015, *T.B. Croat, J. Harrison & L. Harrison 106235* (holotype, MO-6682739; isotype, PMA).

Diagnosis: *Stenospermation adsettiorum* is characterized by its large size, thick stem, incurled sheath with margins brownish and brittle, the free part of petiole narrowly and bluntly sulcate, by the coriaceous, dark gray-brown-drying blades that are about four times longer than broad with the upper surface lacking pale lineations and drying with minor veins narrowly and irregularly low-raised with the intervening area densely, tightly and finely striate as well as by the cernuous inflorescence with a white spathe and spadix.

Epiphytic or terrestrial, to one m tall; sap clear; internodes short (2.5)5–6 cm thick cm diam.; LEAVES erect or nearly so; **petioles** sheathed to within 5.5–10.5 cm from base, 0.60–0.85 their length, medium green, matte, 39–44 cm long (sulcus nearly closed on drying), drying dark brown, matte, bluntly ribbed; **sheath** incurled, margins brownish and brittle, often eroded, free part of petiole narrowly and bluntly sulcate, laterally compressed, 3–8 cm long; geniculum short and paler, 2.5 cm long; **blades** 35.0–49.5 cm long, 11–15 cm wide, 3.0–4.3 times longer than wide, broadest near middle, about as long as petioles, shortly acuminate and down-turned at apex (acumen ca.1.5 cm long), moderately thick and softly coriaceous, dark green and semiglossy above, moderately paler and semiglossy, somewhat lustrous below, drying coriaceous, dark gray-brown and matte above, dark brown and matte below; margins narrowly thickened and paler, blade margins yellowish; midrib slightly to moderately and narrowly sunken and marginally weakly paler, more so on lower 2/3 of blade above, conspicuously yellow-green, narrowly rounded and matte below; primary lateral veins obscure on both surfaces, tightly spaced, departing midrib at 45–60°, arcuate toward apex of blade; **upper surface** with minor veins narrowly and irregularly low-raised with the intervening area densely, tightly and finely striate, lacking short pale lineations; lower surface with minor veins fine and weak, the intervening area finely uniformly and densely striate pale-granular, lacking short pale lineations. INFLORESCENCE cernuous; peduncles 48 cm long, medium green, semiglossy; spathe 20.5 cm long, 1.5 cm diam., furled, medium green and glossy outside, greenish white and very glossy inside; **spadix** 14.5 cm long, 1.1 cm diam., immature. **Figures 1–8**



Figure 1: *Stenospermation adsettiorum*, in cultivation next to its natural habitat, Photo J. Harrison



Figure 2: *Stenospermation adsettiorum*, habit of cultivated flowering plant, TYPE Croat *et al* 106235, Photo J. Harrison



Figure 3: *Stenospermation adsetteorum*, habit showing distichous leaf arrangement, TYPE
Croat et al. 106235, Photo J. Harrison



Figure 4: *Stenospermation adsettiorum*, leaf and open inflorescence, Photo J. Harrison, Panama, Cerro Jefe



Figure 5: *Stenospermaton adsettiorum*, Open inflorescence, TYPE Croat *et al.* 106235, Photo J. Harrison, P1490885 Panama, Cerro Jefe



Figure 6: *Stenospermatum adsettiorum*, Isotype, PMA, Croat et al. 106235



Figure 7: *Stenospermatum adsettiorum*, Holotype, Croat et al. 106235 (MO)

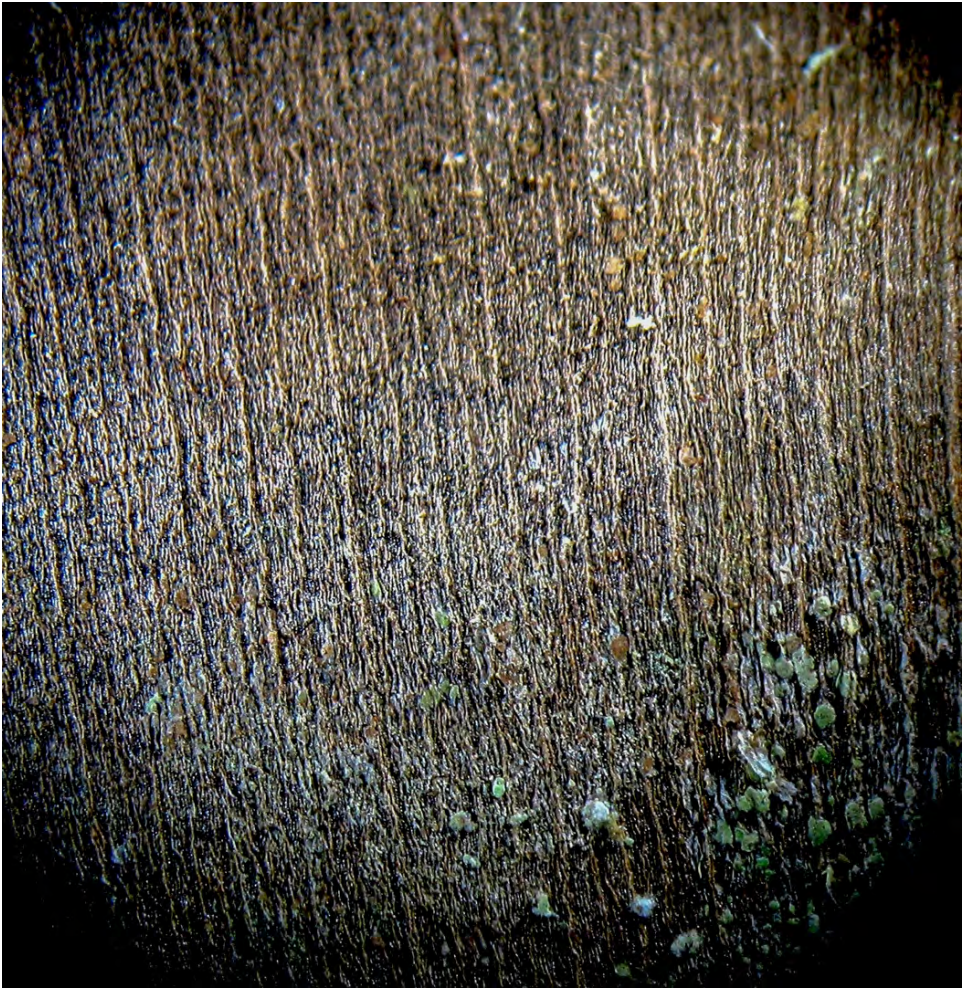


Figure 8: *Stenospermatum adsettiorum*, Upper blade surface *Croat et al. 106235*

Distribution — *Stenospermatum adsettiorum* is endemic to Panama, known only from the type collection from Panamá Province on the western slopes of Cerro Jefe at 857 m in a *Tropical wet forest* life zone.

Comments — *Stenospermatum adsettiorum* is probably most similar to *S. luteynii* which also has large, coriaceous, dark-drying leaves. *Stenospermatum adsettiorum* differs in having more reddish brown-drying blades, petioles more regularly sheathed to the apex with the sheath free-ending at apex and with the upper blade surfaces drying with the minor veins scarcely distinguishable from the acutely areolate-ribbed intervening area.

Etymology — *Stenospermatum adsettiorum* is named in honor of Bill and Esther Adsett, who together have conserved large portions of their property in order to enjoy the surrounding environment. This is the second species of Araceae named in their honor. A new species of *Syngonium*, *S. adsettiorum* Croat, O.Ortiz & J.S. Harrison, was published in 2019. While

the Cerro Jefe region abounds with endemic species and should probably never have been developed, it is wonderful that some of its residents continue to guard against further damage to the forests and explore their environs to better understand its flora and fauna.

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Stenospermatum angustifolium Hemsl., Biol. Centr. Am. Bot. 3: 425. 1885. — Type: NICARAGUA. Chontales: [mapped as Santo Domingo], 12°16'N 085°04'W, 500 m, 1868, *Ralph Tate 147* (K); 1868, *Tate 147* (holotype, K).

Epiphytic vine; stems elongate, terete, weakly rooting at lower nodes; internodes mostly 1–5 cm long, 4–8 mm diam.; cataphylls 3.0–7.5 cm long, apiculate 1.5–6.0 mm at apex, drying, usually persisting. LEAVES dispersed on stem; **petioles** 2.0–8.5 cm long, 1–2 mm diam. at apex, 2–3 times shorter than blades; **sheath** 3.5–6.0 cm long, 0.6–1.0 cm wide, typically 4.0–7.5 times longer than wide, 2.1–2.7 times longer than petioles, usually sheathed to above the middle, most frequently to near the blades; **blades** usually narrow, lanceolate to elliptic, sometimes narrowly oblanceolate, sometimes inequilateral (the acumens apiculate), cuneate to rounded and often unequal at the base, 4.0–18.5 cm long, 2–7 cm wide, (1.9)3.0–8.3 times longer than broad, 1.3–4.0 times longer than petiole, broadest in lower half, subcoriaceous to coriaceous, semiglossy, bicolorous, usually gradually acuminate at apex, sometime abruptly acuminate, usually acute, sometimes obtuse to attenuate at base, usually drying gray-green and matte above, yellowish gray-green and weakly glossy below, sometimes medium yellow-brown to dark brown above, moderately paler and yellow-brown below; midrib discolored along its margin above, drying convex and ribbed above, narrowly rounded and paler below; primary lateral veins obscure, departing midrib at 13–27°; **upper surface** drying with the veins only weakly raised, intervening surface finely and closely granular-striate, frequently short-pale-lineate, sometimes minutely rowed-areolate; lower surface moderately paler, the venation scarcely apparent, the larger veins weakly raised, scarcely apparent, the intervening area uniformly and irregularly costate with underlying trichosclerieds. INFLORESCENCE one per axil but with several produced near the apex of the plant at flowering time, often longer than leaves when emerging; peduncle 5.5–16.0 cm long, 1–2 mm diam. midway, frequently cernuous near apex before anthesis, two times as long as the petioles; spathe acuminate, white, 3.5–6.0 cm long, soon deciduous, broadest near base, **spadix** sessile or nearly so, 1–4 cm long, 4 mm diam. midway, white; flowers rectangular (dry), 1.0–1.9 mm long in direction of axis, 1.3–2.1 mm wide perpendicular to axis; stigma 0.3–0.5 mm long, round to oblong, pollen white; stamens rising above pistils. INFRUCTESCENCE with spathe deciduous; spadix 3.5–5.0 cm long, 1 cm wide; berries translucent, pale lavender or white; seeds 1.7–2.1 mm long, 0.7–1.0 mm wide. The species flowers throughout the year, but usually from January to July.

Figures 9–16.

Distribution — *Stenospermatum angustifolium* ranges from Nicaragua, Costa Rica, and Panama, to Colombia at 0–1600 m in *Tropical moist forest*, *Tropical wet forest*, *Premontane wet forest*, *Premontane rain forest*, and *Lower montane wet forest* life zones.

Comments — *Stenospermatum angustifolium* is characterized by its usually elongated slender internodes, usually prominently sheathed petioles, usually oblong-elliptic usually brownish drying leaf, usually gradually acuminate leaf blades with the upper surface closely low-ribbed



Figure 9: *Stenospermation angustifolium*, Croat 76953, Habit of cultivated plant at MBG Greenhouse 2018_01_31, Photo L Jankowski 2011_JPG



Figure 10: *Stenospermation angustifoium*, Croat 79585, Habit of cultivated plant at MO



Figure 11: *Stenospermatum angustifolium*, Habit of flowering plant, Croat 76585, Cultivated at MO

with the intervening area granular to closely striate and short pale-lineate, as well as the moderately long-pedunculate, cernuous inflorescence with a small, white, acuminate spathe, a short, cylindroid, sessile or weakly stipitate, white spadix and white to pale lavender berries.

Stenospermatum angustifolium is immensely variable in terms of its blade size but also regarding the overall shape and coloration of the blades. Those with broader leaf blades resemble *S. andreanum* but that species differs by having a proportionately broader, more nearly elliptical spadix which is erect at anthesis. *Mori et al.* 4618 is noteworthy in having broadly elliptic blades 1.9 times longer than wide.

Petioles of *Stenospermatum angustifolium* are usually fully sheathed or nearly so with the sheath ending abruptly at the apex, or even somewhat free-ending but some collections from different parts of Panama have leaves with very prolonged, unsheathed portions of the petiole, examples



Figure 12: *Stenospermatum angustifolium*, Plant with both spathe and spadix, *Coronado Gonzalez et al. 2356*, Nicaragua. Photo Coronado Gonzalez



Figure13.:*Stenospermation angustifolium*, Infructescence, Croat & D. Hannon 79283



Figure 14: *Stenospermatum angustifolium*, LD Gomez et al 20533, Costa Rica

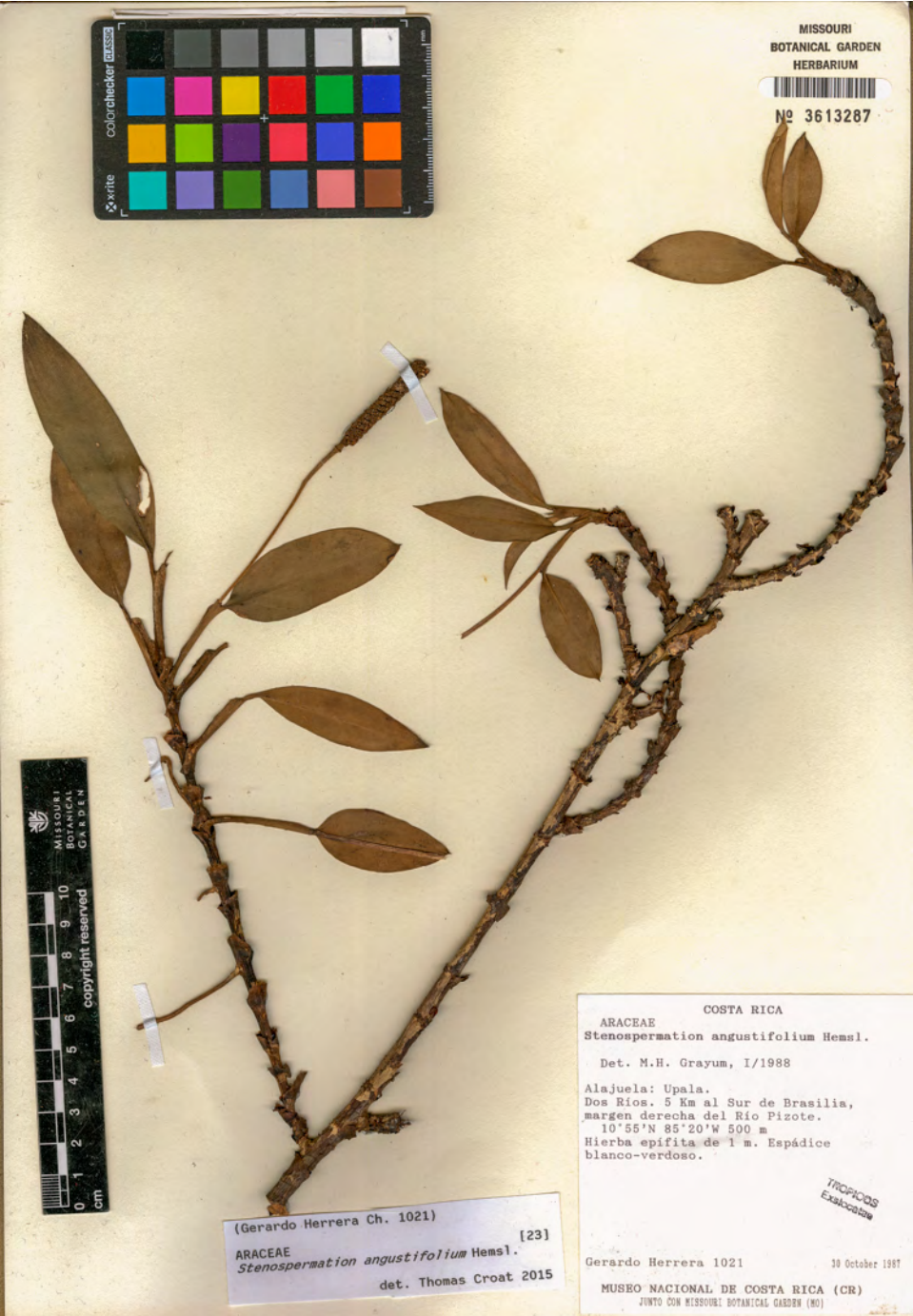


Figure 15: *Stenospermation angustifolium*, G. Herrera 1021, Costa Rica

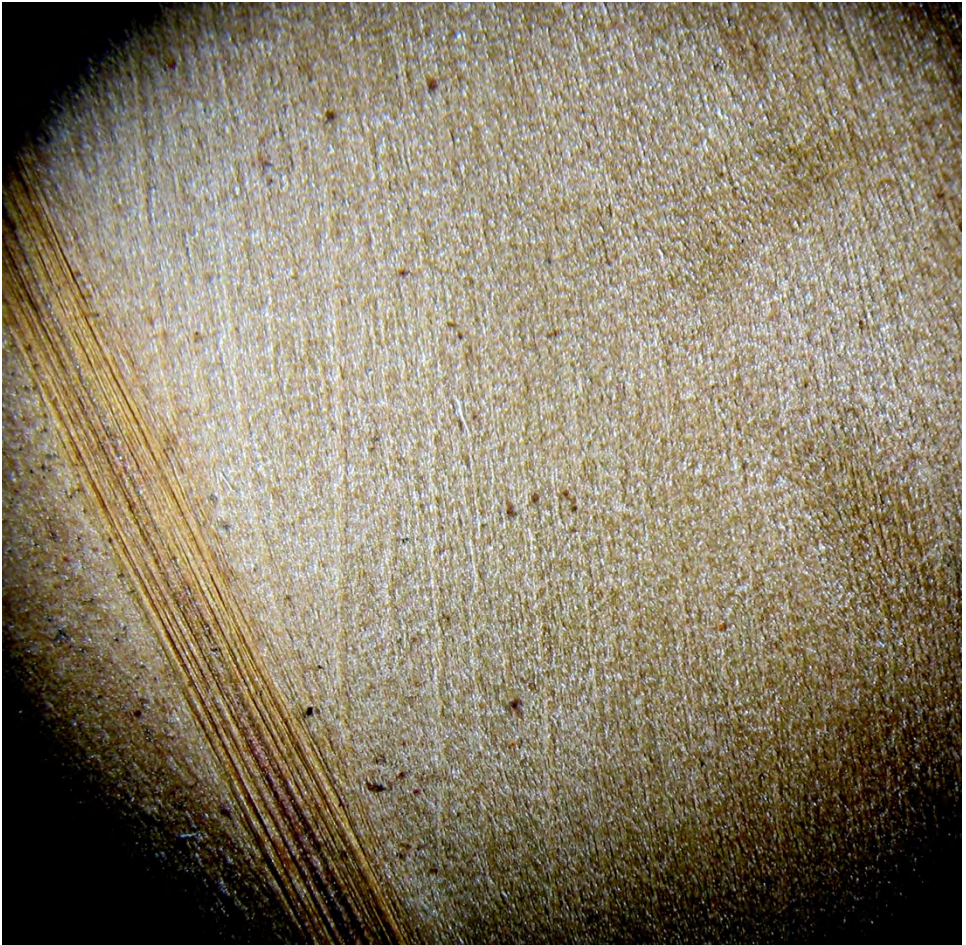


Figure 16: *Stenospermatum angustifolium*, Upper blade surface, *Croat 11011*

of which include for Bocas del Toro Province (*von Wedel 2536*); Coclé (*Duke 12121*); Colón (T.B. *Croat & G. Zhu 76228, Churchill 5121*); Darién (*Hartman 12120, Berry et al. 5417, Knapp & Mallet 3216*; Guna Yala (*de Nevers & H. Herrera 7091*);

A collection from Costa Rica (*Döbbeler 3540*) in the Tapantí region is unusual in having small leaves congested near the ends of branches. It may represent a new species or subspecies.

Additional specimens seen — COLOMBIA. Valle del Cauca: Along road between Buenaventura to Málaga, 4.5 km W of main road at turnoff Km 28., 03°59'N 077°03'W, 50–150 m, 3 August 1993, *D. Bay 252* (MO); Coteje, *F.C. Lehmann 377* (K); Timbiqui, *F.C. Lehmann 378* (K); Antioquia, 49 km NW of Dabeiba on road to Mutata, 8 October 1977, *A.H. Gentry 20264* (MO); Mpio. de Bolívar; 4.5 km W of Farallones, lower eastern flanks of Farallones de Citará, El Ardedero. Steep forested slopes, 05°46'N 076°03'W, 1990 — 2020 m, 15 March 1987, *J.L. Zarucchi & B.E. Echeverry C. 4760* (HUA, MO); 1300–1500 m, 12 November 1995, *Ramiro Fonnegra G. 5857* (GH, MO, RSA); Carretera Mutatá-Pavarandó,

entre Haciendas La Esperanza y Mocarí, 150 m, 6 March 1987, *Ramiro Fonnegra G. & et al. 1805* (MO); Andes. Corregimiento Santa Inés, Vallesitos, sitio después de La Meseta, bosque de Quercus, perturbado en la cima de una colina, 05°33'01"N 075°54'W, 2100 m, 12 April 1990, *Julio C. Betancur B. & et al. 1837* (MO); Anorí. Providencia area, tropical rain forest, transitional between Providencia and Alhibe, 400 — 800 m, 20 February 1976 - 25 February 1976, *Djaja D. Soejarto et al. 4441* (F); Vereda El Carmen, kms 12–16, NO de Anorí en la vía a “Dos Bocas”, colecciones a lo largo del Río Anorí. bh-T, 07°12'N 075°11'W, 940 — 1100 m, 18 Nov 1989, *Ricardo Callejas, Omar D. Escobar & et al. 8776* (HUA, MO); Vic. Planta Providencia, 28 kms SW of Zaragoza. Valley of Río Anorí in areas surrounding the confluence of Quebrada La Tirana and Río Anorí, approx. 3 km upriver from Planta Providencia. Edge of secondary forest along roadway between Q. La Tirana and Providencia along river. Tropical Wet/Very Wet Forest Transition Zone. Rainfall approx. 4400 mm/year, 400 — 700 m, 9 April 1977, *W. S. Alverson, Starker White & et al. 404* (MO); Betania. Farallones del Citará. paraje Las Canoas. Quebrada La Bramadora, 05°44'N 076°00'W, 2100 m, 12 noviembre 1997, *Ramiro Fonnegra G. 6651* (CAS, CUC, G, HUA, K, M, MO); Frontino. Parque Nacional Naural Las Orquídeas, sector de Venados, vereda Venados Abajio, sitio La Esperanza, cuenca de la quebrada Arenales, 06°32'06"N 076°18'46"W, 880 — 920 m, 29 July 2011, *Alejandro Zuluaga 823* (NY); Corregimiento Nutibara, zona de Murri, via Nutibara-La Blanquita, 5–8 km S de Alto de Cuevas, bosque pluvial, 06°39'N 076°25'W, 1000 — 1850 m, 14 February 1991, *Ricardo Callejas 9900* (MO); Mutatá. Pavarandó Grande, bosque después del puente sobre el río Pavarandó, 07°15'20"N 076°33'53"W, 150 — 200 m, 4 March 1987, *Ramiro Fonnegra G. & et al. 1701* (HUA, MO); Margen izquierda del Río Mutatá, 07°12'00"N 076°24'00"W, 180 — 200 m, 2 May 1987, *Ramiro Fonnegra G. & et al. 2076* (HUA, MO); Uraba, Villa Arteaga, 150 ft, 16–20 February 1953, *Richard E. Schultes & Isidoro Cabrera 18673* (NEBC, U); Nariño. Quebrada del Espíritu Santo, cerca al río Samaná, 950 m, 19 July 1951, *L. Uribe 2162* (COL, US); Vereda Puente Linda, margen izquiereda del río, Samaná, 05°34'N 075°03'W, 700 — 960 m, 13 September 1994, *Ramiro Fonnegra G. & et al. 5132* (MO); San Luis. Piedra de Castrillón, 3–4 hours on foot S of town, 06°01'N 075°01'W, 1500 — 1750 m, 09 May 1989, *Douglas C. Daly & Julio C. Betancur B. 5931* (HUA, NY); Piedra el Castrillón. 3–4 hours on foot SW of Town. Partly disturbed forest on ridgetop leading to peak, 06°01'N 075°01'W, 1500 — 1700 m, 12 August 1987, *Douglas C. Daly & Julio C. Betancur B. 5359* (HUA, MO, NY); Quebrada “La Cristalina”. Sector SE. bh-T/bmh-T, 06°N 074°W, 570 — 770 m, 23 September 1987, *J. G. Ramírez & Dairon Cárdenas L. 1598* (JAUM, MO); 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°54'N 074°51'W, 8 May 1983, *T. B. Croat 56580* (MO); Tarazá. Corregimiento El 12, Vereda Barroblanco, Wuebrada Purí, 210 Km N.O. de Medellín, 07°25'N 075°20'W, 450 m, 17 May 1987, *Ricardo Callejas, Betancur & Francisco J. Roldán 3631* (HUA); Urrao. Parque Nacional Natural Las Orquídeas. Vereda Calles. Inventario Permanente. Bosque pluvial premontano. Margen derecha del Río Calles, 06°32'N 076°19'W, 1350 — 1450 m, 05 December 1993, *J. J. Pipoly, III, W. Rodriguez & et al. 17734* (JUAM, MO); Vereda Cruces, sitio Piñares, camino a Perdidas, poco después de la escuela La Esperanza, orilla izquierda del río Calles, Parque Nacional Natural Las Orquídeas, 06°28'36"N 076°19'40"W, 980 m, 03 May 2013, *Julio C. Betancur B, Rafael Arévalo & et al. 18016* (MO, NY); Valdivia. Puerto Valdivia, 07°17'00"N 075°23'00"W, 240 — 260 m, 17–20 February 1942, *R.D. Metcalf & José Cuatrecasas 30051* (UC); Zaragoza. Corr. de Providencia mountain ridge above the confluence of Quebrada Tirana and Río Anorí, 600 — 700 m, 11 February

1971, *D. D. Soejarto & J.D. Villa* 2757 (COL, GH); Caldas: sita Cecilia, Tatama, 800 m, 26 November 1945, *K. von Sneider* 5108 (A); Cauca: Coasta del Pacífico, río Micay, en Guayabal, 5 — 20 m, 26 February 1943, *José Cuatrecasas* 14162 (US); Chocó: Mecana. On Pacific coast N of Bahía Solano, 6°16'N, 77°21'W. Hills near coast, primary forest. Alt. 1–100 m, 06°16'N 077°21'W, 1 — 100 m, 1 January 1984, *A. Juncosa* 1602 (MO); Mecana, 06°18'00"N 077°23'00"W, 14 January 1984, *A. Juncosa* 1931 (MO); Trail from Río Mecana to Alto de Mecana. Lateritic soil, mostly on ridge top, 06°15'N 077°23'W, 100 — 500 m, 06 March 1983, *A. H. Gentry & A. Juncosa* 41025 (MO); Top of Serrania del Darién, ca. due E of Unguia. Lower montane wet forest, 08°03'N 077°02'W, 1400 m, 19 July 1976, *A. H. Gentry, H. León & L. E. Forero* 16808 (MO); Top of Serrania del Darién, exactly on the frontier with Panama. NE of Cerro Mali. Lower montane wet forest, 08°09'N 077°13'W, 1400 — 1500 m, 24 July 1976, *A. H. Gentry, Henry León & L. E. Forero* 16989 (MO); Banks of Quebrada Togoromá, 13 June 1944, *E. P. Killip & José Cuatrecasas* 39222 (US); Chocó; Banks of Quebrada Togoromá, 13 June 1944, *E. P. Killip & José Cuatrecasas* 39111 (US); Hoya del Río San Juan. Alrededores de Palestina, 04°10'N 077°10'W, 5 m, 23 March 1979, *Enrique Forero & al.* 3831 (COL, MO); Hoya del Río San Juan. Quebrada La Sierpe, afluente del Río San Juan, al frente de Palestina, 04°10'N 077°10'W, 5 m, 25 March 1979, *E. Forero et al.* 3930 (MO); Hoya del Río San Juan. Andagoya. Alrededores del campamento de la Cia. Mineros del Chocó, 05°06'N 076°42'W, 13 April 1979, *E. Forero et al.* 5198 (COL, MO); Carretera Itsmina-Quibdó, entre El Dos y Las Animas, 05°15'N 076°40'W - 05°18'N 076°38'W, 21 April 1979, *E. Forero et al.* 5433 (COL, MO); Hoya del Río San Juan. Quebrada Máncamo, afluente del Río Tamaná, abajo de Nóvita, 04°57'N 076°38'W, 11 April 1979, *E. Forero et al.* 5038 (MO); Río Baudó, 04°57'00"N 077°22'00"W, 2 March 1967, *Hans P. Fuchs* 22169 (MO, U); 37–40 km W of El Carmen, 05°40'N 076°15'W, 671 — 1360 m, *J. L. Luteyn et al.* 10651 (NY); Medellín-Quibdó road, Kms 177–179, 450 — 500 m, 05 April 1979, *J. L. Luteyn & Maria L. Lebrón-Luteyn* 7221 (SEL); Drainage basin of Río San Juan, tributary Río Taparal. Along the riverains at high water level, primary tropical lowland rainforest, 04°15'N 077°10'W, 200 m, 15 Nov 1979 - 6 December 1979, *Jan van Rooden* 668 (MO); Municipio de Pizarro, margen izquierdo del río Pepé, entre Boca de Pepé y Pié de Pepé, 05°04'N 076°54'W, 19 noviembre 1985, *Josefina Espina Z.* 2030 (MO, US); Pizarro, 04°56'26"N 077°22'45"W, 28 August 1945, *K. von Sneider* 4868 (A, US); Ca. 10–15 km S of Quibdó on road to Istmina (Panamerican Hwy.), and 8–10 km E on road to petroleum exploration camp, 05°35'N 076°37'W, 90 m, 9 July 1986, *M. H. Grayum et al.* 7654 (HUA, MO); 30 km west of Quibdó on road to Medellín, 140 m, 10 November 1972, *M.T. Madison* 828 (ECON); Along road between Medellín and Quibdo, 5.5 km E of Tutunendo, 23.5 km E of Quibdo. 5 44'N, 76 29'W; elev. ca 150 m, 05°44'N 076°29'W, 150 m, 20 April 1983, *T.B. Croat* 56220 (MO); Serrania de Baudo, along road between Las Animas and Río Pato along the valley of Río Animas, 25 km NW of Animas; 5°20'N, 76°43'W; elev. 150 m; disturbed primary forest, 05°20'N 076°43'W, 150 m, 17 April 1983, *T.B. Croat* 56022 (MO); Along road past Playa de Oro, ca. 2 km E of Playa de Oro; 5°20'N, 76°23'W. Elev. ca. 200 m, 05°20'N 076°23'W, 200 m, 13 March 1984, *T.B. Croat* 57413 (MO); Along road between Medellín and Quibdó, 73 km W of Bolívar, 533 m, 11 December 1979, *T.B. Croat* 49282 (MO); Along road between Quibdó and Istmina, 6.6 km S of Quibdó. Tropical rain forest, 05°33'N 076°37'W, 100 m, 17 December 1980, *T.B. Croat & Á. Cogollo P.* 52172 (COL, MO); Along road between Tadó and Istmina, 3.5 km W of bridge over Río San Juan at Tadó, 5.0 km E of Las Animas. GPS coordinates, 05°16'30"N 076°35'36"W, 140 m, 13 August 1997, *T.B. Croat & J. F. Gaskin*

80784 (MO); Bahía Solano. Corregimiento El Valle, a lo largo del río Valle, en la orilla, 06°07'N 077°22'W, 19 April 1989, *J. Espina Z. F. García Cossio & S. Pino* 2747 (K, MO); Nuquí. Nuquí-Panguí. Río Chicuí-Choco, 05°19'N 077°17'W, 0 m, 9 January 1992, *A. Gómez et al.* 460 (HUA, MO); Corregimiento de Arusí, Estación Biológica El Amargal, 05°34'N 077°31'W, 200 — 500 m, January 1999 — April 1999, *J. Jácome* 373 (MO); Corregimiento de Arusí, Estación Biológica El Amargal, 05°34'N 077°30'W, 50 m, July—September 1998, *M. Mora* 20 (MO); Corregimiento Arusí; vic. of Arusí, Estación Biológica El Amargal, 05°34'14"N 077°30'10"W, 30 m, 17 June 2000, *T.B. Croat & M. Mora* 83648 (=Mora 262) (COL, MO); Quibdó. Corregimiento de Guayabal, río Hugón, 05°44'00"N 076°38'00"W, 14 October 1985, *García* 57 (COL, MO); *Jorge Araque Molina & F. A. Barkley* 19CH039 (K); Intendencia del Chocó: Quibdó, Río Atrato, 60 m, April — May 1931, *W. A. Archer* 1911 (MO); Riosucio. Zona de Urabá. Cerros del Cuchillo. Margenes Quebrada El Cedro. Bosque primario, 100 — 300 m, 20 May 1988, *Dairon Cárdenas L.* 1998 (MO); Zona de Urabá. Cerros del Cuchillo. Camino de Cidón a Cumbre Surestre. Suelo rocoso. Bosque primario. bmh/bp-T, 400 — 500 m, 28 Jun 1988, *D. Cárdenas L.* 2219 (MO); San José del Palmar. San José del Palmar-Corondoto rd, ca. 16–25 km W of San José del Palmar, 04°42'N 076°27'W, 300 — 366 m, 14 May 1984, *J. L. Luteyn et al.* 10471 (NY); Near “La Holanda”, 04°56'48"N 076°13'20"W, 1100 m, 14 January 1983, *P. Franco* 1310 (MO); Nariño: Barbacoas. Corregimiento Altaquer, Vereda El Barro, 01°18'N 078°08'W, 1325 m, 7 December 1993, *P. Franco* 5017 (HUA, MO); Ricaurte. 1850 m, 26 November 1981, *Olga Salazar de Benavides* 3340 (PSO); **Risaralda**: Mistrato. Corregimiento de Santa Cecilia, margen izquierda de la Quebrada Cintu, Cordillera Occidental, vertiente occ. cuenca alta del río San Juan. Bosque perturbado a la orilla de una quebrada, 05°17'N 076°13'W, 500 — 550 m, 23 October 1991, *J. C. Betancur B. et al.* 2955 (HUA, MO, NY); Corregimiento Río Mistrató. Alrededores, 05°17'51"N 075°53'03"W, 700 m, 11 April 1991, *P. Franco* 3474 (MO); Pueblo Rico. Corr. Santa Cecilia, 420 — 480 m, 24 April 1991, *Favio González* 2336 (MO); Santa Cecilia, quebrada junto a “Plosan”, zona alteradas con restos de bosque, 05°17'53"N 076°12'45"W, 580 m, 25 October 1991, *José L. Fernández-Alonso* 9326 (COL); Corregimiento de Santa Cecilia, vereda Aguita, sector la Union, márgenes del río San Juan, 05°17'00"N 076°12'59"W, 450 m, 27 April 1991, *J. L. Fernández-Alonso et al.* 8841 (MO); Valle del Cauca: Río Naya upriver from Puerto Merizalde. Very wet lowland forest, 03°15'N 077°25'W, 10 m, 23 February 1983, *A. H. Gentry & A. Juncosa* 40666 (F, PMA, MO); In mangroves at Mouth of Río Naya to mouth of Río Yurumanguí, 03°21'08"N 071°23'59"W, 0 m, 24 February 1983, *A. H. Gentry & A. Juncosa* 40722 (B, COL, MO); Costa del Pacífico; río Cajambre: Silva, 5 — 80 m, 05 - 15 May 1944, *José Cuatrecasas* 17364 (US); Bajo Calima Region; along road between Buenaventura and Málaga; vicinity of Km 50.7, right (N side) of road in deep ravine along stream, 04°02'N 077°05'W, 12 July 1993, *T.B. Croat & Dorothy Bay* 75685 (MO); Vicinity of Bajo Calima; along road from Buenaventura to Málaga, Km 49, 04°02'N 077°04'W, 150 m, 17 July 1993, *T.B. Croat & Dorothy Bay* 75805 (MO); Along old road from Buenaventura to Cali; at Río Sabaletas, weedy vegetation around large trees near river bank. Elev. less than 50 m, 03°45'N 076°55'W, 10 February 1990, *T.B. Croat & J. Watt* 70440 (MO); Along road between Queremal and Anchicayá, 3 km W of Queremal. GPS coordinates, 03°31'00"N 076°44'00"W, 1400 m, 10 July 1997, *T.B. Croat & John F. Gaskin* 79677 (MO); Buenaventura. Bank of Río Calima, near Bajo Calima. 4°N, 77°W, 04°00'N 077°00'W, 11 February 1984, *A. Juncosa* 2133 (MO); Bajo Calima. Granga Agroforestal, 20 — 30 m, June 1988, *Cabrera* 16219 (CUVC); 03°54'15"N 077°04'12"W, 13 April 1939, *E. P. Killip* 34993

(UC, US); Vallerio Dagua, *F. C. Lehmann* 1132 (K); Forest exploitation in the concession of Cartón de Colombia, 03°56'N 077°10'W, 230 m, 15 November – 6 December 1979, *ROODEN* 262 (MO); Dagua. Wooded cliffs of Río Dagua at Cordoba, 60 — 100 m, 6 May 1922, *E. P. Killip* 5055 (GH, US). **COSTA RICA**; Refugio de Vida Silvestre Boracayán, Fila Costeña, San José-Puntarenas Province border, ca. 10 km E of Dominical. Southern Fila Tinamastes near Cuesta Yeguas, 09°15'N 083°45'W, 800 — 1000 m, 26 May 2003, *John R. Clark et al.* 170 (MO); Región Sur Este del Lago Dabagri, cruzando las filas hacia Telire (Laguna tiestos y fila de los aguacillos), 5 Nov 1984, *Luis Diego Gód* 23220 (MO); **Alajuela**: Los Ensayos Buena Vista de San Carlos, November 1952, *Humberto Barquero Mora* 37 (EAP); Los Ensayos Buena Vista de San Carlos, November 1952, *Humberto Barquero Mora* 37 (MO); Reserva Forestal San Ramón near of the station, 10°12'36"N 084°36'00"W, 900–1000 m, 6 February 1991, *Jens Bittner* 612 (MO); Along road between Cañas and Upala, 8 km north of Bijagua. Primary forest, 10°48'00"N 085°03'00"W, 300 m, 26 Jun 1976, *T.B. Croat* 36492 (MO); Along Highway 15 between Naranjo and Aguas Zarcas, 8 km NE of Quesada, 10°22'48"N 084°23'24"W, 600 m, 3 February 1979, *T.B. Croat* 46941 (MO); Finca Los Ensayos, ca. 11 mi NW of Zarcero. Roadside and fencerows, 10°15'36"N 084°27'00"W, 900 m, 15 August 1977, *T.B. Croat* 43525 (MO); Reserva Biológica Monteverde Río Peñas Blancas, 10°18'N 084°45'W, 900 m, 26 May 1988, *W.A. Haber & Erick Bello C.* 8457 (MO); Reserva Monteverde, Poco Sol, 13 km South Fortuna, 10°21'N 084°41'W, 700 — 900 m, 20 August 1989, *W.A. Haber & W. Zuchowski* 9342 (MO); San Carlos. San Carlos, Fortuna. R. B. Arenal Mundo Aventura, 10°27'10"N 084°39'30"W, 255 — 400 m, 05 March 2004, *A. Rodríguez* 8513 (B, CR, MO, NY); Southwest slope of Volcán Arenal, flood wash area, 10°27'36"N 084°42'00"W, February 22, 1989, *G.F. Russell* 920 (MO); 22 km northeast of Quesada by air, 4 km west of Muelle San Carlos, 10°27'36"N 084°30'00"W, 09 April 1983, *R.L. Liesner* 14171 (MO); 13 km west of Fortuna on road to the Arenal Dam, near crossing of Río Tabacón, primary forest and roadside, 10°28'48"N 084°42'36"W, 500 — 550 m, 29 April 1983, *R. L. Liesner, E. J. Judziewicz & Blanca Pérez G.* 15236 (MO); 2 km north of Santa Rosa, 15 km north of Boca Arenal on Quesada-Muelle San Carlos-Los Chiles road, 10°37'48"N 084°30'36"W, 100 m, 28 April 1983, *R.L. Liesner, E.J. Judziewicz & Blanca Pérez G.* 15027 (MO); San Miguel de San Isidro, Quebrada seca, 10°20'39"N 084°38'40"W, 600 m, 29 Junio 1985, *W.A. Haber & E. Bello C.* 1709 (MO); Upala. Dos Ríos, 5 Km al Sur de Brasilia, margen derecha del Río Pizote, 10°55'N 085°20'W, 500 m, 30 October 1987, *Gerardo Herrera Ch.* 1021 (MO); **Cartago**: Jiménez. Taus, pastures beside Río Pejibaye between Río Taus and Quebrada Azul, 09°46'12"N 083°43'12"W, 760 m, 28 May 1972, *Roy W. Lent* 2552 (MO); Paraíso. Ostliche Umgebung von Tapantí: "Selva" am Weg 8.5 Fahrkilometer ostnordöstlich Tapantí in Richtung Humo/Pejibaye, Weiden, Primärwaldländer, 09°47'12"N 083°45'21"W, 1050 m, 28 October 1990, *Peter Döbbeler* 3540 (MO); Near Río Naranjo, 3 km east of Cachí, 09°49'42"N 083°46'32"W, 1280 m, 11 July 1971, *Roy W. Lent* 1995 (MO); Turrialba. Parque Nacional Barbilla, Cuenca del Matina, Sendero Principal, colecta junto al Río Dantas. [Original label coordinates 9:58:20 N -83:27:10 W], 09°58'12"N 083°27'00"W, 300 — 400 m, 21 junio 2000, *Edgar Mora Castro* 1293 (MO); Along road between Juan Viñas and Turrialba, 7 km west of Turrialba, along ditch, 09°54'00"N 083°37'12"W, 01 July 1976, *T.B. Croat* 36826 (MO); Heredia: La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 24 March 1980, *B.E. Hammel* 8255 (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 June 1980, *B. E. Hammel* 9069 (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,

8 August 1980, *B.E. Hammel* 9481 (DUKE); La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 5 June 1985, *Brian Jacobs* 3256 (DUKE); La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 22 October 1981, *Damon A. Smith* 405 (DUKE); La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 25 August 1981, *Damon A. Smith* 91 (DUKE); Estación Biológica La Selva. Along road leading to the reserve, 10°24'00"N 084°01'48"W, 100 m, 16 August 1987, *James F. Smith & E. Frost* 474 (WIS); La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 31 March 1981, *J.P. Folsom* 9538 (DUKE, TEX); La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 26 February 1981, *J.P. Folsom* 9124 (DUKE); Finca La Selva on tree falls and in cut areas near field station, 10°25'53"N 084°00'13"W, 100 m, December 1973, *J.F. Utley & K. Burt-Utley* 513 (DUKE, MO); Finca La Selva, the OTS Field Station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N 084°00'13"W, 100 m, 3 August 1979, *John Sperry* 2206 (DUKE); P.N. Braulio Carrillo. Estación El Ceibo, borde de bosque cercano a la Estación, 10°19'12"N 084°04'48"W, 500 — 600 m, 1 December 1989, *M.Á. Zumbado* 13 (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, 19 August 1979, *M.H. Grayum* 2468 (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, 3 August 1979, *M.H. Grayum & John Sperry* 2206 (DUKE); La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 17 May 1985, *R.L. Wilbur* 36962 (DUKE); Finca La Selva, Puerto Viejo de Sarapiquí, 10°25'12"N 084°00'36"W, 100 m, 5 January 1978, *T.B. Croat* 44289 (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, 7 October 1982, *Tim McDowell* 386 (DUKE); Along "Starkey Road", 4.5 km SE of bridge at Puerto Viejo, 10°26'N 083°58'W, 50 m, 07 August 1979, *W. D. Stevens* 13485 (MO); Barva. La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 21 March 1981, *J.P. Folsom* 9437 (DUKE); La Selva, 10°25'12"N 084°01'12"W, 100 m, 20 March 1978, *M.H. Grayum* 999 (DUKE); Sarapiquí. Parque Nacional Braulio Carrillo, Estación El Ceibo, bosque entre la Quebrada El Mojón y la margen izquierda del Río Peje, 10°19'45"N 084°04'50"W, 500 m, 13 December 1989, *Abelardo Chacón & Edgar Corrales* 652 (C, MO); Zona Protectora La Selva, 6 km by road from Río Peje crossing, 5 km south-southeast of Magsasay, along picada through primary forest southeast of basecamp eventually doubling back on Quebrada Cantarana, 10°21'N 084°04'W, 340 m, 17 January 1983, *G.E. Schatz & M.H. Grayum* 618 (DUKE); Tirimbina, in tropical wet forest, 10°24'00"N 084°06'00"W, 700 ft, 30 May 1971, *G.R. Proctor* 32158 (MO); La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 8 Septiembre 1983, *Isidro A. Chacón G.* 1239 (DUKE); La Selva Biological Station. Casa de Rafael, 10°25'53"N 084°00'13"W, 100 m, 5/21/2003, *Reinaldo Aguilar & Nelson Zamora* RA007840 (MO); **Limón:** 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, 21 August 1979, *Christopher Davidson & Julian Donahue* 8593 (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, 21 March 1978, *Christopher Davidson et al.* 7103 (MO); Hills 2 airline km SSE of Islas Buena Vista in the Río Colorado, 14 airline km SW of Barra del Colorado, 10°40'N 083°40'W, 10 — 120 m, 13 September 1986 - 14 September 1986, *Gerrit Davidse & Gerardo Herrera Ch.* 31074 (MO); Hills 3 1/2 airline km S of Islas Buena Vista in the Río Colorado, 16 airline km SW of Barra del Colorado, 10°39'00"N 083°40'40"W, 10 — 120 m, 15 September 1986 - 16 September 1986, *Gerrit Davidse &*

Gerardo Herrera Ch. 31252 (MO); Southwestern-most ridge of Cerro Coronel, NW-facing slope, just S of the Río Colorado, 10°40'30"N 083°39'30"W, 10 — 80 m, 17 September 1986 - 18 September 1986, *Gerrit Davidse & Gerardo Herrera Ch. 31346* (IBE, MO); Talamanca, 09°45'36"N 083°04'12"W, 250 m, 6 July 1983, Jorge Gómez-Laurito 9557 (F); Hacienda Tapezco-Hda. La Suerte. 29 air km W of Tortuguero, 10°30'N 083°47'W, 40 m, 21 August 1979, *Julian Donahue 8593* (MO); Tortuguero Canton. Suretka, 200 m from RECOPE oil drilling platform, disturbed forest, 09°33'36"N 082°55'48"W, 6 July 1983, *Kerry Barringer 3559* (MO); Lomas de Sierpe 5 Km Noreste de La Aurora, Guápiles. Límite Sur Parque Nacional Tortuguero, junto al Río Sierpe, 10°21'36"N 083°30'36"W, 30 m, 3 December 1988, *Rafael Robles 2203* (MO); La Aurora, Guácimo Ca. 5 Km al E del pueblo, sobre el Río Sierpe, frente al puesto del P.N. Tortuguero. Manchones de bosque sobre lomas de pendientes medianamente pronunciadas, 10°24'00"N 083°33'00"W, 100 m, 16 August 1988, *Rafael Robles et al. 2074* (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 43322* (MO); Cerro Coronel, E of Laguna Danto, 10°41'N 083°38'W, 20 — 170 m, 16 January 1986 - 23 January 1986, *W. D. Stevens 23760* (MO); Cerro Coronel, E of Laguna Danto, 10°41'N 083°38'W, 20 — 170 m, 15 September 1986 - 20 September 1986, *W. D. Stevens & O. M. Montiel J. 24640* (MO); Shores of Caño Pereira, 10°45'N 083°36'W - 10°47'N 083°37'W, 2 — 4 m, 20 March 1987, *W. D. Stevens et al. 25136* (MO); **Limón.** No protegida. Cuenca del Bananito. Fila Matama, Cerro Muchilla, Falda NW, Río Bananito Lodge, 09°49'30"N 083°03'50"W, 50 — 100 m, 24 March 2001, *J. F. Morales 7708* (CR, MO); Pococí. Cuenca Tortuguero-Sierpe. Tortuguero, San Juan de Pococi, Cuatro Esquinas, Finca Alexander Rojas, 10°30'N 083°47'W, 40 m, 6 April 1999, *J. F. Morales 7027* (MO); No protegida. Cuenca del Sarapiquí. Reserva Bosque Lluvioso. Alrededores de la estación, en borde de bosque, 10°11'28"N 083°51'28"W, 350 — 350 m, 1 September 2005, *Luis Diego Vargas et al. 836* (MO); Near Guápiles, 10°12'55"N 083°47'33"W, 250 m, 17 July 1964, *Roy W. Lent 62* (MO); Siquirres. Los Angeles de Siquirres. 3 km W and 1.9 km S from Guayacán, highway to Limón, 10°01'12"N 083°34'12"W, 1000 m, 06 May 1983, *Luis Diego Gómez P et al. 20533* (CR, MO); Los Angeles de Siquirres. 3 km W and 1.9 km S from Guayacán, highway to Limón, 10°01'12"N 083°34'12"W, 1000 m, 06 May 1983, *Luis Diego Gómez P et al. 20545* (MO); Talamanca. Amubri. Entre Amubri y el puente sobre el Río Lari, margen derecho, 09°29'24"N 083°29'24"W, 200 m, 26 June 1989, *Gerardo Herrera Ch. 3015* (MO); Forests of Shiroles [Shiroles], 09°35'N 082°58'W, 300 f, February 1895, *Henri Pittier & Adolphe Tonduz 9226* (BR); Region between main N-S road outside Cahuita and 1.5-km SW up to main slope of Fila Carbon, 09°40'48"N 082°48'36"W - 09°43'12"N 082°50'24"W, 17 - 19 January 1974, *J. F. Utley & K. Burt-Utley 679* (MO); **Puntarenas:** Buenos Aires, 09°49'48"N 084°00'36"W, 1891, *Henri Pittier 3861* (BR); Parque Nacional Corcovado Sirena, Ollas Trail, 08°27'36"N 083°34'48"W, 1 — 20 m, 12 September 1989, *C. Kernan 1268* (MO); Parque Nacional Corcovado Sirena, 08°27'N 083°33'W - 08°30'N 083°38'W, 0–150 m, 4 March 1988, *C. Kernan 235* (MO); Parque Nacional Corcovado Sirena, Anacardium Trail, 08°27'36"N 083°34'48"W, 1 — 20 m, 2 February 1989, *C. Kernan 929* (MO); Parque Nacional Corcovado. Dos Brazos de Río Tigre, Jiménez. Cuenca superior del Río Madrigal, margen derecha, 08°29'24"N 083°28'48"W, 600 m, 6 December 1990, *Gerardo Herrera Ch. 4722* (CR, MO); Parque Nacional Corcovado. Cerro Rincón, Dos Brazos de Río Tigre, 08°31'12"N 083°27'36"W, 745 m, 2 August 1990, *Gerardo Herrera Ch. 4092* (CR, L, MO); Foothills of the Cordillera de Talamanca, vicinity of Helechales, along the Río Guineal. Premontane wet forest along river, 09°04'30"N 083°05'00"W, 1100 — 1200 m, 29 March 1984, *Gerrit Davidse*

♂ *Gerardo Herrera Ch. 26278* (MO); Foothills of the Cordillera de Talamanca, just north of Santa Elena on Fila Cotón, south of Agua Caliente, 08°57'N 082°56'W, 1100 m, 04 September 1984, *Gerrit Davidse et al. 28229* (MO); Mostly secondary forest between Las Cruces Botanical Garden and Río Jaba, ca. 3 km SE of San Vito de Coto Brus, 08°46'48"N 082°57'36"W, 1050 — 1200 m, 11 July 1985, *M.H. Grayum 5620* (MO); Ridge between Río Riyito (valley of Laguna Chocuaco) and Quebrada Banegas, S of Cerro Rancho Quemado (ca. 7 km W of Rincón de Osa), 8°41'N 83°32.5'W 200–300 m, 08°40'48"N 083°32'24"W, 200 — 300 m, 26 May 1986, *M.H. Grayum et al. 7561* (MO); Monteverde Reserve, 10°17'N 084°48'W, 1500 m, 11 April 1986, *T.B. Croat 61196* (MO); Along highway from Río Claro (on Panamerican Highway) to Golfito, 2.5 m SE of Golfito, 27.5 mi S of Río Claro, 08°36'N 083°04'W, 60 m, 15 September 1987, *T.B. Croat 67624* (MEXU, MO); Las Cruces, along old road to river below Botanical Garden, 08°47'24"N 082°57'00"W, 1300 m, 11 January 1978, *T.B. Croat 44421, 44449* (MO; Osa Peninsula: vic. Boscosa, at Quebrada Aguabuena, 08°42'01"N 083°30'48"W, 50 m, 18 June 1997, *T.B. Croat 79585* (MO); 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 083°12'30"W, 200 — 300 m, 12 September 1996, *T.B. Croat & Dylan P. Hannon 79283* (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 59802* (MO); Along abandoned "high road" W of Rincón de Osa, 08°42'N 083°31'W, 250 — 540 m, 4 March 1985, *T.B. Croat & M.H. Grayum 59846A* (MO); Reserva Biológica Monteverde, Peñas Blancas River Valley, Eston Rockwell parcel, 10°19'N 084°43'W, 800 m, 18 March 1989, *W.A. Haber 9214* (MO); Buenos Aires. Colinas. Cordillera Costeña Norte. Fila Retinto. Aproximadamente 1.5 km al SSO en línea recta del pueblo de Jalisco. Sendero que cruza remanentes de bosque alrededor de camino que va hacia la finca del Sr. Olivier Perez y socios, 09°00'18"N 083°27'52"W, 905 m, 26 March 2015, *Silvia Lobo et al. 3608* (MO); Corredores. No protegida, Cuenca del Coto Colorado, Pueblo Nuevo, cerca del paso sobre el río Coto, 800 m al Oeste del pueblo, Isla Chanchos, lugar anegado y afectado por la marea, 08°32'24"N 083°02'24"W, 22 m, 02 May 1998, *Reinaldo Aguilar 5426* (MO); along Río Java Trail below the Wilson Botanical Garden on north-facing slope in advanced second forest (40+ years old), growing along trail, 08°47'04"N 082°57'40"W, 3835 ft, 15 January 2007, *Loy R. Phillippe et al. 39311* (MO); Municipio Golfito. Gardens of La Gamba Field Station, 08°42'03"N 083°12'07"W, 80 m, 20 March 2015, *A. Berger 1778* (MO); R.N.V.S.; Valle de Coto Colorado. A Torres del ICE. Finca Ston Forestal hasta bosque nativo. Subiendo la fila, 08°40'12"N 083°11'24"W, 80 m, 1 February 1992, *Álvaro Fernández 223* (CR); R.N.V.S. Golfito; Valle de Coto Colorado; por el camino a Río Bonito, 08°40'48"N 083°12'36"W, 200 m, 28 January 1992, *Gerardo Herrera Ch. 5026* (CR, MO); P.N. Piedras Blancas. Serranías de Golfito. Cerros frente a la Estación, 08°41'10"N 083°13'20"W, 200 m, 8 Jun 2000, *Luis Acosta 1598* (MO); P.N. Corcovado. Península de Osa. Estación Sirena. Sendero Ollas, 08°28'40"N 083°35'40"W, 0 m, 30 July 2000, *Reinaldo Aguilar 6292* (CR, MO); Collection from tropical rain forest on low hills, 12 km east of Golfito, 08°36'00"N 083°03'36"W, 140 m, 06 July 1971, *W.E. Harmon & José A. Fuentes 6198* (MO, UMO); Osa. Fila Costeña Sur, ca. 3.3 km al NE de la carretera Panamericana desde Florida, 08°46'40"N 083°12'03"W, 375 m, 26 Marzo 2018, *B. E. Hammel et al. 27479* (CR); R.F. Golfo Dulce; Península de Osa. Rincón. Por las filas de la cuenca superior de la Quebrada Vaquedano, 08°38'24"N 083°35'24"W, 500 m, 22 July 1990, *Gerardo Herrera Ch. 4011* (CR); Road to Puerto Jimenez, 40 km west of

Interamerica Route 2, 08°38'24"N 083°27'00"W, 100 m, Luis Diego Gómez *P. 19503* (MO); Distrito: Sierpe; Reserva Forestal Golfo Dulce; Rincón, cerca de la desembocadura del Río Rincón, 08°40'32"N 083°28'40"W, 0 m, 16 April 2008, *Reinaldo Aguilar 11172* (MO, NY); Rincón de Osa. Streams and slopes adjacent to airfield, 08°42'N 083°31'W, 20 — 300 m, 06 February 1974 - 07 February 1974, *R.L. Liesner 1813* (MO); Corcovado National Park. Primary forest on hills 0 km to 1 km W of the park headquarters at Sirena, 08°28'48"N 083°36'00"W, 0 — 200 m, 4 July 1977, *R.L. Liesner 2840* (MO); 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 2954* (MO); Parrita. Cuenca del Pirris-Damas. Fila Chonta, Sector SW, cabeceras Río Damitas, 09°34'50"N 084°11'00"W, 1200 — 1400 m, 20 February 1999, *J. F. Morales et al. 6997* (MO); San José: Refugio de Vida Silvestre Boracayán, Fila Costeña, San José-Puntarenas Province border, ca. 10 km E of Dominical. Along Fila Alivio in upper Río Barucito basin, a southern tributary of Río Barú, 09°13'N 083°46'W, 700 m, 30 May 2003, *Bruce K. Holst 8735* (MO); Z. P. La Cangreja. Santa Rosa de Puriscal. Bosque primario en las márgenes del río Negro, 09°42'00"N 084°23'24"W, 400 m, 10 August 1992, *J. F. Morales 329* (MO); Sabanas. Fila Bustamante, sector oeste, bosques residuales cerca del cruce a Teruel, 09°44'24"N 084°15'36"W, 1000 — 1100 m, 25 June 1995, *J. F. Morales 4499* (CR, MO); Dota. R. F. Los Santos. Cuenca del Savegre. Entre Nara y San Isidro. 2 km antes de llegar a San Isidro, 09°29'45"N 083°58'00"W, 700 — 800 m, 27 February 2005, *Daniel Santamaría 705* (CR, MO); Zona Protectora Cerro Nara. Sobre la fila, 09°29'40"N 083°59'40"W, 900 — 1069 m, 15 May 1997, *Joaquín Sánchez González & Armando Estrada 815* (MO); Pérez Zeledón. No protegida. Cuenca del Savegre. Río Nuevo; 7.9 km SW; de Savegre Abajo, 09°25'07"N 083°52'50"W, 800 m, 7 February 2001, *Alexánder Rodríguez et al. 7010* (MO); 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 35255* (MO); 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. 8333* (MO); Tarrazu. Z.P. Cerro Nara. Cuenca del Naranjo y Paquita. Faldas del Cerro Nara, bosques arriba de Quebrada Salitrillo, junto al camino, 09°29'N 084°02'W, 250 m, 18 March 1999, *Alexánder Rodríguez & Víctor H. Ramírez 4690* (MO); San Lorenzo. Estribaciones surestes de Cerro Toro, 09°33'50"N 084°03'15"W, 900 — 1000 m, 1 April 1997, *Joaquín Sánchez González et al. 739* (MO); Turrubares. Reserva Biológica Carara, Valle del Tárcoles, Puesto Carara, along Río del Sur, between Río Carara and Quebrada Cimarruda, 09°46'12"N 084°31'48"W, 130 — 150 m, 2 April 1993, *M.H. Grayum 10411* (CR). **ECUADOR. Bolívar:** Hcda Changuil, Nuevo Mundo. Bosque muy húmedo tropical, nublado secundario. Suelos fértiles, 02°06'S 079°10'W, 300 m, 9 October 1995, *Xavier Cornejo S. & Carmen Bonifaz B. 4610* (GUAY, MO); Carchi: San Marcos Valley, 01°07'N 078°22'W, 600 m, 20–24 Nov 1983, *A. S. Barfod & et al. 488872* (MO); San Marcos Valley, 01°07'N 078°22'W, 600 m, 20–24 Nov 1983, *A. S. Barfod & et al. 488872* (AAU); **Esmeraldas:** San Lorenzo. Along unfinished road between Lita and San Lorenzo, 15.5 km W of Lita, 00°55'N 078°28'W, 705 m, 22 February 1992, *T.B. Croat 72373* (MO); Guayas: 0 — 800 m, 1876 - 1881, *F. C. Lehmann 4364* (K); Manabí: Pedernales. Cerro Pata de Pajaro, 10 km east of Pedernales; primary wet cloud forest disturbed by hunting trail network, above the Arroyos house off the main trail, 00°01'N 079°58'W, 400 — 700 m, September 1998, *Tom Delinks & Carlos Robles 70* (MO); Napo: Río Aguarico. S of the river at Cuyabeno. Rain forest, 00°17'S 075°53'W, 200 m, 2/20/1980, *L.B. Holm-Nielsen, Jaime L. Jaramillo & John S. Brandbyge 21544* (MO). **NICARAGUA. Atlántico Norte:** Along Río

Sucio, 2 km E of Bonanza; gallery forest, 14°00'N 084°34'W, 140 m, 14 May 1978, *David A. Neill 4032* (MO); Cerro Waylawás, 10 km S of Siuna, 13°39'N 084°49'W, 250 m, 5 June 1978, *David A. Neill 4237* (MO); Near Río Okonwás, 12 km E of Rosita; tropical wet forest, 13°58'N 084°14'W, 50 m, 15 June 1978, *David A. Neill 4474* (MO); Vecindades de Waní, 13°42'N 084°51'W, 100 m, 1 Marzo 1983, *F. Ortiz 922* (MO); Carretera nueva a Waní, El Hormiguero, 13°44'42"N 084°55'41"W, 180 m, 1 Abril 1983, *F. Ortiz 1208* (MO); Municipio de Siuna, Santa Rosa, 13°39'30"N 084°55'00"W, 135 m, 6 Septiembre 1982, *F. Ortiz 92* (MO); Mina Nueva América, 11.3 km N of main road leading westward from 14.3 km N of El Empalme to Rosita, 13°47'N 084°31'W, 250 m, 22 April 1979, *J.J. Pipoly, III 5291* (MO); Cerro Waylawás, summit of northern range; limestone peak, 13°39'N 084°49'W, 200 — 268 m, 12 March 1979, *J.J. Pipoly, III 4506* (MO); Along banks of Río Prinzipolka, 2 km S of Waní, 13°42'N 084°50'W, 100 m, 16 March 1979, *J.J. Pipoly, III 4769* (MO); El Salto, along Río Pis Pis, and surrounding hills; open fields and disturbed rainforest, 14°04'N 084°38'W, 100 m, 27 February 1979, *J.J. Pipoly, III 3561* (MO); La Posolera, 5 km al W de Waslala, carretera El Tuma a Waslala, 13°17'N 085°24'W, 700 m, 22 Diciembre 1982, *P. P. Moreno 19109* (MO); Cerro Waylawás. Sheer dog-tooth limestone peak and plain on E side of peak, 13°39'00"N 084°48'30"W, 100 — 268 m, 16 March 1978, *W. D. Stevens 7422* (MO); Along new road between Rosita and Puerto Cabezas, ca. 15.7 km SW of Río Kukalaya, 13°58'N 084°12'W, 50 — 100 m, 30 April 1978, *W. D. Stevens 8503* (MO); Cerro Waylawás. Sheer dog-tooth limestone peak and plain on E side of peak, 13°39'00"N 084°48'30"W, 100 — 268 m, 4 May 1978, *W. D. Stevens 8738* (MO); Along new road from Siuna to Matagalpa, ca. 31.4 km beyond Río Ulí (near Waní), ca. 8.9 km beyond Rosa Grande La Balsama and near major highway construction camp, 13°36'N 085°05'W, 100 — 200 m, 18 March 1978, *W. D. Stevens 7479* (MO); Along Río Sucio ca. 0.5 km E of first suspension bridge E of Bonanza; gravel bars and gallery forest, 14°01'N 084°34'W, 140 m, 20 February 1979, *W. D. Stevens 12318* (MO); 0.5–1.5 km from Plantel El Salto along road to Bonanza, slope above Río Pis Pis, 14°03'00"N 084°37'00"W, 140 m, 16 December 1980, *W. D. Stevens 18872* (MO); Atlántico Sur: Vicinity of Base Camp (ca. 3.6 km due SE of Cerro San Isidro) and 0.3–0.8 km N of Base Camp, Río Kama, 12°17'N 084°01'W, 30 m, 7 March 1966, *George R. Proctor et al. 27049* (MICH, UC, US); West of Bluefields to Jackson Farms; forest, pasture and along brook [Seymour series], 12°00'30"N 083°47'00"W, 0 — 100 m, 03 March 1971, *John T. Atwood 4108* (BM, DUKE, ENAG, F, FLAS, GH, MICH, MO, MSC, NY, SMU, UC, US); Comarca Wilike, Río Wilike Grande, 13°05'N 084°57'W, 100 m, 1 mayo 1984, *P. P. Moreno 23988* (MO); Kurinwacito, 13°08'N 084°55'W, 80 — 100 m, 18 marzo 1984, *P.P. Moreno 23757* (MO); Caño Monte Cristo, La Grupera, 11°33'N 083°48'W, 10 m, 4 Febrero 1982, *P. P. Moreno & J. C. Sandino 14687* (MO); Along trail from Colonia San Jose NNE to Parcel of Tomas Mejia Cano, crossing Caño El Gorrión; patches of tall evergreen forest on steep to gentle slopes, 11°53'30"N 084°20'00"W, 40 — 150 m, 18 May 1978, *W. D. Stevens 9010* (MO); ca. 6 km NW of Colonia San Antonio on new road to Colonia San Martín, 11°49'N 084°26'W, 150 — 200 m, 20 May 1978, *W. D. Stevens 9019* (MO); Along new road from Río Blanco to Río Copalar, ca. 31 km E of Río Blanco, 12°52'30"N 085°02'30"W, 200 — 400 m, 13 February 1979, *W. D. Stevens 12108* (MO); [mapped as Santo Domingo], 12°16'N 085°04'W, 500 m, 1867 - 1868, *Ralph Tate 406* (K); [mapped as Santo Domingo], 12°16'N 085°04'W, 500 m, 1867 - 1868, *Ralph Tate 407* (K); Jinotega: Municipio de Wiwilí, Reserva de Bosawas, comunidad de San Andrés, Caño Pilawas, 14°18'04"N 085°08'10"W, 178 m, 11 Abril 2005, *I. Coronado G. et al. 1523* (HULE, MO); Municipio del Cua Bocay, Reserva de Bosawas, comunidad de Walakitan; alrededor del transecto en zona de cacería (Suita Ilka),

14°29'N 085°05'W, 125 m, 4 Octubre 2005, *I. Coronado G. et al.* 2356 (HULE, MO); Reserva Bosawas, Municipio de Wiwili, Río Coco, poblado de Walaquitan, Cerro Muzu, 13°33'N 085°47'W, 300 — 452 m, 8 Septiembre 1997, *R. M. Rueda & I. Coronado G.* 7348 (MO); Reserva Natural Kilambé. Municipio de Bocay, Comunidad Santa Teresa de Kilambé, 13°34'N 085°39'W, 900 — 1100 m, 8 Enero 2001, *R. M. Rueda et al.* 15614 (MO); Municipio de Bocay. Reserva Natural Kilambé, 13°42'N 085°42'W, 1200 — 1700 m, 12 January 2001 - 19 January 2001, *R. M. Rueda et al.* 15771 (MO); Municipio de Wiwili. Reserva Cerro Kilambé, 13°33'N 085°41'W, 1100 — 1200 m, 29 Agosto 2000, *R. M. Rueda, M. Garmendia & N. Toval* 14711 (HULE, MO); Municipio de Wiwili. Reserva Cerro Kilambé, 13°33'N 085°41'W, 1100 — 1200 m, 29 Agosto 2000, *R. M. Rueda et al.* 14777 (HULE, MO); Along road from Hwy. 3 through La Fundadora, between Las Camelias and La Salvadora; along small tributary of Río Jigüina with steep rock sides, 13°05'30"N 085°53'30"W, 1100 — 1150 m, 31 October 1979, *W. D. Stevens & Alfredo Grijalva P.* 15321 (MO); Rápido Plis, Río Coco, 14°05'N 085°25'W, 100 — 200 m, 14 March 1980, *W. D. Stevens et al.* 16811 (MO); Matagalpa: 2 km al N de la hacienda Los Angeles, al pie de los Macizos de Peñas Blancas, 13°13'N 085°40'W, 1100 — 1200 m, 21 Diciembre 1982, *P. P. Moreno* 19036 (MO); Río Mancera, ca. 57 km NE of El Tuma; gallery forest and pastures, 13°16'N 085°31'W, 500 m, 3 March 1981, *W. D. Stevens & P. P. Moreno* 19248 (MO); Macizos del Peñas Blancas, SE side, drainage of Quebrada el Quebradon, slopes N of Hda. San Martín; (collection locality straddles border with Departamento de Jinotega), 13°14'N 085°39'W - 13°15'N 085°39'W, 950 — 1000 m, 24 November 1981, *W. D. Stevens & Russ Riviere* 20902 (MO); Macizos de Peñas Blancas, SE side, drainage of Quebrada El Quebradon, slopes N and W of Hda. San Martín. (collection locality straddles border with Departamento de Jinotega), 13°14'N 085°38'W - 13°15'N 085°39'W, 1000 — 1400 m, 18 - 20 January 1982, *W. D. Stevens et al.* 20965 (MO); Río San Juan: Municipio El Castillo, Comunidad Las Maravillas, 4 km al norte en el Río El Manú a orillas del Río Santa Cruz, 11°07'15"N 084°21'04"W, 100 m, 29 Julio 2005, *D. Urbina* 4300 (HULE, MO); Near Caño Chontaleño, 20 km NE of El Castillo, 11°08'N 084°12'W, 200 m, 18 - 21 April 1978, *David A. Neill & Paul C. Vincelli* 3562 (MO); Municipio El Castillo, comunidad Las Maravillas 1 km al Este, 11°07'15"N 084°21'04"W, 100 m, 27 Abril 2005, *F. Guido* 4101 (HULE, MO); Municipio El Castillo, Comunidad El Padilla, 11°07'45"N 084°18'27"W, 183 m, 19 Abril 2005, *J. Luna* 4235 (HULE, MO); San Juan del Norte; swampy field along river [Seymour series], 10°55'N 083°43'W, 0 — 50 m, 27 March 1971, *John T. Atwood* 5241 (ENAG, MO); 2 km al NW del Río Santa Cruz, 11°03'N 084°25'W, 70 m, 24 Febrero 1984, *P. P. Moreno* 23337 (MO); La Palma, Río Santa Cruz, 11°02'N 084°25'W, 50 m, 21 marzo 1985, *P. P. Moreno* 25501 (MO); Municipio El Castillo, Comunidad El Padilla, 2 km al S de la comunidad, 11°07'45"N 084°18'27"W, 183 m, 15 Julio 2005, *R. Guzmán* 4572 (HULE, MO); Municipio de San Carlos, Río El Zapote y Río Yolillal, 11°02'06"N 084°49'54"W, 45 m, 22 May 2014, *R. M. Rueda et al.* 20435 (HULE); Reserva Indio-Maíz, Municipio de el Castillo, a lo largo del Caño Chontaleño, 11°09'N 084°10'W, 150 — 200 m, 21 Febrero 1997, *R. M. Rueda et al.* 6181 (MO); Reserva Indio-Maíz, Municipio de el Castillo, 5 km al noroeste de la cabecera del Caño Chontaleño, 11°05'N 084°27'W, 150 — 200 m, 25 Febrero 1997, *R. M. Rueda et al.* 6351 (MO); Municipio El Castillo, Comunidad Km 20, 11°07'34"N 084°22'21"W, 110 m, 25 Enero 2005, *W. Garrido* 1143 (HULE, MO).

PANAMA. Parque Nacional Santa Fe, sendero a las cascadas entrando cerca a la finca El Nazareno. Bosque muy humedo intervenido con muchos cuerpos de agua, 08°31'06"N 081°07'10"W, 801 m, 19 noviembre 2012, Álex Espinosa 6102 (MO, PMA); 30 May 1984, *H. Kamemoto* A274 (MO); **Bocas del Toro:** Water Valley, vicinity of Chiriquí Lagoon,

09°14'42"N 082°23'00"W, 15 September 1941, *H. von Wedel* 2671 (MO); Little Bocas, vicinity of Chiriquí Lagoon, 13 July 1941, *H. von Wedel* 2536 (MO); Water Valley, vicinity of Chiriquí Lagoon, 09°14'42"N 082°23'00"W, 0 — 120 m, 14 September 1940, *H. von Wedel* 778 (MO); 29 July 1940, *H. von Wedel* 210 (MO); Bosque Protector Palo Seco. Sendero El Verrugoso, 08°46'46"N 082°10'14"W, 802 m, 06 febrero 2013, *O. Ortiz et al.* 1265 (MO, PMA); 10–15 miles inland (S) from mouth of Changuinola River. Banks of river and adjacent rain forest, 09°22'10"N 082°31'50"W, 18 December 1966, *Walter H. Lewis et al.* 872 (MO); **Canal Area:** Near Salamanca Hydrographic Station on the gorge of the R. Pequení, 09°18'18"N 079°34'56"W, 70 — 80 m, 15 December 1934, *Carroll W. Dodge et al.* 16747A (MO); 12 mi s Colon on Rio Providencia, 09°12'54"N 079°58'14"W, 5–40 m, 16 May 1966, *Edwin L. Tyson & Kurt E. Blum* 3983 (SCZ); Drowned forest between Tumba Vieja and Salamanca, 09°17'51"N 079°35'38"W, 66 m, 3 December 1934, *Julian A. Steyermark* 16747 (MO); Barro Colorado Island. James Zetek Trail, 09°09'31"N 079°52'05"W, 10 — 100 m, 22 June 1970, *T.B. Croat* 11011 (MO); Barro Colorado Island. James Zetek Trail, 09°09'31"N 079°52'05"W, 10 — 100 m, 07 June 1971, *T.B. Croat* 14936 (MO); James Zetek Trail, 09°09'31"N 079°52'05"W, 10 — 100 m, 22 December 1970, *T.B. Croat* 12866 (MO); James Zetek Trail, 09°09'31"N 079°52'05"W, 10 — 100 m, 22 March 1971, *T.B. Croat* 14038 (MO); Along hogback ridge S of Fuertes Cove-Pearson Peninsula, 09°10'07"N 079°51'31"W, 0 — 20 m, 24 February 1969, *T.B. Croat* 8146 (MO); **Chiriquí:** 6.5 mi S of Volcán, 08°41'N 082°38'W, 3300 ft, 17 Jun 1971, *Grady L. Webster* 16636 (MO); Quebrada Grande (near junction with stream called Macho de Monte) between Cuesta Piedra and Cordillera, 08°41'06"N 082°36'06"W, 940 m, 3 Jun 1980, *J.P. Folsom et al.* 8041 (MO); Burica Peninsula. San Bartolo Limitédi, 21 km west by northwest of Puerto Armuelles. Rich forest. N817-W8300, 08°17'N 082°59'W, 400 m, 19 February 1973, *Phil Busey* 458 (MO); Burica Peninsula. Primary forest; San Bartolo Limite, 12 mi. (20 km) west of Puerto Armuelles, 08°18'N 082°58'W, 400 — 500 m, 24 February 1973, *R.L. Liesner* 199 (MO); Roadside from Paso Canoas to Can4as Gordas; 5 mi from Paso Canoas, 08°35'30"N 082°48'30"W, 25 February 1973, *T.B. Croat* 22200 (MO); Along road between Concepción and El Hato del Volcán, 16 km above Concepción, 08°39'N 082°38'W, 800 m, 6 August 1974, *T.B. Croat* 26248 (MO); **Coclé:** Caribbean side of divide at El Copé, 08°42'24"N 080°36'30"W - 08°44'00"N 080°36'31"W, 200 — 400 m, 04 February 1983, *Clem W. Hamilton & Gerrit Davidse* 2686 (MO); Road from La Pintada to Coclesito, 08°41'06"N 080°27'15"W, 600 m, 07 February 1983, *Clem W. Hamilton & Gerrit Davidse* 2860 (MO); 3-mountain ridge above El Valle. [Coordinates on original label: 8°40'N, 80°10'W], 08°37'00"N 080°07'00"W - 08°37'30"N 080°08'00"W, 900 — 1000 m, 24 July 1983, *Clem W. Hamilton et al.* 4116 (MO); Trail from Cano Blanco del Norte to continental divide N of El Copé, 08°41'23"N 080°36'09"W, 250 m, 05 February 1983, *Gerrit Davidse & Clem W. Hamilton* 23661 (MO, PMA); Road to Coclesito 12 mi from Llano Grande. In forest, 08°47'N 080°28'W, 200 m, 17 December 1983, *H. W. Churchill et al.* 4167 (MO); Road to Coclesito. Logging camp 12 miles from Llano Grande, 08°45'N 080°29'W, 200 m, 09 December 1983, *H. W. Churchill et al.* 3988 (MO); On slopes of Cerro Pílon near El Valle, 08°37'36"N 080°06'18"W - 08°38'16"N 080°06'36"W, 700 — 900 m, 10 June 1967, *James A. Duke* 12121 (MO); El Valle. Cloud forest, 08°37'15"N 080°06'30"W - 08°38'00"N 080°08'30"W, 800 - 1000 m, 28 Jun 1967, *James A. Duke* 13209 (MO); Along road and in woods about 6 miles north of El Valle de Anton, 08°38'44"N 080°08'02"W, 1 August 1970, *James L. Luteyn & Helen Kennedy* 1633 (MO); 7 km north of El Copé; area around Rivera Sawmill, called Alto Calvario; New Works (stream in Atlantic watershed), 08°41'N 080°36'W, 700 — 850 m, 21 December 1977, *J. P. Folsom et al.* 7077 (MO); El Valle: at edge of road

above valley, 08°39'N 080°08'W, 21 August 1960, *John E. Ebinger 1120* (MO); Past Llano Grande on road to Cascajal, 08°41'06"N 080°27'15"W, 450 — 500 m, 06 May 1981, *K.J. Sytsma et al. 4378* (MO); Región del Copé después del pueblecito de Barrigón y del Aserradero, 08°43'N 080°36'W, 11 August 1979, *Mireya D. Correa A. et al. 3045* (MO); Parque Nacional General de División Omar Torrinós Herrera. Caño Sucio. Area boscosa del Tife, 08°43'18"N 080°37'56"W, 247 m, 20 Julio 2013, *O. Ortiz et al. 1432* (MO); 2 miles north of Cerro Pilón, 08°38'12"N 080°06'30"W, 900 m, 16 March 1973, *R.L. Liesner 742* (MO); Along road past Furlong's Finca, due N of Cerro Pilón, 08°38'N 080°06'W - 08°39'N 080°07'W, 880 m, 22 July 1976, *T.B. Croat 37526* (MO); Flat forested area below Cerro Pilón, 08°37'42"N 080°07'00"W, 11 February 1971, *T.B. Croat 13473* (MO); Vicinity el Valle de Antón, at forested flat area near Finca Macarenita at La Mesa, 08°36'N 080°07'W, 800 m, 6 July 1994, *T.B. Croat & G. Zhu 76696* (CM, MO); El Copé. Along gravel road to the right, before sawmill, 08°38'30"N 080°35'30"W, 2400 ft, 18 October 1979, *T. M. Antonio 2192* (MO); La Pintada. 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°40'41"N 080°35'47"W - 08°41'04"N 080°35'50"W, 710 — 800 m, 23 June 1988, *T.B. Croat 68808* (MO); **Colón**: Upper Río Piedras headwaters, along trail from end of Santa Rita Ridge Road, ca. 11 km SW of Cerro Bruja, 09°25'N 079°38'W - 09°26'N 079°40'W, 600 — 700 m, 02 May 1981, *K.J. Sytsma et al. 4219* (MO); Quebrada López [originally reported as Prov. Canal Zone on label], 09°19'15"N 079°48'11"W, 30 m, 10 - 11 February 1940, *Paul H. Allen 2140* (MO); San Lorenzo Forest Reserve. CTFS Plot, 09°16'48"N 079°58'32"W, 173 m, 16 March 2017, *Paula A. Morales M. & et al. 1209* (MO, PMA); 10 miles southwest of Puertobelo, 2–4 miles from coast, 09°26'N 079°43'W - 09°26'N 079°44'W, 10 — 200 m, 24 March 1973, *R.L. Liesner 1035* (MO); End of Santa Rita Ridge Road, ca. 21 km from Transisthmian Highway, 09°24'N 079°39'W, 400 — 500 m, 22 May 1982, *S. Knapp & R.J. Schmalzel 5215* (MO); 9–12 mi E of Transisthmian Highway on Santa Rita ridge. [Coordinates on original label: 09°20'N, 079°45'W], 09°22'00"N 079°39'30"W - 09°23'30"N 079°41'30"W, 500 — 550 m, 17 - 18 April 1988, *Sue A. Thompson 4829, 4830* (MO); Santa Rita Ridge Road, 6.5 miles E of Boyd-Roosevelt Highway, 09°21'15"N 079°44'00"W, 370 m, 16 July 1994, *T.B. Croat & G. Zhu 76953* (MO); Santa Rita Ridge, 5.7 mi from Boyd-Roosevelt Hwy, along road which turns to left off main route, 0.2 mi from jct, 09°21'N 079°44'W, 250 m, 17 July 1994, *T.B. Croat & G. Zhu 76967* (MO); Río Guanché, between Puerto Pilón and Portobello; ca. 1.5 miles S of road, 09°30'N 079°39'W, 100 m, 19 June 1994, *T.B. Croat & G. Zhu 76228* (AAU,F, MO,WIS); Santa Rita Ridge Road, 6.5 miles E of Boyd-Roosevelt Highway, 09°21'15"N 079°44'00"W, 370 m, 16 July 1994, *T.B. Croat & G. Zhu 76953* (HUA); Donoso. Campamento de Botija, dirección 60° SE, 976580 N, 538449 E (Coord. UTM), 08°50'N 080°39'W, 150 m, 08 julio 1996, *Alvin Zapata et al. 1114* (MO); Teck Cominco Petaquilla mining concession, 08°51'22"N 080°40'07"W, 170 m, 26 June 2008, *G. McPherson 20676* (MO); Portobelo. Trail along river, 5 km from Portobelo road, 09°30'N 079°39'W, 50 m, 6 May 1984, *H. W. Churchill 5121* (MO); Along Río Guanche, 1–4 km S of the Portobelo Highway. [Coordinates on original label: 09°30'N, 079°40'W], 09°30'N 079°39'W - 09°31'N 079°41'W, 0 — 50 m, 11 April 1982, *S. Knapp et al. 4607* (MO); **Darién**: Cerro Tacarcuna Expedition. Top of west ridge of Cerro Tacarcuna, 08°10'N

077°18'W, 1800 — 1850 m, 31 January 1975, *A. H. Gentry & Scott A. Mori 14030* (MO); Serranía de Kaje. Reserva Privada Chucanti, 08°47'45"N 078°27'47"W, 1325 m, 25 marzo 2017, *O. Ortiz et al. 2754* (MO,PMA); Trail and river bank between Manene and Río Coasi, 07°52'30"N 077°50'30"W, 22 December 1980, *R.L. Hartman 12120* (MO); Río Jacqué. [Coordinates on original label: 07°27'N, 078°05'W], 07°30'N 077°56'W, 100 m, 29 January 1982, *S. Knapp & Jim Mallet 3216* (MO); Pinogana. Corregimiento El Real. Quebrada Uruseca, 6 km S of El Real. Lower limits of Parque Nacional Darién, 08°02'53"N 077°43'13"W, 80 - 200 m, 07 - 10 February 1993, *Paul E. Berry et al. 5417* (L, MEXU, MO, PMA). **Ngäbe-Buglé:** Escudo de Veraguas. E440333, N1005354, 1 m, 10 September 2011, *Rodolfo Flores et al. 1249* RF (MO); **Panamá:** Panama/Guna Yala. El Llano- Cartí road, 09°20'N 079°00'W, 300 — 400 m, 28 August 1982, *Clem W. Hamilton & Henry Stockwell 1065* (MO); Los Altos de Cerro Azule. approx. 22 k from turn off to Los Altos de Cerro Azul from 'Fucer' reached from town of 24 Diciembre off Inter-American Highway; Station in El Torreon subdivision in Los Altos de Cerro Azul, at residence of Bill Adsett (Lot 142. Calle Kirkpatrick);, 850 m, 10 August 2014, *J.S. Harrison & L. Harrison 650* (MO); 10 miles from the Pan-American Highway on the El Llano-Cartí Road. Tropical wet forest, 09°14'N 079°00'W, 350 m, 21 April 1982, *S. Knapp et al. 4713* (MO); Capira. P.N. Altos de Campana, sendero de Interpretación, 09 August 1990, *Carmen Galdames 853* (MO); Cerro Campana, 08°41'N 079°54'W, 2500 f, 7 Jun 1970, *Edwin L. Tyson & T. D. Schwaner 6277* (IBE); La Campana: Cerro Campana, 08°41'N 079°54'W, 600 m, 08 July 1960, *John E. Ebinger 352* (MO); Chepo. Between 6–12 km north of El Llano on Cartí road, 09°15'32"N 078°57'42"W - 09°16'32"N 078°55'49"W, 1200 ft, 13 January 1978, *B. E. Hammel 860* (MO); Area surrounding Rancho Chorro, mountains above Torti Arriba. Serranía de Cañasas, 08°56'01"N 078°25'25"W, 400 — 700 m, 03 December 1977, *J.P. Folsom et al. 6698* (MO); El Llano-Cartí Road, tropical moist forest, 15 km from Pan Am Hwy, 09°17'20"N 078°56'05"W, 900 — 1000 ft, 12 September 1980, *K.J. Sytsma 1038* (MO); El Llano-Cartí Road, Km. 10–15, rain forest, 09°16'10"N 078°55'41"W - 09°17'20"N 078°56'05"W, 300 — 400 m, 03 September 1977, *Paul J. M. Maas et al. 2805* (MO); El Llano-Cartí road, 8–11 km from Inter-American Hwy, 09°16'10"N 078°55'41"W, 300 — 400 m, 13 August 1975, *Scott A. Mori 7706* (MO); El Llano-Cartí Road, 17.5 km from Inter-American Highway, 09°17'45"N 078°55'59"W, 350 m, 14 February 1975, *Scott A. Mori et al. 4618* (MO); Primary forest; along newly cut road from El Llano to Cartí-Tupile; 12 mi above Pan-Am Hwy, 09°18'40"N 078°56'40"W, 200 — 500 m, 13 March 1973, *T.B. Croat 22867* (MO); Panamá. Along road from Cerro Azul to Cerro Jefe, 09°09'58"N 079°24'45"W - 09°14'02"N 079°22'30"W, 2300 — 2700 f, 19 January 1969, *Edwin L. Tyson 5316* (FSU, SCZ); Cerro Jefe, 09°14'02"N 079°22'30"W, 3100 ft, 05 January 1972, *John D. Dwyer & A. H. Gentry 9464* (MO); Guna Yala: Studies of evergreen lowland seasonal rainforest on the Aila Terrain (Rio Acla), 08°48'30"N 077°40'30"W, 25 — 100 m, 10 February 1979, *Andrew M. Sugden 422* (MO); Near El Llano-Cartí road, northwest of Nusagandi on Sendero Wedar, 09°22'N 078°58'W, 150 — 250 m, 18 June 1987, *G. McPherson 11058* (MO); El Llano-Cartí Road, 19.1 km from Interamerican Hwy. Continental divide trail E of camp. [Coordinates on original label: 09°19'N, 78°35'W], 09°20'N 078°59'W, 325 m, 28 August 1984, *Greg C. de Nevers 3782* (MO); Cangandí, 09°26'N 079°07'W, 30 m, 10 February 1986, *Greg C. de Nevers & Heraclio Herrera 7091* (MO); El Llano-Cartí road. Km 17–19. [Coordinates

on original label: 9°19'N, 78°55'W], 09°18'N 078°58'W - 09°20'N 078°59'W, 350 m, 19 June 1986, *Greg C. de Nevers & Heraclio Herrera 7961* (MO); Cangandí. Hills near village, 09°27'N 079°06'W, 30 m, 27 March 1986, *Greg C. de Nevers et al. 7441* (MO); Trail along continental divide, 09°20'N 078°56'W, 400 m, 25 July 1986, *J. F. McDonagh et al. 379* (BM); Cerro Habú, trail from Río Sidro, primary wet forest, 09°23'N 078°49'W, 400 — 800 ft, 20 December 1980, *K.J. Sytsma et al. 2804* (MO); 23–29 km from Pan American Highway on El Llano-Cartí Road. Forests and forest edges along road, 09°18'N 078°58'W - 09°21'N 078°58'W, 300 — 400 m, 28 October 1981, *S. Knapp 1857* (MO); Veraguas: Cascada de alto de piedra, 08°30'54"N 081°07'11"W, 899 m, 08 julio 2012, *O. Ortiz et al. 698* (MO); Santa Fe. On Caribbean slope above Río Primero Brazo 5 miles NW of Santa Fé, 08°31'26"N 081°07'46"W, 700 — 1200 m, 18 - 19 March 1973, *R.L. Liesner 980* (MO); N of Santa Fé, ca. 2 km N of Escuela Agrícola Alto de Piedra, 08°31'22"N 081°07'33"W, 900 m, 17 October 1974, *Scott A. Mori & Jacquelyn A. Kallunki 2584* (MO); Along the Santa Fe to Calovebora road beyond Escuela Agrícola Alto Piedra, along first major stream ca. 3 mi from fork in the road at the school, 08°31'28"N 081°07'50"W, 700 m, 1 December 1979, *T.B. Croat 49033* (MO); Along road between Escuela Agrícola Alto Piedra (above Santa Fé) and Río Dos Bocas, ca. 10 km from the Escuela, 08°32'40"N 081°09'44"W, 530 - 620 m, 26 July 1974, *T.B. Croat 25896* (MO); 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 27577* (MO); Río Segundo Braso, 8 km beyond Escuela Agrícola Alto Piedra beyond Santa Fé, 08°31'48"N 081°08'58"W, 750 m, 24 July 1974, *T.B. Croat 25577* (MO); Along road from Santa Fé to Río Calovebora. 0.6 miles beyond Escuela Agrícola Alto Piedra, 08°30'53"N 081°06'59"W, 735 m, 4 April 1976, *T.B. Croat & J.P. Folsom 33994* (MO); **PERU. Amazonas:** Bagua. Dtto. Imaza, Comunidad de Yamayakat. Bosque primario, 05°03'24"S 078°20'17"W, 350 m, 10 Nov 1997, *Rodolfo Vásquez et al. 24813* (BG, G, IBE, MO); **Pasco:** Oxapampa. Distrito Villa Rica. Sector Union-Shimaki. Bosque de Protección San Matías - San Carlos. Trocha de la escuela antigua, paralela a la trocha a San Roque. Bosque Primario, 10°45'S 074°55'W, 1320 m, 26 Junio 2003, *Jorge Lingán 625* (USM); Distrito Villa Rica. Sector Union-Shimaki. Bosque de Protección San Matías - San Carlos. Trocha cerca al límite del Bosque de Protección. Bosque Primario, 10°45'S 074°55'W, 1352 m, 2 July 2003, *Jorge Lingán 657* (F, HUT, K, MO, USM); Distrito Villa Rica. Sector Union-Shimaki. Bosque de Protección San Matías - San Carlos. Trocha de la escuela antigua, paralela a la trocha a San Roque. Bosque Primario, 10°45'S 074°55'W, 1100 m, 28 June 2003, *Jorge Lingán 634* (AMAZ, F, HUT, K, MO, MOL, NY, US, USM). **UNITED STATES.** Missouri: Saint Louis City. Missouri Botanical Garden, Greenhouse D4. Source: (Wild). Originally collected by *Croat 76953*, Panama, Colón, Santa Rita Ridge Road, 6.5 mi E of Boyd-Roosevelt Hwy, 16-Jul-94. MOBOT LCMS Accession # 2011-1432-1, 38°36'55"N 090°15'34"W, 17 August 2017, *Mónica Carlsen & Danielle Hopkins 3001* (MO).

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Stenospermatum bocachirense Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Along Continental Divide along the Bocas del Toro border above Fortuna Dam, forest along divide trail, 1150–1200 m, 3 December 1985, *Gordon McPherson 7719* (holotype, MO-3322644).

Diagnosis: *Stenospermatum bocachirense* is characterized by its epiphytic habit, moderately short internodes, dark brown-drying, matte petioles sheathed about 2/3 their length with sheath ending acutely at apex with the margin persisting intact, narrowly elliptic, brown-drying, narrowly acuminate blades which are attenuate at the base, the upper surface with the minor veins weakly raised with the intervening areas conspicuously areolate-ridged as well as by the long-pedunculate inflorescence, the broad pale peduncle and stipitate, tapered, orange spadix..

Epiphyte; internodes short, 2 cm diam, shrinking to 1.5 cm diam, drying dark brown, matte, weakly; **petioles** 10–16 cm long, sheathed 0.64–0.68(0.85) their length, drying dark brown, matte, obtusely ribbed abaxially; **sheath** 8–10 cm long, acute at apex, margins thin but not breaking up; free part of petiole 3.5–6.0 cm long (to 1.3 cm long on leaf subtending inflorescence), sulcate, deeply so near the geniculum; **blades** elliptic, 15–18 cm long, 4.7–7.5 cm wide, 2.3–2.9 times longer than wide, 1.1–1.5 times longer than petioles, gradually short-acuminate at apex, acute to weakly attenuate at base, dark green and matte above, slightly paler and semiglossy below, drying usually concolorous, dark brown above and below, sometimes slightly paler, yellowish brown below; midrib broadly raised, concolorous above, narrowly rounded, matte, darker below; primary lateral veins barely visible, departing midrib at 20–25°; upper surface with minor veins very close, weakly and irregularly raised with the intervening area densely and irregularly granular-ribbed, sparsely short pale-lineate; lower surface with minor veins more straight, regular and distinct, the intervening area finely striate and finely pale-speckled to dark-speckled. INFLORESCENCE held only slightly higher than the leaves; peduncle 27 cm long, flattening to 1 cm wide, light yellow-brown, weakly glossy, finely striate and coarsely granular on drying; spathe not seen; **spadix** 11.5 cm long, 2 cm diam. in early fruit, narrowly tapered to apex, ca. 7 mm diam. near tip; pistils moderately close, 5–6 mm diam. on drying, dark short-lineate on margins; style dark brown, rhombic, 4–5 cm wide, 2.3–3.0 mm long, dark brown with a regular, paler brown border, sparsely pustular with minute, ring-like, raised structures; stigma rounded, 0.5–0.6 mm diam. with a broad, pale brown border and medial depression. Fruiting in December. **Figures 17 & 18.**

Distribution — *Stenospermatum bocachirense* is endemic to Panama, known only from the type specimen collected on the border of Bocas del Toro and Chiriquí Provinces in a *Premontane wet forest* life zone.

Comments — *Stenospermatum bocachirense* is seemingly most closely related to *S. herrerae*, a species which shares many similar features, especially the color and general shape of its leaf blades and a similar pattern of the venation on the upper surface. That species differs by having blade drying paler on the lower surface with apices narrowly acute and apiculate, the base sometimes rounded as well as by having the free portion of the petioles longer (8.5–14.0 cm long versus 3.5–5.3 cm long for *S. bocachirense*), peduncles 5–6 mm diam., matte, light brown on drying (versus to 1 cm wide and manila-colored and semiglossy for *S. bocachirense*) and the spadix cylindroid, 3.7 times longer than wide and broadly rounded at apex (versus with the spadix tapered toward apex, 5.2 times longer than wide and narrowly rounded at apex).



Figure 17: *Stenospermation bocachirens*, TYPE McPherson 7719

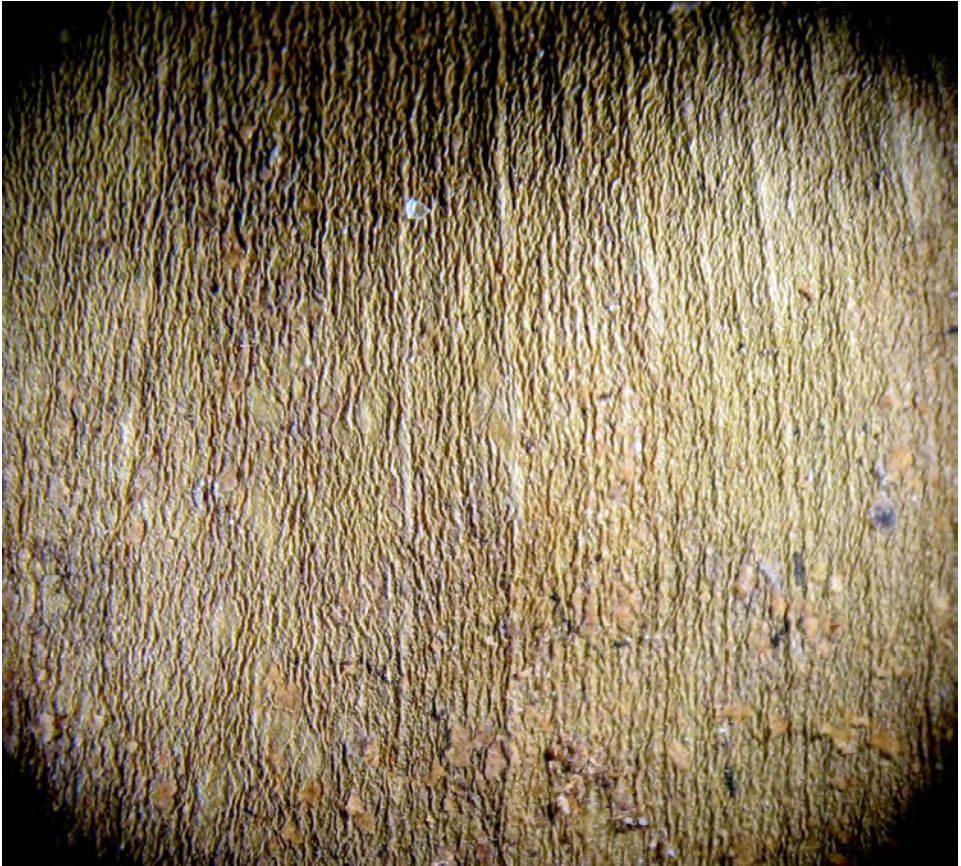


Figure 18: *Stenospermaton bocachirensis*, Upper blade surface, TYPE McPherson 7719

Etymology — *Stenospermaton bocachirensis* is named for the type locality along the border of Bocas del Toro and Chiriquí provinces.

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Stenospermatum brakoe Croat, **sp. nov.** — Type: PANAMA. Comarca de Guna Yala: Cerro Brewster, 09°18'N, 79°16'W, 800–850 m, 20 November 1985, *G. de Nevers, A. Henderson, H. Herrera, G. McPherson & L. Brako* 6302 (holotype, MO-3475546).

Diagnosis: *Stenospermatum brakoe* is characterized by its vining, epiphytic habit, slender internodes longer than broad, weakly winged petioles with the sheath acute to weakly free-ending and a slender, narrowly sulcate, free portion, narrowly oblong-ob lanceolate, long acuminate, brownish drying blades with weak minor veins and no short pale lineations on the upper surface as well as by the short pedunculate, short, cylindroid infructescence with white berries.

Climbing epiphyte; stems elongated; internodes moderately short, 6–10 cm long, 4 mm diam., gray-brown, weakly glossy, moderately ribbed, short pale-lineate; **petioles** 4.2–6.8 cm long, dark green, weakly glossy, sheathed from midway to nearly to the geniculum, ending rounded to weakly free-ending at apex; **sheath** 3.2–4.2 cm long, 3–4 mm high, margin concolorous, intact, free portion (0.3)2.0–3.2 cm long, deeply sulcate. **LEAVES** scattered on stem; **blades** oblanceolate, (9.0)10.0–21.3 cm long, (2.0)3.3–3.8 cm long, 4.6–5.6 times longer than wide, 2.0–2.5 times longer than petiole, broadest above the middle, gradually long-acuminate to abruptly short-acuminate at apex, acute to attenuate at base, dark green and velvety-matte above, moderately paler and weakly glossy below, drying dark gray-brown above, paler, yellow-brown and weakly glossy below; midrib narrowly sunken and concolorous above, thicker than broad and concolorous and finely ribbed below; primary lateral veins obscure, departing midrib at less than 15°; upper surface with minor veins weak, scarcely raised and obscure, the intervening area finely and uniformly striate-granular, lacking short pale lineations; lower surface uniformly and coarsely striate. **INFLORESCENCE** erect; peduncle 4.4 cm long, 2 mm diam., light brown; spathe not seen; **spadix** in fruit sessile, 3.3 cm long, 1.2 cm diam.; berries white; style 1.8–2.5 mm wide, subrounded to quadrangular, caviform, yellow-brown, matte; stigma oval, 3–4 mm long, moderately raised, the margins light brown; seeds cylindroid to narrowly obovoid, 2 mm long, 0.8 mm diam., weakly constricted, narrower and nipple-like at base. Flowering in late rainy season probably as early as August; fruiting in late rainy season (November–December). **Figures 19 & 20.**

Distribution — *Stenospermatum brakoe* is endemic to Panama, known only from the type specimen from the Comarca de Guna Yala on Cerro Brewster at 800–850 m in *Premontane rain forest* life zone.

Comments — *Stenospermatum brakoe* has been confused with *S. angustifolium* but that species differs in having blades with short pale lineations and has a more slender spadix.

Stenospermatum brakoe is also similar to both *S. angustispadix* Hemsl. which differs in having oblong leaves with many short pale lineations and *S. andreanum* Engl., which, while typically lacking short pale lineations, has spadices much more globose and has styles usually markedly concave with thick margins and with a big stigma encompassing a high percentage of the entire style surface (about ½ of the entire surface coverage of the style) not only a small percentage (ca. 1/7) of the width of the style surface as is the case with *S. brakoe*. *Stenospermatum brakoe* might be confused with *S. brewsterense* which occurs in the same area but that species differs by having more elliptic, abruptly short-acuminate blades with a longer peduncle (to 20.5 cm long) and a prominently stipitate spadix.

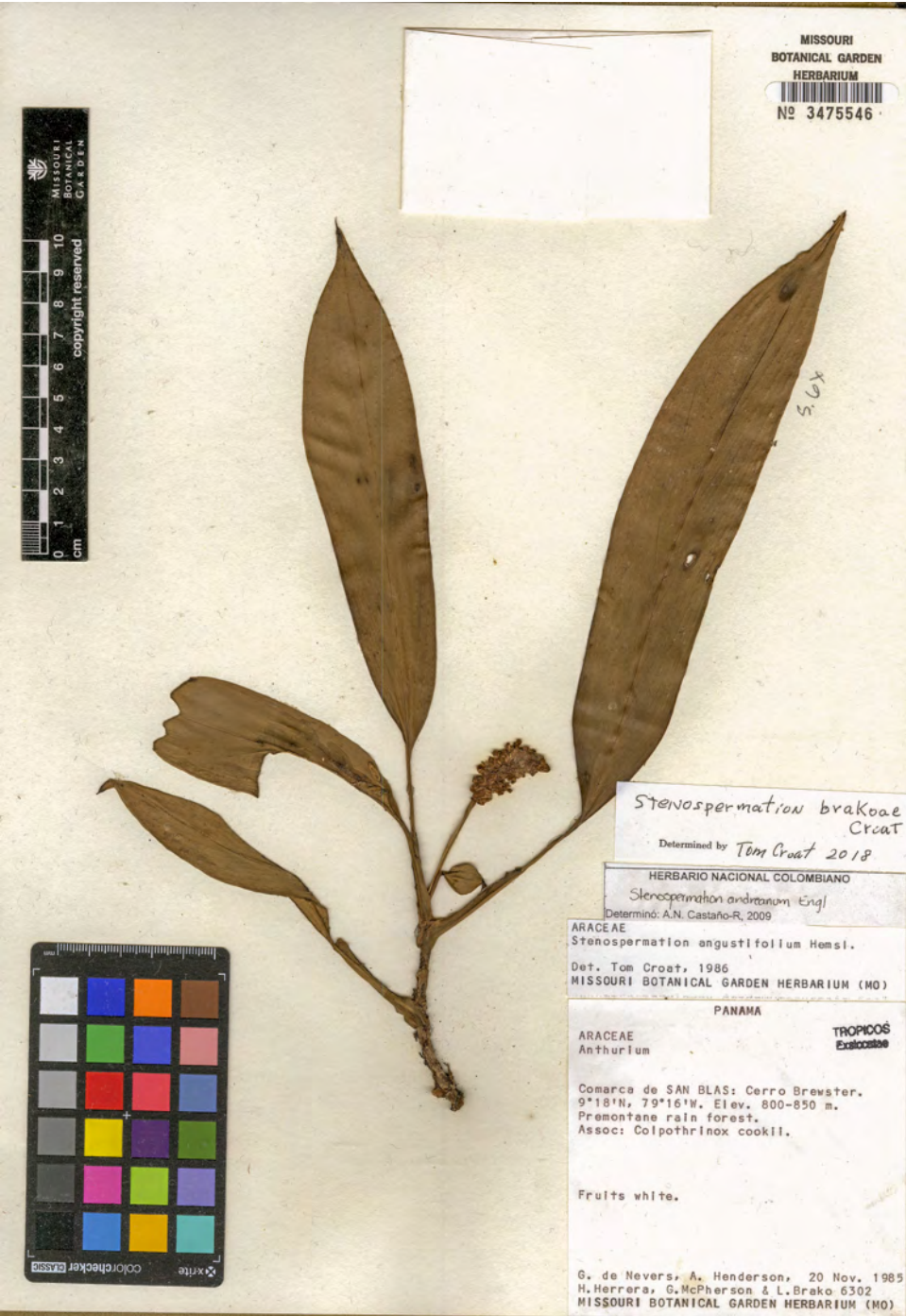


Figure 19: *Stenospermation brakoae*, TYPE DeNevers 6302

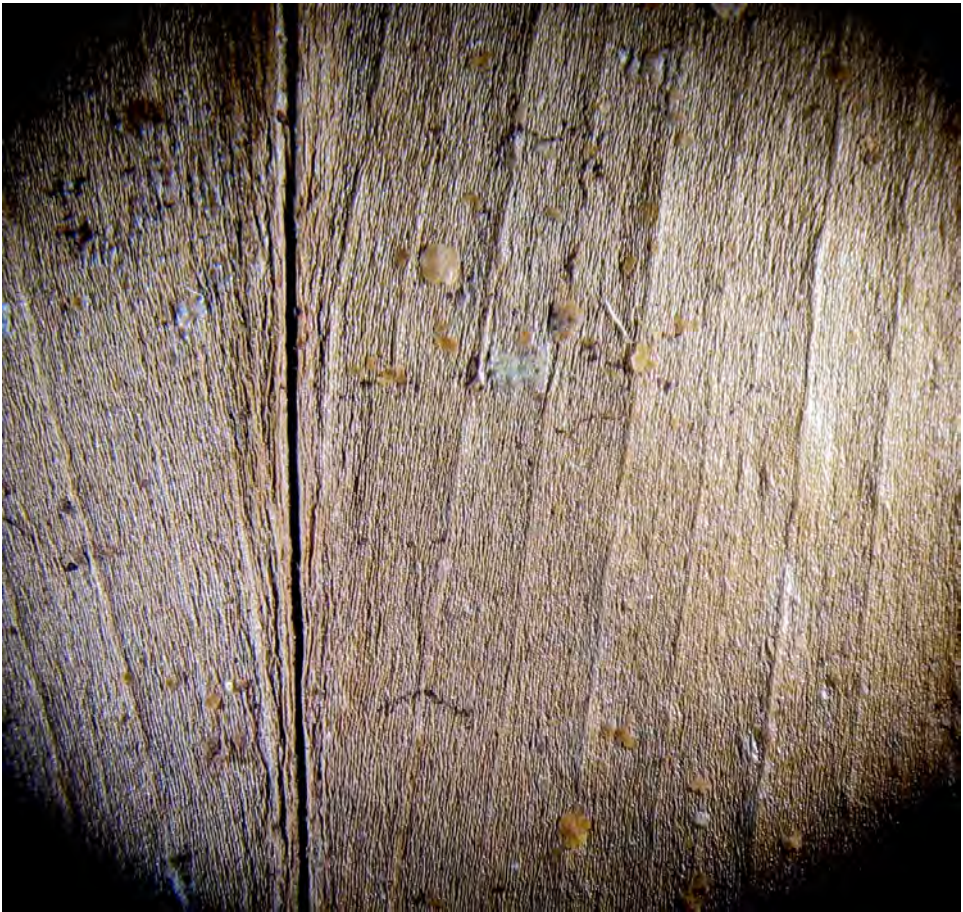


Figure 20: *Stenospermaton brakoae*, Upper blade surface, TYPE *DeNevers 6302*

Etymology — *Stenospermaton brakoae* is named in honor of Dr. Lois Brako who was one of the members of the crew that made the long hike into Cerro Brewster and discovered this new species. At the time she was at the New York Botanical Garden and was working on her thesis. She is now Assistant Vice President for research, regulatory and compliance oversight at the University of Michigan and coordinates activities related to the development and modification of campus-wide policies, procedures, and strategic planning initiatives to help reduce regulatory burden for investigators. She also serves as a member of U-M's leadership team for electronic information systems and serves nationally on the Board of Directors of the Council on Governmental Relations.

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Stenospermation brewsterense Croat, **sp. nov.** — Type: PANAMA. Panamá, Cerro Brewster on Guna Yala border, 09°20'N, 79°15'W, summit, 800–850 m, 20 November 1985, *G.McPherson* 7525 (holotype, MO-3306952).

Diagnosis. *Stenospermation brewsterense* is characterized by its epiphytic habit, short slender internodes, slender petioles sheathed 0.42–0.82 their length, mostly oblong-elliptic, abruptly short-acuminate, brownish-drying blades 2.4–4.4 times longer than wide, the upper surface closely and more or less evenly ribbed, the intervening area densely granular and usually lacking short pale-lineations as well as its stipitate, cylindrical spadix and orange berries.

Epiphyte; internodes short, 1.2 cm long or less, 6–7 mm diam., drying light yellow-brown, closely ribbed, the epidermis gray, often loosening; **petioles** 4.2–8.4 cm long, sheathed 0.4–0.8 their length, finely and closely ribbed adaxially and on the sides; **sheath** narrow, 4.2–8.4 cm long, drying finely ribbed, concolorous with shaft, its margin moderately thick, pale tan, somewhat crustiose and jagged, acute or nearly so and often with margin missing, free part of petiole C-shaped, 1.6–8.0 cm long, drying narrowly and usually sharply sulcate; geniculum ca. 6 mm long, not often apparent; **blades** oblong-elliptic to narrowly elliptic, rarely ovate-elliptic, 10.2–15.3 cm long, 3.3–4.7 cm wide, 2.4–4.4 times longer than wide, 0.8–2.0 times longer than petioles, abruptly short-acuminate and down-turned at apex, acute to weakly attenuate at base, subcoriaceous, moderately bicolorous, drying dark brown and matte above, reddish yellow-brown and semiglossy below; midrib narrowly and deeply sunken, concolorous above, moderately raised, closely ribbed, slightly darker below; primary lateral veins not readily apparent; upper surface closely and more or less evenly ribbed, the larger ribs separated by 3–8 mm with the intervening space closely ribbed with only slightly weaker ribs, the intervening area densely granular and lacking short pale-lineations or sometimes sparsely short-pale-lineate, lacking minute striations; lower surface closely striate-granular and sparsely short pale-lineate. INFLORESCENCE erect, shorter than leaves; peduncle 19 cm long, drying 2 mm diam., light brown; spathe not seen; **spadix** prominently stipitate (stipe 1.2 cm long, 2 mm diam., densely warty) 4.7 cm long, 3.6 mm diam.; styles to 2 mm wide and mostly rounded-prismatic when young, 3.0–3.5 mm wide, 6-sided and mostly elongated laterally or in the direction of the axis with the sides markedly unequal in length (those on the ends of the elongation much narrower, apex drying truncate, dark yellow-brown, matte; stigmas oval, 0.8 mm long, 0.4 mm wide, the margin light brown with a deep medial depression. INFRUCTESCENCE orange, 7 mm long, 4–6 mm diam.; seeds moderately few (8–15) per berry, attached basally, oblong and weakly falcate, drying yellow-brown, moderately glossy, 2 mm long, 0.6 mm diam., truncate at base on chalazal end, narrowly rounded at apex. **Figures 21 & 22.**

Distribution — *Stenospermation brewsterense* is endemic to Panama, known only from the type specimen collected on Cerro Brewster in northern Panama Province on the border with Comarca Guna Yala at 800–850 m elevation in a *Premontane wet forest* or *Tropical wet forest* lifezone.

Comments — *Stenospermation brewsterense* is most similar to *Stenospermation morii* and *S. dukei* both of which differ by having shorter, decidedly more heavily winged petioles which have their sheaths ending abruptly and somewhat prolonged beyond their attachment whereas the petioles of *S. brewsterense* have their slender petiole sheaths ending acutely at the apex.



Figure 21: *Stenospermatum brewsteriense*, Holotype McPherson 7525

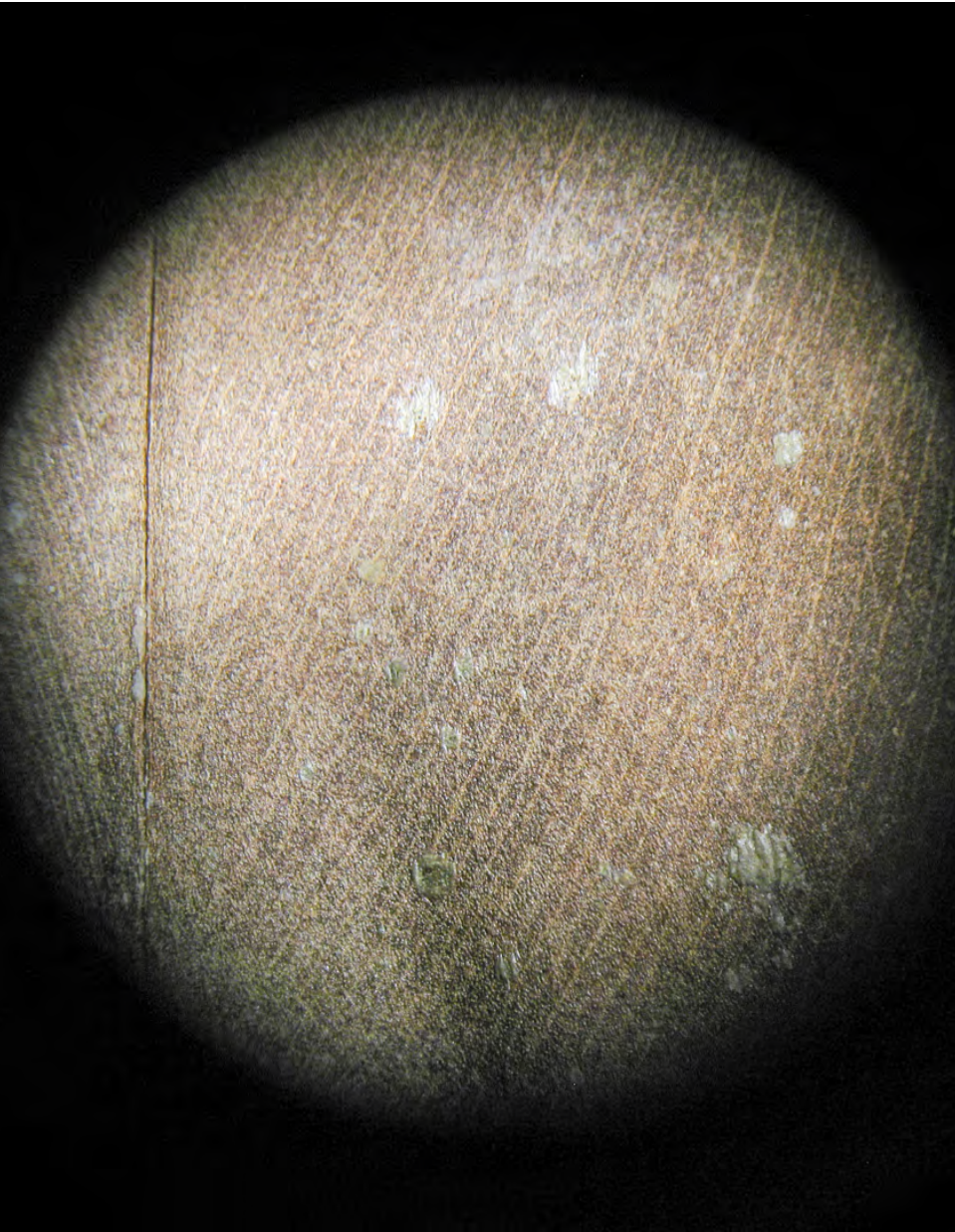


Figure 22: *Stenospermation brewsteriense*, Upper blade surface, *McPherson 7525*

In addition, *S. brewsterense* has a much longer free portion of the petiole. *Stenospermatum brewsterense* might be confused with *S. brakoae* which occurs in the same area but that species has proportionately longer, more oblanceolate, more gradually acuminate blades and a much shorter peduncle (to 4 cm long) as well as a sessile spadix.

Etymology — *Stenospermatum brewsterense* is named for the type locality on Cerro Brewster

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Stenospermatum calvarioense Croat, **sp. nov.** — Type: PANAMA. 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°40'41"N, 80°35'47"W, 800 m, 31 March, 1993, *Croat 75065* (holotype, MO-4342588, isotypes TEX, SAR).

Diagnosis. *Stenospermatum calvarioense* is characterized by its epiphytic habit, stout stems with deciduous petioles, petioles as long as blades and sheathed 4/5 their length, broad elliptic blades that are two times longer than wide, inflorescences that are about as tall as the blades, which have finely alternating ribs and short-pale-lineations on the upper surface and finely ribbed and dark granular on lower surface as well as the erect inflorescence, pale green spathe 3.6 cm longer than the creamy, moderately tapered, stipitate spadix with a sterile flower segment at the base.

Epiphyte; internodes 1.5–2.5 cm long, 2.5 cm diam., fibrous, drying yellow-brown. LEAVES erect, 5 or 6 clustered near the apex of stem, eventually totally deciduous; **petioles** (11)15–28 cm long, sheathed 0.82–0.88 their length, bluntly and narrowly sulcate, light green, semiglossy, drying brown; **sheath** 23 cm long, margins thick, persisting intact; **blades** broadly elliptic, 24.5–28.5 cm long, 9.5–13.2 cm wide, 2.0–2.2 times longer than wide, about as long as petioles, coriaceous, moderately bicolorous, dark green and semi-glossy above, much paler and glossy below, drying dark brown above, yellow-brown below; midrib narrowly sunken and moderately discolored marginally above, narrow-rounded and paler below; primary lateral veins scarcely apparent on either surface; **upper surfaces** with veins spaced 2–3 mm apart with an intermediate smaller vein alternating with the stouter veins, narrowly rounded, the intervening area infrequently short-pale-lineate, smooth; lower surfaces moderately smooth with weak ribs, spaced 1.5–2.5 mm apart, the intervening area sparsely dark-granular. INFLORESCENCE erect at anthesis; spathe 18 cm long, 3.6 cm longer than spadix, pale green on both surfaces at anthesis, drying red-brown; **spadix** stipitate 10–25 mm, 13.0–14.4 cm long, 10–11 mm diam., lowest 1.5 cm long portion at base composed of sterile flowers, whitish, tinged weakly purplish in age, drying dark brown-orange; sterile flower segment with flowers thicker, remaining creamy after anthesis; pistils surrounded by cup like structures; stigmas terete to oblong, dark brown in middle, ringed by white; berries unknown. Flowering in late March. **Figures 23 & 24.**



Figure 23: *Stenospermation calvarioense* TYPE Croat 75065, Panama

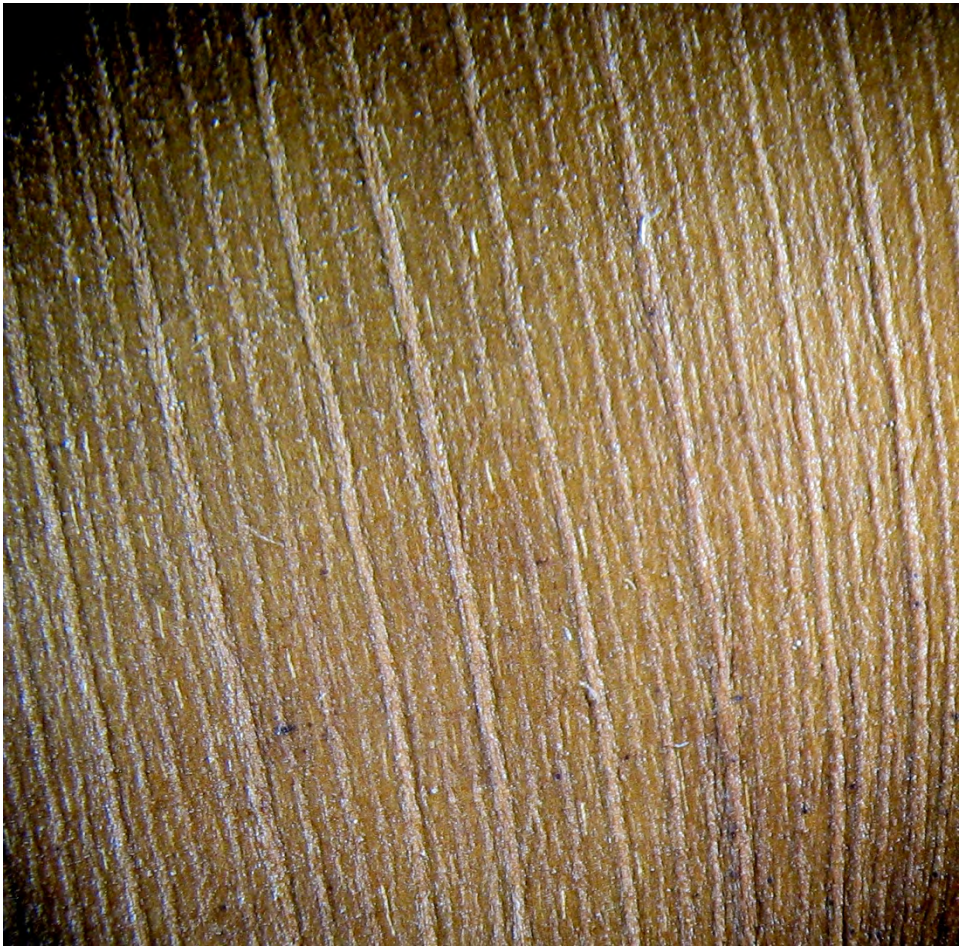


Figure 24: *Stenospermatum calvarioense*, Upper blade surface, TYPE Croat 75065

Distribution — *Stenospermatum calvarioense* is endemic to Panama, known only from Coclé Province in the El Copé region at 800 m and in Bocas de Toro Province at Cerro Colorado in a *Lower montane wet forest* life zone.

Comments — *Stenospermatum calvarioense* compares closely to *S. majus* from Costa Rica, but the defining character difference is the lack of the tight areolate pattern on the upper surface of *S. majus*. The upper surface of *S. calvarioense* is irregularly ridged, with smaller irregular ridges in the intervening spaces.

Stenospermatum calvarioense is similar to *Stenospermatum ortizii* Croat from Bocas del Toro and Chiriquí Provinces occurring at 1200 to 1900 m in the Fortuna Dam region. That species differs in having the intervenal region with usually jagged, areolate ridges and often with pustules. In contrast the intervening space on *S. calvarioense* is moderately smooth.

Etymology — *Stenospermation calvarioense* is named after the type locality, Alto Calvario.

Paratype: PANAMA. Bocas del Toro: 12 km above Chami Copper Mine near Cerro Colorado, along path down to river, ca. 08°35'N, 81°50'W, 21 June, 1986, *W.J. Kress, H. Luther, L. Besse & J. Halton* 86-1939 (MO, SEL).

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Stenospermation castanoanum Croat, **sp. nov.** — Type: PANAMA: Panamá: vicinity of summit of Cerro Jefe, 09°13'53"N, 79°22'59"W, 1000 m; 21 June 1972, *J.L. Luteyn* 3203 (holotype, MO-2180602; isotype, DUKE).

Diagnosis. *Stenospermation castanoanum* is characterized by its moderately short, dark-drying internodes, petiole sheathed from 2/3 to throughout, dark brown, matte, nearly coriaceous, short-acuminate blades with the upper surface closely ribbed and coarsely granular, the lower surfaces moderately smooth, densely granular and finely ridged as well as by its pale-yellow, oblong, stipitate spadix and orange berries.

Epiphytic or rarely terrestrial, trailing and upright, hanging on fallen and live trees; internodes short, 0.3–2.2 cm long, 0.8–1.6 cm wide, drying black to dark red-brown, coarsely ribbed, with the epidermis sometimes deciduous to expose pale brown, closely ribbed surface; **petioles** C-shaped, 4.5–14.8 cm long, sheathed 0.6–1.0 their length to fully throughout (on petioles subtending inflorescence), free part of petiole mostly short to absent, mostly less than 1.5 cm long, sometimes to 3.8 cm long; **sheath** (4.2)7.0–13.7 cm long, acute to rounded, sometimes truncate, sometimes free-ending; margins mostly persisting intact and concolorous, sometimes thick, rarely thin and lighter, 0.4–0.8 times as long as blade, drying black to dark brown; **blades** often inequilateral, narrowly oblong-elliptic to elliptic, (8)11–27 cm long, 3.1–6.7 cm wide, 2.6–5.8 times longer than wide, 1.6–3.1 times longer than petioles, gradually and weakly short-acuminate to abruptly short-acuminate at apex, acute to narrowly acute at base, moderately coriaceous, drying weakly bicolorous, dark red-brown on both surfaces; midrib narrowly sunken, drying concolorous above, broadly raised, drying finely ribbed, concolorous to slightly darker below; primary lateral veins absent; **upper surface** closely and finely ribbed with the intervening area even more finely, closely and coarsely granular-ribbed with copious pustules, short-pale-lineations absent or few, (those present small, faint and obscure); lower surface densely granular and finely ribbed. INFLORESCENCE erect, moderately long-pedunculate; peduncle 11.3–35.0 cm long, terete; spathe green, white, or yellow, 8.7–14.3 cm long; **spadix** stipitate 6–16 mm, 4.5–14.2 cm long, 5–17 mm wide, stipe 9 mm long, 2 mm diam., usually yellow-orange, rarely cream, drying yellow and black to dark brown; pistils yellow with orange apices; styles drying dark brown, flattened, irregularly hexagonal; stigma oval, 8–11 mm long, 4–6 mm wide, drying light brown, deeply sunken in the middle. INFRUCTESCENCES erect-pendent; berries yellow turning dull orange at maturity; 2.4–2.8 mm diam. Flowering March to July; immature fruits in August; fruiting Sept. and October. **Figures 25–35.**



Figure 25: *Stenospermation castanoanum* Croat, Habit of branching stem, *Croat et al.* 106213, Panama



Figure 26: *Stenospermation castanoanum*, Growing on trunk, Photo O. Ortíz



Figure 27: *Stenospermatum castanoanum*, Habit of flowering plant, Photo J. Harrison

Distribution — *Stenospermatum castanoanum* is endemic to Panama, known from the Cerro Jefe Region at 820–1000 m elevation in a *Premontane rain forest* life zone as well at lower elevations in Colón Province in *Tropical wet forest* life zones.

Comments — *Stenospermatum castanoanum* resembles *S. sessile* which may occur in the same region but that species differs in typically having petioles with the sheath margins markedly paler and thin-wrinkled as well as by having a spathe that is much longer than the spadix and a sessile, usually creamy white spadix. It might also be confused with *S. chagrense* which shares dark brown-drying leaf blades but that species differs in having petioles sheathed only 0.7 their length with the free portion of the petioles 12–13 cm long and has the intervening area between the minor veins on the upper surface irregular and coarsely ridged. Likewise, *S. castanoanum* might be confused with *S. multicostatum* both of which have orangish spadices. *Stenospermatum multicostatum* differs in having somewhat longer internodes (2.2–4.0 cm) and proportionately broader leaves (1.9–2.8 times longer than broad).

Croat et al. 106213 has appreciably smaller leaves and is apparently a juvenile specimen;



Figure 28: *Stenospermation castanoanum*, inflorescence, Photo J. Harrison



Figure 29: *Stenospermatum castanoanum*, plant with unopened spathe and an exposed spadix, O. Ortiz 2410, Photo O. Ortiz



Figure 30: *Stenospermatum castanoanum*, Inflorescence, O. Ortiz 2410, Photo O. Ortiz



Figure 31: *Stenospermatum castanoanum*, inflorescence near opening, O. Ortiz 2410, Photo O. Ortiz



Figure 32: *Stenospermation castanoanum*, Gottsberger 15-RG-2



Figure 33: *Stenospermatum castanoanum*, Ortiz 2410



Figure 34: *Stenospermatum castanoanum*, Knapp 901



Figure 35: *Stenospermatum castanoanum*, Upper blade surface, Ortiz 2410

Etymology — *Stenospermatum castanoanum* was first collected by Jim Luteyn in June, 1972, and his collection serves as the type but another species of *Stenospermatum* honors him. Instead, the species is named in honor of Colombian botanist Natalia Castaño-Rubiano who works at the Universidad de Caldas in Manizales near where she was raised. Natalia did her Master's degree at the Universidad Nacional de Colombia in Bogotá, working on a revision of the genus *Stenospermatum* for Colombia and is continuing this work in the Neotropics. Part of her work led her to isolating misidentified specimens into this distinct species. Thus, the species is named in honor of her work.

Paratypes — PANAMA. **Colón:** Donoso. Coclé del Norte, Minera Panama. Helipad C01. Coordenadas UTM 17 P 531362 991989., 119 m, 10 marzo 2010, Álex Espinosa 5555 (MO, PMA); Conseción de Minera Panama S.A. Helipad LIMO03 (Zona Este), 08°56'40"N 080°36'08"W, 66 m, 17 July 2011, *J.L. Clark & A. Zapata* 12492 (MO); Along road - 1 km sw of Cerro Jefe summit, 09°13'N 079°21'W, 950 m, 08 junio 2014, *O. Ortiz et al.* 2410 (MO); Area de Concesión Minera Panamá. Pipeline Road, 01 Abril 2013, *O. Ortiz et al.* 1278

(MO, PMA). **Panamá:** Cerro Jefe, ca. 1 km from radio tower, Pacific slope, low cloud forest, 09°13'53"N, 79°22'59"W, 1000 m, 16 August, 1981, *Sandra Knapp 901* (MO, PMA); East slope of Cerro Jefe. Along dirt track near radio tower., 09°15'N 079°30'W, 950 — 1000 m, 20 May 1982, *S. Knapp & Jim Mallet 5207* (MO); Vicinity of Cerro Jefe, along road between Cerro Jefe and Altos de Pacora, 0.5 mi from turn-off to Cerro Jefe radio tower, 0.2 mi from turn-off to La Eneida, 09°15'N 079°30'W, 820 m, 4 July 1994, *T.B. Croat & G. Zhu 76599A* (MO); Vic. of Cerro Jefe, between Alto de Cerro Azul and Cerro Jefe, SW slopes of Cerro Jefe, 09°13'4479°23'15"W, 993 m, *T.B. Croat et al. 106213* (MO); Cerro Jefe region roadside and forest, 09°10'40"N 079°24'30"W, 200 - 800 m, 30 September 1978, *B.E. Hammel 4841* (MO); Cerro Jefe, advanced secondary cloud forest, 09°14'02"N 079°22'30"W, 700 — 1000 m, 2 April 1969, *Duncan M. Porter et al. 5069* (MO); Cerro Jefe. Near radio tower., 09°15'N 079°30'W, 950 m, 11 October 1985, *G. McPherson 7102* (MO); Cerro Jefe. Near radio tower, 09°15'N 079°30'W, 950 m, 11 October 1985, *G. McPherson 7121* (MO); Top of Cerro Jefe, 09°14'02"N 079°22'30"W, 1000 m, 9 Jun 1977, *J.P. Folsom 3606* (MO); Top of Cerro Jefe, 2.3 km [by road] N of Panamerican Highway., 09°13'45"N 079°23'14"W, 1000 m, 11 April 1977, *J.P. Folsom et al. 2531* (MO); Cerro Jefe, new road leading N from summit, 09°14'02"N 079°22'30"W, 900 - 1000 m, 26 September 1975, *J. T. & F. Witherspoon 8561* (MO); Cerro Jefe, 1.5 km before weather station, 09°12'50"N 079°23'05"W, 850 - 900 m, 07 October 1980, *K.J. Sytsma 1419* (MO); Cerro Jefe, 09°12'50"N 079°23'05"W, 850 - 900 m, 29 October 1980, *K.J. Sytsma 2015* (MO); Cerro Jefe, 09°12'10"N 079°23'30"W, 800 m, 3 May 1999, *R. Gottsberger 15-RG-2* (MO, ULM); Cerro Jefe; cloud forest dominated by *Clusia* spp. and *Colpothrinax cookii*. Premontane rain forest, 09°14'02"N 079°22'30"W, 1000 m, 5 Jun 1975, *S.A. Mori & J.A. Kallunki 6592* (MO); Cerro Jefe near radio tower, 09°12'50"N 079°23'05"W, 900 m, Jun 1986, *W.G. D'Arcy 16256A* (MO); Cerro Jefe near radio tower., 09°12'50"N 079°23'05"W, 900 m, 15 August 1982, *W.G. D'Arcy & C.W. Hamilton 14795* (MO); Cerro Jefe near radio tower, 09°12'50"N 079°23'05"W, 900 m, 15 August 1982, *W.G. D'Arcy & C.W. Hamilton 14816* (MO).

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Stenospermation cerrofríoense Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Changuinola. Cerro Frio. Headwaters of Rio Tskui. Point 23. Steep N facing slope; 09°15'40.5"N, 50°22'26.4"W, 1100 m, 29 October 2008, *D.Santamaria, A.K. Monro & L. Martínez 7852* (holotype, PMA-80219)

Diagnosis. Characterized by its epiphytic climbing habit, stems pendent at flowering time, moderately elongated internodes with dark purple speckles, distichous leaves, petioles sheathed 0.6–0.8 their length with free part terete, the sheath subrounded at apex, narrowly lanceolate, mostly narrowly acute, light brown-drying, scarcely bicolorous blades with the upper surface uniformly rowed-areolate and lacking distinct pale lineations as well as by the long pedunculate, stipitate, whitish spadix.

Epiphytic climber at 3 m from ground; stems pendent at flowering time; internodes moderately elongated, 1.5–2.0 cm long, 6 mm diam., drying dark brown, matte, bluntly ribbed, densely granular, densely covered with punctiform to hyphen-shaped, dark purple speckles. LEAVES distichous; **petioles** 15.0–19.5 cm long, sheathed 0.5–0.7 their length, drying light brown, weakly ribbed, finely striate longitudinally and minutely granular; **sheath** darker brown, curled inward, minutely granular, scarcely ribbed, its margin thin, mostly remaining intact, subrounded, not free-ending at apex; petiole free part 5.5–8.3 cm, terete; geniculum scarcely apparent; **blades** narrowly lanceolate, 20.2–24.1 cm long, 3.2–3.5 cm wide, 5.3–7.8 times longer than broad, 1.1–1.4 times longer than petioles, narrowly acute, sometimes acuminate, ending in an apiculum at apex, narrowly acute to attenuate at base, drying light brown, scarcely bicolorous, matte above, weakly glossy below; midrib broadly rounded, concolorous, densely granular above, slightly thicker below, weakly paler, weakly ribbed, densely granular below; **upper surface** with weakly and widely spaced ribs with the intervening space closely and uniformly rowed-areolate, lacking true pale lineations, some pale spaces imposed on areolate rows; lower surface uniformly striate-weak granular. INFLORESCENCE pendent in age; spathe not seen; **spadix** stipitate 8 mm, 7.3 cm long, 8 mm diam., pale cream to white, tipped with a slender sterile segment 6 mm long; flowers widely spaced on drying; styles mostly rhombic to subquadrangular, drying dark brown, matte, 1.4–2.0 mm diam., truncate; stigmas subrounded to ovate, raised, dark brown and mostly flat in center, margin light brown.

Figures 36–40.

Distribution — *Stenospermatum cerrofríoense* is known only from the type collection from NW Panama in a *Premontane rainforest* life zone at 1100 m.

Comments — *Stenospermatum cerrofríoense* closely resembles *S. mcphersonii* in leaf blade shape but that species differs in having darker brown-drying leaves with shorter petioles (7.5–11 cm long) which are more extensively sheathed (77–81% their length), more dark-drying, more heavily ribbed petioles which have the sheath somewhat free-ending at apex and blades which are proportionately smaller, more acuminate and down-turned at apex

Etymology — *Stenospermatum cerrofríoense* is named for the type locality at Cerro Frio in Bocas del Toro Province.



Figure 36: *Stenospermation cerrofríoense*, Habit of live detached plant, TYPE D. *Santamaria et al* 7852. Photo D. Santamaria



Figure 37: *Stenospermation cerrofríoense*, Inflorescence,TYPE D. *Santamaria* 7852. Photo D. Santamaria



Figure 38: *Stenospermatum cerrofríoense*, Close-up of spadix, *D. Santamaria et al.* 7852, Photo D. Santamaria



Figure 39: *Stenospermation cerrofríoense*, TYPE D. Santamaria et al. 7852

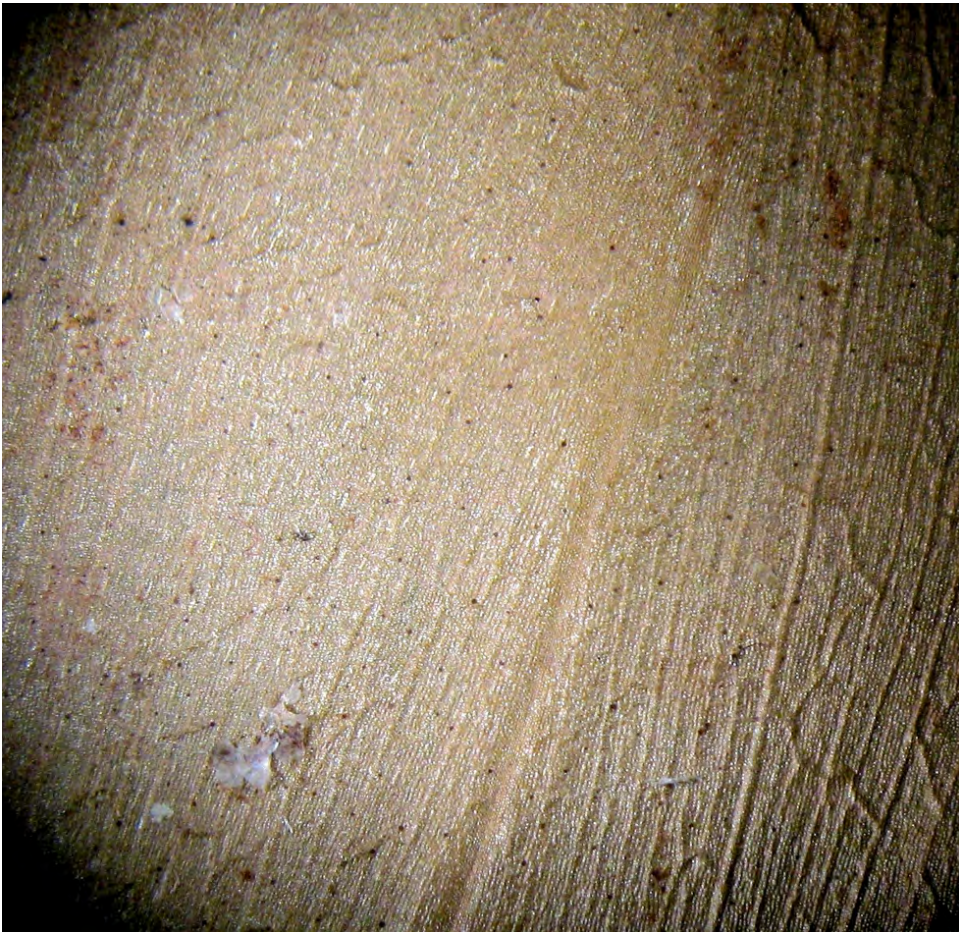


Figure 40: *Stenospermatum_cerrofríoense*, Upper blade surface, *D. Santamaria et al 7852*

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Stenospermatum chagrense Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Panamá: Cerro Jefe, Chagres National Park, western slopes of Cerro Jefe between Los Altos de Cerro Azul and Cerro Jefe, 900 m, 09°14'03"N, 79°24'25"W, 02 March 2015, *T.B. Croat, J.Harrison & L.Harrison 106220* (holotype, MO-6681879).

Diagnosis. *Stenospermatum chagrense* is characterized by its terrestrial habit, short internodes, densely dark-speckled petioles sheathed to about the middle, the pale brown sheath margin that is fragile and breaking up, its broadly oblong-elliptic, dark brown-drying, nearly concolorous blades that dry matte or nearly so and the long, subterete portion of the petiole making the leaves look like a canoe paddle.

Terrestrial; internodes short, 2 cm diam., drying ca. 8 mm diam., reddish brown, minutely granular; **petioles** sheathed to about middle; **sheath** 17–21 cm long, margins thin, light brown, somewhat crisped and fragile on margin; free part of petiole oval, 11–13 cm long, densely and minutely dark-speckled, drying narrowly sulcate, 2 mm diam.; **blades** 19.3–21.6 cm long, 7.5–8.1 cm wide, 2.6 times longer than wide, rounded at apex with a short, abruptly acute, down-turned tip, acute at base, subcoriaceous, dark green and glossy above, moderately paler and semiglossy below, drying dark gray-brown and matte above, grayish yellow-brown and weakly glossy below; midrib slightly paler and sunken above, narrowly rounded and slightly paler below, drying nearly concolorous, dark brown and matte above, weakly paler, slightly more yellowish dark brown; primary lateral veins obscure on both surfaces; **upper surface** with the minor veins narrowly raised, rather closely spaced, the intervening area tightly areolate-ridged, essentially lacking short pale lines; lower surface with minor veins scarcely raised, the intervening areas closely and uniformly striate-granular. INFLORESCENCE lacking. **Figures 41–51.**



Figure 41: *Stenospermatum chagrense*, Habit, TYPE Croat et al. 106220, Photo J. Harrison



Figure 42: *Stenospermaton chagrense*, Habit, TYPE Croat *et al.* 106220, Photo J. Harison



Figure 43: *Stenospermation chagrenese*, stem with internodes, TYPE Croat *et al.* 106220, Photo J. Harrison



Figure 44: *Stenospermation chagrense*, Leaves at apex, TYPE Croat et al. 106220, Photo J. Harrison



Figure 45: *Stenospermation chagrense*, Habit, TYPE Croat et al. 106220, Photo J. Harrison



Figure 46: *Stenospermatum chagrense*, blade adaxial, TYPE Croat et al. 106220, Photo J. Harrison

Distribution — *Stenospermatum chagrense* is endemic to Panama, known only from the type locality in Panamá Province on the western slopes (Pacific drainage) of the Cerro Jefe Region at 900 m in a *Tropical wet forest* life zone.

Comments — Although the species has not yet been collected in fertile condition the species is so distinctive that it will not be confused with any other.

Etymology — *Stenospermatum chagrense* is named for the type locality in the Chagres National Park which encompasses the Cerro Jefe Region.

Paratype: PANAMA. Panamá: Los Altos de Cerro Azul; Station on lot 142, Calle Kirpatrick of El Torreon subdivision growing naturally at wooded residence of Bill Adsett at end of road; Disturbed premontane wet tropical forest; alt. 850 m, 09°12' 40.34"W, 79°24' 53.67"W; March 24, 2018, J. & L. Harrison 792 (PMA).

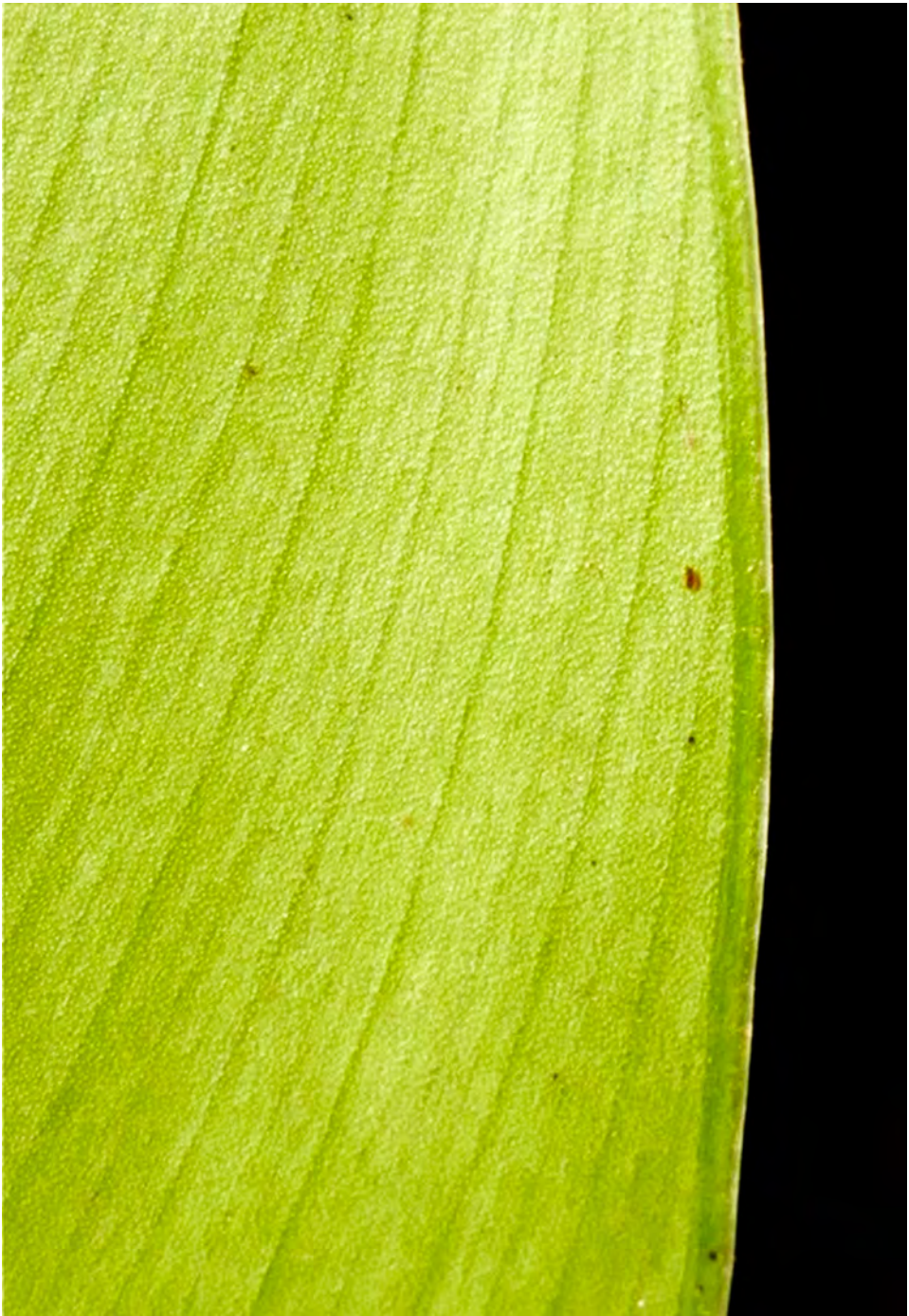


Figure 47: *Stenospermation chagrense*, Lower leaf blade surface fresh, TYPE Croat *et al* 106220, Photo J. Harrison



Figure 48: *Stenospermatum chagrense*, pPetiole and sheath, TYPE Croat *et al.* 108220, Photo J. Harrison



Figure 49: *Stenospermation chagrense*, Open inflorescence, TYPE Croat *et al.* 108220, Photo J. Harrison



Figure 50: *Stenospermation chagrense*, TYPE Croat, Harrison & Harrison 106220



Figure 51: *Stenospermation chagrense*, Upper blade surface, TYPE *Croat et al. 106220*

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Stenospermation chucantiense Croat & O.Ortiz, **sp. nov.** —Type: PANAMA. Darién: Serranía de Cañasas, Cerro Chucantí, Reserva Privada, sendero de los helicópteros, 1138 m, 05°17'34"N, 78°27'25"W, 1138 m, 03 April, 2-15, *J.Batista 1298* (holotype, MO-6727868; isotype, PMA)

Diagnosis. *Stenospermation chucantiense* is characterized by its epiphytic habit, moderately short internodes, petiole sheathed 85–87% its length with the sheath ending gradually at apex and persisting intact, small elliptic to oblong-elliptic, abruptly acuminate blades with the upper surface drying dark brown, moderately smooth with scarcely raised veins and many short pale lineations as well as by the white spathe that is more than twice as long as the yellowish spadix with orange berries.

Epiphytic herb; internodes mostly short and less than 5 mm long, sometimes to 1.7 cm long, drying 5–7 mm diam., drying dark brown, matte, appearing smooth, finely ridged and minutely granular on magnification, usually hidden by persisting old petiole bases; **petioles** 5.0–10.5 cm long, sheathed 0.85–0.87 times their length; **sheath** 7.0–9.5 cm long, tightly in-rolled, margin intact; free part of petiole (0.0)0.3–1.3 cm long; **blades** narrowly elliptic to oblong-elliptic, 9.1–16.9 cm long, 3.0–6.2 cm wide, 1.9–2.9 times longer than wide, 1.1–2.0 times longer than petioles, abruptly short-acuminate at apex (acumen less than 1 cm long), obtuse to acute at base, drying dark brown and matte above, moderately paler, yellow-brown and slightly glossy below; midrib drying weakly raised, narrowly several-ribbed, concolorous above, narrowly raised, slightly paler, irregularly several-ribbed, sparsely short pale-lineate below; primary lateral veins fewer than 10, mostly not apparent, departing midrib at 40°; **upper surface** moderately smooth with minor veins scarcely raised, slightly darker than surface, the area between the veins moderately smooth with no obvious venation, finely and uniformly granular on surface, densely short pale-lineate throughout; lower surface uniformly smooth with weakly visible minor veins, finely striate-granular, sparsely short pale-lineate. INFLORESCENCE erect; peduncle 15.0–18.7 cm long, 1.5–2.0 mm diam., light brown, weakly ribbed; spathe white, 8–9 cm long, 4 cm wide, drying thin, brown and matte outside, semiglossy and slightly paler inside; **spadix** 2.8–3.4 cm long, 5–6 mm diam., sessile, rounded at apex; flowers 5–6 visible per spiral, 2 mm long and wide, subrounded or more commonly quadrangular; style light brown, depressed medially with the margins thin; stigma ca. 5 mm long, moderately raised, circular, 0.4 mm diam., usually slightly darker than style. Flowering in April. **Figures 52–61.**

Distribution — *Stenospermation chucantiense* is endemic to Panama, known only from Darién Province in the Serranía de Cañasas on Cerro Chucantí at 1138 m in a transition zone between *Premontane wet forest* and *Lower montane rain forest* life zones.

Comments — *Stenospermation chucantiense* is perhaps most closely related to *Stenospermation pucuroense*, which also has a spathe much longer than the spadix. *Stenospermation chucantiense* differs by having the petioles narrower and much less prominently sheathed (usually 0.6 to



Figure 52: *Stenospermation chucantiense*, Habit of flowering plant, Paratype O. Ortiz 2454, Photo O. Ortiz



Figure 53: *Stenospermation chucantiense*, Habit of flowering plant, Paratype O. Ortiz 2454, Photo O. Ortiz



Figure 54: *Stenospermatum chucantiense*, Leaf showing petiole sheath, Paratype O. Ortiz 2454, Photo O. Ortiz



Figure 55: *Stenospermatum chucantiense*, Habit of fruiting plant, Paratype O. Ortiz 2454, Photo O. Ortiz

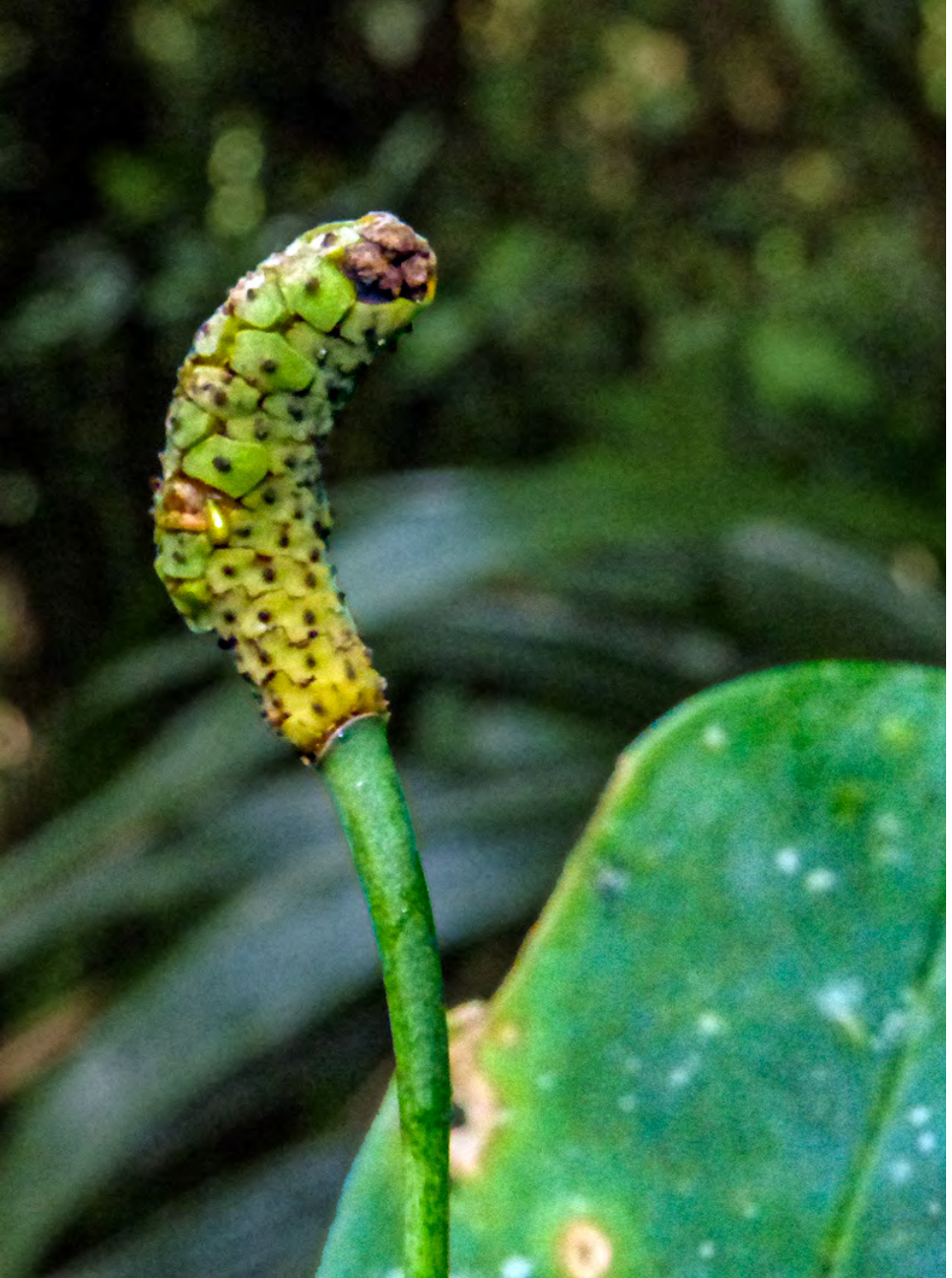


Figure 56: *Stenospermaton chucantiense*, Immature infructescence with expanded pistils, Paratype O. Ortiz 2454, Photo O. Ortiz



Figure 57: *Stenospermation chucantiense*, mature infructescence with loosened berries, Paratype O. Ortiz 2454, Photo O. Ortiz



Figure 58: *Stenospermation chucantiense*, TYPE Batista et al. 1298



Figure 59: *Stenospermatum chucantiense*, Paratype Hoover et al 3219



Figure 60: *Stenospermation chucantiense*, Paratype Batista et al. 1299

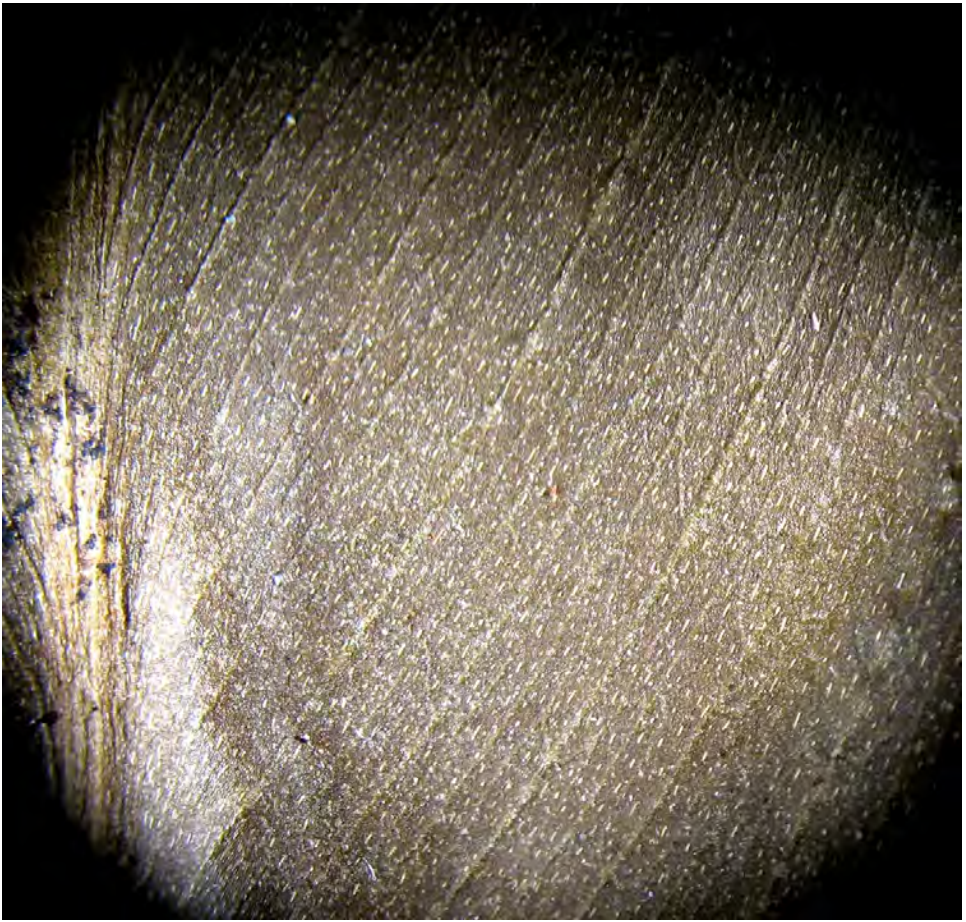


Figure 61: *Stenospermation chucantiense*, Upper blade surface, TYPE *Batista et al. 1298*

0.7), narrower leaf blades (3.3–3.5 times longer than broad), upper surface with the minor veins much more prominently raised and more acute with oblique ridging between the main ridges of the upper surface as well as by having the spathe very prolonged, 3.2 times longer than the spadix.

Etymology — *Stenospermation chucantiense* is named for the type locality.

Paratypes: PANAMA. Darién: Serranía de Cañasas, Cerro Chucantí, Reserva Privada, sendero de los helicópteros, 05°17'34"N, 78°27'25"W, 1138 m, 03 April, 2-15, *J. Batista 1299* (MO, PMA); 08°47'45"N, 78°27'47"W, 1325 m, 29 August, 2014, *O. Ortiz 2437* (PMA); cima del Cerro Chucantí, 08°47'45"N, 78°27'47"W, 1325 m, 30 August, 2014, *O. Ortiz 2454* (MO, PMA).

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Stenospermatum copense Croat, **sp. nov.** — Type: PANAMA. Coclé: in mountains near continental divide, 8 km above El Copé, ca. 0.5 km down logging trail going NE from sawmill, in forest near small stream; 609 m, moist cloud forest; 08°40'N, 80°35'W, 837 m, 10 January 1978, *B. Hammel* 807 (MO-2634290).

Diagnosis. *Stenospermatum copense* is characterized by its terrestrial habit, brownish drying matte stems, heavily sheathed petioles with the sheath conspicuous and subrounded at apex, oblong-elliptic to obovate-elliptic, gradually acuminate, gray-brown-drying blade as well as a short-pedunculate, stipitate spadix.

Terrestrial herb; internodes 1.8–2.0 cm long, 7–8 cm diam., light brown, smooth, matte with inconspicuous leaf scars; **petioles** 3.0–4.2 cm long, sheathed 0.7–0.9 their length; **sheath** 2.5–3.5 cm long, thin and papery, rounded to truncate at apex, margin thin but intact; free part of petiole 3–7 mm long; **blades** 12.7–14.7 cm long, 3.0–4.2 cm wide, 3.7–3.9 times longer than wide, 3.6 times longer than petioles, oblong-elliptic, gradually acuminate at apex, acute to attenuate at base, slightly inequilateral, one side 2–3 mm wider, drying gray-brown; midrib broadly rounded, several ribbed and concolorous above, irregularly folded and weakly paler below; primary lateral veins weakly apparent above, closely spaced, departing midrib at ca. 20°, narrowly rounded, darker below; **upper surface** with minor veins weakly raised, the intervening area closely striate-areolae with obscure oblique cross-veins and scattered deposits of wax, these darker below; lower surface more distinctly and regularly veined with the intervening area closely striate-areolate and with distinct oblique cross-veins. INFLORESCENCE short-pedunculate, erect; peduncle 7.5 cm long, drying 3 mm diam, light brown; spathe not seen; **spadix** stipitate 6 mm, short-cylindroid, 4.1 cm long, 1.2 cm diam., slightly tapered near tip; pistils rather closely aggregated; styles rhombic, drying dark brown, 2.2–2.6 mm long and wide; stigma circular, light brown, lacking a pale edge, depressed medially. Flowering in early January. **Figures 62 & 63.**

Distribution — *Stenospermatum copense* is endemic to Panama, known only from the type specimen from Coclé Province at 837 m in a *Premontane wet forest* life zone.

Comments — *Stenospermatum copense* is most closely related to *S. marantifolium* with which it shares similarly shaped leaves and a short-cylindroid spadix. That species differs by having larger leaves (mostly more than 25 cm long) which are pale green and glossy on the lower blade surface instead of being gray-brown and almost matte.

Etymology — *Stenospermatum copense* is named for the type locality at El Copé in Coclé Department.

Stenospermatum coques Al.Rodr., O.Ortiz & M.Cedeño, *Anales Jard. Bot. Madrid* 79(2):128:



Figure 62: *Stenospermatum copense*, TYPE Hammel 807

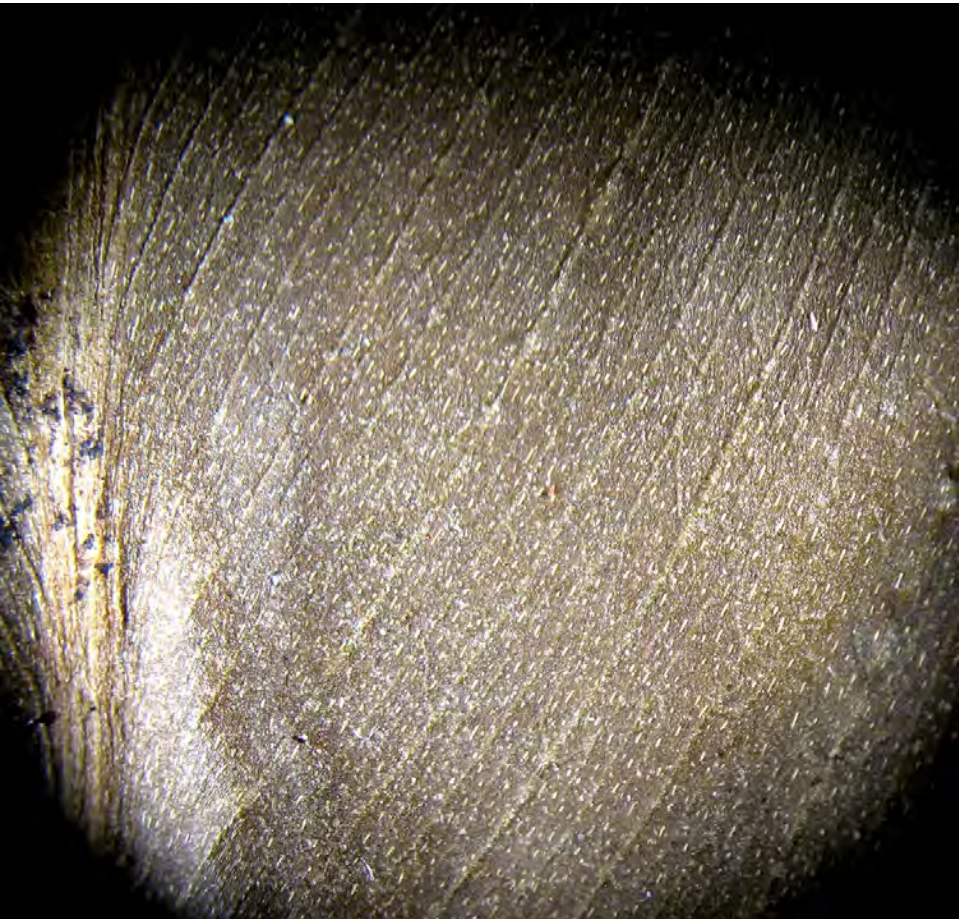


Figure 63: *Stenospermation copense*, Upper blade surface, TYPE *Hammel 807*

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3 (2022). — Type: COSTA RICA. Puntarenas: Isla del Coco, Parque Nacional Isla del Coco, cercanías de Bahía Iglesias, 300–400 m, 05° 31'N, 87°04'W, 06 Diciembre 2020 (fls.), *D. Madrigal, G. Blanco & J. Loría* 1 (holotype, CR-4470148; isotypes not distributed)

Diagnosis. *Stenospermation coques* is characterized by its usually terrestrial habit, short internodes, oblong-elliptic leaf blades that dry grayish to grayish brown on the upper surface and reddish brown on the lower surface, prominently raised minor veins on the upper surface with the intermediate area minutely granular and/or with minute short irregular ridges as well as by having an inflorescence with a relatively large, coriaceous, ovate-elliptic to lanceolate-elliptic spathe (1.6–2.0 times longer than the spadix) and a yellowish spadix at anthesis.

Terrestrial, sometimes epiphytic. Stems 30–100 cm long, erect to appressed-climbing, leaf scars conspicuous, linear; internodes 0.7–2.0 cm long and 0.8–1.5 cm diam., usually slightly longer than broad, terete, drying grayish to grayish brown, matte, smooth, slightly 7–9 sulcate longitudinally; roots commonly one per node; cataphylls 5.5–6.0 cm long, early deciduous, coriaceous, with a prominent midrib, obtuse at apex, mucronate, 2.0–2.5 mm long (extension of the midrib), drying dark brown. LEAVES erect to erect-spreading; **petioles** 8–14 cm long, sheathed 0.40–0.95 their length; **sheath** 6.0–8.5 cm long, ending 0.1–7.8 cm below the geniculum, both sides obtuse to subtruncate or rounded at apex but not markedly free-ending, drying medium brown, matte, longitudinally striate; free part of petiole terete to subterete, slightly sulcate adaxially; geniculum 4–6 mm long, inconspicuous, slightly darker and thicker than petiole; **blades** oblong-elliptic, widest towards the middle, 8.5–17.5 cm long, 2–4 cm wide, 4.0–7.4 times as long as wide, 1–2 times longer than petiole, acute at apex with an apical mucro 0.5–2.0 mm long, although early deciduous (rarely seen), cuneate to attenuate at base, moderately coriaceous, slightly undulate on margins, drying greyish-green to greyish-brown above, reddish brown below, usually matte on both surfaces; midrib sunken, drying slightly darker above, concolorous to slightly paler below; primary lateral veins numerous, departing midrib at 20°–30°, drying obscure above, almost indistinct below; minor veins closely parallel and markedly elevated on the upper side, with the intervening area minutely granular and/or with minute irregular ridges, indistinct on the lower side. INFLORESCENCE one per axil, erect to slightly arched during anthesis, sheathed by the leaf that precedes the inflorescence; peduncle 25–33 cm long and 0.25–0.40 cm diam., 2.8–3.3 times longer than petioles, terete, dark brown when dry, green when alive; spathe 13.5–15.0 cm long and 5.0–6.5 cm wide, early deciduous, ovate-elliptic to lanceolate-elliptic, 1.6–2.0 times longer than spadix, coriaceous, base obtuse to subtruncate, apex long-acute, white at anthesis with green apex, then yellowish green when it falls, dark brown when dry; **spadix** 6–8 cm long and 0.8–1.0 cm diam., cylindrical, slightly attenuate towards apex, yellowish during anthesis, stipe 6–10 mm long and 5–6 mm in diameter, slightly obconic, curved towards peduncle; flowers hexagonal, although

sometimes almost rhombic due to the abrupt reduction of two of their sides, 2.3–6.3 mm long and 2.3–3.6 mm wide, stylar surface minute and inconspicuous-papillose, minute-foveolate, appearing almost smooth; stigma 0.55–0.75 mm long, rounded, oblong to linear, darker than style zone, briefly cupulate; ovary unilocular, ovules numerous, about 20, immersed in a mass of numerous white raphides, funiculus 0.25–0.60 mm long; stamens sterile, 2.0–2.4 mm long, free, filaments 1.25–1.75 mm long and 0.60–0.75 mm wide, flattened, dark brown, subcoriaceous, nonhyaline, with one or two prominent longitudinal ribs on one of their sides; anthers sterile, without pollen, with ellipsoid thecae, 0.4–0.6 mm long and 0.3–0.4 mm wide, dark brown, adherent. Berries not seen. Flowering plants seen in December. **Figures 64–72.**

Distribution — *Stenospermatum coques* is endemic to Costa Rica, known only from the type locality on Cocos Island at 300–400 m elevation in a *Premontane rain forest* life zone as well as in Limón Province. On Cocos Island the species is known only from a small population of about 50 m radius near Bahía Iglesias (Rodríguez et al., 2022).

Comments — *Stenospermatum coques* is most closely related to *S. luisgomezii* which differs in occurring on the Atlantic slope of Costa Rica and Panama, by having more slender stems (4–6(9) mm diam., longer sheaths (mostly 8–13(16) cm long and a white, more thickly cylindroid spadix.

Stenospermatum coques has been confused with specimens mistakenly determined as *Stenospermatum spruceanum* Schott by Pérez de Gómez (1983) and most of the material previously determined as that species were other species, namely *S. luisgomezii*, *S. mutlisulcatum* and *S. spruceanum* Schott, a species from the upper Amazon region in Brazil and Venezuela that is mostly restricted to areas of white sand soil. *Stenospermatum spruceanum* differs in being a mostly terrestrial species and by having usually larger, grayish green to brownish leaves which are 1.0–3.4 times longer than broad with the upper surface drying irregularly ridged-reticulate not with prominently raised and closely spaced minor veins without short pale lineations. *Stenospermatum spruceanum* was reported by A. Pérez de Gómez (1983) in a treatment of the genus *Stenospermatum* for Central America for her unpublished Master's thesis but the material that she included was in part *S. luisgomezii* and in part *S. mutlisulcatum*.

According to Rodríguez et al., (2022), *Stenospermatum coques* appears to reproduce primarily vegetatively which would explain why the species is restricted to a single dense population.

Etymology — *Stenospermatum coques* is named for the type locality.



Figure 64: *Stenospermatum coques*, Habit, Photo Guillerma Blanco 2020-12-12-08-44-13



Figure 65: *Stenospermaton coques*, Habit of flowering plant preanthesis, Photo Guillermo Blanco 2020-12-12-08-44-11



Figure 66: *Stenospermaton coques*, Habit of flowering plant at anthesis, Photo Guillermo Blanco 2020-12-12-08-44-07



Figure 67: *Stenospermation coques*, Spadix at anthesis, Photo Guillermo Blanco, 2020-12-12-08-44-09



Figure 68: *Stenospermation coques*, open detached spathe at anthesis, Photo Guillermo Blanco, 2020-12-12-08-44-10



Figure 69: *Stenospermaton coques*, Alexander Rodríguez holding adult plant, Photo Guillermo Blanco, 12-12-08-44-06



Figure 70: *Stenospermation coques*, TYPE D. Madrigal G. et al. 1 (CR-4470148)



Figure 71: *Stenospermatium coques*, Isotype D. Madrigal G., et al. 1 (CR-4470148002-150 (sheet 2)



Figure 72: *Stenospermation coques*, Upper blade surface, Isotype, *D. Madrigal G. et al.* 1 (CR-4470148002-150 (sheet 2)

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Stenospermatum darienense Croat, **sp. nov.** — Type: PANAMA. Darién: vic. of Cerro Pirre, along trail from base camp to Rancho Frio on slopes of Cerro Pirre, 07°58'77°43'W, 200–450 m, 27 July 1994, *T.B. Croat & G. Zhu 77143* (holotype, MO-04613629).

Diagnosis. *Stenospermatum darienense* is characterized by its short internodes, petioles sheathed to the apex, the sheath free-ending just below the blades, the subelliptic, black-drying, short acuminate blades with primary lateral veins weakly pleated-raised and concolorous above, weakly pleated-sunken below as well as a medium green, stipitate spadix with white berries.

Epiphyte; stems to less than 1 m long, erect; internodes short, 1.0–2.5 cm diam., dark green, drying yellowish brown, finely granular-ribbed; **petioles** 8–12 cm long, sheathed to apex and weakly free-ending just below blade, dark green, weakly glossy; **sheath** 8.5–12.0 cm long, 9 mm high on sides, margin paler, persisting intact, free part of petiole lacking or up to 2 mm long. LEAVES spirally arranged; **blades** narrowly elliptic to weakly oblanceolate-elliptic, 14.0–22.2 cm long, 5.5–9.0 cm wide, (2.0)2.5–2.7 times longer than wide, 0.4–0.6 times as long as petiole, broadest at the middle or slightly above the middle, abruptly short-acuminate at apex (acumen moderately down-turned), acute at base, dark green and moderately glossy above, moderately paler and glossy below, drying dark blackish brown and weakly glossy above, slightly paler and dark brown, semiglossy below; midrib narrowly sunken and slightly paler, thicker than broad and paler below; primary lateral veins weakly pleated-raised and concolorous above, weakly pleated-sunken below. INFLORESCENCE with spathe not seen; **spadix** medium green, whitish toward apex, stipitate 4 mm, 7.7 cm long, 1 cm diam.; pistils 8–9 visible per spiral, style 2.6–3.0 mm long, 3–4 mm wide, minutely papillate, drying grayish; stigma 0.7–0.9 mm long, elliptic, moderately raised, excavated medially. INFRUDESCENCE pendent from a semi-erect peduncle; berry white. Fruiting in late July. **Figures 73 & 74.**

Distribution — *Stenospermatum darienense* is endemic to Panama, known only from the type specimen collected in Darién Province at 200–450 m in *Premontane wet forest* life zone.

Comments — Owing to its blackened drying blades the species is not easily confused with any other in Central America but the species keys out with both *Stenospermatum robustum* and *S. gaitalense*, both of which have blades of similar shape and fully sheathed petioles but both of those species differ in having blades that dry yellow-brown.

Etymology — *Stenospermatum darienense* is named for the type locality on Cerro Pirre in Darién Province.

Stenospermatum dasae Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Changuinola; PILA (Parque Internacional La Amistad), Falso Fabrega, 09°11'50"N, 82°39'55"W, 4 August



Figure 73: *Stenospermation darienense*, TYPE Croat & Zhu 77143



Figure 74: *Stenospermation darienense*, Upper blade surface, TYPE Croat & Zhu 77143

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2008, D. Solano, N. Zamora, A.K. Monro, A. Solis, A. Hartmann & D. Santamaría 5670 (holotype MO; isotypes BM, PMA-70433, INB)

Diagnosis. *Stenospermatum dasae* is characterized by its appressed-climbing epiphytic habit, slender internodes much longer than broad, drying reddish brown, moderately smooth petioles sheathed to within 10–12 mm of base of blade, the sheath rounded and sometimes weakly free-ending at apex, oblong-elliptic to oblong oblanceolate-elliptic blades 3.2–3.4 times longer than wide, the upper surface finely and regularly ridged-granular with dense, obscure, short, pale lineations, and by its green spathe and short, oblong, sessile spadix.

Appressed-climbing epiphyte; internodes much longer than broad, 2.5–4.5 cm long, 4–5 mm diam., drying reddish brown, moderately smooth, lacking any heavy ribbing, finely striate to granular on magnification; **petioles** 7.5–10.4 cm long, heavily sheathed to within 10–12 mm of base of blade, **sheath** 6.7–8.7 cm long, rounded and sometimes weakly free-ending at apex, persisting intact, drying grayish brown, matte; sheath 7–9 cm long, 0.8–0.9 times as long as petiole; **blades** oblong-elliptic to oblong oblanceolate-elliptic, 12.8–17.5 cm long, 4.0–5.2 cm wide, 3.2–3.4 times longer than wide, 1.6–1.9 times longer than petioles, drying grayish brown and matte above, yellowish brown and weakly glossy below; midrib broadly rounded, slightly darker, irregularly ribbed, often with a narrow medial groove above, narrowly rounded, finely ribbed, darker, sometimes short-pale-lineate below; primary lateral veins moderately obscure; **upper surface** finely and regularly ridged-granular with dense, obscure short pale lineations; lower surface evenly ribbed and striate-granular, densely and obscurely short pale-lineate. INFLORESCENCE erect; peduncle 18 cm long, 1.5 mm diam.; spathe green, 4.7 cm long, immature and unopened; **spadix** 4.5 cm long; styles rounded-prismatic to square or trapezoidal, 1.8–2.2 mm wide, almost truncate with the margins weakly turned up; stigmas subrounded to ellipsoid, 0.4–0.6 mm, raised, drying light brown with a central depression or short slit. **Figures 75 & 76.**

Distribution — *Stenospermatum dasae* is known only from Panama but could range to Costa Rica, at 1500–1700 m. elevation in a *Premontane rain forest* life zones.

Comments — *Stenospermatum dasae* is similar to *Stenospermatum whitefoordiae* from lowland Darién Province on the Pacific coast but that species differs by having proportionately longer, more gradually acuminate blades which have low, less conspicuous, more widely spaced ribs on the upper surface with the intervening area closely rowed-areolate and lacking short paler lineations.

Etymology — *Stenospermatum dasae* is named for Daniel Santamaría who assisted in collecting the species. Daniel prefers to be called by his nickname Dasa.

Stenospermatum densiovulatum Engl., Bot. Jahrb. Syst. 37: 112. 1905. — Type: ECUADOR. Pichincha: between Nanegal and Gualea, Oct., 1900 *L. Sodiro* sn. [marked #28 by Engler],



Figure 75: *Stenospermatum dasae*, TYPE D. Solano, N. Zamora, A.K. Monro, A. Solís, A. Hartmann & D. Santamaría 5670

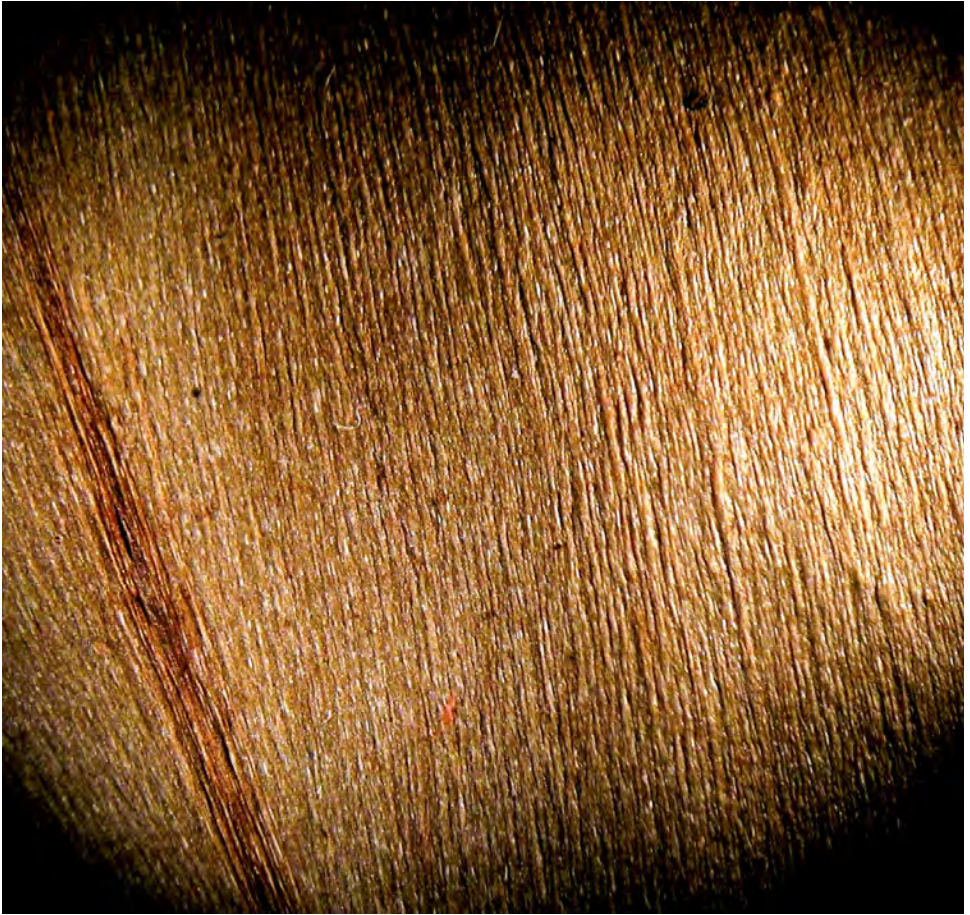


Figure 76: *Stenospermation dasae*, Upper blade surface, *Solano et al. 5670*

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(lectotype, G; designated here; isoelectotypes, B, MO).

Terrestrial or epiphytic; stems to 1 m long, spreading when epiphytic; internodes short near apex, 2–4 cm long on older portions of stem, 0.6–1.3 cm diam., gray, moderately glossy, conspicuously closely transverse-fissured; **petioles** 7–15 cm long, 4–7 mm thick including sheath, dark green, weakly glossy, sheathed from midway to nearly to the geniculum, ending acutely at apex; **sheath** 7.0–10.5 cm long, margin scarious and frayed; free portion (0.7)3–7 cm long, weakly sulcate. LEAVES distichous; **blades** narrowly elliptic to weakly oblanceolate elliptic, 15.8–21.0 cm long, 3.9–7.0 cm long, 2.9–3.3 times longer than wide, 1.1–1.8 times longer than petiole, broadest at the middle or slightly above the middle, gradually long-acuminate to abruptly short-acuminate at apex (acumen prominently down-turned), acute to abruptly attenuated at base, dark green and velvety-matte above, moderately paler and semiglossy below, drying gray-green to yellow-brown above, paler and grayish yellow-green to green and semiglossy below; midrib narrowly sunken and concolorous above, thicker than broad and paler below; primary lateral veins weakly pleated-raised and concolorous above, weakly pleated-sunken below, **upper surface** with minor veins spaced 2–7 mm apart, narrowly rounded and weakly raised, the intervening area 3- or 4-low-ribbed, moderately smooth, usually with few, short, pale lineations except near the midrib; lower surface with veins more prominently raised, evenly short-striate, weakly granular, often densely and long-lineate. INFLORESCENCE with spathe not seen; **spadix** medium green, whitish toward apex, stipitate 4 mm, 7.7 cm long, 1 cm diam.; style 2.6–3.0 mm long, 3–4 mm wide, minutely papillate, drying grayish; stigma 0.7–0.9 mm long, elliptic, moderately raised, excavated medially. INFRUTESCENCE pendent from a semi-erect peduncle; berry color unknown. Flowering in April and June. **Figures 77–81.**

Distribution — *Stenospermatum densiovulatum* is known in Ecuador and Colombia (Antioquia, Chocó, Valle), ranging from 200–2225 m in Ecuador. In Panama it is known only from Veraguas [1.7 km past Ag. School] at 570–670 m and in Coclé Province [near old saw works] at 600–800 m. It occurs in *Premontane wet forest* in Panama.

Comments — *Stenospermatum densiovulatum* is characterized by its scandent habit, internodes that are longer than broad with portions of the internodes conspicuously lighter and transverse-fissured, sheath margins that dry light brown, thin and frayed, prominently short-acuminate blades that are 2.9–3.3 times longer than broad.

In describing *Stenospermatum densiovulatum* Engler also cites a collection prepared in October at the Río Tauté (but spelled ‘fl. Tanti’ by Sodiro (Sodiro, 1908)). The other collection designated here as the lectotype is substantially more complete.

Additional specimens seen: **BOLIVIA. La Paz:** Caranavi. serranía Bella Vista, 38 Km de Caranavi hacia Sapecho, 15°40’S 067°29’W, 1500 m, 25 Agosto 1997, *M. Kessler & et al. 11398* (MO); **COLOMBIA. Antioquia:** 16 km above Urinta (Las Juntas), 2225 m, 29 March 1979, *J.L. Luteyn & M.L. Lebrón-Luteyn 7170* (NY, SEL); 16 km above Urinta (Las Juntas), 2225 m, 29 March 1979, *J.L. Luteyn & M.L. Lebrón-Luteyn 7170* (NY); **Cauca:** Along road between Popayan and Juntas on western slope of Cordillera Occidental, 12 km W of summit, 2 km below Viente de Julio. GPS coordinates., 02°32’05”N 077°00’10”W, 1675 m, 20 July 1997, *T.B. Croat & J.F. Gaskin 80178* (CAUP, MO). **Chocó:** Along road between Bolívar and



Figure 77: *Stenospermatum densiovulatum*, Croat & Zhu 76830 (MO)



Figure 78: *Stenospermatum densiovulatum*, Croat & Zhu 76830 (SCZ)



Figure 79: *Stenospermation densiovulatum*, TYPE Sodiro sn



Figure 80: *Stenospermation densiovulatum*, Sodiro sn



Figure 81: *Stenospermation densiovulatum*, Upper blade surface, Croat 76830

Quibdó 23.0 miles W of Bolívar. [over metal and pole bridge on south bank of Río Atrato. Tropical lower montane wet forest., 05°50'N 076°15'W, 1600 m, 16 December 1980, *T.B. Croat* 52059 (MO); Along road between Bolívar and Quibdó, 44.8 mi W of Bolívar. Premontane moist forest., 05°40'N 076°23'W, 530 m, 16 December 1980, *T.B. Croat & Á. Cogollo* P. 52122 (MO); San José del Palmar. Cerro del Torrá, vertiente del río Negro, ca a 1 hora abajo del Helipuerto; bosque primario. Vereda de Río Negro., 1600 m, 8 August 1988, *J.E. Ramos et al.* 1045 (MO); **Nariño:** Barbacoas. m, *A. Avila et al.* 1001 (UDBC); **Valle del Cauca:** Mpio. La Elvira: Finca Zingara, primary forest at 1800-2200 m; ca. 25 km W of Cali at Km 18., 03°28'N 076°37'W, 1800 - 2200 m, 19 April 1989, *J.L. Luteyn & J. Giraldo* G. 12534 (MO, QCNE) Trujillo; Finca Chiveras, Vereda La Sonora; finca propiedad de Smurfit Kappa Cartón de Colombia, núcleo Bolívar-Trujillo, cordillera Occidental, vertiente oriental, bosque de especies nativas., 1980 m, 10 April 2011, *P.A. Silverstone-Sopkin et al.* 11323 (CUVC, MO). **ECUADOR.** Santo Domingo de los Colorados, Hac. Zaracay, 500 m, 29 March 1967, *B. Sparre* 15153 (S); *L. Sodiro s.n.* (QPLS); In silv. tropic ad praed., October 1883, *L. Sodiro* 53 (B, MO); Nanegal & Gualea, May 1907, *L. Sodiro* SEL # 066240 (QPLS); **Azuay:** Manta Real; Río Patul. Sur de la carretera La Troncal-Zhud, camino entre Zhucay y

Rio Patul al base de los Andes. Trocha subiendo el pledemonte hasta 1200 m, atrás (Este) del pueblo de Marta Real., 02°33'S 079°20'W, 450 - 800 m, 13 - 14 julio 1991, *R. Foster & B. Mitsui* 13526(MO); **Bolívar:** Hcda. Changuil, Nuevo Mundo. Bosque muy húmedo tropical nublado, secundario. Suelos fértiles., 02°06'S 079°10'W, 500 m, 14 August 1995, *X. Cornejo S. & C. Bonifaz B.* 4321 (GUAY, MO); **Cañar:** Along road between Azogues and El Triunfo (connections to Guayaquil, Machala, Riobamba), ca. 5 km W of La Delicia, ca. 8 km SE of El Truncal. Montane moist forest., 02°27'S 079°15'W, 600 m, 22 October 1980, *T.B. Croat* 50905 (MO); **Carchi:** San Marcos Valley. Farmland and rainforest disturbed by the local Coaiquer (Awa) Amerindians., 01°07'N 078°22'W, 600 m, 20 - 24 November 1983, *A. S. Barfod et al.* 48859 (AAU, MO); San Marcos valley, 01°07'N 078°22'W, 600 m, 20-24 Nov. 1983, *L.P. Kvist & D. Nissen* 48859 (AAU, MO); Along road between El Chical and Tulcán, 15.4 km E of El Chical., 00°54'04"N 078°05'50"W, 1547 m, 19 February 2004, *T.B. Croat et al.* 94977 (MO); **Cotopaxi:** Tenefuerte Río Picalco, at Km 52-53 on Quevedo Latacunga road., 00°51'S 079°06'W, 29 October 1981, *C.H. Dodson* 11985(MO); La Maná. Along road between Guayacan (13.1 km N of La Maná) and Montinuevo (N of Pucayacu), at end of road which branches to the right 23.6 km from Guayacan, in vicinity of Escuela Quindigua, 10.7 km beyond the junction in road to Escuela Quindigua., 00°39'S 079°05'W, 1480 - 1530 m, 9 April 1992, *T.B. Croat* 73784 (MO); **El Oro:** Along road from Balsas to Piñas (via new road), 20.3 km from jct. of Balsas-Machala road, departing main Hwy. ca. 24 km W of Balsas, via Hacienda Buenaventura., 03°39'15"S 079°44'11"W, 955 m, 31 July 2004, *T.B. Croat & L.P. Hannon* 92786 (AAU, MO); **Esmeraldas:** Fila de Bilsa, E of San Jose de Bilsa, wet forest, ca. 80 km due SW of Esmeraldas., 00°37'N 079°51'W, 280 m, 28 January 1991, *A. H. Gentry & C. Josse* 72771 (MO); Further along trail to Río Mataje Awá encampment from Río Palaví encampment. Mataje beginning at point left from previous day on top of hill at 230 m, 01°07'N 078°37'W, 200 - 230 m, 12 February 1988, *W.S. Hoover et al.* 4006 (MO); Eloy Alfaro. Parroquia Teleuvi. Cristóbal Colón. Cooperativa Tesoro Escondido. Zona del Río Gualpi. Bosque Húmedo Tropical. Bosque primario colinado., 00°31'N 079°08'W, 520 m, 8 Marzo 2004, *Edwin Narváez et al.* 980 (QCNE); Reserva Ecológica Cotacachi-Cayapas. Parroquia Luis Vargas Torres. Río Santiago, Estero Angostura. Bosque muy húmedo Tropical. Bosque primario sobre colinas disectadas., 00°49'S 078°45'W, 250 m, 08 - 14 December 1993, *M. Tirado et al.* 725 (ECUAMZ, MO, QCNE); Quinindé. Reserva Ecológica Mache-Chindul, 35 km west of Quinindé. Bilsa Biological Station. Sendero Verde to Dos Bocas and returned via the river to La Ducha Vieja., 00°21'23"N 079°42'29"W, 500 - 600 m, 17 May 2011, *J.L. Clark* 12118 (ECUAMZ, MO, UNA); Bilsa Biological Station. Montañas de Mache, 35 km W of Quinindé, 5 km W of Santa Isabel. Premontane Wet Forest. Mature and disturbed forest behind Manuel's house., 00°21'N 079°44'W, 400 - 600 m, 16 May 1995, *J.L. Clark & C. Watt* 881 (MO, QCNE); Bilsa Biological Station. Mache mountains, 35 km W of Quinindé, 5 km W of Santa Isabel. Premontane Wet Forest. Mature and disturbed forest along stream near the Station's shower., 00°21'N 079°44'W, 400 - 600 m, 10 April 1995, *J.L. Clark & Y. Troya* 669 (MO, QCNE); The Mache-Chindul Ecological Reserve. Bilsa Biological Station. Mache Mountains, 35 km W of Quinindé. Premontane wet forest., 00°21'N 079°44'W, 500 m, 01 - 10 January 1997, *J.L. Clark et al.* 3674 (MO); Bilsa Biological Station., 00°21'00"N 079°42'00"W, 450 - 650 m, October 2006, *N. Köster & A. Schnell* 2073 (MO);

Carretera Herrera-El Páramo (Sta. Isabel). Estación Biológica Bilsa. Bosque primario nublado. Bosque húmedo Pre-montano., 00°21'36"N 079°42'40"W, 580 m, 18 February - 5 March 1995, *W.A. Palacios et al.* 13528 (AAU, MO, QCNE); San Lorenzo. Parroquia Ricaurte. Centro Pambilar. Bosque Pluvial Tropical. Bosque primario., 01°08'N 078°36'W, 500 m, 21 January 1993, *Carlos Aulestia & Milton Aulestia* 915 (MO, QCNE); Parroquia Mataje. Reserva Etnica Awá. Centro Mataje. Bosque húmedo Tropical., 01°08'N 078°33'W, 200 m, 21 Septiembre 1992, *Carlos Aulestia et al.* 573 (MO, QCNE); **Los Ríos:** Hcda. Clementina, Cerro Samama, trail between Destacamento Pita and La Torre, 01°39'S 079°20'W, 500 m, 25 May 2002, *Stahl* 5891 (GUAY); **Manabí:** E of Pedernales, half hour drive on new road to El Carmen via Puerto Nuevo (Boca de Chila) Trail up E slope from 2 km S of Mariano on road to Atahualpa. Cloud forest on mountain top ridges and steep slopes, 20 m canopy, 00°02'N 079°58'W, 650 - 800 m, 20 July 1991, *R.B. Foster & B. Mitsui* 13606 (MO, QCA); Pedernales. Cerro Pata de Pajaro, 10 km east of Pedernales; primary fog/cloud forest disturbed by hunting trail network., 00°01'N 079°58'W, 550 m, 15 August 1998, *T. Delinks & C. Robles* 34 (MO); **Pichincha:** Maquipucuna, 5 km E of Nanegal, mature cloud forest., 00°07'N 078°37'W, 1550 m, 10 February 1991, *A. H. Gentry & R. Valencia* 73203 (MO); 15 hectare patch of mature forest in Cooperativa Santa Marta # 2 along Rio Verde. 2 km southeast of Sto. Domingo de Los Colorados., 530 m, 5 February 1979, *C. H. Dodson et al.* 7613 (MO); Bosque muy humedo. Montano Bajo. Suelos arenosos de origen volcánico Vitrandept y con baja fertilidad, especialmente en magnesio y suelos Hidrandept., 00°16'S 078°44'W, 1600 - 1800 m, 13 April 1990, *G. Benavides & D. Meza* 88 (MO); Bosque muy humedo. Montano Bajo. Suelos arenosos de origen volcánico Vitrandept y con baja fertilidad, especialmente en magnesio y suelos Hidrandept., 00°16'S 078°44'W, 1600 - 1800 m, 12 Jun 1990, *G. Benavides & Lorena, A.* 106 (MO); Nanegal., 00°07'00"N 078°40'00"W, July 1906, *L. Sodiro* 73 (MO); In silv. subtroic inter. Nanegal et Guallea., May 1907, *L. Sodiro s.n.* (QPLS); *L. Sodiro s.n.* (QPLS); May 1908, *L. Sodiro SEL # 041931* (SEL); May 1907, *L. Sodiro SEL # 036240* (SEL); *L. Sodiro MO # 3390989* (QPLS); In silv. subtroic inter. Nanegal et Guallea., May 1907, *L. Sodiro s.n.* (MO); July 1906, *L. Sodiro Mo # 2131829* (MO); October 1883, *L. Sodiro MO 3241531* (B); October 1900, *L. Sodiro MO 1664015* (B); *L. Sodiro s.n.* (MO); Nanegal. In silv. subtropics., *L. Sodiro s.n.* (MO); Nanegal. In silv. subtropics., *L. Sodiro s.n.* (QPLS); Mostly primary forest at E side of Río Lelia, ca. 16 km (as-the-crow-flies) SE of Santo Domingo de los Colorados., 00°18'05"S 079°02'00"W, 800 m, 12 April 1989, *M.H. Grayum & N. Zamora* 9421 (MO); Río Toachi. 2 km above confluence with Río Pilaton., 850 m, 19 April 1977, *M.T. Madison* 4043 (MO, NY); Bosque Integral Ontonga., 00°25'00"S 079°01'00"W, 2000 m, November 2005, *N. Köster & K. Friedrich* 710 (BONN, MO, QCE, QCNE); Reserva Maguipucuna, vicinity of Nanegal, departing road from Nanegalito to Nanegal, 12.1 km W of Nanegalito, then 6.9 km NW, on road via Recinto Marienetta, 4.4 km N of Recinto Marienetta, along trails N of main lodge., 00°06'48"N 078°38'19"W, 1446 m, 2 September 2004, *T.B. Croat* 93998 (MO); Vicinity Hotel Tinalandia S of hwy. between Santo Domingo de los Colorados along Río Toachi; 9.6 km E of Santo Domingo de los Colorados., 00°16'S 079°07'W, 600 m, 2 April 1983, *T.B. Croat* 55675 (MO, S); Along old road to Quito from Alluriquin via Chiriboga, 2-3 km from main Aloag-Sta Domingo de los Colorados road. 78 54'30"W, 0 18'13"S; elev. 890-1010 m., 00°18'13"S 078°54'30"W, 890 - 1010 m, 8 October 1983, *T.B.*

Croat 56974 (MO); Reserva Endesa, along San Miguel de los Bancos-Puerto Quito Road, NW of Quito, km 113, 28.6 km E of Puerto Quito, 3.1 km E of Vincente Maldonado, 0.8 km from turnoff at entrance., 00°03'N 079°07'W, 710 m, 19 March 1992, *T.B. Croat 73162* (MO); Maquipucuna Reserve, vicinity of Nanegal 6.7 km NE of Nanegalito-Nanegal Road (turnoff ca. 3 km S of Nanegal), 19 km N of Nanegalito, along main trail to the summit., 00°07'12"N 078°37'56"W - 00°06'42"N 078°37'49"W, 1331 - 1431 m, 11 March 2006, *T.B. Croat et al. 95749* (MO); Mejía. Bosque humedo Pre Montano., 00°30'00"S 078°34'00"W, 1750 - 2000 m, Junio 1999, *G. Benavides et al. 499*(QCNE); Quito. Parroquia Nanegal, Reserva Maquipucuna, Sendero Colibri, secondary forest., 00°07'05"N 078°38'00"W, 1230 m, 11 January 1995, *G.L. Webster 31155* (MO); Parroquia Nanegal, Reserva Maquipucuna, Sendero Colibri, secondary forest., 00°07'05"N 078°38'00"W, 1230 m, 11 January 1995, *G.L. Webster 31155* (DAV); Parroquia Nanegal: Reserva Maquipucuna, secondary forest, Inca Trail, banks of Río Tulambi., 00°07'N 078°38'W, 1325 m, 06 January 1995, *G.L. Webster et al. 31033* (MO, QCNE); Reserva Forestal ENDESA, Río Silanche: "Corporación Forestal Juan Manuel Durini", Km 113 de la carretera Quito-Pto. Quito, faldas occidentales, a 10 km al Norte de la carretera principal. Bosque Primario y alrededores de la reserva., 00°05'N 079°02'W, 650 - 700 m, 6 - 8 January 1985, *J.L. Jaramillo 7454* (QCA); Trek from Lloa to Mindo, forest between Hacienda Pacay and main bridge to Mindo (south side of Río Cinto). Mature forest along edge of cow pasture., 00°08'S 078°44'W, 1400 m, 08 February 1998, *J.L. Clark 4512* (MO, QCNE); Parroquia Nanegal: Reserva Maquipucuna, primary rain forest, Cerro Sosa, ca. 5 km airline SE of Nanegal., 00°07'N 078°38'W, 1700 - 1800 m, 14 July 1990, *G. Webster 28196* (DAV); San Miguel de Los Bancos. Parroquia Mindo, Esación Mindo nembillo., 00°01'35"S 078°41'18"W - 00°01'56"S 078°41'01"W, 2250 - 2300 m, 22 marzo 2010, *C.E. Cerón & Reyes, Carmita I 71338* (MO, QAP); **Zamora-Chinchipe:** *T.B. Croat 98061* (MO); **PANAMA.** **Veraguas:** Santa Fe. Vicinity of Santa Fé, along dirt road between Santa Fé and Río San Luis, past Escuela Circlo Alto de Piedra, ca. 5 mi N of school, 08°33'N 081°08'W, 670 m, 28 Jun 1987, *T.B. Croat 66968* (MO); vicinity Santa Fé, along road between Santa Fé and Calovebora, 1.7 miles past Alto Piedra School, 1.5 miles beyond Quebrada Cosilla (previously referred to as Río Primero Braso 13 July, 1994, *T.B. Croat & G. Zhu 76830* (SCZ).

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Stenospermation donosoense Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Colón: Westernmost part of province, site of proposed copper mine (INMET). Forest on steep slopes, north end of Tailings Area, 08°53'42"N, 80°40'09"W, 100 m, 08 April, 2009, *G. McPherson & J. Serein* 20769 (holotype, MO-6189544; isotype, PMA).

Diagnosis. *Stenospermation donosoense* is characterized by its epiphytic habit, internodes longer than broad and moderately smooth, drying weakly ribbed and light gray-brown, petioles inconspicuously sheathed to ca. 2/3, narrowly oblong, narrowly acuminate, dark gray-brown blades with the upper surface finely striate-areolate and sparsely short pale-lineate with weakly raised minor veins and the lower surface whitish beneath as well as by the paired, short-pedunculate inflorescences with small, cylindroid, stipitate, white spadices with acute tips. Epiphyte; internodes 2.0–4.5 cm long, 6 mm diam., drying moderately smooth, weakly ribbed and light gray-brown, matte; **petioles** inconspicuously sheathed to 0.6–0.8 their length; **sheath** 3.7–4.4 cm long, narrow and inconspicuous, weakly free-ending at apex, the margins remaining intact; free part of petiole oval, 7–15 mm long; **blades** narrowly oblong, 15.5–18.0 cm long, 2.5–3.0 cm wide, 2.6–6.3 times longer than wide, 2.6–3.3 times longer than petioles, narrowly acuminate at apex, narrowly acute to attenuate at base, dark green and matte above, whitish and matte below, drying dark gray-brown; **upper surface** with minor veins narrowly rounded, moderately raised, concolorous with the intermediate area finely striate-areolate and sparsely short pale-lineate; lower surface drying yellowish brown, weakly glossy, evenly and finely striate-granular. INFLORESCENCES short-pedunculate, paired; peduncle 6.2–7.0 cm long, 2.5 mm diam.; spathe not seen; **spadix** white, short-cylindroid, stipitate 3–4 mm, 2.7–3.6 cm long, 6–7 mm diam., drying brownish, the apex with a narrow triangular apical nipple; styles 1.8–2.1 mm wide, subrounded to prismatic, drying dark brown with a moderately thin, sometimes undulated margins; stigma rather prominently raised to 1.5 mm long, consisting of a narrow open tube, 0.4 mm diam., brownish. Flowering in April. **Figures 82–85.**

Distribution — *Stenospermation donosoense* is endemic to Panama, known only from Colón Province at 100 m in *Premontane rain forest* life zone.

Comments — In appearance *Stenospermation donosoense* looks closest to *S. terrabaense* from Costa Rica which differs by having thicker, shorter, and black-drying internodes, more conspicuously sheathed petioles and more bicolorous and larger blades.

Etymology — *Stenospermation donosoense* is named for the type locality at Donoso, the site of copper mining operations in Colón Province.



Figure 82: *Stenospermation donosoense*, Habit of flowering plant, Photo Alex Espinoza



Figure 83: *Stenospermation donosoense*, Upper blade surface, TYPE McPherson 20769



Figure 84: *Stenospermatum donosoense*, TYPE McPherson 20769



Figure 85: *Stenospermatum donosoense*, Close up of inflorescences at several stages, Photo Alex Espinoza

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Stenospermatum dressleri Croat, **sp. nov.** — Type: PANAMA. Panamá: El Llano—Cartí Road, 10–12 km N of El Llano, 09°18'N, 79°49'W; 750 m, 2 March, 1974, R.L. Dressler 4614 (holotype PMA-19067, isotype MO-1087034).

Diagnosis. *Stenospermatum dressleri* is characterized by its epiphytic habit, internodes longer than broad and slender, fully sheathed petioles with a free-ending sheath, small, weakly elliptic-oblongate, short, weakly acuminate, brown-drying blades, strongly cernuous, short-pedunculate inflorescences with a short cream-colored spathe and a shortly stipitate, cylindroid, cream spadix.

Moderately small epiphyte; internodes longer than broad and slender, 1.3–3.0 cm long, drying blackish brown, matte, finely and weakly striate, sparsely granular; **petioles** 3.7–4.9 cm long, broadly spreading from stem, fully sheathed, drying dark brown, matte; **sheath** clasping petiole at base, free-ending at apex, usually extending over base of blade, margin intact, usually incurled; free part of petiole lacking; **blades** (7.3)10.9–16.6 cm long, (2)4–6 cm wide, 2.3–4.2 times longer than broad, 1.7–4.4 times longer than petioles, weakly elliptic-obovate, weakly and abruptly acuminate at apex (acumen down-turned, less than 3 mm long), obtuse to narrowly rounded at base, drying dark brown and matte above, moderately paler and grayish yellow-brown, weakly glossy below; midrib weakly sunken and concolorous above, drying weakly raised and concolorous to flattened with up to five ribs; primary lateral veins scarcely apparent, departing midrib at 15–20°; **upper surface** with minor veins very weak and scarcely apparent, the intervening area finely and minutely areolate-linear, sparsely and faintly short pale-lineate; lower surface more coarsely and closely ribbed, not short pale-lineate. INFLORESCENCE moderately long-pedunculate; peduncle 12.3 cm long, somewhat cernuous at apex; spathe pale green, unopened; **spadix** stipitate 2 mm, 4.2–5.3 cm long, 6–9 mm diam., 5.5–7.0 times longer than broad, cream, cylindroid, broadly rounded at apex. **Figures 86 & 87.**

Distribution — *Stenospermatum dressleri* is endemic to Panama, known only from the type collection from Panamá Province in a *Tropical wet forest* life zone.

Comments — *Stenospermatum dressleri* resembles *S. sessile* but that species differs in having the petioles more broadly sheathed with the sheath margin thin, discolored and often breaking up with the apex merely rounded, not free-ending as well as by having a sessile spadix. *Stenospermatum dressleri* is also similar to *S. multicostatum* which differs in having shorter internodes, leaf blades with the minor veins prominent and more closely spaced and in having the inflorescence less cernuous.

Etymology — *Stenospermatum dressleri* is named in honor of American botanist and orchidologist, the late Dr. Robert Dressler, a native of Missouri, and long-time staff member of the Smithsonian Tropical Research Institute. While Bob did not collect many aroids, those he did collect were mostly new so he had a very good eye for the unusual plant. Bob retired and lived with his wife, Kerry, in Costa Rica near Lancaster Orchid Garden.



Figure 86: *Stenospermaton dressleri*, HOLOTYPE Dressler 4614



Figure 87: *Stenospermation dressleri*, Upper blade surface, *Dressler 4614*

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Stenospermatum dukei Croat, **sp. nov.** — Type: PANAMA. Coclé: El Valle de Antón, ca. 08°37'N, 80°08'W, 800–1000 m, *J.A. Duke 13160* (holotype, MO-5397803).

Diagnosis. *Stenospermatum dukei* is characterized by its hemiephytic habit, moderately short, slender internodes, prominently sheathed petioles with the sheath acute to rounded at apex, small, narrowly ovate-elliptic, grayish drying, shortly and abruptly acuminate blades as well as by the moderately short-pedunculate inflorescence with the peduncle bent at nearly 90° and by the prominently stipitate, slender, bluntly tapered, yellow spadix.

Climbing epiphyte; internodes short, ca. 8 mm diam., about as long as broad; **petioles** 6.8–9.2 cm long, sheathed 0.7–1.0 their length; **sheath** 5.3–7.7 cm long, acute to rounded at apex, margins thin, not flaking; free part of petiole (1)4–10(13) cm long; **blades** elliptic to ovate-elliptic, 8.1–13.3 cm long, 3.3–6.5 cm wide, broadest near middle, abruptly short-acuminate at apex, rounded to acute at base, subcoriaceous, drying gray and matte to weakly glossy above, gray and semiglossy below; midrib broadly raised and concolorous above, narrowly rounded, drying light brown and coarsely ribbed below; primary lateral veins drying weakly apparent above, departing midrib at 30–35°; minor veins narrowly rounded, 3–4 mm apart; intervening area interspersed with 2–5, more or less equidistant, subequal ribs with rare oblique branching, densely short pale-lineate; **upper surface** with minor veins closely spaced, mostly 3–4 mm apart, narrowly rounded and smooth, the intervening area with 3–4 slightly lower but similar ribs, these often with oblique cross-veins, otherwise smooth with many, very short and moderately weak pale lineations; lower surface much like upper surface but lacking short pale lineations. INFLORESCENCE moderately long-pedunculate; peduncle 18 cm long, somewhat directed to one side at 100° at apex; spathe not seen; **spadix** stipitate 7 mm, 7.2 cm long, 6 mm diam., 12 times longer than broad, pale yellow, narrowly cylindroid, bluntly pointed at apex; style 2.2–2.6 mm wide, subquadrangular to jaggedly prismatic, drying moderately flattened, light brown, sub-tuberculate-ridged; stigma oval, 0.8 mm long, 0.4–0.5 mm wide, the margins concolorous, dark brown. **Figures 88 & 89.**

Distribution — *Stenospermatum dukei* is endemic to Panama, known only from the type locality in Coclé Province at 800–1000 m in a *Tropical wet forest* life zone.

Comments — *Stenospermatum dukei* is most similar to *S. marantifolium* which differs by having larger leaves (15–33 cm long and 6–13 cm wide with the upper surface with weakly raised minor veins with the intervening area finely striate-areolate and weakly short pale-lineate with oblique cross veins) as well as a thickly cylindroid, white spadix which is rounded at apex.

Stenospermatum dukei keys out with *Stenospermatum morii* but that species differs by having broadly ovate to ovate-elliptic, dark brown-drying leaf blades that are 1.5–1.8 times longer than wide in contrast to elliptic and greenish gray-drying and 2.2–2.4 times longer than wide for *S. dukei*.

Etymology — *Stenospermatum dukei* is named in honor of the late Dr. James Duke who collected the type specimen. Duke, was born 4 April 1929, in Birmingham, Alabama and died on 10 December 2017 at age 88. He received his doctorate at the University of North Carolina



Figure 88: *Stenospermation dukei*, TYPE, J.A. Duke 13160

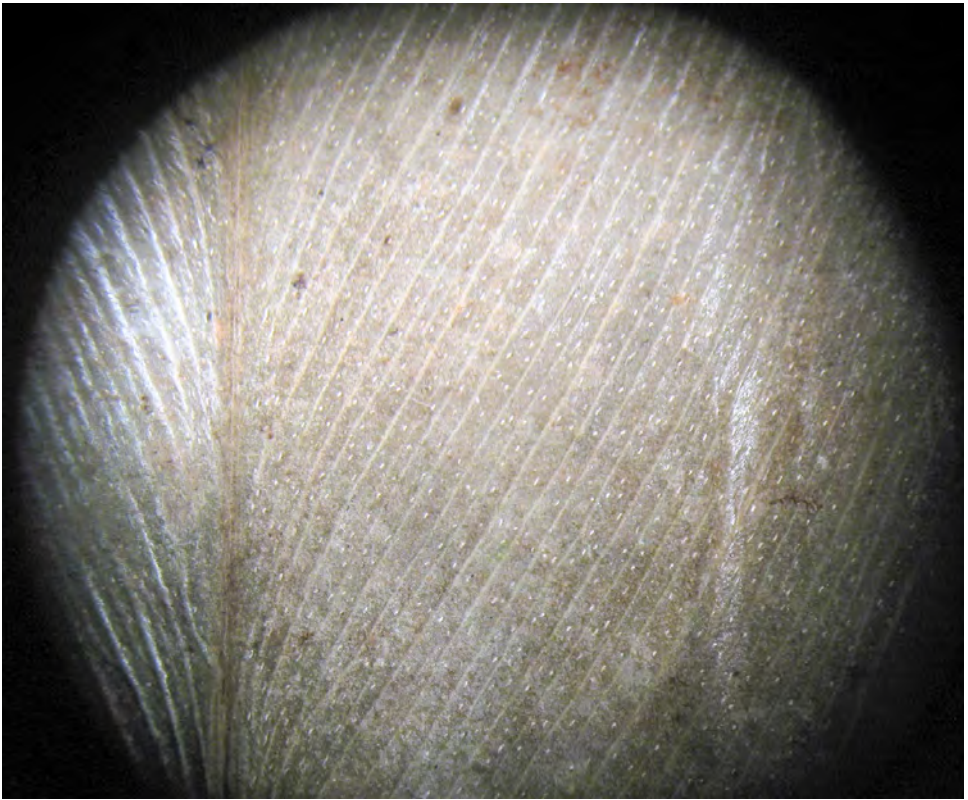


Figure 89: *Stenospermation dukei*, Upper blade surface, J. A. Duke 13160

in 1961, worked briefly at the Missouri Botanical Garden, then spent many years collecting in the tropics, primarily in Panama. There he worked for the Batelle Memorial Institute while making plant surveys in preparation for a sea level canal. He became a legend in the Darién jungle where he explored so intensively that he was known and respected by the inhabitants of many villages all over the Darién. Duke became a specialist in ethnobotany and while working for the USDA's Agricultural Research Service in Beltsville, Maryland from 1968 to 1995 he developed comprehensive Phytochemical and Ethnobotanical Databases that remain critical research tools for today's scientists. He has authored or co-authored more than 30 books and hundreds of articles, bringing his expertise not only to fellow scientists but to the public with an interest in medicinal uses of plants. When he was not writing books he spent time playing in his own blue grass band.

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Stenospermation ellipticum Croat & D.C.Bay, Novon 17: 298–299. 2007. — Type: COLOMBIA. Valle del Cauca: Buenaventura–Malagá Road, on Carretera Hanz, less than 100 m, 1 March 1990, *T.B. Croat 71062* (holotype MO-3780456; isotypes CUVC, US).

Epiphytic or rarely terrestrial; stem appressed-climbing; internodes slightly longer than broad, 5–15 mm diam., 1.5–3.0 cm long, light reddish brown, finely narrow-ribbed, matte, drying 1.5 cm diam., light yellow-brown, matte and weakly ribbed, often obscured by petiole bases, roots few per node; cataphylls deciduous. LEAVES erect to erect-spreading, long-petiolate; **petioles** 16.5–49.0 cm long, sheathed 0.2–0.6(0.8) their length, yellow-green, semiglossy, longitudinally striate near base, terete to subterete and weakly narrowly sulcate above sheath, drying gray-green to olive-brown, finely ribbed throughout, matte; **sheath** 10.5–23.0 cm long, densely dark green- speckled, thin but not markedly discolored, sometimes fragmenting; free portion of petiole (the unsheathed part) 8.5–28.0 cm long, 3 mm diam., finely ribbed; geniculum 2.0–2.5 cm long, not swollen, darker than shaft; **blades** elliptic to weakly obovate-elliptic or oblanceolate-elliptic, 23.5–35.5 cm long, 8.3–17.0 cm wide, 1.7–3.1 times longer than broad, 0.6–1.6(1.9) times longer than petiole, broadest at middle, broadly rounded to obtuse to rounded and abruptly acuminate to weakly short acuminate to gradually short-acuminate at apex, acute to weakly attenuate or obtuse at base, moderately coriaceous, dark green to yellow-green, glossy to semiglossy above, slightly paler and weakly glossy below, drying dark gray-brown to dark brown, matte to semiglossy above, grayish yellow-brown and weakly glossy below; midrib narrowly sunken and marginally discolored to paler or concolorous above, narrowly rounded and paler, finely and irregularly ribbed on drying below; primary lateral veins not markedly apparent, minor veins departing at 30–50°, only weakly apparent above, obscure below, drying raised above, easily visible but more or less flat below; **upper surface** with the minor veins close, 2–3 mm apart, prominently raised but blunt with intervening area moderately smooth, lacking conspicuous granules, transverse ridges or short pale lineations; lower surface slightly paler, grayish yellow-brown to reddish brown, weakly glossy to matte, finely veined, the veins bluntly raised with the intervening area striate to areolate-granular, sometimes finely and uniformly striate-papillate (*Ortiz et al.* 2651), sometimes weakly and obscurely short pale-lineate. INFLORESCENCE erect, long-pedunculate; peduncle (10.5)21.0–34.5 cm long, 2–3 mm diam., finely striate; spathe cernuous, 5.0–9.5 cm long, ca. 2 cm wide, narrowly acuminate at apex, 4 cm longer than the as yet unexposed spadix, green to yellow-white, drying reddish brown, promptly deciduous; **spadix** sessile, pale yellowish, cylindroid, 5.5–6.5 cm long, 6.7–8 mm diam., drying 6–7 mm diam.; styles quadrangular to subrounded and prismatic, drying subflattened to concave, matte, sometimes with a radiating ridge, 5 visible per spiral 0.5 mm long, 0.4 mm diam.; stigma black, prominently raised to 0.4 mm long, circular, oblong, weakly raised, 0.5–0.6 mm long. INFRUCTESCENCE with **spadix** to 10.5 cm long, 1.7 cm diam.; berries orange, widely spaced on drying, dark brown; seeds 1.8 mm long, 0.8 mm diam., tan, smooth. Flowers in March to August; fruits in July and August. **Figures 90–95.**



Figure 90: *Stenospermation ellipticum*, Habit of fruiting plant, O. Ortiz 2651, Photo O. Ortiz



Figure 91: *Stenospermation ellipticum*, Leaves adaxial surface, O. Ortiz 2651, Photo O. Ortiz



Figure 92: *Stenospermation ellipticum*, Inflorescence, Ortiz 2651, Photo O. Ortiz



Figure 93: *Stenospermation ellipticum*, O. Ortiz 2651



Figure 94: *Stenospermatum ellipticum*, TYPE Croat 71062

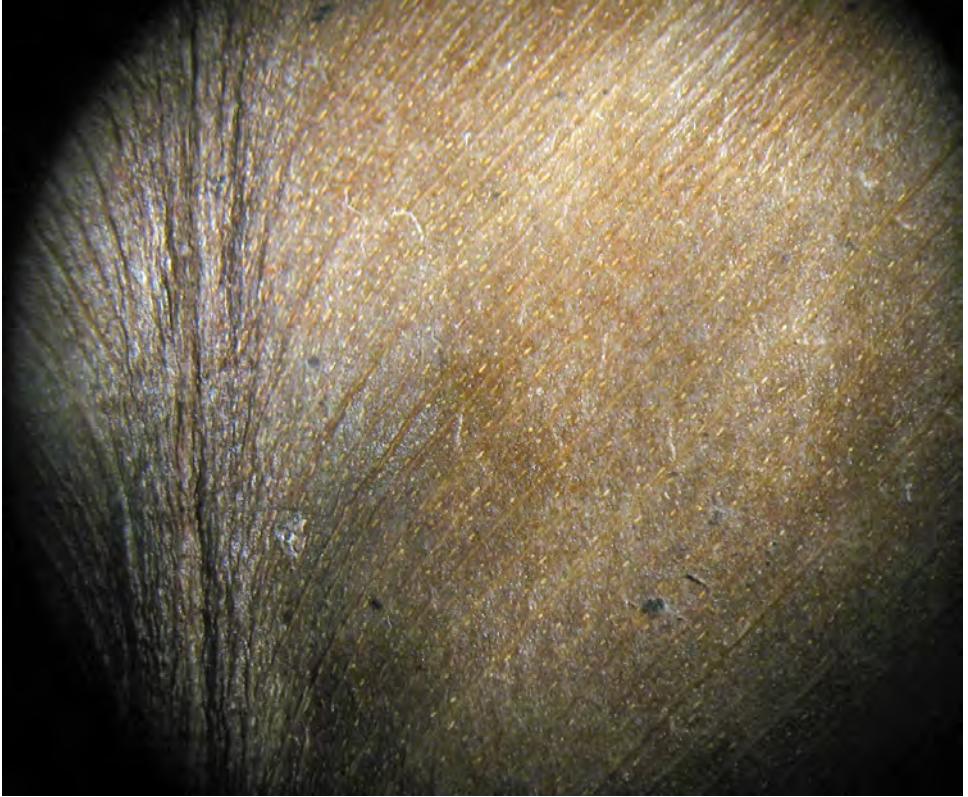


Figure 95: *Stenospermatum ellipticum*, Upper blade surface, McPherson 7027

Distribution — *Stenospermatum ellipticum* ranges from southern Panama (Darién) to northern Colombia (Antioquia, Chocó, Valle del Cauca) at 30–1440 m in *Premontane wet transition to Tropical rain forest* and *Tropical rain forest transition to Premontane* life zones. In Darién Province at 1128 m in a *Premontane wet forest* life zone.

Comments — *Stenospermatum ellipticum* is characterized by its usually epiphytic habit, large size, short, thick, light yellow-brown drying internodes which are slightly longer than broad, the dark green-speckled petioles which dry light brown and finely ridged, usually sheathed about half way with the free portion terete and prominently geniculate, the elliptic to weakly obovate-elliptic to oblanceolate-elliptic, coriaceous, abruptly acuminate, dark gray-brown-drying blades, and the long-pedunculate inflorescences with green to yellow-white cernuous spathes that are 4 cm longer than the sessile, yellow spadices.

In Central America *Stenospermatum ellipticum* is closest to *S. sessile* which differs by having smaller leaves with the petiole sheath margins drying much paler and the upper blade

surface smoother and by having a spathe which is proportionately longer than the spadix. *Stenospermatum ellipticum* is also similar to *S. ortizii* which has similar leaves in terms of size, shape and drying color but that species differs in having petiole sheathed nearly throughout and has the upper blade surface with the minor veins more widely spaced with the intervening area nearly smooth. In contrast the minor veins on *S. ellipticum* are closer together, more acutely raised with the intervening area finely heavily striate-granular.

A collection from the Department of Santander at Encino, Colombia, [*A.J. Taquinas 269* (UDBC)] is out of range for the species and its determination must be confirmed.

Additional specimens seen — COLOMBIA. Antioquia: El Castrillón, San Luis., 1490 m, 02 March 1981, *C.A. Loaiza 153* (COL); El Castrillón, San Luis., 1470 m, 03 March 1981, *C.A. Loaiza 169* (COL); Mpio. de Amalfi: road between Amalfi and Fraguas, NE of Salazar, 23.0-26.5 km from centro of Amalfi. Bosque húmedo premontano. Specimen treated with ethanol., 06°58'N 074°59'W, 1220 - 1300 m, 14 February 1989, *J.M. MacDougal & J.C. Betancur B. 4067* (HUA, MO); Amalfi. 8-27 Kms NE de Amalfi, en la via Vetilla-Fraguas, sitios Salazar y Marengo., 06°56'N 075°04'W, 1150 - 1450 m, 07 December 1989, *Ricardo Callejas et al. 9104* (HUA); Anorí. Km 15 de la via al Municipio de Campamento, quebrada San Juan, NO-O de Anorí., 07°08'N 075°21'W, 990 m, *R. Callejas et al. 8867* (HUA); San Francisco. Corregimiento de Aquiatania, Finca La Ilusión., 1350 m, 02 April 1992, *Fonnegra & Curso Tax. Plant. Vasc. Sem I/92 4114* (COL); Corregimiento de Aquiatania, Tierra Linda., 1350 m, 02 April 1992, *R. Fonnegra G. 4065* (COL); San Luis. Vereda Manizales, 12 Km de San Luis en la via San Luis-San Carlos, bosques a lo largo del rio Dormilon., 06°05'N 075°00'W, 1440 m, 26 June 1987, *R. Callejas et al. 4310* (HUA, MO); Via Medellin-Bogota, Km 100-125. Colecciones a lo largo del rio Tebaida., 06°10'N 075°25'W, 990 - 1030 m, 02 April 1987, *R. Callejas et al. 3421* (COL, HUA, MO); **Chocó:** Ca. 10-15 km S of Quibdó on road to Istmina (Panamerican Hwy.), and 8-10 km E on road to petroleum exploration camp., 05°35'N 076°37'W, 90 m, 9 July 1986, *M.H. Grayum, et al. 7652* (HUA, MO); Road between Bolivar and Quibdo, at Km 134.5., 05°46'N 076°20'W, 1070 m, 13 April 1983, *T.B. Croat 55909* (B, K, M, NY); Along road between San Jose del Palmar and Novita, between La Italica and San Jose del Palmar, ca 3 km W of San Jose del Palmar. 4 56'N, 76 29'W; elev. 930 m., 04°56'N 076°29'W, 930 m, 11 May 1983, *T.B. Croat 56648* (COL, MO); **Valle del Cauca:** 30 - 40 m, 19 May 1946, *R.E. Schultes 7380* (US); Along old highway between Cali and Buenaventura, 28 km beyond the junction with the new highway (20 km W of village of Borrero Ayerbe and 7 km W of El Salado) disturbed forest along steep rocky creek., 1400 - 1420 m, 28 August 1976, *T.B. Croat 38597, 38597a* (COL, MO); Along road from Buenaventura to Málaga, Km 52.4 (from beginning of road at Gallinero), 04°03'N 077°05'W, 140 m, 14 July 1993, *T.B. Croat & D. Bay 75725* (K, MO); Along old road from Cali to Buenaventura, 50.5 km N of Agua Clara, 31.2 km S of jct. with main Cali- Buenaventura Hwy., 03°31'N 076°45'W, 9 July 1993, *T.B. Croat & D. Bay 75604* (MO); Along road between Queremal and Buenaventura,

32.2 km W of Queremal, near Río Blanco. GPS coordinates., 03°36'00"N 076°52'00"W, 230 m, 12 July 1997, *T.B. Croat & J.F. Gaskin 79755* (CUVC, MO); Vicinity of Queremal, along Río Cava (south of Queremal-Buenaventura Highway, near Queremal, at Km 55), ca. 2 km S of road. GPS coordinates., 03°32'21"N 076°45'25"W, 1100 m, 26 July 1997, *T.B. Croat & J.F. Gaskin 80401* (CUVC, MO); Along road between Queremal and Anchicaya on old Cali-Buenaventura Road, departing road on trail at Km 55, 6.5 km W of Queremal via Río San Juan, 03°32'23"N 076°45'26"W, 1250 m, 26 July 1997, *T.B. Croat & J.F. Gaskin 80376* (CUVC, MO); Bahía Málaga, vicinity Base Naval Málaga, along road to Buenaventura, ca. 1 km from base ca. Km 104. 03°59'N 077°20'W, 28 July 1997, *T.B. Croat & J.F. Gaskin 80474* (CUVC, MO); Bajo Calima Region, Carton de Colombia lumber concession area; Carretera Gasolina 6 km S of main road between Cali-Buenaventura highway and Canalete; wedge of intact primary forest, 1 km W of Carretera Gasolina., 03°56'00"N 077°07'30"W, 50 - 80 m, 19 July 1988, *T.B. Croat 69402* (MO); Vicinity of Bajo Calima: Along road past Pulpapel Headquarters (at km 17) to Bahía de Málaga; at Km 44 from the main Cali-Buenaventura highway. Elevation less than 100 m., 04°03'N 077°08'W, 05 February 1990, *T.B. Croat & J. Watt 70203* (MO); **PANAMA. Darién:** S of El Real on trail up Cerro Pirre. Forest, 08°00'N 077°45'W, 550 - 1030 m, 29 March 1985, *G. McPherson 7027* (MO); S of El Real on trail up Cerro Pirre. Forest, 08°00'N 077°45'W, 550 - 1030 m, 29 March 1985, *G. McPherson 7005* (MO); Parque Nacional Darién, Serranía de Pirre, Rancho Plástico., 07°58'54"N 077°42'30"W, 1128 m, 31 julio 2016, *O. Ortiz et al. 2651* (MO); Serranía de Pirre, along steep narrow ridge from Alturas de Nique to Cerro Pirre, ca. 9 km from Alturas de Nique, ca. 8 km W of Cana gold mine., 07°49'N 077°43'W, 1480 - 1520 m, 27 July 1976, *T.B. Croat 37888* (MO).

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Stenospermatum filamatamense Croat, **sp. nov.** — Type: COSTA RICA. Limón: Cantón: El Progreso. Cabaceras de Río Cabriel, Fila Matama, Valle de La Estrella, 09°47'20"N, 83°08'18"W, 1400 m, 27 April 1989, *G. Herrera & A. Chacón 2816* (holotype, MO-4371171; isotype, CR).

Diagnosis. *Stenospermatum filamatamense* is characterized by its epiphytic habit, dark brown-drying internodes which are longer than broad, petioles which are narrowly sheathed to well below the apex and acute at the apex, oblong-elliptic, grayish brown-drying, narrowly acuminate blades which are acute at the base with the minor veins on the upper surface weakly raised with a faint medial rib and with the intervening area finely and uniformly striate-pale-lineate as well as moderately long-pedunculate inflorescence which is about as long as the leaves, a pale-drying peduncle and a white cylindroid spadix.

Epiphyte; internodes 1.5–1.7 cm long, drying blackened, finely ridged and granular; **petiole** 19.5–20.5 cm long, sheathed 0.6–0.7 its length; **sheath** 12.0–15.5 cm long, acute to obtuse at apex; free part of petiole 4.3–6.5 cm long; **blades** narrowly elliptic, 12.2–19.4 cm long, 3.4–5.5 cm wide, 2.3–5.4 times longer than broad, 0.9 times as long as or equally as long as petioles, gradually acuminate at apex, acute to attenuate at base, drying subcoriaceous, drying grayish brown and matte above, medium yellow-brown and semiglossy below; midrib drying weakly sunken and concolorous above, narrowly rounded and finely ribbed, slightly paler below; primary lateral veins scarcely visible, departing midrib at 35°; **upper surface** with minor veins spaced 3.5–5.5 mm apart, scarcely raised, slightly darker; intervening area with one or more weak ribs but entirely and uniformly, densely, fine-granular-striate and densely and faintly short pale-lineate; lower surface with minor veins moderately raised, intervening area several low-ribbed and mostly obliquely and irregularly ribbed. INFLORESCENCE long-pedunculate; peduncle 28 cm long, drying 3.5 mm diam., semiglossy, tan, densely granular-striate; spathe not seen; **spadix** stipitate 6–7 mm (stipe 2 mm diam.), 6 mm diam., cylindroid, moderately tapered at apex, creamy white, drying dark brown; styles quadrangular to trapezoidal, 2.0–2.2 mm long, flattened, drying dark brown and matte, smooth; stigma oval, 0.8 mm long, 0.5 mm wide, drying blackened; stamens held at level of tepals; anthers 0.4 mm long, 0.6 mm wide; thecae ovoid, moderately divaricate. **Figures 96–98.**

Distribution — *Stenospermatum filamatamense* is endemic to Costa Rica, known only from the type specimen from Limón Province in the Fila Matama at 1400 m in a *Tropical wet forest to Premontane wet forest* transition life zone.

Comments — In the key being published *Stenospermatum filamatamense* keys out with *S. andreanum* which differs in having the spadix thickly cylindric and only 3–4 times longer than wide whereas *S. filamatamense* has the spadix narrowly cylindroid and more than 9 times longer than wide.



Figure 96: *Stenospermation filamatamense*, G. Herrera & Chacón 2816



Figure 97: *Stenospermation filamatamense*, Habit, Photo Marco Cedeño IMG_0219

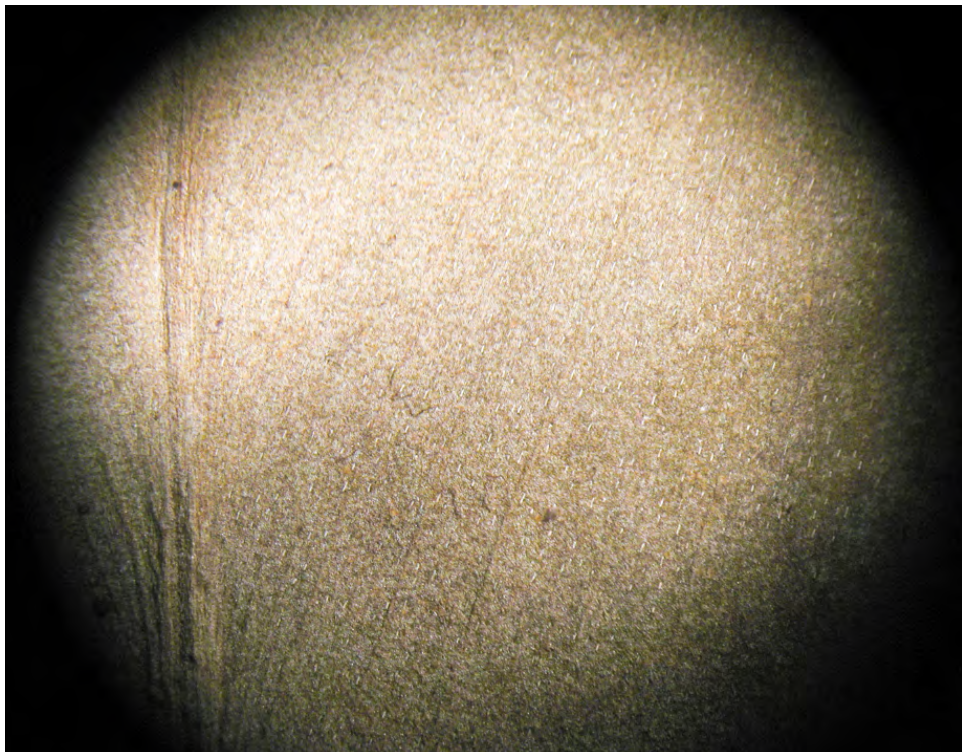


Figure 98: *Stenospermation filamatamense*, Leaf blade surface, G. Herrera & Chacón 2816

Etymology — *Stenospermatum filamatamense* is named for the type locality in the Fila Matama in Limón Province.

Paratype: COSTA RICA. Limón: Cantón Limón, distrito Valle la Estrella, subiendo Cerro Fila Matama, 900 m, 10 Octubre, 2023, *M. Cedeño, R. Acuña, R.A. Ramírez-Ortiz* 2994 (USJ).

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Stenospermatum folsomii Croat, **sp. nov.** — Type: PANAMA. Chiriquí: Fortuna Dam Site, top of mountain above camp to south, 08°44'N, 82°15'W, 1700 m, 13 September 1977, *J.P. Folsom, R. Dressler & K. Dressler* 5392 (holotype, MO-2629998).

Diagnosis. *Stenospermatum folsomii* is characterized by its erect epiphytic habit, small size, short slender internodes, gray-drying foliage, fully sheathed petioles with a weakly free-ending sheath with persisting margins, the more or less narrowly elliptic, abruptly short-acuminate leaves with the upper surface finely and closely low-ribbed with the intermediate area more weakly ribbed and granular without short pale lineations as well as by the long-pedunculate, short stipitate, cylindroid, green spadix.

Epiphyte; stem erect; internodes 1 cm long, 6 mm diam., drying dark brown, obtusely ribbed, matte, minutely dark-punctate; **petioles** 4.7–6.8 cm long, sheathed nearly throughout or at least to the geniculum, 0.7–0.9 their length, weakly ribbed adaxially on drying; **sheath** 4.1–5.8 cm long, 5–7 mm long, the sides rounded to free-ending at apex, the margin incurled, persisting intact; the free part of petiole 5–7 mm from base of blade; geniculum sharply sulcate; **blades** narrowly elliptic to weakly oblanceolate-elliptic, 7.5–11.4 cm long, 2.7–4.0 cm wide, 3.4–3.7 times longer than wide, 1.1–2.2 times longer than petioles, abruptly short-acuminate and down-turned at apex, acute at base, weakly inequilateral (one side 2–3 mm wider), drying light gray and matte above, slightly more brownish and weakly glossy below; midrib narrowly sunken and concolorous above, convex and lightly ribbed on drying below; primary lateral veins not apparent; minor veins departing at 20–30°, very closely spaced and weakly raised above; **upper surface** with the minor veins weakly raised but distinct, the intervening area slightly less prominently ribbed, densely granular as well as with minute dark punctations; lower surface with veins not apparent, evenly and densely striate-granular and minutely dark-punctate. INFLORESCENCE long-pedunculate; peduncle 19.5 cm long, drying light brown. 1.5 mm diam.; spathe not seen; **spadix** green, stipitate 7 mm, 8.3 cm long, 8 mm diam., ca. 10 times longer than broad; pistils closely aggregated; styles 2–3 cm long, 2.6–3.0 mm wide, prismatic and 6-sided, yellowish brown, matte, sparsely circular-pustular (appearing as minute stigmas); stigma subcircular, 0.6–0.7 mm long, 0.5–0.6 mm wide, depressed medially. Young fruits in mid-September. **Figures 99 & 100.**

Distribution — *Stenospermaton folsomii* is endemic to Panama, known only from the type collection from Chiriquí Province at 1700 m in a *Premontane rain forest* life zone.

Comments — *Stenospermaton folsomii* is most easily confused with *Stenospermaton multicostatum* which often has blades of a similar shape and also has close ribbing on the upper surface but that *S. multicostatum* differs in having leaves which dry usually dark brown and has the intervening area between the ribs finely striate-granular.

Etymology — *Stenospermaton folsomii* is named for American botanist Dr. J.P. Folsom, Director of the Huntington Botanical Garden. Jim is an orchid specialist who worked for the

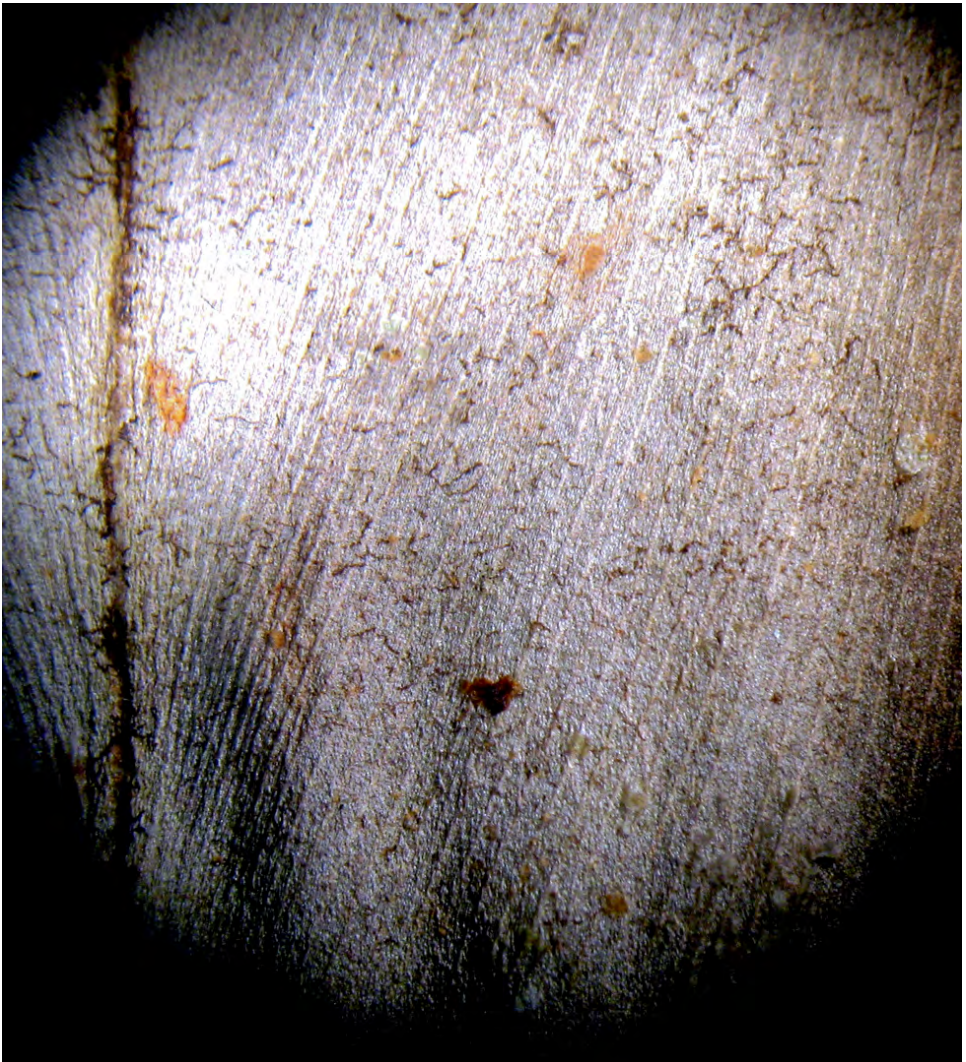


Figure 99: *Stenospermaton folsomii*, Upper blade surface, *Folsom et al. 5392*



Figure 100: *Stenospermatum folsomii*, Folsom et al 5392

Missouri Botanical Garden in Panama as Curator of Summit Herbarium and the collector for the Flora of Panama Project in 1977. Jim earned his Ph.D. at the University of Texas working on the orchid genus *Laelia* and continues his interest in that family but as Director at Huntington he has also helped to develop a world class collection of Araceae with the assistance of Dylan Hannon who works in the greenhouses at Huntington.

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Stenospermation fortunense Croat, **sp. nov.** — Type: PANAMA. Chiriquí, La Fortuna hydroelectric project, in cloud forest along trail uphill behind camp, 08°44'N, 82°15'W, 1200–1400 m, 21 March 1978, *B. Hammel 2133* (holotype, MO-2634347)

Diagnosis. *Stenospermation fortunense* is characterized by its epiphytic habit, short slender internodes, petioles sheathed ca 2/3 their length, intact sheath margins, blades that are 3.0 times longer than wide, inequilaterally elliptic in shape, a sunken midrib, a sandy upper surface, and a spadix with an infertile portion at the top.

Epiphyte; internodes short, 1.1 cm diam., drying yellow, glaucous; **petioles** 14.9 cm long, sheathed 0.6 their length, 0.8 times as long as blades, drying brown-red, weakly sulcate, geniculum present below base of leaf; **sheath** 9.4 cm long, margins intact, acute, free part of petiole (1.7)6.0–9.5 cm long; **blades** inequilateral elliptic, 18.7–19.2 cm long, 6.1 cm long, 3.0 times longer than wide, drying green-yellow, acuminate at apex, narrowly acute at base; midrib shallowly sunken, slightly paler, densely granular above, broadly raised, drying darker, densely granular below; **upper surface** smooth but exceptionally and densely granular at higher magnification with some aggregations of granules in short rows, short-pale-lineation lacking, minor veins lighter colored, 1.0–1.5 mm apart; lower surfaces uniformly and closely striate, densely and dark-punctate, minor veins indistinguishable. INFLORESCENCE bracteate, erect; peduncle erect, 27.1 cm long, drying yellow, granular, glaucous; spathe green, deciduous; **spadix** stipitate 5 mm, 5.6 cm long, 9 mm diam., white, drying dark brown, sterile portion at apex, three spirals long, subglobular, waxy, matte; flowers 5 visible per spiral; style 2.0–2.2 mm wide, quadrangular to 5-sided, usually irregularly 6-sided, truncate, densely papillate, matte; stigma terete, weakly raised, mammillate; stamens drying orange, nested below pistils; sterile flowers 2.8–3.8 mm wide, drying blackened; berries unknown. Flowers in March. **Figures 101 & 102.**

Distribution — *Stenospermation fortunense* is endemic to Panama, known only from Chiriquí at 1200–1400 m elevation in a *Premontane rain forest* life zone.



Figure 101: *Stenospermation fortuneense*, TYPE Hammel 2133

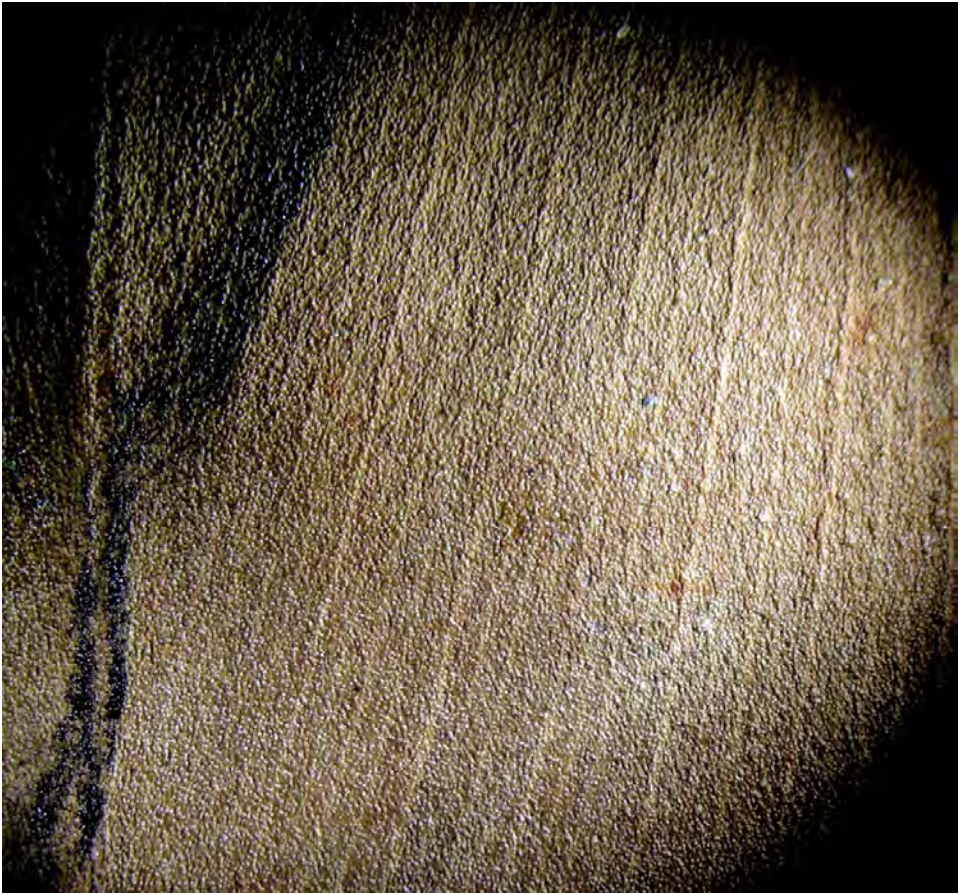


Figure 102: *Stenospermation fortunense*, Upper blade surface, TYPE *Hammel 2133*

Comments — *Stenospermation fortunense* is quite similar in appearance to *Stenospermation zurquiense* from Costa Rica in Braulio Carrillo Park but that species differs by having more ovate to lanceolate, less gradually acuminate blades that are broadest below the middle and more coarsely areolate-ridged and not finely and coarsely granular and sparsely short-pale-lineate.

Etymology — *Stenospermation fortunense* was named for the locality near the Fortuna Lake in Chiriquí Province.

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Stenospermation gaitalense Croat, **sp. nov.** — Type: PANAMA. Valle: La Mesa region N of Cerro Gaital, vic. of El Valle, 08°37'00"N, 80°07'00", 680-731 m, 2 July 1978, *B.Hammel* 3863 (holotype: MO-2658925)..

Diagnosis. *Stenospermation gaitalense* is characterized by its epiphytic habit, short internodes, nearly fully sheathed petioles, the sheath with a free-ending apex with the margins thin and somewhat scarious, narrowly ovate to elliptic blades which are rounded at apex with a weak, short, narrowly acute point, inequilateral, moderately coriaceous, dark brown to gray-brown-drying blades, upper surfaces with minor veins barely visible, the entire surface minutely and finely striate, densely pustular, sparsely and minutely dark-punctate as well as by the long-pedunculate, semi-erect inflorescences which are held well above the leaves with the spathe subequalling the stipitate spadix.

Epiphyte; internodes short, 1.7 cm diam., drying dark brown to blackened; **petioles** 14.3–26.0 cm long, darkly and minutely reddish punctate toward base, sheathed 0.95 to fully throughout, free-ending at apex and several ribbed abaxially; free part of petiole absent or at most with up to 5 mm of geniculum exposed at apex; **sheath** 14.3–15.3 cm long, 1.0–1.2 cm high on sides, drying dark brown, matte, the margin thin, somewhat scarious but mostly persisting intact, in part extending above the base of the blades; **blades** narrowly ovate to elliptic, 17.9–19.8 cm long, 7.8–8.5 cm wide, 2.2–2.5 times longer than wide, 1.5 times longer than petioles, rounded at apex with a weak, short, narrowly acute point, acute at base, inequilateral, one side 5 mm wider, moderately coriaceous, drying dark brown to gray-brown, weakly glossy above, slightly paler and weakly glossy below; midrib broadly raised and densely ribbed above, weakly raised, slightly darker and finely ribbed below; primary lateral veins barely visible, departing midrib at 40–45°; **upper surface** with minor veins barely visible, the entire surface minutely and finely striate, densely pustular, sparsely and minutely dark-punctate; lower surface finely and uniformly striate-granular, sparsely minutely punctate. INFLORESCENCE long-pedunculate, held well above the leaves; peduncle 50 cm long, drying 3 mm diam., dark yellow-brown, matte; spathe 17.5 cm long, ca. 3 cm diam. when furled, flattening to about 8 cm wide, narrowly acuminate at apex; **spadix** stipitate 5 mm, 13.5 cm long, 9 mm diam.; style 1.0–1.2 mm diam., subrounded and prominently and irregularly angular, the margins in part drying scalloped and convex, drying yellowish-brown, matte; stigma oblong-elliptic, 0.8 mm long, 0.4 mm wide, with a medial depression. Flowers at anthesis in early July. **Figures 103 & 104.**

Distribution — *Stenospermation gaitalense* is endemic to Panama, known only from a *Tropical wet forest* life zone at 700 m.

Comments — *Stenospermation gaitalense* can be confused with *S. robustum* and *S. darienense*. It differs from *S. darienense* in drying brown instead of blackened and from *S. robustum* in having leaf blades more than two times longer than broad and by having a spadix which is ca 17 times longer than broad. In contrast *S. robustum* has leaf blades less than 2.0 times longer than broad and a spadix only 5 times longer than broad.

Etymology — *Stenospermation gaitalense* is named for the type location on Cerro Gaital.



Figure 103: *Stenospermation gaitalense*, TYPE Hammel 3863



Figure 104: *Stenospermatum gaitalense*, Upper blade surface, TYPE *Hammel 3863*

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Stenospermatum hageniorum Croat, **sp. nov.** — Type: PANAMA. Colón: Chiriquí: Boquete region, Cerro Hoqueta, 6500 feet (1981 m), 08°49'N, 82°27'W, August, 1940, *C.von Hagen & W.von Hagen 2178* (holotype, NY).

Diagnosis. *Stenospermatum hageniorum* is characterized by its terrestrial habit, low stature (to 60 cm tall); short internodes, petioles sheathed 0.6–0.9 their length with the sheath persisting intact, the free part of petiole terete and geniculum acutely sulcate, by its elliptic to weakly elliptic-oblongate, weakly short-acuminate blades, the upper surface with minor veins about 2 mm apart with the intervening area with minute, closely spaced ridges longitudinally aligned between each vein and the entire surface minutely and densely granular as well as by its stipitate spadix.

Terrestrial to 60 cm tall; internodes short, ca. 2 cm diam.; **petioles** 19–32 cm long, subterete, 7–10 mm diam., drying manila to light brown, matte, finely striate, sheathed 0.6–0.9 their length; **sheath** 18–23 cm long, margin persisting intact; free part of petiole terete, 4–12 cm long; geniculum acutely sulcate; **blades** 16.3–26.2 cm long, 6.8–9.9 cm wide, 2.5–3.5 times longer than broad, 0.8–1.1 times longer than petioles, slightly inequilateral, slightly broader (by 5 mm) on one side, subcoriaceous, elliptic to weakly elliptic-oblongate, weakly short-acuminate at apex, slightly attenuate at base, weakly bicolorous, dark gray-brown and matte above, slightly paler and grayish yellow-brown and weakly glossy below; midrib deeply sunken and concolorous above, narrowly rounded, slightly darker and matte below; primary lateral veins not at all apparent on either surface; **upper surface** with minor veins about 2 mm apart with the intervening area with minute, closely spaced, irregular, longitudinal lineations aligned between each vein, the entire surface minutely and densely granular including the veins and ridges, sparsely short-pale-lineate; lower surface moderately smooth, densely and closely striate-granular, entirely granular including on the veins, lacking short pale lineations. INFLORESCENCE erect; peduncle 34 cm long, drying tan, 4 mm diam.; spathe not seen but leaving a conspicuous scar 8 mm wide, 3 mm thick; **spadix** 7.7 cm long, 1.2 cm diam. on drying, stipitate 7 mm, 2.0–2.1 cm long, pistils 2.6–3.1 mm wide; style 4- or 5-sided, rounded on margins; stigma donut-shaped, manila, impressed medially, sterile flowers occurring at apex. Fruits in late August. **Figures 105 & 106**

Distribution — *Stenospermatum hageniorum* is endemic to Panama, known only from the type locality on Cerro Horqueta in Chiriquí Province at 1881 m in a *Premontane wet forest* life zone.

Comments — *Stenospermatum hageniorum* is most similar to Species #1 described in this paper, a species which is known only from a single collection (*Croat 66843*) found along the Continental Divide between Chiriquí and Bocas del Toro Provinces near Fortuna Lake. That species differs in being epiphytic with thicker stems which are densely purple-speckled, more dark-drying, more fully sheathed petioles and broader, darker brown-drying, more acuminate leaf blades which are only 1.6–2.5 times longer than wide and with the intervenal surface much less areolate-ridged and lacking the minute and dense granules on the surface and on the veins as in *Stenospermatum hageniorum*. *S. hageniorum* is also similar to *S. luteynii* which differs in having blades which lack short-pale-lineations on the upper surface with the veins drying more irregular, more narrowly raised and with a dense array of slender, narrowly raised, somewhat anastomosing ridges.



Figure 105: *Stenospermation hageniorum* Croat, TYPE C. von Hagen & W. von Hagen 2178 (holotype, NY)



Figure 106: *Stenospermatum hageniorum* Croat, Upper blade surface, TYPE *C. von Hagen* & *W. von Hagen* 2178

Etymology — *Stenospermatum hageniorum* is named in honor of German explorers Christine von Hagen and Victor Wolfgang von Hagen who collected the species for the first time in August 1940. The von Hagens spent time exploring the Galapagos in the late 1930's. It is not known why they were visiting Chiriquí Province in Panama which was rather remote from the Isthmus of Panama in the 1930's.

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Stenospermatum hampshireae Croat, **sp. nov.** — Type: PANAMA. Chiriquí: Cleared forest on banks of Fortuna Lake; 08°45'N, 82°12'W, 1070 m, 20 March 1985, *R.J. Hampshire & C. Whiteford* 737 (holotype, MO-3416532; isotype, BM)

Diagnosis. *Stenospermatum hampshireae* is characterized by its epiphytic climbing habit, short internodes, petioles sheathed 0.90–0.95 their length, a sheath very inequilateral at apex with one side prominently protruding and bluntly acute at apex, lanceolate, narrowly acute to weakly acuminate, dark grayish brown-drying blades 2.7–3.1 times longer than broad, an upper surface with ribs rather widely and evenly spaced with 3–5 lower, somewhat irregular ribs in between each major rib, the intervening space irregularly ridged-granular and densely short pale-lineate as well as by its green, narrowly long-attenuate spathe and yellow, stipitate, cylindroid spadix 5.4 times longer than wide with a subcircular stigma.

Epiphytic climber; internodes short, as long as broad or slightly longer than broad, 0.6–1.0 cm long, 6–8 mm diam., drying light gray-brown, weakly glossy, scarcely at all ribbed, often conspicuously pustular; petiole scars often with short remnants of petioles; **petioles** 3.0–4.3 cm long, 0.3–0.4 times as long as blades, yellowish in life, drying coarsely ribbed on sides, short pale-lineate on lower part of sheath on stem, sheathed 0.90–0.95 their length, drying dark brown, matte; **sheath** 2.7–4.1 cm long, prominent, very inequilateral at apex, acute on one side, the other side prominently protruding and bluntly acute at apex, the margin thick, remaining intact; free part of petiole 2–3 mm long; **blades** lanceolate, 9.2–11.5 cm long, 3.2–3.7 cm wide, 2.7–3.1 times longer than broad, 2.1–3.8 times longer than petioles, narrowly acute to weakly acuminate at apex, broadly acute to subrounded at base, moderately coriaceous, scarcely bicolorous, drying dark grayish brown, matte above, slightly more yellowish brown, weakly glossy below; midrib narrowly and sharply sunken, concolorous above, broadly flattened-ribbed, darker below; primary lateral veins weakly visible on both surfaces, 4–6 per side, departing midrib at 25–30°; **upper surface** with ribs rather widely and evenly spaced with 3–5 lower somewhat irregular ribs in between each major rib, the intervening space irregularly ridged-granular and densely short pale-lineate; lower surface with veins darker and more conspicuous than above, the intervening area coarsely ridged-granular. INFLORESCENCE short-pedunculate, erect, held among the leave; peduncle 7 cm long; spathe green, narrowly long-attenuate and unopened; **spadix** yellow, stipitate 7 mm, 3 cm long, 5.5 mm diam., 5.4 times longer than wide; styles usually four visible per spiral, sharply rounded-prismatic, dark yellowish brown, truncate, rather widely spaced; stigma subcircular, slightly darker brown. Flowers seen in March. **Figures 107 & 108.**

Distribution — *Stenospermatum hampshireae* is endemic to Panama, known only from the type locality in Chiriquí Province at 1070 m in a *Premontane rain forest* life zone.

Comments — *Stenospermatum hampshireae* is most easily confused with *Stenospermatum pirrense* from Cerro Pirre in Darién which differs by having the leaf usually markedly bicolorous, leaf blades that are about two times longer than petioles and broadest usually about midway, drying light brown to greenish or gray, rarely dark brown. Also, the apex of the petiole sheath is scarcely broader than the shaft and not prominently pointed. In contrast, the leaf blades of *S. hampshireae* are clearly broadest in lower 1/3 and dry dark brown and scarcely bicolorous while being about 3.5 times longer than the petioles. The petiole sheath is also markedly different,



Figure 107: *Stenospermatum hamphshireae*, TYPE Rachel J. Hampshire & Carolyn Whitefoord 737



Figure 108: *Stenospermatum hampshireae*, Upper blade surface, TYPE Hampshire & Whitefoord 737 (MO)

with the apex of the petiole sheath being much broader than the shaft and, prominently pointed and much wider than the petiole shaft.

Etymology — *Stenospermatum hampshireae* is named in honor of British botanist Rachel J. Hampshire who collected the type specimen.

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Stenospermatum heraclioi Croat, **sp. nov.** — Type: PANAMA. Guna Yala: Río Diablo, tierra firme del Pueblo de Nargana, a 7 km de la costa, 09°23'N, 78°34'W, 40 m, 9 August 1994, *H. Herrera, C. Galdames, E. Montenegro & C. Chung 1719* (holotype, MO-04637942).

Diagnosis. *Stenospermatum heraclioi* is characterized by its climbing epiphytic habit, short internodes, petioles sheathed to 85% their length with a thin flaky margin, the oblanceolate-elliptic, light gray-drying blades with the upper surface densely areolate ridged as well as by the long-pedunculate inflorescence with a prominently stipitate, yellowish, narrowly oblong spadix.

Climbing epiphyte; internodes short, ca. 1 cm long, 2 cm diam., drying ca. 1 cm diam., dark brown, matte; **petiole** sheathed to 85% its length with a thin flaky margin on the cauline leaves, drying dark gray-brown, matte, densely granular, weakly waxy; **sheath** 19.5–20.0 cm long, ending acute to obtuse at apex, margin thin and lighter brown, fragile and usually breaking up; free portion 5 cm long (to only 1.5 cm when subtending inflorescence), subterete, narrowly sulcate in upper half, drying dark brown; **blades** oblanceolate-elliptic, 28.5–35.5 cm long, 8.3–9.5 cm wide, 3.3–3.7 times longer than wide, broadest above the middle of the blade, 1.2–1.4 times longer than petioles, gradually short-acuminate at apex, narrowly acute at base, moderately coriaceous, drying light gray-brown and matte above, more brownish, semiglossy below; midrib drying broadly convex, finely ribbed and granular above, primary lateral veins obscure; **upper surface** with minor veins 1–2 mm apart, moderately obscure, weakly raised with the intervening area densely and prominently areolate ridged. INFLORESCENCE long-pedunculate; peduncle 53 cm long, drying yellow-brown, densely short dark-lineate; spathe not seen; **spadix** stipitate 1.2 cm, 17 cm long, 1 cm diam., more than 17 times longer than wide, narrowly rounded at apex, acute at base, lacking staminodia, yellowish, narrowly oblong; styles 2.5–4.0 mm wide, quadrangular to prismatic and 6-sided, flat, drying dark brown; stigma oval, weakly raised, 1 mm long, 0.5 mm wide, depressed medially, light brown. Flowering in July; fruiting in August or September. **Figures 109 & 110.**

Distribution — *Stenospermatum heraclioi* is endemic to Panama, known only from the type collection from the Comarca de Guna Yala at 40 m elevation in a *Premontane wet forest* life zone.

Comments — *Stenospermatum heraclioi* appears to be most closely allied with *S. adsettiorum* from Cerro Jefe in Panamá Province. That species differs by having leaf blades that dry dark gray with the upper surface with minor veins moderately distinct with the intervening area finely and closely ribbed, densely dark-punctate and with pale flaky wax patches as well as by its whitish spadix.

Etymology — *Stenospermatum heraclioi* is named in honor of Panamanian botanist Heraclio Herrera who collected the type specimen. Heraclio, a member of the indigenous Cuna group in the Guna Yala Island chain has participated in many expeditions in Panama, especially in the Comarca de Guna Yala but also in other parts of Panama and has collected many interesting and new species.

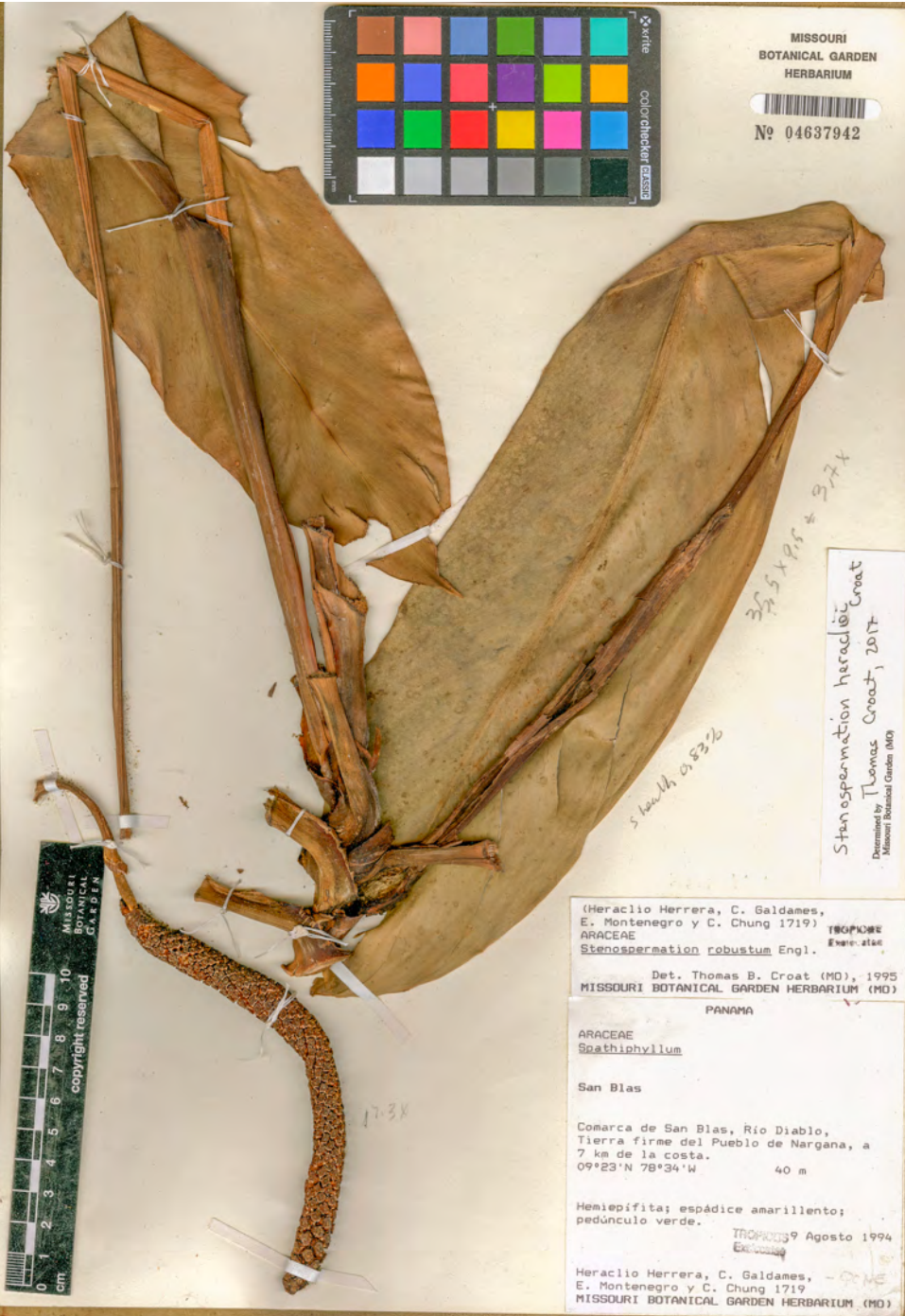


Figure 109: *Stenospermatum heraclioi*, TYPE H. Herrera et al. 1719

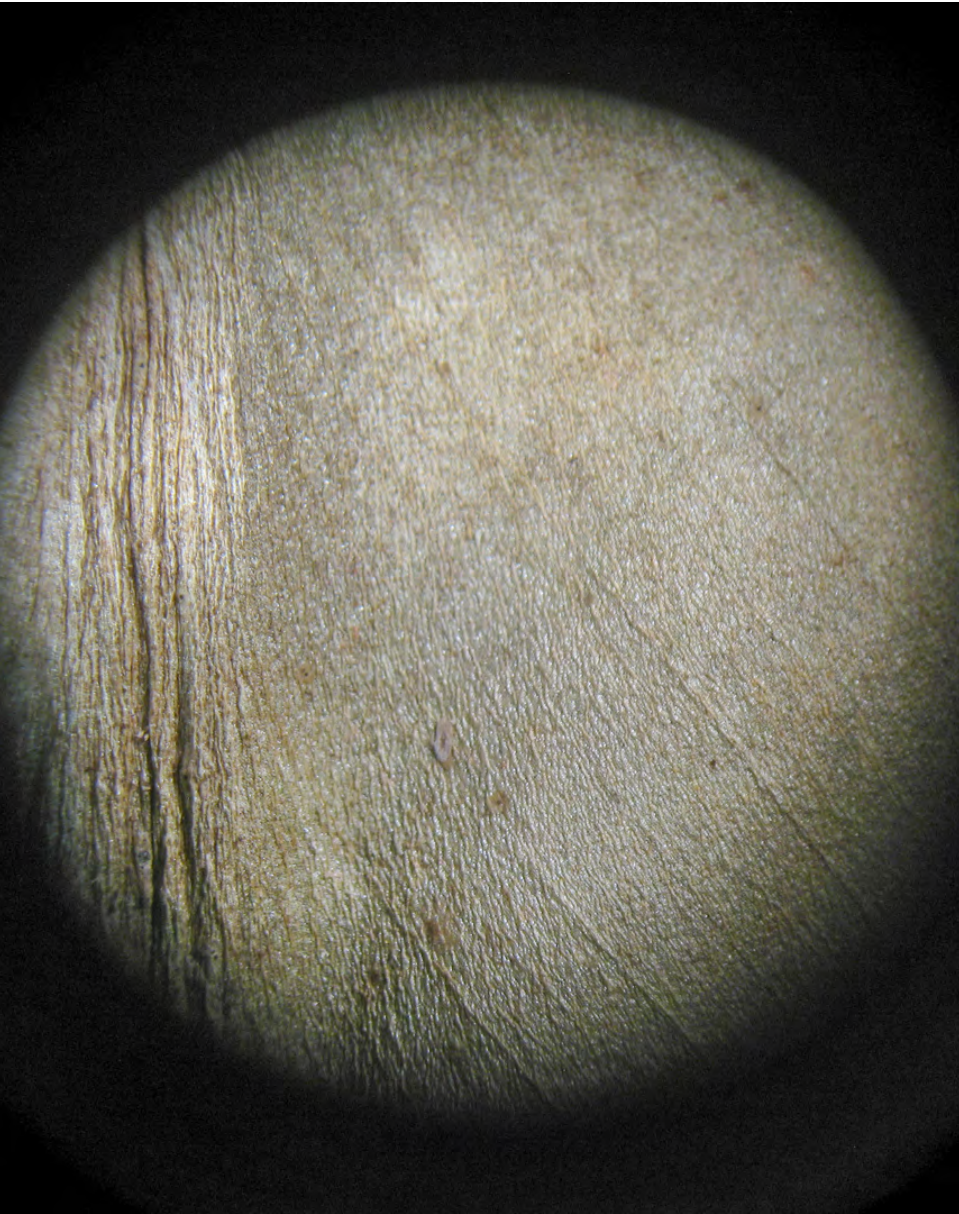


Figure 110: *Stenospermation heraclioi*, Upper blade surface, TYPE *H. Herrera et 1719*

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Stenospermatum herrerae Croat, **sp. nov.** — Type: COSTA RICA. Heredia: Parque Nacional Braulio Carrillo, San Rafael de Vara Blanca, 10°11'50"N, 84°06'35"W; 1830 m, 7 November 1986, *G. Herrera Ch. 240* (holotype, MO-3611739; isotypes, CR, MEXU).

Diagnosis. *Stenospermatum herrerae* is characterized by its epiphytic habit, short internodes, moderately long-petiolate leaves with the petioles inconspicuously sheathed, ending acutely so and well below the apex of the petiole, elliptic, brownish-drying, moderately bicolorous, acuminate blades which are subrounded at the base as well as by its moderately long-pedunculate inflorescence with a stipitate spadix.

Epiphyte; internodes short, 1.5 cm diam., drying dark brown, matte, weakly low-ribbed; **petioles** 16.5–26.5 cm long, sheathed 0.65–0.75 their length; **sheath** 12.5–18.5 cm long, ending gradually acute at apex, 8–15 mm high on sides, margin persisting intact; free part of petiole (2.5)7.5–10.0 cm long; **blades** narrowly elliptic, 16.5–26.3 cm long, 5.4–8.0 cm wide, 2.5–3.1 times longer than wide, nearly equalling petioles, gradually sharply acuminate at apex, usually subrounded at base, sometimes acute, drying dark brown and matte above, moderately paler and semiglossy, smooth below, inequilateral, one side 3–7 mm wider; midrib broadly convex, areolate-ridged, slightly paler above, convex and obtusely ribbed, slightly darker below; primary lateral veins 4–6 per side, weakly visible, departing midrib at 20–30°, scarcely distinguishable above, weakly visible below; **upper surface** with minor veins obscure, scarcely apparent but weakly raised with the intervening area irregularly etched and conspicuously punctate with dense, pale, sunken lineations; lower surface with the minor veins more apparent, weakly raised with the intervening areas irregularly striate-granular. INFLORESCENCE slightly shorter than the leaves; peduncle 27 cm long, drying less than 6 mm diam., dark brown; spathe not seen: **spadix** stipitate 4–5 mm, 7 cm long, 2 cm diam.; pistils closely compacted, dark brown, thick, short-lineate on the sides; styles 2.4–3.6(5.0) mm diam., subrounded to trapezoidal, drying dark brown, matte; stigma circular or subcircular, 0.4–0.8 mm wide, the border slightly paler, weakly raised. Fruiting in November. **Figures 111 & 112.**

Distribution — *Stenospermatum herrerae* is endemic to Costa Rica, known only from the type locality in Heredia Province at 1830 m in Braulio Carrillo Park in a *Montane rain forest* life zone.

Comments — *Stenospermatum herrerae* appears to be related to *S. bocachirens* from Bocas del Toro Province in Panama based on the coloration of their dried leaves and the texture of their upper blade surfaces but *S. bocachirens* differs in having leaf blades somewhat smaller, drying darker with the leaf apex more decidedly acuminate and the leaf bases narrower and attenuate as well as by having the free part of the petiole shorter (3.5–5.3 cm long), the dried peduncle broader and semiglossy on drying as well as by having the spadix tapered to the apex and 5.2 times longer than wide.

Stenospermatum herrerae is yet another species considered to be *S. spruceanum* Schott by Grayum. Grayum was the first to discover the species but it was sterile and he was reluctant to describe it. *Stenospermatum spruceanum*, a South American species, differs by having the

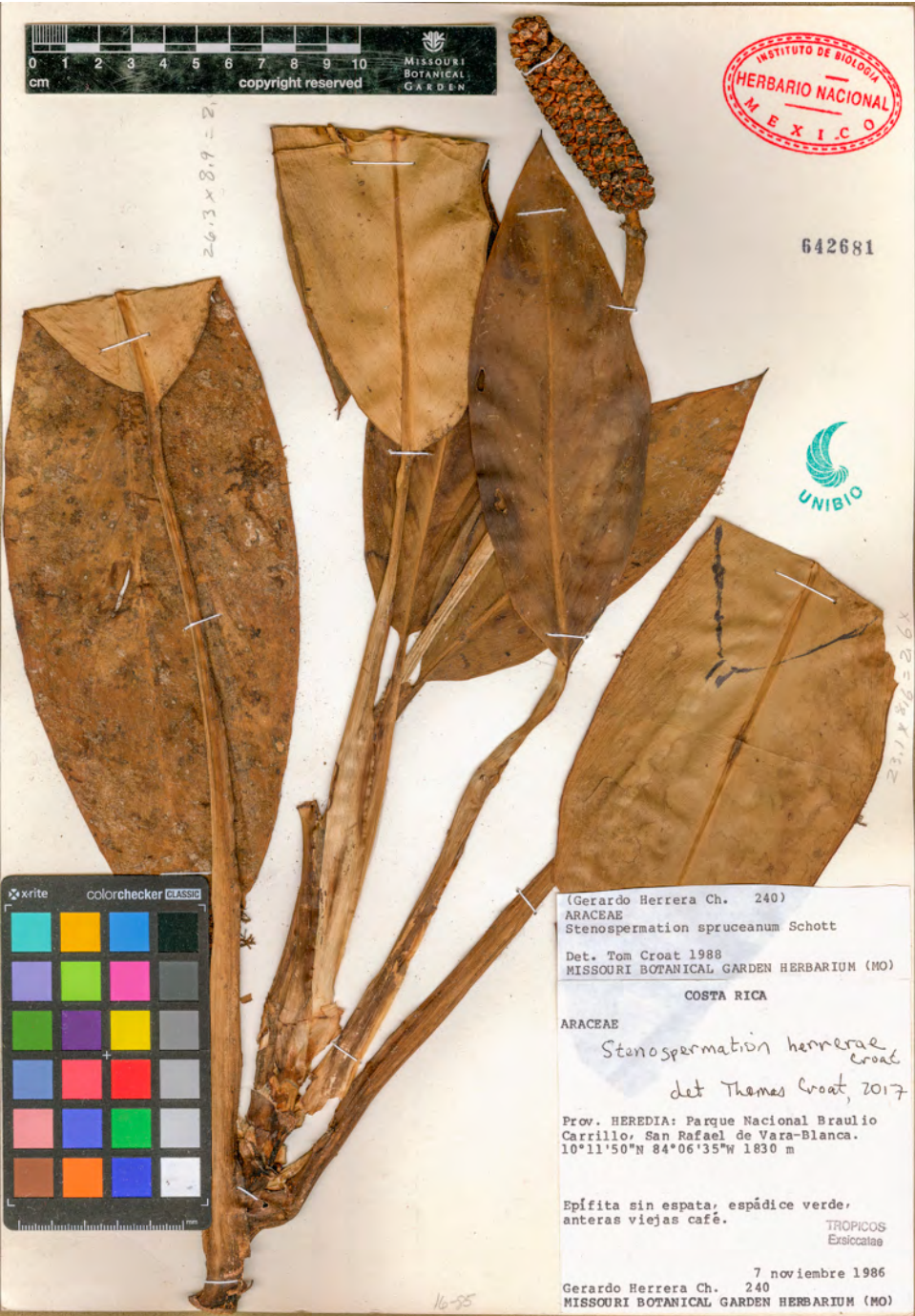


Figure 111: *Stenospermatum herrerae* TYPE, G. Herrera 240



Figure 112: *Stenospermatum herrerae*, Upper blade surface, TYPE *G. Herrera 240*

intervening area between the minor veins densely and conspicuously areolate ridged and undulated, frequently branched and discontinuous, with the larger intervening ridges differing only in being more continuous, not closely parallel and conspicuously granular as they are in *S. herrerae*. In addition, the upper surface of *S. spruceanum* lacks the short pale lineations of *S. herrerae*.

Etymology — *Stenospermatum herrerae* is named for Costa Rican botanist Gerardo Herrera who collected the type specimen and the first fertile collection of the species. Herrera was employed as a plant collector by the Museo de Historia Natural and was one of the finest and most knowledgeable botanists in the country knowing much about the better places to collect. The senior author can attest to his skills because Herrera spent some months at La Planada in Colombia and found a lot of species of Araceae after Croat thought he had already collected most of the Araceae. Gerardo also worked for the Missouri Botanical Garden, working on the Costa Rican Manual Project. While working for Missouri he was based mainly at Rincón de la Vieja. In addition, he worked with Vickie Funk and others on a study of the plants in the

vicinity of Volcán Arenal. In addition to his long expedition to Colombia mentioned above, Herrera also worked in Suriname collecting with Randy Evans of the Missouri Botanical Garden.

Paratype — Costa Rica: Heredia: Forested hilly region between headwaters of Río San Fernando and Río Sardinal, Atlantic slope of Volcán Barva. 10°12'N 84°06.5'W, 1850–1880 m, 22 April 1986, *Grayum* 7348 (MO-1987218)

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Stenospermation hodelii Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro, 3 km west from dirt road 50 m before Bocas del Toro/Chiriqui border from Fortuna/Chiriqui Grande road, then off foot path to west, 25 April 1993, 08°46'48"N, 82°14'00"W, 1000 m, *D.R. Hodel, J. Benzie, C. Hubbush* 1243 (holotype, MO-4352226)

Diagnosis. *Stenospermation hodelii* is characterized by its epiphytic climbing habit, internodes longer than broad, drying yellow-brown and finely ribbed, ovate-elliptic to elliptic, light grayish brown-drying leaves with prominently ridged elineate blades, a long inflorescence, yellow spathe and yellow, stipitate, narrowly oblong spadix with weakly raised, oblong stigmas.

Epiphytic, climbing; internodes longer than broad, 1.4–1.5 cm long, 6 mm diam., drying yellow-brown and finely ribbed; **petioles** 5.3–14.4 cm long, 0.5–1.0 times as long as blades, sheathed 0.38–0.92 the length of petiole, mostly from 1/3 to 2/3 the length on the lower leaves, drying yellow-brown, finely ribbed; **sheath** 4.9–8.8 cm long, drying yellow-brown, rounded to acute at apex; free part of petiole (0.6) 5.2–8.3 cm long; **blades** rarely inequilateral, ovate-elliptic to elliptic, 10.0–14.6 cm long, 3.7–5.6 cm wide, 2.3–3.6 times longer than wide, equally as long as petioles to 2 times longer than petioles, drying grayish yellow-brown above, yellow-brown below, papyraceous; midrib sunken, marginally paler along its border; **upper surface** prominently ridged at intervals of 1.0–1.4 mm, with one or sometimes two, intermediate, smaller and often discontinuous ribs, the intervening space irregularly granular and pustulate with little obvious alignment of ridging but mostly parallel to the ribs, lacking short-pale-lineations; lower surface smooth, finely striate, irregularly dark-punctate (but apparently from an external source). INFLORESCENCE longer than leaves, bracteate; peduncle 20.5 cm long, drying yellow, finely sulcate; spathe yellow as per notes, not seen; **spadix** stipitate 7 mm, 8.2 cm long, 6 mm diam., yellow, drying black; flowers four visible per spiral; pistils with style hexagonal; stigma oblong, drying with a pale-yellow rim, protruding; stamens rising above pistils. Flowering in late April. **Figures 113 & 114.**

Distribution — *Stenospermation hodelii* is endemic to Panama, known only from the type collection from Bocas del Toro Province along the Continental Divide and border with Chiriquí Province at 1000 m elevation on the border of a *Premontane rain forest* life zone and a *Lower montane wet forest* life zone.



Figure 113: *Stenospermation hodelii*, TYPE Hodel et al.1243



Figure 114: *Stenospermatum hodelii*, Upper blade surface, TYPE *Hodel et al. 1243*

Comments — *Stenospermatum hodelii* keys out with *S. steyermarkii* which differs by having much larger blades which are 5.5–7.4 times longer than wide and more than 6 cm wide and drying light brown to greenish gray. It also differs by having the spathe only slightly longer than spadix.

Etymology — *Stenospermatum hodelii* is named in honor of American botanist Donald R. Hodel who is the Environmental Horticulture Advisor at the University of California Cooperative Extension Service in Alhambra, California. Don graduated from the University of Hawaii in 1975 and has long been a specialist on both ferns and palms. He has collected widely in the neotropics and was in Panama collecting when he discovered this new *Stenospermatum* that bears his name.

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Stenospermation kamemotoanum Croat, **sp. nov.** —Type: PANAMA. Panamá: Cerro Jefe, along road just below the summit, 09°13'53"N, 79°22'59"W, 1000 m, 17 June 1994, T.B. Croat & G. Zhu 76209 (holotype, MO-04614007; isotype, PMA-039469)

Diagnosis. *Stenospermation kamemotoanum* is distinguished by its epiphytic scandent habit, short petioles sheathed 0.5–0.94 their length, the free-ending sheath, narrowly sulcate free portion of petiole, narrowly oblong-elliptic, shortly acuminate blades 3.5–5.7 times longer than broad as well as the short peduncles, white spathe and spadix that is stipitate, cylindroid, 2.4–3.5 cm long, 4.0–6.5 mm diam. near base, with an acute nipple at apex.

Scandent, epiphytic vine, sometimes pendent to 1.5 m; stems slender, sometimes branching near apex; internodes 1.0–4.2 cm long, 4–8 mm diam.. LEAVES spreading to erect, dispersed on stem; **petiole** 3.0–5.5(10.0) cm long, sheathed 0.5–0.94 its length, medium green, matte, 39–44 cm long (sulcus nearly closed on drying), drying dark brown, matte, bluntly ribbed; **sheath** 3–5 cm long, 3–5 mm high, incurled, margins concolorous, not brittle or flaking, usually prominently free-ending at apex, sometimes rounded; free part of petiole narrowly and deeply sulcate, 0.5–1.2(5.0) cm long; geniculum to 1.5 cm long but usually not apparent; **blades** narrowly oblong-elliptic, 7–15(18) cm long, 2.0–4.8 cm wide, 3.5–5.7 times longer than broad, broadest at the middle, 2.1–3.5 times longer than petioles, narrowly and usually shortly acuminate at apex, acute to attenuate at base, semiglossy, medium to dark green above, much paler below, drying dark brown and matte above, slightly paler and weakly glossy below; midrib sunken throughout above, concolorous, raised below; primary lateral veins inconspicuous, departing midrib at 10–20°. **upper surface** with minor veins 2.5–3.0 mm apart, weakly raised, usually with a medial rib, the intervening area finely and densely striate-granular and sparsely short-pale-lineate; lower surface with minor veins narrowly rounded, inconspicuous, uniformly and densely striate-ribbed and granular. INFLORESCENCE much shorter than leaves, erect, persisting erect after anthesis; peduncle 2.7–4.0 cm long, 2–3 mm diam. midway, drying yellow-brown, much shorter than petioles; spathe thin, white at anthesis, ovate-elliptic, matte on both surfaces, 2.7–4.3 cm long, 3–4 cm wide at anthesis, apiculate at apex; **spadix** white, erect, stipitate 2–7 mm, cylindroid, 2.4–3.5 cm long, 4.0–6.5 mm diam. near base, with an acute nipple at apex; flowers irregularly and jaggedly 4–6-sided, 2.4–3.6 mm diam.; style usually drying grayish to dark brown, matte, deeply concave, sometimes flattened; stigma 0.5–0.6 mm long, 0.4–0.5 mm wide, oval, moderately raised, margins light brown; stamens with filaments emerging just above the level of the tepals, 0.2 mm long, 0.3 mm wide; thecae ovoid, weakly divaricate. **Figures 115–117.**

Distribution — *Stenospermation kamemotoanum* is endemic to Panama, known only from Panama Province on Cerro Jefe and in Darién Province on Cerro Pirre with an outlying population in Veraguas, occurring in *Premontane rain forest*. Flowering throughout the year, mostly January to June; fruiting April, June, August.

Comments — *Stenospermation kamemotoanum* has been previously confused with *S. andreanum* in Central America but that species has leaf blade typically more grayish drying and lacking short pale lineations as well as having a spadix that is proportionately broader (nearly round in fruit) and with the stigma subrounded and comprising a much larger percentage of the total width of the pistils (about half of the distance across the style).



Figure 115: *Stenospermation kamemotoanum*, Kamemoto 274



Figure 116: *Stenospermation kamemotoanum*, TYPE Croat & Zhu 76209

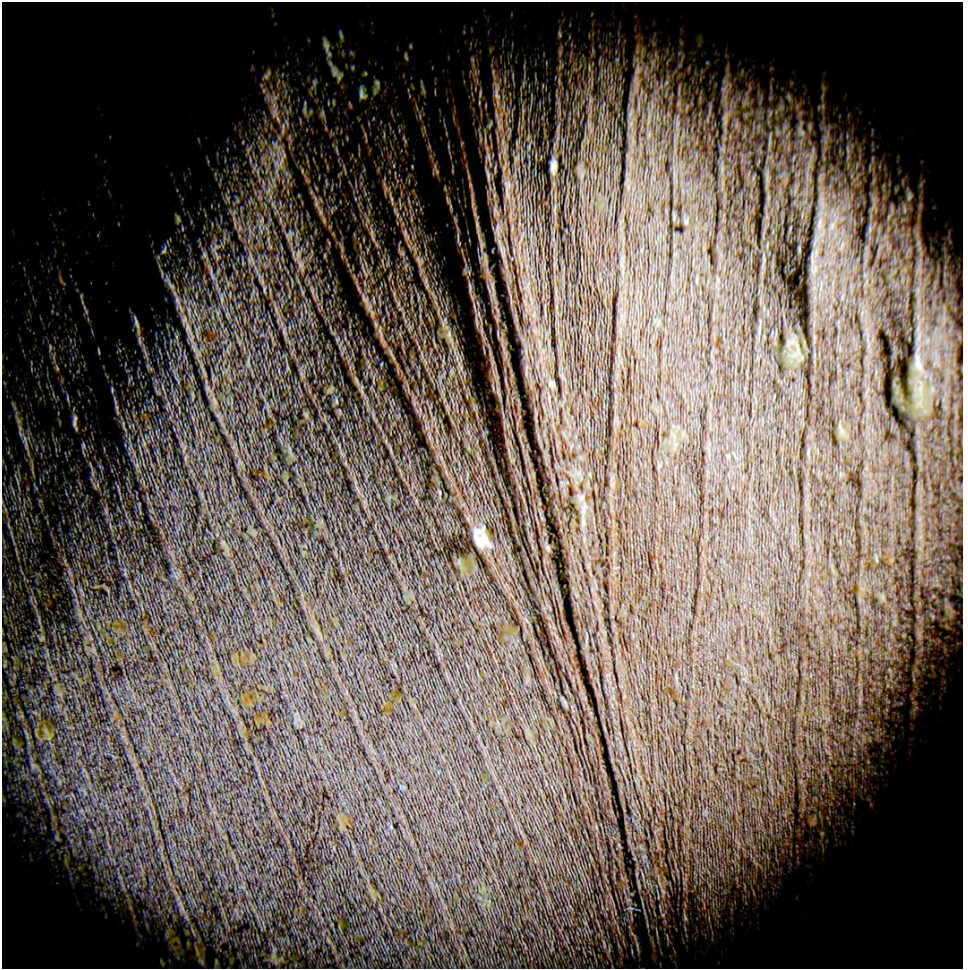


Figure 117: *Stenospermation kamemotoanum*, Upper blade surface, Croat & Zhu 76209

Etymology — *Stenospermation kamemotoanum* is named in honor of Hari Kamemoto, formerly a professor at the University of Hawaii, who found it in 1960. The only specimen of his that was seen is from a cultivated plant at the University of Hawaii made in 1974 by the senior author. Kamemoto did many years of research with *Anthurium*, breeding new cultivars for the Hawaiian cut flower industry.

Paratypes — **PANAMA. Darién:** Parque Nacional Darién, middle slopes on W side of Cerro Pirre. [Coordinates on original label 07°N, 077°45'W], 07°56'N 077°43'W - 07°56'N 077°45'W, 800 — 1050 m, 30 June 1988, *T.B. Croat 68700A* (MO); Vicinity of upper gold mining camp of Tyler Kittredge on headwaters of Rio Tuquesa ca. 2 air km from Continental Divide., 08°33'30"N 077°29'00"W, 600 m, 26 August 1974, *T.B. Croat 27205* (MO); **Panamá:** Cerro Jefe region, c. 9°15'N, 79°30'W. Forest near summit, c. 850 m., 09°15'N 079°30'W, 850 m, 24 August 1986, *G. McPherson 9978* (MO); Along El Llano-Carti road, near

Nussagandi., 09°15'N 079°00'W, 350 m, 21 July 1986, *G. McPherson* 9758 (MO); Panamá. Cerro Jefe. Specimen prepared October 1974 by Tom Croat., 09°14'22"N 079°22'30"W, 700 — 1000 m, 30 May 1984, *H. Kamemoto* 274 (MO); Vicinity of Altos de Pacora, 15–20 km WNW of Cerro Azul. *Premontane rain forest*, 09°16'30"N 079°18'50"W, 800 m, 30 Jun 1975, *S.A. Mori et al.* 6922 (MO); Altos del Río Pacora., 09°16'30"N 079°18'50"W, 2500 ft, 09 June 1967, *W.H. Lewis et al.* 2346 (MO); **Veraguas**: Santa Fe. 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* 27688 (GH, MO); **UNITED STATES. Hawaii**: Honolulu. Niu area, Oka Nursery, 445 Halaki St., 3 February 1986, *J. Lau & C. Cory* 1957 (MO).

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Stenospermation loiselleae Croat, **sp. nov.** — Type: COSTA RICA. Heredia: 9 km SW of San Ramon, *Premontane rain forest*, 10°16'N, 84°05'W, 1000 m, April 1986, *B.A. Loiselle* 197 (holotype, MO-5201132).

Diagnosis. *Stenospermation loiselleae* is characterized by its epiphytic habit, moderately short, slender internodes, long-petiolate, graceful leaves, slender petioles sheathed only 50–55% their length with the sheath spreading with a thin brittle brownish margin, small, narrowly elliptic, brown-drying, short, gradually acuminate blades with the upper surface with the minor veins close and moderately raised but with the intervening areas irregularly reticulate with moderately few, short pale lineations as well as by its moderately long-pedunculate, stubby, sessile spadix.

Epiphyte; internodes drying 7–10 mm long, 2.2–2.5 mm diam., drying black, matte; **petioles** 11.5–21.0 cm long, sheathed 0.3–0.8 their length; **sheath** 7.0–10.2 cm long, ending acute on the petiole, margins light brown, 2–3 mm broad, drying light brown and brittle, breaking up; free part of petiole weakly sulcate, 8.0–11.9 cm long (often not present or to 1.5 cm when subtending inflorescence), drying 1 mm diam.; geniculum 6 mm long, drying darker; **blades** 11.8–14.8 cm long, 3.8–4.3 cm wide, 2.9–3.7 times longer than wide, 0.58 to fully as long as petioles, drying dark brown and matte above, grayish brown and matte below; midrib deeply sunken, concolorous above, narrowly rounded, coarsely ribbed, darker brown below; primary lateral veins not obvious; **upper surface** with minor veins prominently and narrowly raised, closely spaced, the intervening areas areolate-ridged to finely striate, sparsely and thickly short pale-lineate; lower surface uniformly and closely striate-granular with obscure veins below. INFLORESCENCE erect; peduncle 21 cm long, drying 1.8 mm diam., light brown; spathe

not seen; **spadix** 3 cm long, 6 mm diam., bluntly rounded at apex. Flowering in March and April. **Figures 118 & 119.**

Distribution — *Stenospermation loiselleae* is endemic to Costa Rica, known only from the type locality in Heredia Province at 1000 m in a *Premontane wet forest* life zone.

Comments — *Stenospermation loiselleae* is clearly most closely related to *Stenospermation luisgomezii* but that species differs by having its petioles sheathed nearly throughout, the sheath margins mostly intact or only weakly fragmented, leaf blades more oblong and 4.7–9.0 times longer than wide, as well as a more long-pedunculate inflorescence with a proportionally longer spadix (10.3 times longer than broad and usually 9 cm long or more versus only 1.3 times longer than broad and less than 5 cm long for *S. loiselleae*). *Stenospermation loiselleae* is also close to *S. pucuroense*, which differs by having the petiole sheath inconspicuous and remaining intact with a spadix that is more than 13 times longer than wide.

Etymology — *Stenospermation loiselleae* is named in honor of ecologist Dr. Betty Loiselle, formerly at the University of Missouri and since 2014 the Director of Tropical Conservation



Figure 118: *Stenospermation loiselleae*, Upper blade surface, B. Loiselle 197



Figure 119: *Stenospermation loiselleae*, TYPE B. Loiselle 197

and Development Program at the Center for Latin American Studies at the University of Florida. Betty collected the type specimen during her ornithological studies in Costa Rica. Her research efforts involve studying the interaction of animals and plants, especially animal-mediated seed dispersal and its consequences for plant populations.

Paratype — Costa Rica. Heredia: 7.5 km N of Vara Blanca, vicinity of Río La Paz Grande, 1270–1350 m, 22 June 1976, *Croat 36021* (MO-2395281)

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Stenospermation luisgomezii Croat, **sp. nov.** — Type: COSTA RICA: Heredia: Forest of Río Vueltas, 10°05'24"N 084°04'12"W, 2100 m, 23 May 1969, *L.D. Gómez P. 2270* (holotype MO-2167424, isotypes, CR, F, L)

Diagnosis. *Stenospermation luisgomezii* is distinguished by its epiphytic habit, sheathing 1/2 to 4/5 the length of the petiole, with the margins thin and sometimes frayed, the sheath, when dry, narrowly lanceolate to oblanceolate, blades that average 6.5 times longer than wide, are matte on upper surface and glossy on lower surface as well as by a long-pedunculate inflorescence with a white spadix with a fertile portion at the apex and white berries.

Epiphytic appressed climber with spreading to scandent branches; internodes moderately short, 0.7–2.0 cm long, 4–6(9) mm diam., fibrous, drying medium to dark brown, often ribbed, densely granular. LEAVES scattered along stem; **petioles** 7.7–21.0 cm long, sheathed 0.50–0.95 their length, surface closely ribbed, short-pale-lineate, densely granular, free part of petiole 1 mm diam., narrowly C-shaped, narrowly and shallowly sulcate adaxially, margins obtuse, drying light brown to dark brown; **sheath** erect, (3)8–13(16) cm long, acute, obtuse, truncate at apex, margins usually intact, sometimes frayed along the very margin; **blades** narrowly lanceolate to narrowly oblong-elliptic or narrowly oblanceolate, 12.9–29.4 cm long, 2.2–5.2 cm wide, 4.6–9.2 times longer than wide, 1.0–2.3 times longer than petioles, acuminate at apex, narrowly acute at base, matte above, glossy below, drying bicolorous, subcoriaceous, dark brown to gray-brown, matte above, weakly paler, yellowish gray-brown to dark gray-brown below; midrib sunken and concolorous above, prominently raised and narrowly rounded below; primary lateral veins usually not at all apparent, sometimes drying visible; **upper surface** with minor veins close, moderately raised, 1.0–1.5 mm apart, the intermediate area finely striate and densely short pale-lineate to densely granular; lower surfaces with minor veins moderately raised with the intervening area both low-ridged and closely and evenly striate, sometimes dark-punctate, closely ridged. INFLORESCENCE pendulous, bracteate; peduncle 16.2–34.5 cm long, drying sulcate; spathe 11.9 cm long, greenish to greenish white to white; **spadix** white, stipitate 5–12 mm, (ca. 1.5 mm diam.), 5.8–9.1 cm long, 7–12 mm diam., pendulous, sterile portion at apex 3–6 spirals long, drying darker; flowers 5 visible per spiral;

stigma oblong; stamens held at level of styles; berries white. Flowers in March and April and again in August through October with fruits mature in March through July and September, November and December. **Figures 120–123.**

Distribution — *Stenospermaton luisgomezii* is endemic to Costa Rica (Alejuela, Cartago, Heredia, Limón, San José) at 800–2100 m in *Lower montane wet forest* and *Premontane rain forest* life zones.

Comments — *Stenospermaton luisgomezii* has been confused with several other similar species. In Costa Rica the species has been confused with both *S. pamsleeperae* with which it shares short pale lineations and *S. ramonense* which lacks short pale lineations. *Stenospermaton pamsleeperae* which occurs in Alejuela, Cartago and Limón Provinces at 1300–1500 m is separated by having leaf blades mostly 17–36 cm long and 3.0–5.7 cm wide with the upper surface uniformly smooth and seemingly lacking ridges while also being uniformly minutely striate and rowed-areolate with a uniform scattering of moderately faint short pale lineations. In contrast, *S. luisgomezii* has the leaf blades mostly 12–29 cm long and 2.0–3.5 cm wide with the upper surface closely ridged with at least one minor rib between each succeeding alternating larger rib and with the intermediate area closely ridged-granular with seemingly no difference in the prominence of the ribs.

Stenospermaton ramonense which also occurs in Alajuela Province differs from *S. luisgomezii* not only by lacking short pale lineations but by drying greenish gray.

Stenospermaton luisgomezii has also been confused with *S. monroi* from northeastern Panama but that species has much longer, more blackish-drying blades that are usually more than 8 times longer than broad. In contrast *S. luisgomezii* usually has blades less than 8 times longer than broad and usually drying lighter yellow brown to dark brown.

Stenospermaton luisgomezii differs from *S. multicostatum* by lacking prominently raised minor veins on the upper surface, blades that are too long and narrow, having a dense array of short-pale-lineations on both surfaces, and white berries. *Stenospermaton luisgomezii* is also similar to *S. coques* but that species differs by having a yellow spadix at anthesis, is endemic to Isla de Coca and occurs in a *Premontane wet forest* lifezone.

Specimens of *Stenospermaton luisgomezii* were previously determined as *S. spruceanum* Schott, a species from the upper Amazon region in Brazil and Venezuela that is mostly restricted to areas of white sand soil. That species also differs in being a mostly terrestrial species and by having grayish green to brownish leaves that are 1.0–3.4 times longer than broad with the upper surface drying irregularly ridged-reticulate, not with prominently raised and closely spaced minor veins without short pale lineations. *Stenospermaton spruceanum* was reported by A. Pérez de Gómez (1983) in a treatment of the genus *Stenospermaton* for Central America for her unpublished Master's thesis but the material that she included was in part *S. luisgomezii* Croat and in part *S. multisulcatum* Croat. Alternatively, the treatment of the Araceae for the Costa Rican Manual Project for Costa Rica completed by M. Grayum (2003) contained the specimens herein included in *S. luisgomezii*.



Figure 120: *Stenospermation luisgomezii*, TYPE L. D. Gomez 2270

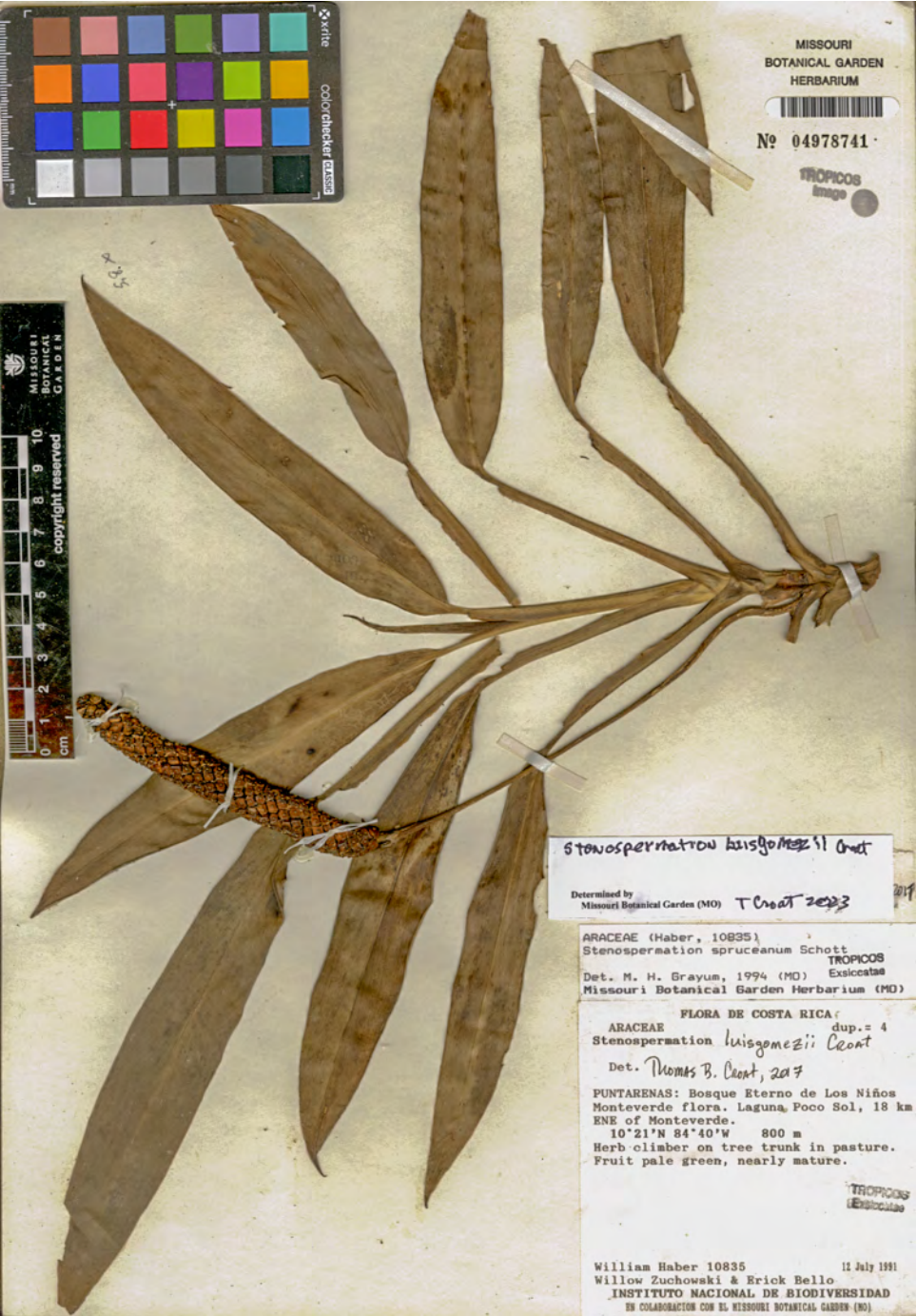


Figure 121: *Stenospermation luisgomezii*, Paratype Haber 10835



Figure 122: *Stenospermaton luisgomezii* , Paratype Soto 753



Figure 123: *Stenospermaton luisgomezii*, Upper blade surface, Paratype Haber 7168

Etymology — *Stenospermaton luisgomezii* is named in honor of the late Costa Rican botanist Dr. Luis Diego Gómez who made the first collection of the species in May 1969 in Heredia Province in Costa Rica. Luis spent much of his career at the Museo de Historia Natural in San José, serving as its Director between 1970 and 1985. He then served as Director of the Las Cruces Biological Station from 1986 until 2005 and finally as Director of the La Selva Biological Station from 2005 to 2007. He was a fern specialist who was well liked and successful personally, training and mentoring many young botanists. He died of leukemia on 13 November 2009.

Paratypes — **COSTA RICA. Alajuela** Monteverde Reserve, Peñas Blancas river valley, Atlantic slope rain forest., 10°20'N 84°43'W, 800 — 900 m, 17 September 1986, *W.A. Haber & E. Cruz L. 5647* (MO); Monteverde Reserve, Atlantic slope in valley of Río Peñas Blancas, along the river and north along the Reserve boundary where it crosses the river, 10°16'48"N 84°45'00"W, 900 — 950 m, 20 July 1985, *B.E. Hammel et al. 14237* (MO); Reserva Biológica Monteverde Río Peñas Blancas, 10°18'N 84°45'W, 900 m, 21 May 1987, *W.A. Haber & E. Bello C. 7168* (MO); Reserva Biológica Monteverde Río Peñas Blancas, Vertiente Atlántica, 10°18'N 84°45'W, 900 m, 24 July 1987, *W.A. Haber & E. Bello C. 7477* (MO); Reserva Biológica Monteverde Río Peñas Blancas, Bosque pluvial premontano, 10°18'36"N 84°43'48"W, 900 m, 9 March 1987, *W.A. Haber & E. Bello C. 6930* (MO);

San Ramón. Reserva Forestal, San Lorenzo, 10°14'24"N 084°37'48"W, 900 - 1000 m, 17 April 1982, *A. Carvajal* U. 145 (MO); *J. Gómez-Laurito* 24 (CR); **Cartago**: Paraíso. Tapantí Hydroelectric Reserve along Río Grande de Orosí, 4.5 km beyond small bridge which crosses the river inside the preserve, along road to diversion dam., 09°42'00"N 083°46'48"W, 1500 — 1700 m, 23 June 1976, *T.B. Croat* 36070 (MO); **Turrialba**. Along road from Moravia to Quebrada Platanillo (Tsipirí), disturbed primary forest (marketable lumber trees removed), 09°49'12"N 083°26'24"W, 1250 m, 1 July 1976, *T.B. Croat* 36692 (MO); **Heredia**: Heredia. R. F. Cordillera Volcanica Central. Cuenca del Sarapiquí. Albergue ALAS-1500, en Finca de Oscar Murillo. Potrereros del sector E del refugio., 10°14'25"N 084°07'29"W, 1430 m, 09 April 2005, *A. Soto & F. González* 753 (CR, MO); **Limón**: Cantón de Talamanca Camp by Kivut Trail between Kivut and Alto Lari, 1 Km up to Alto Lari Primary Forest, 09°24'00"N 083°04'48"W, 1200 - 1300 m, 6 March 1992, *J. Bittner* 1432 (B, MO); **Puntarenas**: Puntarenas. Bosque Eterno De Los Niños; Cordillera de Tilarán. Monteverde flora. Laguna Poco Sol 18 km ENE of Monteverde., 10°21'00"N 084°39'36"W, 800 m, 12 July 1991, *W.A. Haber et al.* 10835 (CR, MO); **San José**: Cerro entre Cerro Chimú y Cerro Fila Matama, Cordillera de Talamanca., 09°51'00"N 083°14'24"W, 1200 m, 30 abril 1985, *L. Diego Gómez P. et al.* 23570 (MO).

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Stenospermation luteynii A.P.Gómez & Croat, **sp. nov.** — Type: PANAMA. Guna Yala: El Llano—Carti Road, km 17–19, 19 June 1986, *G. de Nevers & H. Herrera* 7962 (holotype, MO-3446758; isotype, PMA).

Diagnosis. *Stenospermation luteynii* is characterized by its comparatively large size, grayish to yellowish brown-drying foliage, epiphytic habit, short internodes, long-petiolate leaves, usually fully sheathed petioles, acute geniculum, weakly bicolorous, elliptic-oblongate blades which are rounded and abruptly blunt-acute at apex with obscure primary lateral veins as well as a long-pedunculate inflorescence, long green spathe and a long white tapered spadix which lacks sterile flowers at the base.

Epiphytic or terrestrial, ca. 1 m tall, usually low growing but to as high as 12 m; stem to 60 cm long; internodes 2.0–3.5 cm long, 2.0–4.5 cm diam. LEAVES dispersed on stem, long-petiolate; **petioles** 17–34 cm long, 5–7 mm diam. midway, sheathed throughout or to 0.9 their length, drying dark brown, matte, obtusely folded and finely and minutely ridged; **sheath** 1–4 cm wide, to 1.3 cm midway, the apex obtuse on one side, acute on the other, often weakly free-ending, the margins tightly inrolled, thin, pale brown usually intact, often cracking free or loosened, paler; free part of petiole (1.0)2.2–7.5(9.0) cm long; geniculum 1.5 cm long, darker than petiole, acutely sulcate adaxially; **blades** elliptic to oblong-elliptic or elliptic-oblongate, 23–58 cm long, 9.5–14.0 cm wide, 2.6–3.2 times longer than wide, (1.3)1.7–1.8 times longer than petiole, broadest at the middle, rounded and abruptly blunt-acute at apex, acute at base, moderately coriaceous, dark green and matte above, slightly paler and semiglossy below, sometimes semiglossy on both surfaces, moderately bicolorous, drying dark brown to grayish

or yellow-brown and matte above, yellow-brown and weakly glossy below; midrib narrowly sunken above with a discolored band along its margins, narrowly rounded, finely ribbed and paler or slightly darker below; primary lateral veins obscure on both surfaces, 10–14 per side, departing midrib at 22–35°, weakly rounded and granular below; **upper surface** finely ridged to ridged-areolate, lacking short pale lineations, with minor veins drying weakly raised and the intervening area between the veins consisting of a series of irregular, distinct, bluntly angular, discontinuous, sometimes branching ridges running roughly parallel to the minor veins and these often interspersed with 1–3 rows of closely packed circular areolae; lower surface minutely granular with the minor veins weakly raised and with an irregular, dense layer of trichosclerids visible on the surface. INFLORESCENCE erect, arising above blades; bract leaf 24.2 cm long, 9.9 cm wide; peduncle 46–58 cm long, 6–8 mm diam. midway, twice as long as the petioles, drying dark reddish brown, weakly glossy; spathe white or pale green, greenish white inside, moderately coriaceous, drying dark brown, affixed at 120°, 19.2–23.0 cm long, 1.5 cm diam. when furled, 4.5 cm longer than spadix; **spadix** stipitate 0.6–1.5 cm (rarely sessile when immature (*Hammel 26256*), cylindrical, 11.5–14.5 cm long, 8–9 mm diam. midway; flowers ending abruptly at base, not extending onto the stipe, sterile flowers occurring at apex; pistils with style obtusely 6-sided, irregularly shaped, 2.2–2.8 × 1.6–2.5 mm, drying brownish, minutely papillate, matte; stigma oblong, deeply sunken, 0.8–1.0 mm long, 0.4–0.5 mm wide, oblong, sunken medially; anthers 0.3 mm long, 0.2 mm wide, oblong, not divaricate, pollen white. INFRUCTESCENCE not seen. Flowers in bud in March, flowers in April, May and June. **Figures 124–129.**

Distribution — *Stenospermatum luteynii* is endemic to Panamá, at 200 to 1160(1900) m in *Tropical wet forest* and *Premontane rain forest* life zones mostly in central Panama in Colón, Panamá and Guna Yala but with a few collections from Chiriquí Province.

Comments — *Stenospermatum luteynii* is most similar to *S. majus* which has similarly large leaf blades and fully sheathed petioles but that species has blades which typically dry darker brown on the upper surface with more or less evenly spaced, weakly raised minor veins with the intervening area smooth with fine and close rows of areolate cells in contrast to the prominently and acutely raised, irregular angled, discontinuous, sometimes branching ridges found in *S. luteynii*.

Etymology — First collected by Woodson & Schery in 1940 at El Valle de Antón, *Stenospermatum luteynii* was not collected again until 1973 when Ron Liesner collected it on the El Llano-Cartí Road. Alcira Gómez de Pérez, who revised *Stenospermatum* for Central America for her Master's Degree thesis (Gomez, 1983) selected the epithet "*luteynii*" for this species in honor of American botanist Jim Luteyn and we are following her suggested name. However, since the Luteyn collection has not been seen another type specimen was selected.

Paratypes — **PANAMA. Chiriquí:** Cerro Colorado., *T.B. Croat s.n.* (MO); **Coclé:** North rim of El Valle de Antón, near Cerro Turega., 08°36'18"N 080°10'36"W, 650 — 700 m, 30 June 1940, *R. E. Woodson, Jr. & R. W. Schery 195* (MO); La Mesa, above El Valle de Antón, ca. 2 km W of Cerro Pilón on slopes of steep hill., 08°37'30"N 080°07'30"W, 860 — 900 m, 21 July 1976, *T.B. Croat 37376* (MO); La Pintada. Along road between Penonomé and Coclecito on slopes above Río Cascajal, 5.7 mi N of Llano Grande, Atlantic slope; on huge boulder, 08°42'07"N 080°27'06"W, 210 m, 12 Sept. 1987, *T.B. Croat 67537* (MO); **Colón:** Donoso District; MPSA Concession, Valle Grande, 08°49'31"N, 80°40'11"W, 291 m, 18 May 2012,



Figure 124: *Stenospermation luteynii*, live plant, Paratype *Croat 33708*



Figure 125: *Stenospermation luteynii* TYPE de Nevers & H. Herrera 7962

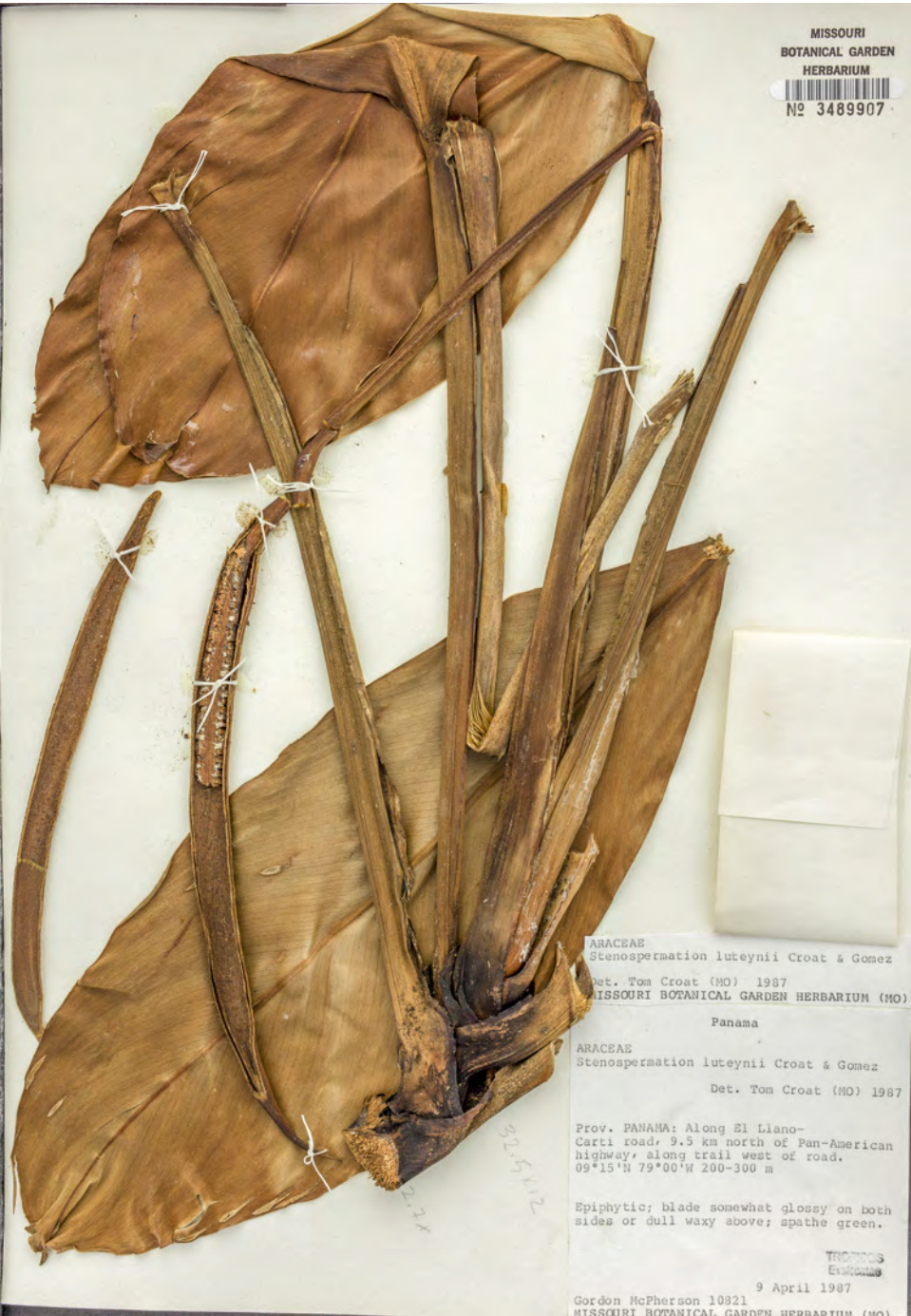


Figure 126: *Stenospermation luteynii*, McPherson 10821



Figure 127: *Stenospermatum luteynii*, Croat 67537



Figure 128: *Stenospermatum luteynii*, with sessile spadix when immature, *Hammel 26256*



Figure 129: *Stenospermatum luteynii*, Upper blade surface, Paratype Croat 67537

B.E. Hammel 26256 (MO); Panamá. Panamá: along road to La Eneida, 900–1000 m, *Luteyn* 3213 (DUKE). 9–12 mi E of Transisthmian Highway on Santa Rita ridge. [Coordinates on original label: 09°20'N, 079°45'W], 09°22'00"N 079°39'30"W - 09°23'30"N 079°41'30"W, 500 - 550 m, 17- 18 April 1988, *Sue A. Thompson* 4841 (MO); Donoso. MPSA Concession. Valle Grande. Collected with: J. De Gracia, J. Martínez, H. Quiel, & M. Merello. (UTM 536312, 975563), 08°49'31"N 080°40'11"W, 291 m, 18 May 2012, *B.E. Hammel* 26256 (MO); **Panamá:** Along El Llano- Carti road, 9.5 km north of Pan-American highway, along trail west of road., 09°15'N 079°00'W, 200 - 300 m, 09 April 1987, *G. McPherson* 10821 (MO); Guna Yala Nusigandi, along El Llano-Carti Road, 0.7 miles beyond Cuna Headquarters, located 10.9 miles N of Pan-American Highway, 11.6 miles N of Pan-American Highway., 09°18'N 078°59'W, 450 m, 03 April 1993, *T.B. Croat* 75123 (MO); Chepo. Along El Llano Carti-Tupile road; 12 mi above Pan-Am Hwy., 09°18'40"N 078°56'40"W, 200 - 500 m, 26 - 27 March 1973, *Ronald L. Liesner* 1213 (MO); El Llano-Cartí Road, 5-6 miles N of Interamerican Highway at El Llano, 09°15'30"N 078°55'50"W, 350 - 375 m, 7 May 1976, *T.B. Croat* 34784 (MO); El Llano-Cartí Road, 5-6 miles N of Interamerican Highway at El

Llano, 09°15'30"N 078°55'50"W, 350 - 375 m, 7 May 1976, *T.B. Croat 34800* (MO); El Llano-Cartí Road, 10 miles from main gate near El Llano, 09°17'45"N 078°56'15"W, 27 March 1976, *T.B. Croat 33708* (MO); El Llano-Cartí Road 10 miles from Interamerican Highway near El Llano., 09°17'45"N 078°56'15"W, 330 m, 28 March 1976, *T.B. Croat 33811* (MO); Along El Llano-Cartí road, near border with Province of Guna Yala; in forest along road on steep slopes; virgin forest, 09°19'40"N 078°57'05"W, 325 - 350 m, 17 July 1987, *T.B. Croat 67397* (MO).

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Stenospermation majus Grayum, Phytologia 82(1):50. 1997 — Type: Costa Rica. Alajuela: Reserva Forestal de San Ramón, ca. 10 km W of Laguitos, in forest on ridge and secondary woods along Río San Loreneito, 10°18'N, 84°34'W, 850–1100 m, 30 May–1 June 1986, *B. Hammel, G. de Nevers & C. Gómez 15285* (holotype, MO-3474411).

Epiphyte on stumps, tree trunks, occasionally in the canopy; internodes short, 4 cm diam., covered by persisting petiole sheath; **petioles** (11.0)14.0–38.5(43.5) cm long, sheathed usually from 1/2 to 2/3, sometimes ¾ to fully throughout their length, the free part of petiole 1–16 cm long, C-shaped, sulcate adaxially, the margins obtuse to acutely angular; **sheath** 10–22 cm long, usually acute to rounded where ending on petiole at apex, margins remaining intact, **blades** (12)18–42(48) cm long, 6–17 cm wide, 2.4–3.3 times longer than wide, 1.1–2.4 times longer than petioles, elliptic, acute and apiculate to shortly acuminate at apex, acute to weakly attenuate at base, coriaceous, rubbery, weakly bicolorous, bright dark green and glossy above, glossy to semiglossy below, drying dark brown above, slightly paler and yellow-brown below; midrib sunken and paler above, convex and paler below; primary lateral veins obscure, the lateral minor veins apparent, moderately close and weakly raised on both surfaces on drying; **upper surface** moderately smooth without magnification, minor veins narrowly rounded and 2–3 mm apart, the intervening area finely and irregularly ridged, sparsely and inconspicuously short-pale-lineate; lower surface moderately smooth on drying with obtusely raised granular minor veins with a tight array of striae and dark granulations. INFLORESCENCE with peduncle 23–39(46) cm long; spathe pale green; **spadix** 10.7–19.0(22.5) cm long, 1.0–1.4(1.9) cm wide, cream-colored to yellowish, the stipe 5–22 mm long (to 4 cm in fruit); pistils usually extending loosely onto the stipe; style acutely 4–6-sided, orange-brown to dark brown, matte, 1.6–2.0 mm wide; stigma circular to subelliptic, raised with a pale rim, drying black in the center, 0.6 mm diam.; berries white. **Figures 130–134.**

Distribution — *Stenospermation majus* is endemic to the Caribbean coast of Costa Rica, at 500–1200 m in Tropical wet and Lower montane rainforest life zone in relatively inaccessible regions on the Caribbean slope in the Cordillera de Tilarán, Cordillera Central and Cordillera de Talamanca. Flowering February–April, June and July, November.

Comments — *Stenospermation majus* is recognized by its comparatively large size, the reddish



Figure 130: *Stenospermation majus*, Entire plant on ground, Croat 78904



Figure 131: *Stenospermation majus*, Inflorescence without spathe, *Croat 78904*



Figure 132: *Stenospermatum majus*, TYPE, Hammel 15285



Figure 133: *Stenospermation majus*, Gomez 23573



Figure 134: *Stenospermatum_majus*, Upper blade surface, *Hammel 15285*

brown dried foliage, the petiole sheath usually acute to rounded where ending on petiole at apex, the sheath margins remaining intact, the free part of petiole C-shaped and sulcate adaxially, elliptic, acute and apiculate to shortly acuminate blades 2.4–3.3 times longer than wide with the upper surface moderately smooth and the minor veins narrowly rounded and 2–3 mm apart, the intervening area finely and irregularly ridged, sparsely and inconspicuously short-pale-lineate as well as the pale green spathe and cream-colored to yellowish, stipitate, elongated spadix.

Stenospermaton majus is most similar to *Stenospermaton luteynii* which has similarly large leaf blades and fully sheathed petioles but that species has blades which dry usually grayish on the upper surface and have the intervening area between the raised minor veins consisting of a series of irregular, distinct, bluntly angular, discontinuous, sometimes branching ridges running roughly parallel to the minor veins and these interspersed with 1–3 rows of closely packed circular areolae. In contrast the upper surface of *S. majus* dries smooth and has the intervening area between the veins consisting of a continuous, closely packed areolae, usually in distinct rows. Finally, the spadix of *S. luteynii* has the flowers terminating abruptly, not extending loosely onto the stipe as in *S. majus*.

Additional Specimens Seen — COSTA RICA. Alajuela: Reserva Biológica Monteverde Río Peñas Blancas, 10°18'36"N 84°42'36"W, 1000 m, 1 November 1988, *E. Bello C. 522* (CR, MO); *E. Bello C. 165* (CR); Reserva Biológica Monteverde Valle del Río Peñas Blancas, Quebrada Celeste, 10°20'N 84°43'W, 950 m, 20 March 1987, *W.A. Haber & E. Bello C. 7067* (MO); San Carlos. Peñas Blancas, 10°18'24"N 84°44'19"W, 900 m, 10 julio 1985, *W.A. Haber & E. Bello C. 1920* (MO); San Ramón. Bosque Eterno De Los Niños, Cordillera de Tilarán, Atlantic slope, Río Peñas Blancas valley, Laguna Poco Sol, 10°21'00"N 84°39'36"W, 840 m, 27 April 1992, *W.A. Haber & W. Zuchowski 11153* (CR, MO); **Heredia:** m, *M.H. Grayum & P.J. Sleeper 6531* (CR, MO); **Limón:** Parque Internacional La Amistad Crotiña, camino a Amubri, Quebrada Croti y Quebrada Lumbeta, 09°25'12"N 82°58'48"W, 800 m, 13 July 1989, *A. Chacón 169* (MO); Limón. *A. Chacón 108* (CR); **San José:** Cerro entre Cerro Chimú y Cerro Fila Matama, Cordillera de Talamanca., 09°51'00"N 83°14'24"W, 1200 m, 30 abril 1985, *L.D. Gómez P., G. Herrera Ch. & J. Berrocal 23573* (MO); 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, 05 September 1996, *T.B. Croat 78904* (CR, MO); Vazquez de Coronado. Braulio Carrillo National Park, along Highway San José to Siquierres Highway, 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 78760* (CR, MO); **PANAMA. Bocas del Toro:** Changuinola. Area of the community of Guayacan., 300 m, 30 August 2007, *S. Laube et al. SL 372* (PMA).

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Stenospermation maloneanum Croat, **sp. nov.** — Type: COSTA RICA. Puntarenas, Vicinity of Boscosa, at Quebrada Aguabuena, 08°42'01"N, 83°30'48"W, 50 m, 11 September 1996, T.B. Croat & D.P. Hannon 79241A (holotype, MO-6571457; isotype CR)

Diagnosis. *Stenospermation maloneanum* is characterized by short internodes, petioles sheathed 0.85 times their length, blades that are 3.4 times longer than wide with prominent short-pale-lineations visible to the naked eye on the upper surface, a short, cylindroid, pale-yellow spadix with an apical sterile portion of the spadix that dries waxy and matte.

Habit unknown; internodes short, 0.8 cm diam., drying gray-black; **petioles** erect, 13–17 cm long, sheathed 0.85 length of petiole, terete, green, semiglossy, narrow and acutely sulcate, 0.4 cm diam., drying dark gray-green; **sheath** 10.7–13.5 cm long, drying darker than shaft, dark brown, acute at apex, margin thin, persisting intact; free part of petiole 1.3–4.7 cm long. **LEAVES** erect; **blades** ovate to narrowly elliptic, 21.5–24.2 cm long, 5.9–8.5 cm wide, 3.4 times longer than wide, 1.5 times longer than petioles, subcoriaceous, acuminate at apex, obtuse to acute at base, dark green and moderately velvety above, paler and semiglossy below, 22.5–25.0 cm long, 7.0–9.2 cm wide; midrib narrowly sunken and slightly discolored above, narrowly convex below; primary lateral veins weakly visible; **upper surface** with prominent and frequent short-pale-lineations, slight ruminant ridges, granular; lower surface with frequent short-pale-lineations, grooved throughout. **INFLORESCENCE** erect, bracteate; peduncle green, 19.0 cm long, 4 mm diam., terete, drying sulcate, yellow; spathe erect, fleshy, yellowish cream, 5.5–6.9 cm long, 8.5 cm wide flattened, 85 ° angle of insertion, drying yellow-brown, attached; **spadix** stipitate 4–6 mm, (the stipe pale green), pale yellow, cylindrical, erect, 4.0–4.5 cm long, 5–9 mm diam., sterile portion at apex drying black, waxy, matte, three spirals long; flowers 5–6 visible per spiral; stigma hexagonal to quadrangular, mammillate; stamens obovoid, nested at same level as pistils; berries unknown. Flowering in September. **Figures 135 & 136.**

Distribution — *Stenospermation maloneanum* is endemic to Costa Rica, found only in the Vicinity of Boscosa at 50 m elevation in a *Premontane wet forest basal belt transition* life zone.

Comments — *Stenospermation maloneanum* was first identified as *Stenospermation ulei* K.Krause. *Stenospermation maloneanum* has prominent short-pale-lineations that are visible to the naked eye, as does *Stenospermation ulei*. However, *S. ulei* is sheathed ca 1/2 the length of the petiole, *S. maloneanum* is sheathed ca 4/5 the length of the petiole. *S. ulei* has scandent internodes, *S. maloneanum* has short ones. The spadix on *S. maloneanum* has a distinctive sterile portion present on its spadices that is not present in *S. ulei*. The geographical locality of the types also indicates that the species are distinct.

Etymology — *Stenospermation maloneanum* is named in honor of Amanda Malone, a co-author of this revision and an REU Student at the Missouri Botanical Garden during the summer of 2016. Mandy was later a graduate student at the University of Colorado. She took on a very difficult revision and accomplished an amazing amount in a very short time. Her taxonomic skills and work ethic as well as her organizational skills allowed this project to be mostly finished by the time she left at the end of her 10-week course.



Figure 135: *Stenospermation malonianum*, TYPE Croat 79241A



Figure 136: *Stenospermation_malonianum*, Upper blade surface, *Croat 79241A*

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Stenospermation marantifolium Hemsl., Biol. Centr. Am. Bot. 3: 425. 1885. — Type: Nicaragua. 1867–68, *R. Tate 401* (holotype, K).

Epiphytic or terrestrial; stems green, glaucous, terete, +/- elongate, fleshy; internodes 1–4 cm long, 0.5–1.4 cm diam; cataphylls thick, 5.0–7.5 cm long, ribbed throughout, apiculate 0.5–1.1 mm at apex, drying, sometimes persisting but usually deciduous in the lower part of the stem. LEAVES spreading, clustered at apex of stem; **petioles** 3.5–8.5 cm long, 4–8 mm diam. midway, sheathed 0.5–0.9 their length, flexible, terete, 0.3–0.5 as long as the blades; **sheath** 5.0–7.5 cm long, 0.7–1.4 cm wide, persisting, extending to the geniculum or throughout, inequilateral at apex, obtuse on one side, acute on the other, sometimes truncate; margins thin but intact; free part of petiole (0.5)1–6 cm long; geniculum 2.0–2.5 cm long, slightly thicker and paler than the petiole; **blades** ovate-oblong to oblong-elliptic, 15.0–33.5 cm long, 5.3–13.0 cm wide, 2.3–3.6 times longer than wide, 3.0–4.6 times longer than petioles, usually broadest in the middle to above the middle, sometimes in lower half, inequilateral

(one side 3–10 mm wider), usually abruptly short-acuminate, sometimes long-acuminate, usually downturned at apex, (the acumen apiculate), acute to narrowly obtuse at base, drying yellow-green (pale olive) to green, semiglossy, dark green and glossy above, slightly paler and semiglossy below, greenish yellow to yellow-brown below; midrib sunken above toward apex, slightly paler than surface, narrowly rounded below, drying broadly raised and obtusely ribbed, nearly concolorous below; primary lateral veins 8–11 per side, barely distinguishable on either surface, departing midrib at 20–40°, slightly raised and arcuate-ascending, drying prominulous, especially below; interprimary veins similar to primary lateral veins; prophylls 2 cm long; **upper surface** with weakly raised minor veins with the intervening surfaces smooth, finely, closely and uniformly areolate striate, sometimes weakly short-pale-lineate, frequently sparsely pustular; lower surface with closely spaced, narrowly rounded minor veins, otherwise smooth except for sparse pustules. INFLORESCENCE usually solitary, erect, shorter than leaves; peduncle (6)8–9(15) cm long, 5–7 mm diam. midway, stiff, equaling to twice as long as petioles; spathe thick, greenish at anthesis, ovate-elliptic, semiglossy on upper surface, matte on lower surface, 6.5–7.0 cm long, 6.5 cm wide, broadest at the middle, deciduous, spreading, acuminate at the apex; stipe 0.6–1.7 cm long, 3–7 mm wide, slightly paler than peduncle; **spadix** stipitate, erect, oblong, 3.5–8.2 cm long, 1 cm diam. near the apex; flowers irregularly shaped but usually hexagonal (trapezoidal at apex), 2.5–2.8 mm long in direction of axis, 2.5–2.8 mm wide perpendicular to axis; stigma 0.5–0.8 mm long, round to oblong, slightly tan; stamens with filaments 0.3–0.8 mm long, 0.4–0.5 mm wide, exserted; anthers 0.4 mm long, 0.4–0.5 mm wide; thecae oblong, not divaricate; pollen white. INFRUCTESCENCE white with spathe deciduous; the spadix 6.0–9.5 cm long, 1.8–2.3 cm wide; seeds (dried), 2.3–2.6 mm long, 0.9–1.0 mm wide. Flowering and fruiting year-round, but usually between March and June. **Figures 137–148.**

Distribution — *Stenospermation marantifolium* is known from Nicaragua, Panama, Costa Rica and Colombia (Chocó), 0–2100 m in *Premontane wet forest*, *Tropical wet forest* and *Premontane rain forest*.

Comments — *Stenospermation marantifolium* is characterized by its glaucous elongated internodes, petioles sheathed 0.5–0.9 their length, the ovate-oblong to oblong-elliptic blades 2.3–3.6 times longer than wide with the minor veins on upper surface weakly raised with the intervening surfaces smooth, finely, closely and uniformly areolate striate, sometimes weakly short-pale-lineate, frequently sparsely pustular as well as the greenish spathe and an erect stipitate, erect, oblong whitish spadix.

Stenospermation marantifolium might be confused with *S. dukei* which differs in having smaller leaves with the upper surface more conspicuously close-veined with the intervening area smooth and densely short pale-lineate, scarcely cross-veined.

Croat 33268 and *Croat 69130A* from Cerro Colorado in Bocas del Toro Province in Panama may represent *Stenospermation marantifolium* and are included here but differ in having petioles to 12 cm long, a broader petiole sheath, blades that are more conspicuously sparse-granular on the upper surface as well as longer, broader and more yellowish peduncles to 23 cm long.

Additional Specimens Seen — COSTA RICA. **Alajuela:** border of Alajuela and Guanacaste Province, Bijagua de Upala vicinity to Río Naranjo, north and west of Volcán Tenorio, 10°43'48"N 085°03'00"W, 600 m, 05 July 1988, *B. E. Hammel & L. Flores 17081* (CR, MO); Reserva Biológica Monteverde, Cordille de Tilarán, Estación Eladio's., 10°18'36"N 084°42'36"W, 820 m, 2 October 1990, *E. Bello C. 2434* (CR); Along road between Cañas and Upala, 4 km NNE of Bijagua on slopes leading into Río Zapote, 10°44'24"N 085°04'12"W, 400 m, 24 June 1976, *T.B. Croat 36280* (MO); Along road between Cañas and Upala, 4 km NNE of Bijagua on slopes leading into Río Zapote., 10°44'24"N 085°04'12"W, 400 m, 24 June 1976, *T.B. Croat 36323* (MO); Braulio Carillo National Park, along trail to Río Sucio, site of old Carillo Station, 10°09'50"N 083°57'10"W, 600 - 700 m, 18 June 1997, *T.B. Croat 79586* (MO); San Bosco, Monteverde Río Peñas Blancas, 10°23'N 084°40'W, 900 m, 13 January 1988, *W.A. Haber & E. Bello C. 8053* (MO); Reserva Monteverde, Poco Sol, 13 km South Fortuna, 10°21'N 084°41'W, 700 - 900 m, 20 August 1989, *W.A. Haber & W. Zuchowski 9469, 9471* (MO); Guatuso. Parque Nacional Tenorio, Cuenca del Río Frío, Bijaqua, El Pilón. Colectando en bosque secundario y primario, 10°42'00"N 085°00'00"W, 800 m, 10 January 2000, *E. Alfaro et al. 2650* (MO); Parque Nacional Volcán Tenorio, Cuenca del Río Frío, Bijagua, El Pilón; colectado en bosque secundario, 10°42'17"N 084°59'32"W, 800 m, 20 Jun 2001, *J.L. Chaves 1184* (MO); Upala. Bijagua El Pilón, Cabeceras del Río Celeste, 10°48'36"N 084°57'00"W, 700 m, 21 April 1988, *G. Herrera Ch. 1854* (MO); Parque Nacional Guanacaste, Cordillera de Guanacaste, Estación San Ramón, Dos Ríos, 10°52'48"N 085°24'00"W, 550 m, 03 abril 1993, *M. Chinchilla 86* (CR); **Cartago:** Turrialba. CATIE. Faldas del cañón del Río Reventazón, por el Sendero Los Espaveles, 09°52'48"N 083°39'00"W, 600 m, 16 May 1989, *B. E. Hammel et al. 17337* (MO); Parque Nacional Barbilla, Cuenca del Matina, Sendero Principal, colectada junto al Río Dantas, 09°58'20"N 083°27'10"W, 300 - 400 m, 26 June 2000, *E.M. Castro 1340* (MO); Trail from Instituto de Ciencias Agrícolas to Río Reventazón, Turrialba, 09°53'24"N 083°38'24"W, 340 - 440 m, 14 April 1953, *H.E. Moore 6706* (BH); **Guanacaste:** Parque Nacional Guanacaste. Estación Pitilla. Camino al Este de la tornado hace ca 3 años. * Grupo de Estudiantes de Biodiversidad, 11°01'48"N 085°24'36"W, 600 m, 24 May 1989, *B.E. Hammel 17367* (CM, CR, MO); **Heredia:** La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 20 March 1980, *B.E. Hammel 8178* (DUKE, MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25'53"N 084°00'13"W, 100 m, 30 August 1980, *B. E. Hammel 9635* (DUKE); La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 5 March 1981, *J. P. Folsom 9227* (DUKE); La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 5 April 1981, *J. P. Folsom 9630* (DUKE); La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 2 April 1981, *J.P. Folsom 9604* (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, 12 August 1979, *M.H. Grayum 2312* (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 2455* (DUKE); Forest between Río Peje and Río Sardinalito, Atlantic slope of Volcán Barva, 10°17'30"N 084°04'30"W, 700 - 950 m, 09 April 1986, *M.H. Grayum 6933* (MO); Zona Protectora, N slopes of Volcan Barba, between Río Peje and Río Guacimo. Along Quebrada Cantarana, upstream from base camp, 10°25'12"N 084°01'12"W,



Figure 137: *Stenospermatum marantifolium*, Habit of fruiting plant, Photo C. Galdames 7441-478

300 - 400 m, 16 January 1983, *M.H. Grayum et al. 3151* (DUKE); La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 29 May 1985, *R.L. Wilbur 37611* (DUKE); La Selva Biological Station, 10°25'53"N 084°00'13"W, 100 m, 6 December 1979, *R.L. Wilbur 28282* (DUKE); Heredia. Parque Nacional Braulio Carrillo Quebrada Sanguijuela, 10°14'24"N 084°00'00"W, 500 m, 17 May 1988, *M.M. Chavarría & G. U. Dodero 151* (MO); Sarapiquí. Llanura de San Carlos. Camino del lado N de San Miguel (distrito Sarapiquí) directamente E al R, 10°18'36"N 084°12'00"W, 400 m, 23 November 1994, *B. E. Hammel et al. 19686* (CR, MO); La Selva Biological Station. Sendero: SJ 2020m. Der. 10 m. Sobre tronco de Ceiba



Figure 138: *Stenospermation marantifolium*, Inflorescence, Croat 76883



Figure 139: *Stenospermation marantifolium*, Leaf base and petiole, Croat 76233

pentandra a 30 m. de altura; 10°25'53"N 084°00'13"W, 100 m, 12/6/2005, *O. Vargas 1376*(MO). **Limón:** Parque Internac. La Amistad Fila Tsiurábeta, entre Ríos Urén y Lari, 09°27'00"N 083°00'00"W, 800 m, 26 July 1989, *A. Chacón 300* (MO); Talamanca. Csaki, 09°29'24"N 082°57'36"W, 1895, *A. Tonduz 9508* (BR); Hills 2 airline km SSE of Islas Buena Vista in the Río Colorado, 14 airline km SW of Barra del Colorado, 10°40'N 083°40'W, 10 - 120 m, 13 - 14 September 1986, *G. Davidse & G. Herrera Ch. 31006* (MO); Hills 2 airline km SSE of Islas Buena Vista in the Río Colorado, 14 airline km SW of Barra del Colorado, 10°40'N 083°40'W, 10 - 120 m, 13 - 14 September 1986, *G. Davidse & G. Herrera Ch. 31076* (MO); Cordillera de Talamanca between headwaters of Río Madre de Dios and Quebrada Barreal, 10°01'48"N 083°27'00"W, 400 - 440 m, 5 September 1988, *M.H. Grayum et al. 8792* (MO); W side of Río Colorado about 2 km upstream from downstream branch of Caño



Figure 140: *Stenospermatum marantifolium*, Inflorescence at anthesis, *Croat 74938*, MBG Greenhouse, Photo by Randy Headrick



Figure 141: *Stenospermation marantifolium*, Inflorescence with long-stipitate spadix, Croat 74938



Figure 142: *Stenospermation marantifolium*, Inflorescence at anthesis with falling spathe and stamens exuding pollen, *Croat 74938*, MBG Greenhouse, Photo by R. Headrick



Figure 143: *Stenospermation marantifolium*, Inflorescence, *Croat 74938* MBG Greenhouse, Photo by R Headrick



Figure 144: *Stenospermation marantifolium*, Infructescence, O. Ortiz 8249 Cerro Jefe, Photo J. Harrison



Figure 145: *Stenospermatum marantifolium*, Morillo 23362



Figure 146: *Stenospermatum marantifolium*, Croat 76883



Figure 147: *Stenospermation marantifolium*, Croat 27437

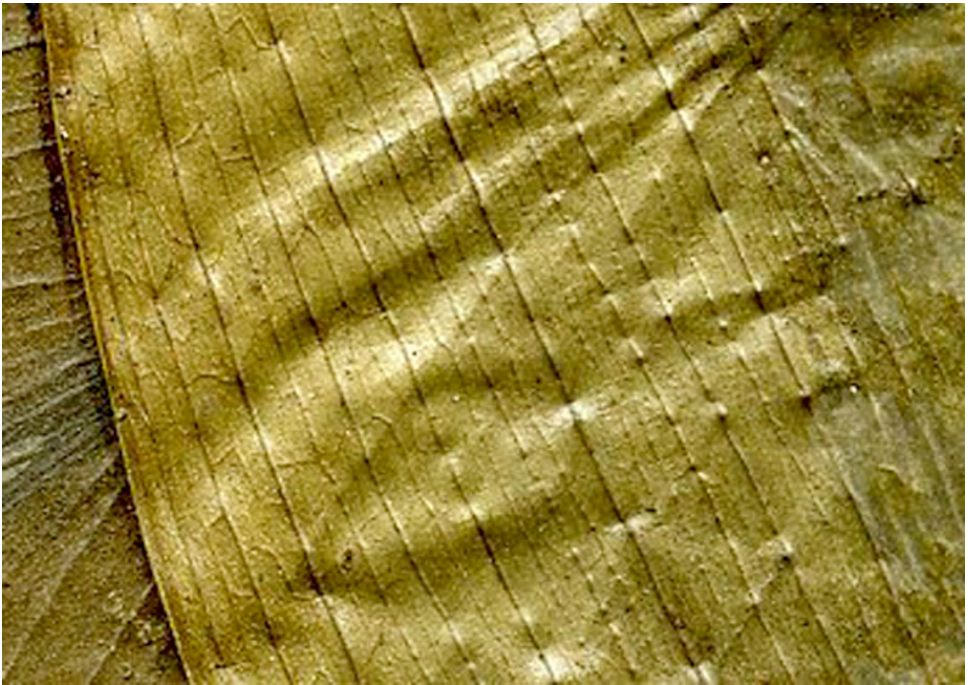


Figure 148: *Stenospermatum marantifolium*, Upper blade surface, *Croat & Zhu 76883*

Bravo, 10°43'N 083°40'W, 5 m, 25 January 1986, *W. D. Stevens 24042* (MO); Cerro Coronel, E of Laguna Danto, 10°41'N 083°38'W, 20 - 170 m, 15 - 20 September 1986, *W. D. Stevens & O. M. Montiel J. 24393* (MO); Matina. P.N. Barbilla. Cuenca del Matina. Sector Colonia Puriscaleña, Sendero Cerro Azul, 09°59'45"N 083°23'08"W, 400 - 500 m, 11 March 2000, *E.M. Castro 937* (MO); Pococí. along shore of Laguna de Enmedio, NNE of Barra del Colorado. 10°47'-51'N 83°36'-37'W 0-2 m, 10°51'N 083°37'W, 0-2 m, 18 March 1987, *W. D. Stevens et al. 25007* (MO); Siquirres. Las Brisas de Pacuarito, Siquirres, 10°02'24"N 083°31'12"W, 500 m, 17 April 1985, *L.D. Gómez P et al. 23362* (MO); Talamanca. P.N. Cordillera de Talamanca; Valle de Talamanca. Amubri, Alto Lari. Margen izquierda del Río Lari. Areas aledañas a Surayo, 09°27'00"N 083°02'24"W, 300 m, 26 February 1992, *G. Herrera Ch. 5091* (CR); **Puntarenas:** Golfito. Camino entre Golfito y Villa Briceño, ca. 2 km NW de campo de aterrizaje de Golfito, 08°40'12"N 083°12'00"W, 100 m, 27 January 1992, *B.E. Hammel 18400* (CR, MO); Valle de Coto Colorado. Golfito. Bosque primario en la Quebrada Gamba, por Fila Gamba, 08°40'12"N 083°12'00"W, 150 - 200 m, 27 February 1995, *J. F. Morales 3569* (CR, MO); Osa. Alrededores de la toma de Agua. Rancho Quemado. Rincón, 08°37'49"N 083°25'59"W, 200 m, 01 October 1990, *F. J. Quesada 193* (MO); **San José:** Pérez Zeledón. Basin of El General, 09°22'20"N 083°39'12"W, 675 - 900 m, July 1945, *A.F. Skutch 5206* (NY); Vazquez de Coronado. Fila Carrillo, Parque Nacional Braulio Carrillo, 10°07'48"N 083°56'24"W, 600 - 700 m, 18 febrero 1983, *I.A. Chacón G. 334* (MO).

COLOMBIA. **Chocó:** Rio Tolo. Region Guayabal. 5 horas a pié al SE de Acandí, 50 m, 27 March 1974, *E. Forero & et al. 1007* (COL). **PANAMA.** Parque Nacional Santa Fe. Bosque cercano al Piragual, al borde del rio Santa Maria, 08°56'57"N 081°04'38"W, 452 m, 20 noviembre 2012, *O. Ortiz 1038* (MO, PMA); **Bocas del Toro:** 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 66733* (MO); Cerro Colorado, ca. 8.6 mi W of Chamé, ca. 3 mi beyond junction of road which goes S to old construction camp for copper ore exploration. Along trail N of divide toward Atlantic slope which leads down a rocky stream, 08°35'N 081°50'W, 1450 - 1480 m, 07 July 1988, *T.B. Croat 69130A* (MO); Gualaca-Chiriquí Grande, 13.6 mi N of Continental Divide, 0.4 mi SL of Punta Peña. [Coordinates on original label: 08°57'N, 082°11'W], 08°54'24"N 082°11'06"W, 120 m, 29 March 1993, *T.B. Croat 74938* (F, K, CAS, MO, US, WU); Along road between Chiriquí Grande and Fortuna, 13.2 miles W of Chiriquí Grande, 08°50'12"N 082°11'48"W, 310 m, 09 March 1985, *T.B. Croat & M.H. Grayum 60127* (MO); **Chiriquí:** Vicinity of Cerro Colorado Copper Mine development, 28 miles above San Félix, 9-10 miles above turn off to Escopeta, 08°32'N 081°49'W, 1200 - 1500 m, 13 March 1976, *T.B. Croat 33268* (MO); **Coclé:** Along Río San Juan below its junction with Río Tife, 08°44'N 080°39'W - 08°46'N 080°40'W, 1200 ft, 11 June 1978, *B.E. Hammel 3406* (MO); Continental divide ridge, Coclesito road, 08°39'00"N 080°27'30"W, 20 April 1978, *B.E. Hammel 2544* (MO); El Santísimo, 08°41'30"N 080°26'48"W, 520 m, 7 Jun 2001 - 9 Jun 2001, *B. Wong 15-481* (PMA); Alto Calvario, New Works. Medium to tall montane forest, 08°41'N 080°36'W, 700 m, 16 April 1977, *J.P. Folsom & J. Kauke 2630* (MO); Forgotten Works, Alto Calvario; 7+ km N of El Copé, 08°41'N 080°36'W, 850 m, 19 May 1977, *J.P. Folsom & R. Button 3305* (MO); 4 miles past Llano Grande on road to Cascajal, rocky faced hill ca. 2 km W along continental divide, 08°41'42"N 080°28'36"W, 600 m, 11 April 1981, *K.J. Sytsma 3970* (MO); La Mesa, 08°37'30"N 080°06'24"W - 08°38'30"N 080°08'00"W, 650-710 m, 15 September 1974, *S.A. Mori et al. 1915* (MO); La Pintada. 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°40'41"N 080°35'47"W - 08°41'04"N 080°35'50"W, 710 - 800 m, 23 June 1988, *T.B. Croat 68826* (MO); Vicinity of El Copé, 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°39'54"N 080°35'21"W - 08°39'21"N 080°35'21"W, 680 - 770 m, 25 March 1993, *T.B. Croat 74854* (MO); **Colón:** Along banks of Río Guanche, above bridge, 09°30'00"N 079°39'30"W, 50 m, 08 July 1976, *Gene A. Sullivan 173* (MO); Río Guanché, between Puerto Pilon and Portobello; ca. 1.5 miles S of road, 09°30'N 079°39'W, 100 m, 19 June 1994, *T.B. Croat & G. Zhu 76233* (MO, PMA); Donoso. Coclé del Norte, Minera Panama, .Helipad C02. Coordenadas UTM 17 P 529254 988803, 110 m, 16 marzo 2010, Álex Espinosa 5712 (MO, PMA); Teck Cominco Petaquilla mining concession. Collected in and near transect C006, 08°49'28"N 080°39'29"W, 155 m, 20 September 2007, *G. McPherson 19735* (MO); Westernmost part of province, site of proposed copper mine (INMET). Along route of proposed road. Lowland forest. Collected with Jean-Yves Serein, 08°56'04"N 080°44'11"W, 100 m, 11 April 2009, *G. McPherson 20849* (MO); Afueras del area de la concesion de Minera Panama. Belen. Helipad BL03, 08°50'47"N

080°49'31"W, 50 m, 23 agosto 2012, *O. Ortiz* 818 (MO,PMA); Portobelo. Along Río Guanche, E of Colón, W of Portobelo, 09°30'N 079°40'W, 50 m, 28 February 1986, *G. McPherson* 8512 (MO). **Guna Yala.** Nusigandi, along El Llano-Carti Road, 0.7 miles beyond Cuna Headquarters, located 10.9 miles N of Pan-American Highway, 11.6 miles N of Pan-American Highway, 09°18'N 078°59'W, 450 m, 03 April 1993, *T.B. Croat* 75128 (MO); Capira. Middle slopes of Cerro Campana, ca. 1 mile from Interamerican Highway, 08°43'09"N 079°53'25"W, 150 m, 15 June 1976, *T.B. Croat* 35971 (MO); **Veraguas:** Trail to top of Cerro Pelado, 08°39'18"N 080°05'55"W, 1000 m, 16 June 1979, *T. M. Antonio* 1078 (MO); Forests above Primero Brazo del Río Santa María, N of Escuela Agícola Alto de Piedra, just W of Santa Fé. [Printed specimen labels indicate 1981, but 1982 is correct.], 08°34'N 081°07'W, 600 - 750 m, 04 June 1982, *S. Knapp & R.L. Dressler* 5371 (MO); 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 Rí San Luis, 08°33'N 081°08'W, 800-950 m, 29 Jun 1987, *T.B. Croat* 66986 (MO); Santa Fe. Atlantic slope, Río Concepción to Río Barrera; along stream, 08°47'37"N 080°57'26"W, 200 ft, 16 October 1978, *B. E. Hammel* 5178 (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* 76883 (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. Headwaters of Río Calveborita; ca. 15 km past Escuela Agrícola Alto Piedra above Santa Fé; Atlantic watershed, 08°36'15"N 081°07'05"W, 500 m, 16 May 1981, *K.J. Sytsma & L. Andersson* 4756 (MO); 16 km NW of Santa Fé, on road to Calovebora (Panama Highway 35), 08°33'03"N 081°10'22"W, 300 - 500 m, 16 May 1975, *S. Mori & J.A. Kallunki* 6135 (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* 27437 (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 November 1979, *T.B. Croat* 48905 (MO); Vicinity Santa Fé, along road between Santa Fé and Calovebora, 1.7 miles past Alto Piedra School, 1.5 miles beyond Quebrada Cosilla (previously referred to as Río Primero Braso), 08°31'28"N 081°07'50"W, 570 m, 13 July 1994, *T.B. Croat & G. Zhu* 76811 (MO); UNITED STATES. **Missouri:** Saint Louis. Source: Missouri Botanical Garden. Provenance: Cultivated from wild, 28 February 2018, *S. Ratcliff* 253 (MO); Saint Louis City. Missouri Botanical Garden, ClimaTron. Source: Missouri Botanical Garden (Cultivated from wild). Originally collected by *Croat* 74938, Panama, Bocas del Toro, Gualaca-Chiriquí Grande, 13.6 mi N of Continental Divide, 0.4 mi SL of Punta Peña, March 29, 1993. MOBOT LCMS Accesion # 2016-0033-1, 38°36'51"N 090°15'32"W, 08 June 2018, *M. Carlsen et al.* 3277 (MO); Missouri Botanical Garden. Aroid Green House cultivated plant. Voucher prepared by Claudia Henriquez. Original collection: Panama, Bocas del Toro, Gualaca-Chiriquí Grande, 13.6 mi N of Continental Divide, 0.4 mi SL of Punta Peña. [Coordinates on original label: 08°57'N, 082°11'W], July 29, 1993, July 2015, *T.B. Croat* 74938-C1 (MO).

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Stenospermatum martinezii Croat & O. Ortiz, **sp. nov.** — Type: PANAMA. Veraguas: Santa Fé, Area del Río Guayabal. Bosque secundario mature, troche que conduce a la comunidad de Calle Larga, 08°44'34"N, 80°48'26"W; 115 m, 22 Marzo 2014, *L. Martínez, J. Rodríguez, B. Vargas, A. Galvez & L. Mora* 1765 (PMA).

Diagnosis. Characterized by its epiphytic habit, short, dark brown-drying internodes, short, heavily sheathed petioles sheathed 0.7–0.85 their length, the sheath weakly free-ending and rounded at apex; blades broadly elliptic to obovate-elliptic, medium gray-brown-drying, inequilaterally short-acuminate, 1.9–2.4 times longer than wide, upper surface with the veins weakly raised and evenly spaced, lacking cross-veins or short pale-lineations as well as by the short erect inflorescences with a stipitate, cylindroid spadix ca. 6 times longer than wide.

Epiphyte; internodes short, ca. 1 cm long, 8 mm diam, drying dark brown, matte; **petioles** 5.5–8.0 cm long, prominently sheathed 0.70–0.85 their length, the shaft drying medium brown, bluntly ribbed; **sheath** 4.5–6.2 cm long, drying paler, weakly undulate, weakly free-ending, rounded at apex; free part of petiole 1.0–2.2 cm long; **blades** 17.7–21.5 cm long, 8.5–9.3 cm wide, 1.9–2.4 times longer than wide, 3.0–3.2 times longer than petioles, inequilaterally short-acuminate at apex, inequilaterally acute to attenuate at base, subcoriaceous, weakly bicolorous, drying medium gray-brown, matte above, slightly paler yellowish brown, weakly glossy below; midrib sunken and drying darker above, narrowly rounded and slightly darker below; primary lateral fewer than 10 per side, moderately obscure, departing midrib at 40°; **upper surface** with the veins weakly raised and evenly spaced, mostly 5–7 mm apart with 3–5 weakly raised, slightly less prominent ribs between them, the intervening area weakly granular, lacking cross-veins or short pale-lineations; lower surface coarsely areolate-striate, lacking short pale lineations. INFLORESCENCE erect, much shorter than leaves; peduncle 9 cm long; spathe not seen; **spadix** 6.2 cm long, 1 cm diam, cylindroid, ca 6 times longer than wide, narrowly rounded at apex; flowers 7–8 visible per spiral; styles trapezoidal, 1.5–2.0 mm diam. **Figures 149 & 150.**

Distribution — *Stenospermatum martinezii* is endemic to Panama, known only from the type specimen from Veraguas Province on the Caribbean slope at 115 m in a *Tropical wet forest* life zone.

Comments — *Stenospermatum martinezii* is perhaps closest to *Stenospermatum ortizii* from Chiriquí Province in the Fortuna area at Cerro Hornito (900–1900 m). That species differs by having longer petioles (13.8–28.6 cm long) with the sheath ending imperceptibly at apex and generally by having longer leaf blades which range from 13.1–30.0 cm long. In contrast *S. martinezii* is from Veraguas at only 115 m and has petioles which are only 2.5–8.0 cm long with the sheath ending abruptly and rounded at apex with a weakly free-ending tip and the leaf blades are generally shorter (17.8–21.0 cm long).

Etymology — *Stenospermatum martinezii* is named in honor of Panamanian botanist Laurencio Martínez who collected the type specimen. Laurencio is an experienced collector who has made many interesting and often new collections.

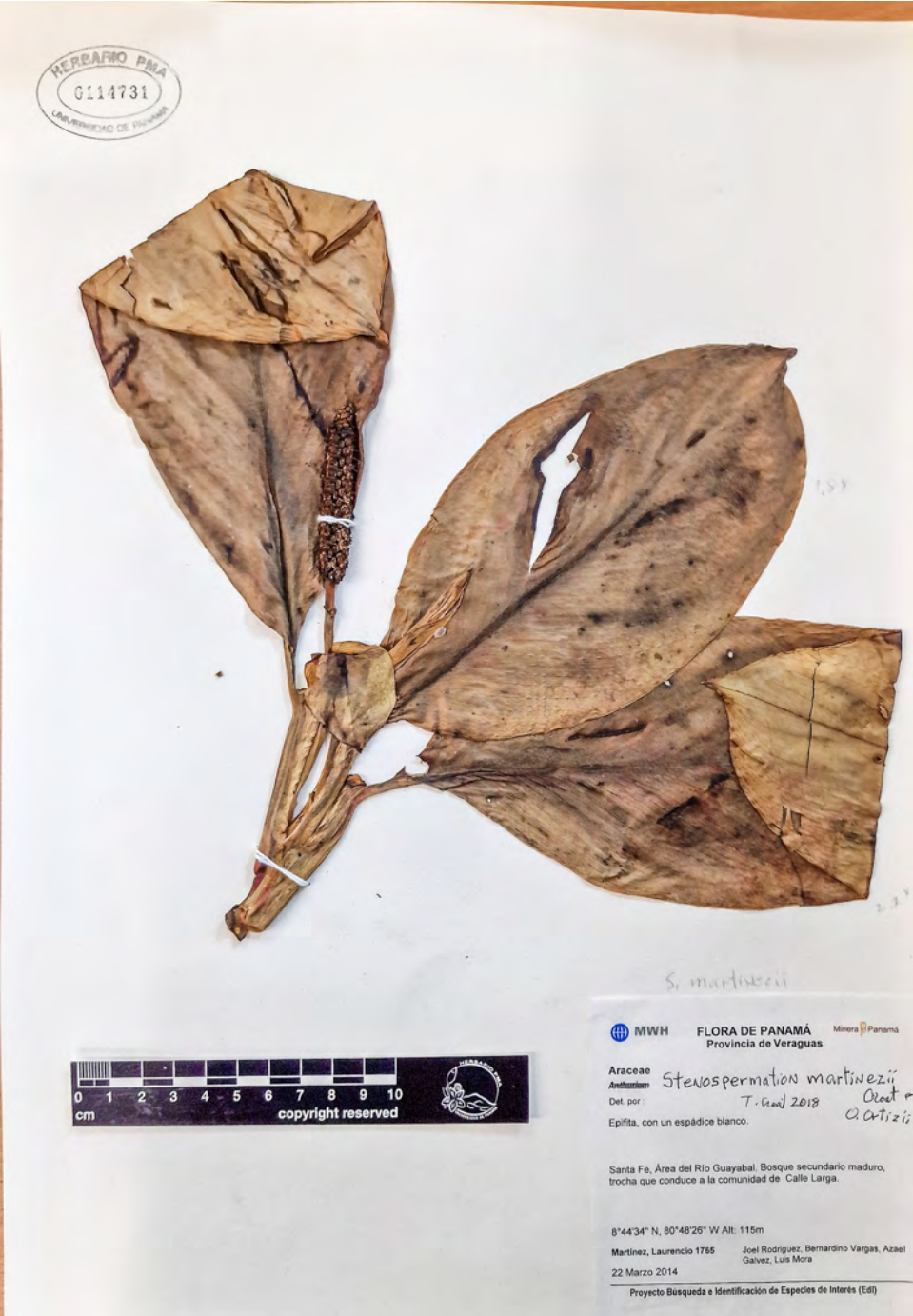


Figure 149: *Stenospermation martinezii*, TYPE L. Martínez 1765



Figure 150: *Stenospermation martineziii*, Upper blade surface, TYPE *L. Martinez 1765*

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Stenospermatum mcphersonii Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Along old pipeline road from Continental Divide; 08°48'04"N, 82°15'04"W, 900 m [1186 m fide Google Earth for these coordinates], 27 December 1986, *G.McPherson and J.Aranda 10168* (holotype, MO-3432542; isotype, PMA)

Diagnosis. *Stenospermatum mcphersonii* is characterized by its epiphytic climbing habit, moderately short internodes, petioles sheathed 0.7–0.8 their length with the dark brown-drying sheath having a pale and thin, incurled margin, a sharply sulcate free part; blades narrowly lanceolate, narrowly long-acuminate, dark brown to yellowish brown-drying with the upper surface uniformly and densely short pale-lineate and imperceptibly ribbed as well as a stipitate white spadix with ellipsoidal stigmas.

Epiphytic climber; internodes moderately short, about as long as broad or only slightly longer than broad, ca. 1 cm long, drying 5–6 mm diam, dark brown, matte; **petioles** 15.2–16.8 cm long, sheathed 0.7–0.8 their length; **sheath** 8.3–12.5 cm long, drying dark brown, prominently several ribbed abaxially, finely striate on sheath, the margin pale and thin, incurled, free part of petiole mostly 1–2 cm long, usually sharply sulcate; **blades** narrowly lanceolate, 15.2–16.8 cm long, 2.9–3.5 cm wide, 1.4–1.6 times longer than petioles, narrowly long-acuminate at apex, narrowly to bluntly acute at base, matte above, glossy below when fresh, drying thinly coriaceous, dark brown and matte above, slightly paler yellowish brown and weakly glossy below; midrib scarcely perceptible, concolorous, mostly lacking short pale lineations above, bluntly and narrowly angular, slightly darker finely striate-ridged below; primary lateral veins faintly visible below, widely spaced, departing midrib at 20°; **upper surface** uniformly and densely short pale-lineate, imperceptibly ribbed; lower surface uniformly striate with scarcely any visible short pale lineations. INFLORESCENCE pendent; spathe not seen; **spadix** stipitate 5 mm, 7 cm long, 1 cm diam., white, bluntly rounded at apex; styles mostly square to trapezoidal, irregularly hexagonal toward the base, drying mostly 2 mm wide, dark brown, matte, truncate; stigma ellipsoidal, 0.6–0.8 mm long, the margin light brown, dark brown medially. **Figures 151 & 152.**

Distribution — *Stenospermatum mcphersonii* is endemic to Panama, known only from the type collection from along the Continental Divide in Bocas del Toro Province at 1186 m in *Lower montane rainforest* life zone.

Comments — *Stenospermatum mcphersonii* is very similar to *Stenospermatum cerrofríoense*, a species occurring elsewhere in Bocas del Toro which has a very similar leaf blade shape but that species differs in having more light brown-drying leaves with longer petioles (15–19 cm long) which are less extensively sheathed (0.5–0.66 their length), more light brown-drying, less heavily ribbed petioles which have a sheath acute at the apex (not at all free-ending) and blades which are proportionately smaller, more acuminate and down-turned at apex

Etymology — *Stenospermatum mcphersonii* is named for G. McPherson of the Missouri Botanical Garden who collected the type specimen when he served as the Curator of Summit Herbarium and was collecting for the Flora of Panama Project during a long period in the 1980s.



Figure 151: *Stenospermation mcphersonii*, TYPE McPherson & Aranda 10168

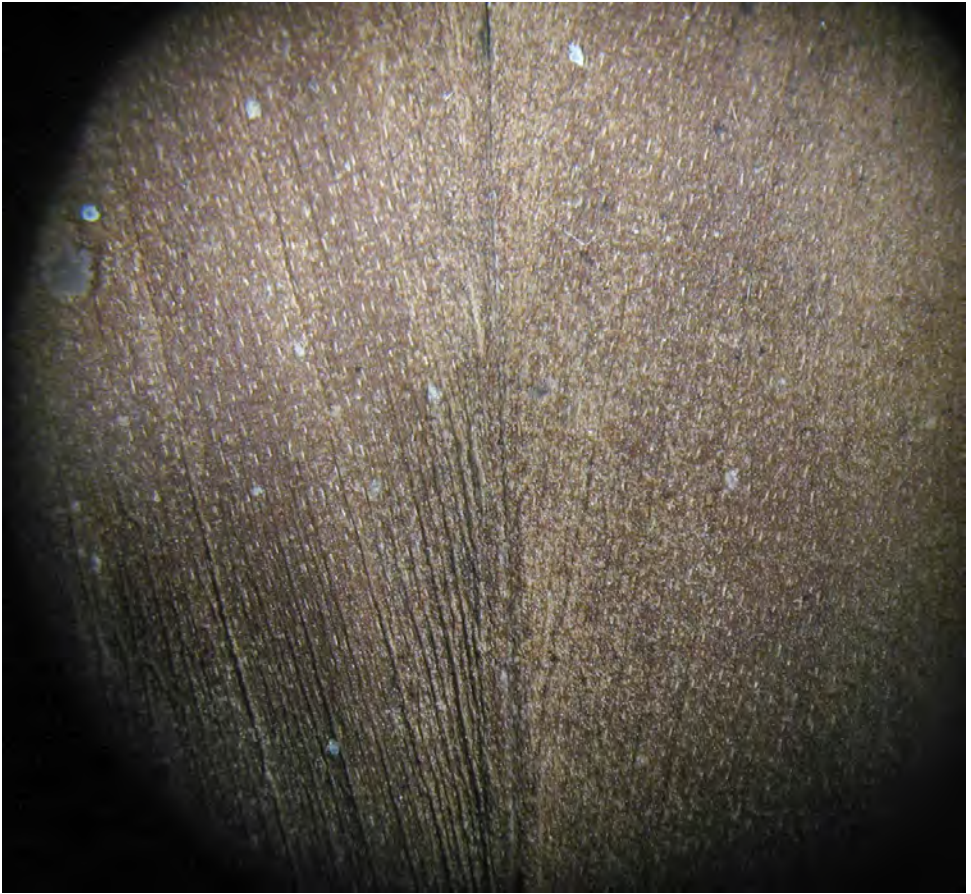


Figure 152: *Stenospermation mcphersonii*, Upper blade surface, TYPE McPherson & Aranda 10168

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Stenospermation mesaense Croat, **sp. nov.** — **Type:** PANAMA. Coclé: Vicinity of La Mesa, above El Valle de Antón, ca. 08°37'N, 80°08'W, 600–900 m, 12 May 1973, *A. Gentry 7445* (holotype, MO-2923837; isotype, PMA-23026).

Diagnosis. *Stenospermation mesaense* is characterized by its epiphytic habit, short internodes, heavily sheathed petioles with the sheath persisting more or less intact and acute at the apex, elliptic, dark brown-drying, short-acuminate blades with the upper surface drying with close, weakly raised minor veins with the intervening area finely and evenly striate and lacking short pale lineations as well as by the white spathe and stipitate spadix.

Epiphyte; internodes short, ca. 2 cm diam., drying to 1.5 cm diam., dark brown, smooth; **petioles** 16.0–21.8 cm long, sheathed 0.82–0.94 their length; **sheath** 13.3–18.0 cm long, margin sometimes thin and fragile but not much broken up; free part of petiole (1.0)2.5–4.0 cm long, sharply and narrowly sulcate; geniculum 1.5–2.0 cm, usually darker; **blades** elliptical, 22.5–26.2 cm long, 9.0–10.4 cm wide, 2.4–2.8 times longer than wide, 1.2–1.5 times longer than petiole, broadest near the middle, slightly inequilateral (one side 7 mm wider), inconspicuously short-acuminate at apex, acute at base, drying dark brown and matte above, scarcely pale and semiglossy below; midrib obtusely sunken and concolorous above, drying weakly sunken, otherwise broadly convex, finely ribbed above; narrowly rounded and concolorous below, drying weakly paler below; primary lateral veins not perceptible but minor veins departing midrib at 35–40°; **upper surface** with minor veins very close (mostly less than 1 mm apart), weakly and narrowly raised, the intervening area closely and densely striate and somewhat granular, lacking short pale lineations; lower surface with minor veins weak with the intervening area closely and densely striate-granular, concolorous throughout. INFLORESCENCE erect; peduncle slightly bent below spathe, 21–35 cm long; spathe 14.0–15.5 cm long, 1.0–1.5 cm diam. when furled, white; **spadix** immature, weakly stipitate, 10.0–12.5 cm long, 8–9 mm diam., lacking any obvious staminodia on either end; style 2.5–3.0 mm diam., hexagonal, flat, matte, immature; stigma a pit with margins paler, barely raised. Flowering in May. **Figures 153 & 154.**

Distribution — *Stenospermation mesaense* is endemic to Panama, known only from the type locality in Coclé Province at 900 m in *Tropical wet forest* life zone.

Comments — *Stenospermation mesaense* is seemingly closest to *S. ortizii* from western Panama which has similarly shaped brown-drying blades but that species has the minor veins with the intervening area conspicuously granular-ridged, usually densely granular and usually with sunken short-pale lineations.

Etymology — *Stenospermation mesaense* is named for the type locality at La Mesa above El Valle, an area of rich diversity in Araceae in Coclé Province.



Figure 153: *Stenospermation mesaense*, TYPE Gentry 7445



Figure 154: *Stenospermation mesaense*, Upper blade surface, TYPE Gentry 7445

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Stenospermatum monroi Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro, La Pata de Cedro, ridgetop, 9°43'58"N, 82°03'56"W, 1500 m, 9 March 2004, *A.K. Monro & E. Alfaro 4279* (holotype, MO-5878702; isotypes BM, INB, MEXU, PMA).

Diagnosis: *Stenospermatum monroi* is characterized by its moderately short internodes, petioles narrowly sheathed 0.69–0.74 their length, the dark gray-brown-drying, slender blades 7.4–9.2 times longer than broad with narrowly acute apices and acute bases and with the primary lateral veins obscure as well as by the long-pedunculate inflorescence with a long, attenuated, green, cernuous spathe.

Epiphytic at 3–4 m; stems brown-green; internodes 1–2 cm long, drying 4–7 mm diam., about as long as broad or longer than broad, drying dark brown to medium gray brown, unribbed or bluntly and closely low-ribbed, matte; **petioles** 11.3–20.0 cm long, 2.2–4.6 cm wide, 5.8–12.5 times longer than wide, slender, narrowly sheathed 0.5–0.9 times their length, short-pale-lineate; **sheath** 8.2–15.5 cm long, narrow, rounded at apex with margins remaining mostly intact; free part of petiole subterete, weakly sulcate adaxially, drying 1.5–2.0 mm diam., geniculum slightly swollen, 1.0–1.3 cm long; **blades** narrowly oblong-lanceolate, 15.3–32.0 cm long, 2.2–4.6 cm wide, 5.8–12.5 times longer than wide, 1.2–2.3 times longer than petioles, broadest in lower half, slightly inequilateral with one side 2–3 mm narrower, drying dark gray-brown, narrowly acute at apex, acute at base; midrib drying deeply sunken and darker above, narrowly rounded, matte and darker below, moderately ribbed below; primary lateral veins obscure on both surfaces; minor veins weakly raised and concolorous below, the intervening area finely striate; **upper surface** drying matte, the ribs closely spaced with intervening area coarsely ribbed-granular and densely short-pale-lineate, frequently pale-short-lineate: lower surface drying weakly glossy, finely ribbed and infrequently short-pale-lineate on magnification. INFLORESCENCE long-pedunculate; peduncle 30 cm long, 1.5 mm diam., drying dark brown; spathe long-attenuate, green when immature, somewhat cernuous, 12 cm long, furled 7 mm diam.; **spadix** green, sessile, 7–9 cm long, 7–10 mm diam.; flowers 3–4 visible per spiral, 4–5 mm wide, irregularly 4- or 5-sided, brownish, the margins rounded; stigma oblong-elliptic. INFRUCTESCENCE to 11 cm long, 12 mm diam. Flowering is known only from early March. **Figures 155–163.**

Distribution — *Stenospermatum monroi* is known only from Panama in Bocas del Toro and Chiriqui Provinces at 850–1500 m in a *Premontane rain forest* life zone.

Comments — *Stenospermatum monroi* may be most closely related to *S. luisgomezii*, which is similar in having long narrow leaves and pendent inflorescences with long peduncles but that species differs in having a sessile spadix. *S. monroi* differs from most other species in Central America by its narrowly linear-lanceolate blades.



Figure 155: *Stenospermation monroi*, Habit of flowering plant



Figure 156: *Stenospermation monroi*, Live plant removed from tree

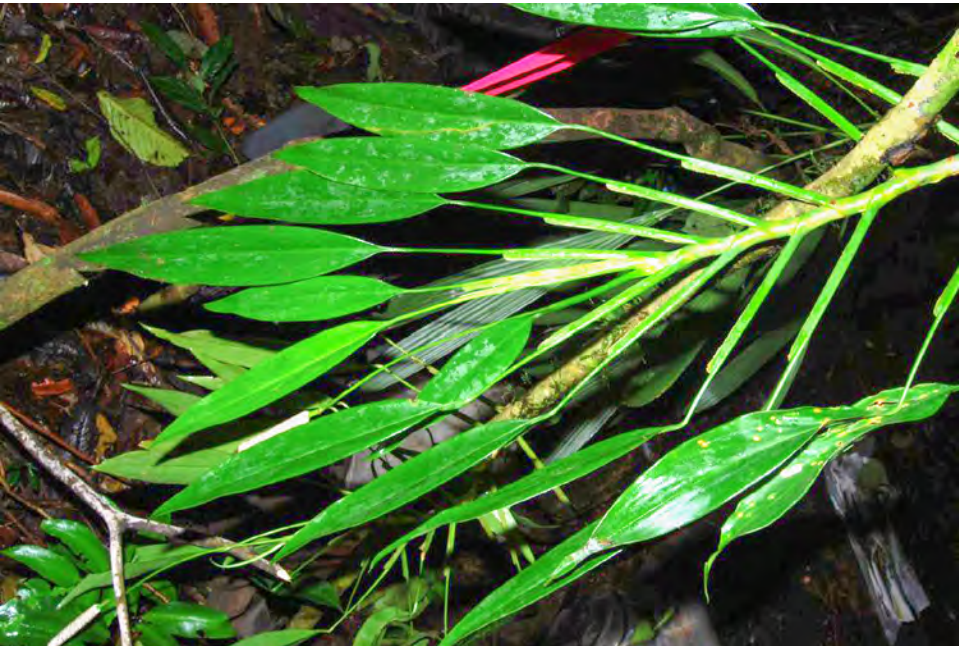


Figure 157: *Stenospermation monroi*, Live flowering plant removed from tree



Figure 158: *Stenospermation monroi*, Spathe cut open, *Monro et al.* 6057



Figure 159: *Stenospermation monroi*, Spadix



Figure 160: *Stenospermatum monroi*, Closeup of spadix



Figure 161: *Stenospermation monroi*, D. Santamaria et al. 7559



Figure 162: *Stenospermatum monroi*, McPherson 8672

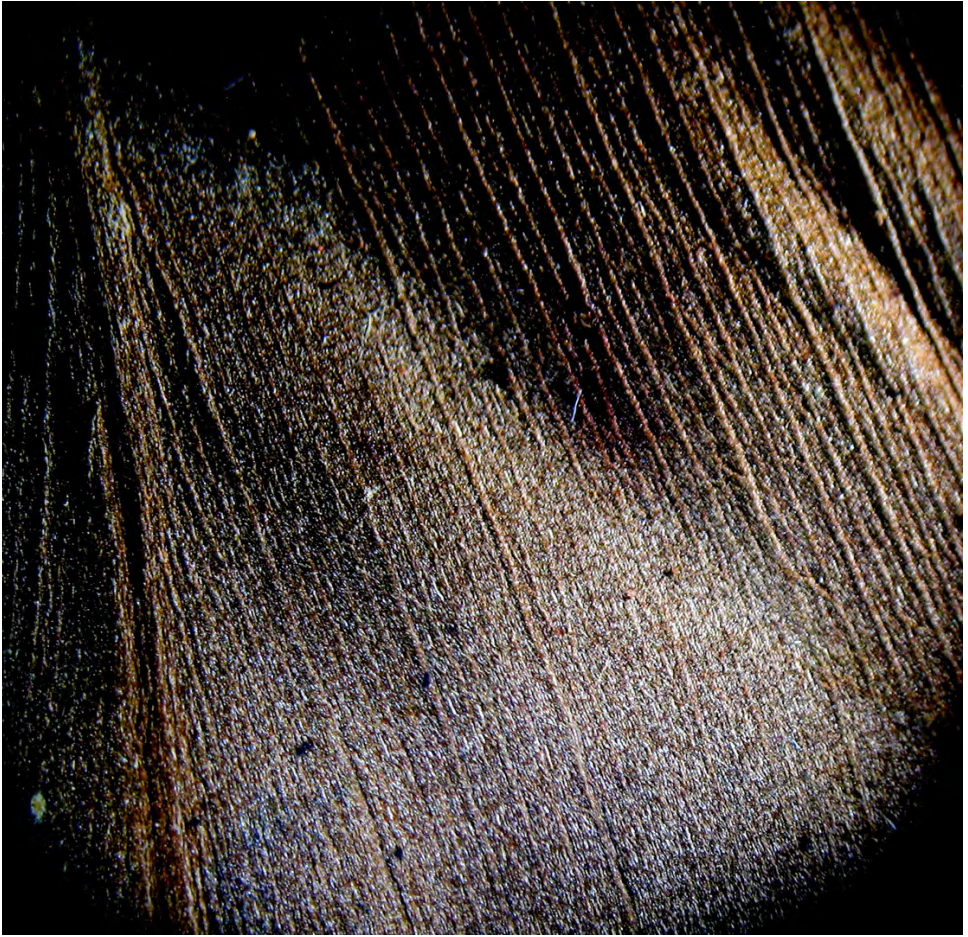


Figure: 163: *Stenospermatum monroi*, Upper blade surface, McPherson 8672

Etymology — *Stenospermatum monroi* is named in honor of British botanist Alex Monro, a taxonomist and field botanist formerly at The Natural History Museum but now at the Royal Botanic Gardens, Kew. He has spent most of his career working in Central America, in particular the Chiquibul Mountains of Belize, El Salvador and the La Amistad Binational Park of Panama and Costa Rica. His focus has been on the taxonomy of the Urticaceae, botanical inventories and using botanical knowledge to support and inform conservation.

Paratypes — **PANAMA. Bocas del Toro:** La Pata del Cedro" ridgetop, 09°04'N 082°44'W, 1500 m, 09 March 2004, *A.K. Monro & E. Alfaro* 4274 (MO); Alto Uri, Rancho Santin, PILA, Punto #4. Aprox a 300 m de R. Santin, 29 July 2008, *D. Santamaria et al.* 7559 (PMA); Fortuna Dam region, along road to Chiriquí Grande. [Coordinates on original label: 8°48'N,

82°10'W], 08°46'43"N 082°12'26"W, 950 — 1100 m, 07 March 1986, *G. McPherson* 8672 (MO); Road from Fortuna Dam to Chiriquí Grande, 1 mi from Continental Divide, 08°47'N 082°12'W, 950 m, 22 September 1984, *H. W. Churchill & A. Churchill* 6242 (MO); Along road between Fortuna and Chiriquí Grande, 1.2 mi N of Continental Divide, 5.3 mi N of bridge over Fortuna Dam 4. [Coordinates on original label: 08°44'N, 82°17'W], 08°46'06"N 082°12'30"W, 910 m, 12 March 1985, *T.B. Croat & M.H. Grayum* 60453 (MO); Changuinola. PILA. Point 9, ridge above camp, close to pasture,, 09°03'42"N 082°42'35"W, 1700 m, 20 April 2008, *A.K. Monro et al.* 6057 (PMA); Point 16, ca 3 km from estación de Alto Uri, 09°03'12"N 082°41'54"W, 1400 m, 17 April 2008, *J. Lezcano et al.* 319 (PMA); **Chiriquí:** División Continental, Bosque Protector Palo Seco, 08°47'27"N 082°12'40"W, 1060 m, 26 octubre 2001, *Florpan, C. Guerra & Á. Espinosa* 5422 (PMA); Gualaca. Reserva Forestal Fortuna. División Continental. Sendero El verrugoso B, 08°46'51"N 082°10'41"W, 865 m, 10 diciembre 2013, *O. Ortiz & J.C. Miranda* 1841 (MO); Reserva Forestal Fortuna. Sendero Palo Seco, cercano a la División Continental, 08°46'49"N 082°12'01"W, 953 m, 08 noviembre 2013, *O. Ortiz, Batista, J. & F. Miranda* 1794 (MO);

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Stenospermation morii Croat, **sp. nov.** — Type: PANAMA. Veraguas, Cerro Tute, ca. 10 km NW of Santa Fé, on ridge top in cloud forest, 08°28'56"N, 81°05'53"W, 750-1000 m, 3 August 1975, *S.Mori, A.Bolten, R.Dressler* 7598 (holotype, MO-2288582).

Diagnosis. *Stenospermation morii* is characterized by its epiphytic habit, small size, slender stems with short internodes and small leaves with nearly fully sheathed petioles, broad blades that are almost as wide as they are long, multiple inflorescences arising from each plant subtended by one bract for each peduncle, sheathing along the entire length of the petiole, stamens with obovoid thecae, and a stipitate cylindroid spadix.

Epiphyte; internodes clustered, short near apex with up to 8 leaves, 0.9–1.3 cm diam.; **petiole** 9.1–10.4 cm long, sheathed nearly its entire length, 0.7–0.9 times as long as blades, drying light red-brown, mostly smooth, weakly sulcate; sheath 8.9–10.2 cm long, ending acute to truncate at apex, margins remaining intact; free part of petiole lacking or from 3–5 mm long; blades broadly ovate-elliptic to ovate, 12.1–13.4 cm long, 7.2–8.0 cm wide, 1.5–1.8 times longer than wide, 1.1–1.3 times longer than petioles, short-acuminate at apex, acute to rounded at base, drying subcoriaceous, dark brown to gray-brown and weakly glossy to matte

above, slightly paler and semiglossy, light brown to gray-yellow below; primary lateral veins not distinguishable; upper surface smooth, finely and uniformly striate-granular and uniform in color, lacking short-pale-lineations; lower surface smooth, finely and weakly ribbed on magnification, regularly dark-punctate; peduncle 14.4–22.9 cm long; spathe not seen; spadix stipitate 3–9 mm, drying orange-brown; styles 1.5–2.0 mm long, often elongated in direction of axis, irregularly shaped, drying dark brown, smooth, matte, the margins thin; stigma mostly terete, mammillate, protruding 3–4 mm; stamens arising above pistils, thecae obovoid, 0.5 mm long, 0.6 mm wide, thecae ovoid, broadly divaricate, persisting above level of tepals, drying red-brown. Flowering in early August. **Figures 164–166.**

Distribution — *Stenospermatum morii* is endemic to Panama, known only from the type locality on Cerro Tute at more than 1000 m in a Lower montane rain forest life zone.

Comments — *Stenospermatum morii* is probably closest to *Stenospermatum dukei* from Coclé Province in Panama at 800–1000 m, a species which differs by having the leaf blades elliptic and drying greenish gray as well as being smaller (only 3.5–5.0 cm wide) and narrower (2.2–2.4 times longer than wide). In addition, *S. dukei* has the upper surface with minor veins moderately raised with the intervening area irregular, often obliquely ridged and short pale-lineate, not finely and uniformly striate-granular. In contrast *S. morii* has leaf blades which are broadly ovate-elliptic to ovate (7.2–8.0 cm wide) and dark brown-drying, only 1.5–1.8 times longer than wide with the upper surface smooth, finely and uniformly striate-granular and uniform in color while lacking short-pale-lineations.

Etymology — *Stenospermatum morii* is named in honor of the late Dr. Scott Mori, who collected the type specimen. Scott received his Ph.D. at the University of Wisconsin and served most of his career at the New York Botanical Garden where he worked on Lecythidaceae. He was a great floristician, working even as an undergraduate as Curator of Summit Herbarium in Panama where he collected for the Flora of Panama Project. Later in his career he published the Vascular Plants of Central French Guiana and did many floristic studies in eastern Brazil as well as in Saba in the West Indies. He was a great friend and one of the finest botanists I have ever known.

Paratypes — Panama: Veraguas, Santa Fe, Cerro Tute, ca. 10 km NW of Santa Fe, on ridgetop in cloud forest, 08°28'56"N 081°05'53"W, 1000 m, 19 June 1975, Mori 6754 (MO BC:MO-1088481); Santa Fe: El Cuatro. Bosque cerrado. 1300 m, 19 July 2009, Fermín Hernández *et al.* 1322 (PMA).



Figure 164: *Stenospermation morii*, F. Hernandez 1322

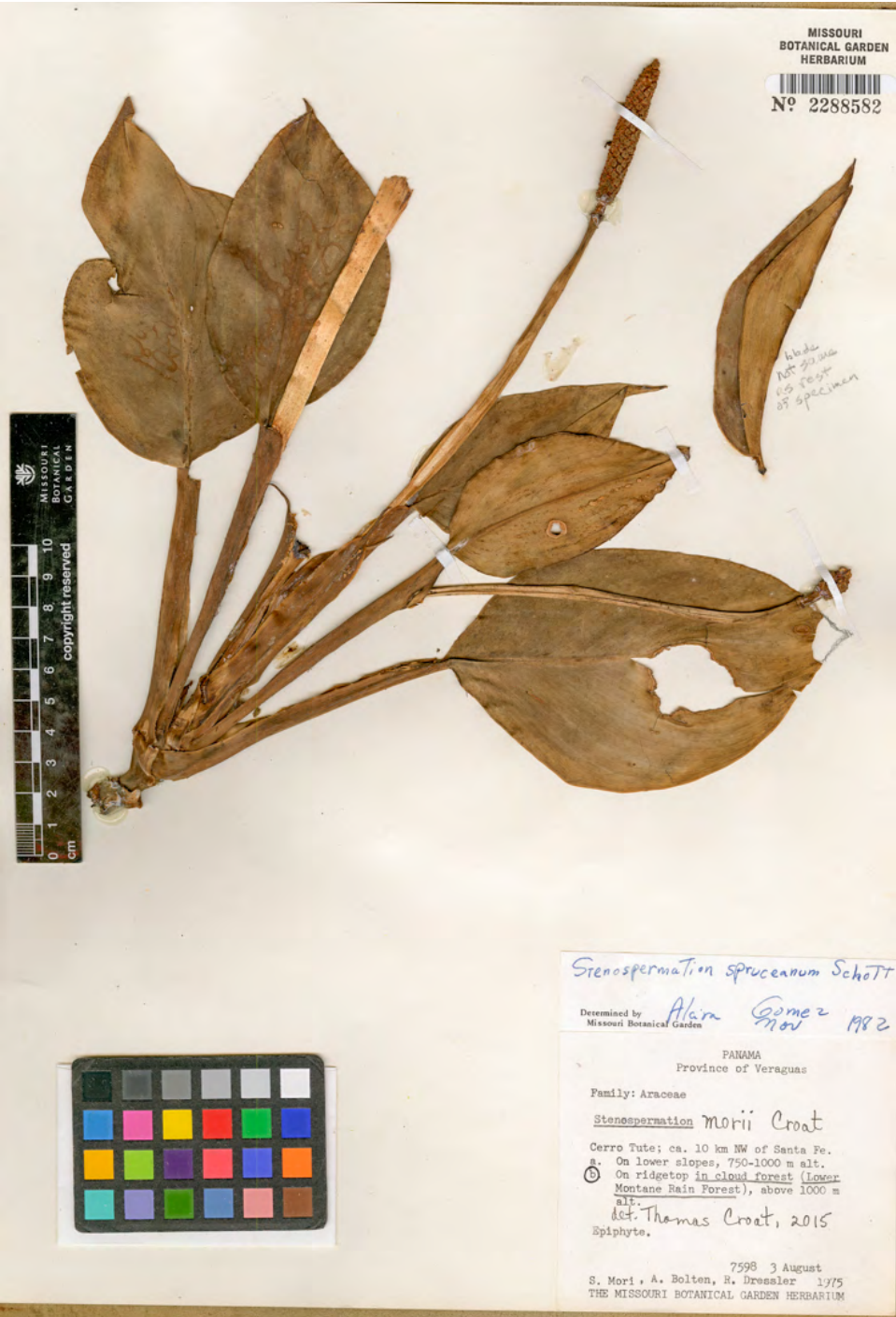


Figure 165: *Stenospermation morii*, TYPE, Mori et al. 7598



Figure 166: *Stenospermation_morii*, Upper blade surface *Mori 6754*

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Stenospermatum multicostatum Croat, **sp. nov.** — Type: PANAMA. Chiriquí: Gualaca-Chiriquí Grande, 4.8 km beyond IRHE facilities at Fortuna Dam, 4 mi. N of bridge over Bayano Lake, along gravel road which turns left off highway 100 m beyond pipeline marker 108; 08°46'N, 82°16'W, 23 September 1987, T.B. *Croat 68021* (holotype, MO-3636334).

Diagnosis. *Stenospermatum multicostatum* is recognized by its epiphytic habit, small to modest size, moderately short internodes (longer than broad lower down), dark brownish-drying blades, the close prominently raised veins with the intervening area minutely granular or with minute irregular ridges and usually with interspersed pale, linear cellular inclusions and finally a modest inflorescence with the whitish spathe only slightly longer than the more or less orange spadix and orange berries. It is an attractive plant and one of the frequently collected species in the aroid flora of Panama.

Epiphytic to 6 m high, sometimes somewhat scandent; stems 75 cm to more than 1 m long, 1.0–1.5 cm diam., spreading to drooping then upturned toward apex; internodes 2.5–4.0 cm long and 1.0–1.5 cm diam. lower down, to less than 1 cm long and less than 1 cm diam. at apex, dark green, soon dark purple-brown, weakly glossy, drying dark yellowish red-brown, matte, densely and minutely granular, sometimes with short ridges oriented vertically, turning dark yellowish red-brown, matte, densely dark-speckled on magnification, becoming deeply ribbed longitudinally and semiglossy in age on drying, the older stems sometimes drying smooth and semiglossy; **petioles** 6.5–9.0(11.0) cm long, 4–7 mm diam. including sheath, erect-spreading, usually sheathed to the geniculum or up to 6 mm below the geniculum, sometimes virtually to the base of the blade, less frequently sheathed 0.30–0.75 their length, medium green, drying grayish yellow-brown, matte, closely ribbed drying matte and finely costate abaxially; **sheath** (3.3)5.5–8.5 cm long, unequally rounded at apex, one side often weakly free-ending, the margins usually thin and scarious but intact; free portion of petiole usually variable from habitat to habitat, sometimes short (0.5–4.0 cm), sometimes long (8.0–14.5 cm long), slender, slightly thicker than broad, obscurely and narrowly sulcate adaxially, drying 1–2 mm diam., greenish brown; geniculum 4–7 mm long, drying darker; **blades** held nearly horizontal, usually elliptic to ovate-elliptic, oblong-elliptic or oblong-lanceolate, rarely ovate to obovate, (8)10–19(25) cm long, (2.4)5.1–7.5 cm wide, 1.9–2.8(4.3) times longer than wide, 0.8–1.8 times longer than petioles, usually abruptly, sometimes gradually acuminate and usually markedly down-turned at apex (with the dried leaves usually with the apex markedly turned to one side), acute to narrowly acute at base, slightly inequilateral with one side 3–9 mm wider, subcoriaceous, slightly to moderately bicolorous, semiglossy, drying matte, typically drying dark brown; midrib narrowly sunken and weakly discolorous marginally above, narrowly raised and paler below; primary lateral veins not apparent on either surface; **upper surface** with minor veins closely parallel and prominently raised (with 10X magnification), the stronger of these interceded by 1–3 weaker raised veins, sometimes the major among them only slightly more raised than the remainder, the intervening areas and sometimes the upper edge of the larger veins minutely granular or with minute irregular ridges and usually with interspersed pale, linear cellular inclusions oriented in the same direction as the veins; lower surface drying slightly to moderately paler and matte to semiglossy, usually medium yellow-brown, sometimes grayish green to grayish yellow brown, the larger of the minor veins concolorous with the surface and scarcely apparent, each pair separating a densely spread layer

of very elongated trichosclereids exposed from just below the surface of the epidermis that upon drying forms a closely and irregularly ribbed surface that varies little from the margin to the midrib except for the weakly raised minor veins. INFLORESCENCE spreading-pendent, usually cernuous; spathe cream-colored to white, 11.3–12.7 cm long, 2–3 cm longer than spadix, long-acuminate, caducous; **spadix** 6.6–11.0 cm long, drying 5–7 cm diam., narrowly stipitate 4–12 mm (stipe 2 mm diam.), dull green turning orange, finally orange-brown post-anthesis, drying matte, dark yellow-brown; pistils irregularly 6-sided, broader perpendicular to axis, 2.4–2.8 mm wide on drying, 1.8–2.0 mm wide in direction of axis, style smooth, yellow-brown; stigma drying blackened, mostly oblong and oriented perpendicular to axis, 0.6–0.8 mm long, 0.2–0.3 mm wide or sometimes circular, 0.5 mm wide. INFRUCTIONESCENT pendent, the spadix dark yellow-green, matte; mature berries orange; seeds drying greenish white, 1.6–1.9 mm long, 0.6–0.9 mm diam., minutely papillate, conspicuously constricted on one end into a nipple-like projection but otherwise lacking any obvious inconsistencies in the terminal flowers on either end of the spadix. Flowering in January to July (September & November); fruiting August to November. **Figures 167–174.**

Distribution — *Stenospermatum multicostatum* is endemic to Panama, occurring at about 900–1200 m in areas of *Premontane wet forest*, *Tropical wet forest* and *Premontane rain forest* life zones in Bocas del Toro, Chiriquí, Coclé, Colón, Guna Yala and Panamá Provinces.

Comments — *Stenospermatum multicostatum* is remarkably variable throughout its range, especially in regard to the proportionate length of the sheath (ranging from 2/3 the petiole length to sometimes nearly throughout), the width of the sheath and its shape at its apex (usually free-ending but sometimes only weakly so) and by its blade shape (1.9 to 4.3 times longer than wide). Blade shape may be in part correlated with elevation. For example, in the vicinity of Santa Fe de Veraguas T.B. *Croat & G. Zhu* 76812 from 570 m has blades to 4.3 times longer than wide whereas *Ibañez et al.* 5802 from 1000 m in the same region has blades only 1.7 times longer than wide.

A species that can be confused with *Stenospermatum multicostatum* is *S. castanoanum* which occurs in the same areas but *S. castanoanum* differs in having typically shorter internodes and proportionately longer blades, averaging 4 times longer than broad.

Stenospermatum multicostatum was one of two species treated as *S. spruceanum* Schott by Alcira Pérez de Gomez in her thesis dealing with the *Stenospermatum* of Central America (Pérez de Gómez, 1983). See under 'species excluded', below.

Some collections included here in *Stenospermatum multicostatum* have leaves with much longer blades 2.8–4.3 times longer than wide and they typically dry grayish. These same collections have petioles sheathed only in the lower ¼ to 3/4th of their length in contrast to being sheathed to or nearly to the apex. Nevertheless, these collections share the close, raised venation of the dried blades. Examples of the collections with these features include, *Antonio* 1982, T.B. *Croat* 27479, 66967 and T.B. *Croat & G. Zhu* 76812.

Collections from the Donoso region (*Ortiz* 1306, *Ortiz et al.* 1332) are at much lower elevations (102–111 m) than other collections of *S. multicostatum*. A few other collections, e.g., *Croat* 27479 and 66967 from the area west of Santa Fe de Veraguas were collected at elevations

of only 650 to 670 m but the Donoso collections are unusual. It is an area with unusually wet conditions at scarcely more than 100 m which may account for the species being present there.

Several collections from far western Panama near the Continental Divide in Boca del Toro and Chiriquí Provinces at 1150–1250 m differ in having venation not so prominently raised on the upper surface and have the spathe and spadix reportedly white, not yellowish. These may prove to represent a new species. The collections in this group are *Thompson 5048* from Chiriquí Province and *McPherson 9039* and *Knapp 5083*.

Etymology — The species epithet is from the Latin, “multi” (meaning many) and “costatus” (having one or more veins or ribs) referring to the close and prominently raised minor veins on the upper surface.

Paratypes — **PANAMA. Bocas del Toro:** Along trail on continental divide. Vicinity of Fortuna Dam. [Coordinates on original label: 08°45'N, 82°15'W.], 08°45'59"N 082°12'44"W, 1200 m, 26 April 1986, *G. McPherson 9039* (B, MO); Chiriquí Grande. Chiriquí border along Continental Divide on Carretera del Oleoducto, ca 1 km N of Quebrada Arena. IRHE Fortuna Hydroelectric Project. [Coordinates on original label: 08°46'N, 082°12'W], 08°46'54"N 082°12'48"W, 1150 m, 11 May 1982, *S. Knapp 5083* (MO); **Chiriquí:** Trail to the Río Hornito, 11 km N of Los Planes de Hornito, IRHE Fortuna Hydroelectric Project. Premontane rainforest, 08°45'N 082°12'W, 1100 — 1200 m, 12 May 1982, *S. Knapp 5113* (MO); Ca. 0.5 km NE of Quebrada de Arena, drainage into Río Chiriquí. Carretera del Oleoducto, IRHE Fortuna Hydroelectric Project. Near Continental Divide, 08°46'N 082°12'W, 1100 m, 12 March 1982, *S. Knapp et al. 4012* (MO); Chiriquí-Bocas del Toro; 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 4959* (CM); Vicinity of Fortuna Dam, along trail from road near Forestry Nursery to Río Hornito. [Coordinates on original label: 8°45'N, 82°15'W], 08°42'N 082°13'W, 1100 - 1200 m, 27 April 1988, *S.A. Thompson 5048* (CM); Along the road between Gualaca and the Fortuna dam site, 8.3 miles NW of Los Planes de Hornito, 08°44'N 082°16'W, 1260 m, 09 abril 1980, *T.B. Croat 49947* (MO); Along road between Gualaca and Fortuna dam site; 10 mi NW of Los Planes de Hornito, 08°45'N 082°17'W, 1260 m, 10 April 1980, *T.B. Croat 50070* (MO); Along highway between Gualaca and Chiriquí Grande, along boundary trail between Bocas del Toro Province and Chiriquí Province, beginning from gravel road which leads W off main pavement just S of Continental Divide, 08°45'N 082°18'W, 1170 - 1250 m, 26 June 1987, *T.B. Croat 66844* (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, 08°42'20"N 082°13'50"W, 1400 m, 26 November 1979, *T.B. Croat 48717* (MO); Along road to Fortuna dam site on Río Chiriquí, N of Gualaca, 7.7 mi beyond Francisco Linare's lane, 19.2 mi beyond bridge over the Río Estí; 9.1 mi beyond Los Planes de Hornito; 8 mi beyond jct. in road to tunnel, 08°42'N 082°14'W, 1300 m, 27 November 1979, *T.B. Croat 48756* (MO); **Coclé:** On ridge W of Sawmill above El Copé, Pacific drainage, 08°40'N 080°37'W, 2800 - 3600 ft, 21 June 1978, *B. E. Hammel 3540* (MO); El Copé sawmill cloud forest on peak to right of road just before (S of) sawmill, 08°40'30"N 080°35'48"W, 3200 f, 28 July 1978, *B. E. Hammel 4146* (MO); La Mesa, 2 km W of Cerro Pilón, 08°37'40"N 080°07'35"W, 860 m, 21 July 1976, *G.A. Sullivan 490* (MO); La Mesa, 2 km W of Cerro Pilón, 08°37'40"N 080°07'35"W, 900 m, 22 July 1976, *G.A. Sullivan 527* (MO); Around



Figure 167: *Stenospermation multicostatum*, Habit of flowering plant, Photo J. Harrison, Cerro Jefe, Panama



Figure 168: *Stenospermation multicostatum*, Opening inflorescence, Croat 76812



Figure 169: *Stenospermation multicostatum*, Stem with petiole bases, Croat 76812



Figure 170: *Stenospermatum multicostatum*, Spathe at anthesis, Croat 76812



Figure 171: *Stenospermation multicostatum*, Mendieta 17-429



Figure 172: *Stenospermation multicostatum*, Mori 6622



Figure 173: *Stenospermatum multicostatum*, Croat 74860

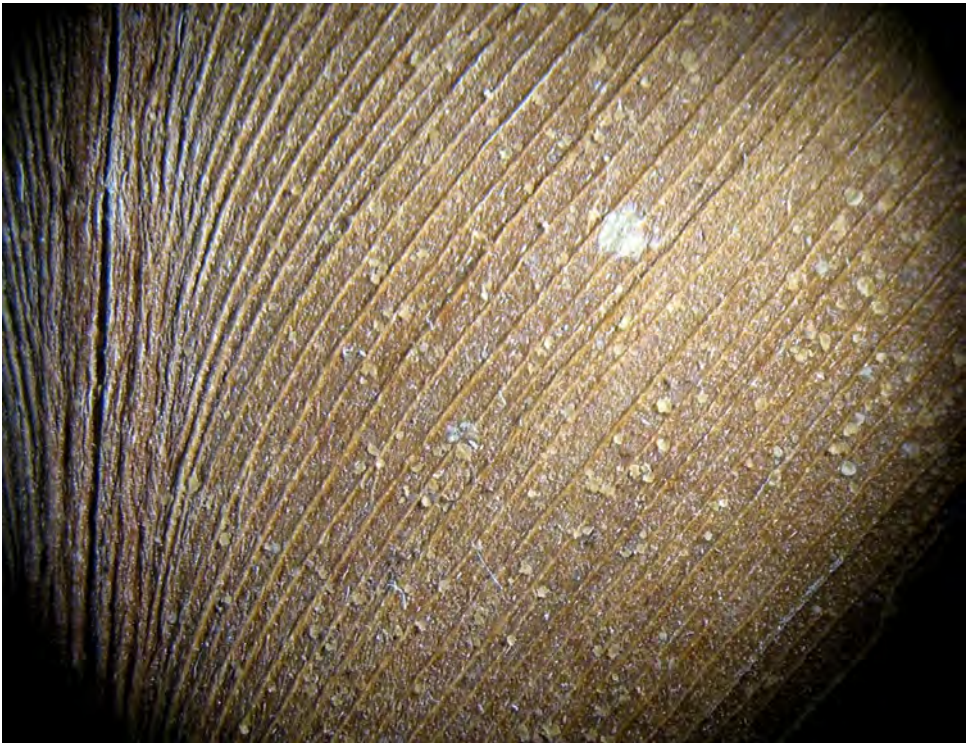


Figure 174: *Stenospermatum multicostatum*, Upper blade surface, *Croat 17199*

Rivera Sawmill, 7 km north of El Copé, road to summit, 08°40'55"N 080°36'05"W, 700 - 850 m, 02 October 1977, *J.P. Folsom et al. 5693* (MO); Cerro Gaital above El Valle. Ridge trail to summit. Cloud forest, 08°37'N 080°07'W, 1150 - 1185 m, 24 July 1983, *J.S. Miller et al. 808* (MO); Cerro Pilón. Rainforest, 08°38'15"N 080°06'19"W, 2900 f, 14 July 1968, *J.D. Dwyer & B. R. Lallathin 8582* (MO); Cerro Tigrero, 08°37'33"N 080°41'18"W, 1000 - 1350 m, 26 September 2001 - 28 September 2001, *Jorge A. Mendieta M. 17-429* (MO); El Valle de Antón, Monumento Natural Cerro Gaital, 11 mayo 2013, *O. Ortiz & R. Chavez 1318* (MO); Hills N of El Valle, E slope and ridges leading to Cerro Gaital. [Coordinates on original label: 08°40'N, 080°07'W], 08°37'36"N 080°07'18"W, 900 - 1000 m, 30 May 1982, *S. Knapp 5336* (MO); Hills N of El Valle, E slope of Cerro Gaital, 08°37'35"N 080°07'20"W, 900 - 1000 m, 29 May 1982, *S. Knapp 5318* (MO); Foothills and summit of Cerro Caracoral, near La Mesa, N. of El Valle de Antón, 08°37'18"N 080°06'36"W - 08°37'20"N 080°07'12"W, 800 - 1100 m, 10 September 1981, *S. Knapp 1147* (MO); Hills N of El Valle, E slope and ridges leading to Cerro Gaital, 08°40'N 080°07'W, 900 - 1000 m, 27 June 1982, *S. Knapp 5768* (MO); Hills N of El Valle, E slope and ridges leading to Cerro Gaital, 08°40'N 080°07'W, 900 - 1000 m, 27 June 1982, *S. Knapp 5794* (MO); Slopes and summit of Cerro Gaital, N of El Valle, 08°40'N 080°07'W, 1000 - 1400 m, 10 July 1982, *S. Knapp et al. 5992* (B, MO); Slopes and summit of Cerro Gaital, N of El Valle, 08°40'N 080°07'W, 1000 - 1400 m, 10 July 1982, *S. Knapp et al. 6002* (B, MO); Cerro Pilón, 5 km NE of El Valle, 08°38'00"N 080°06'30"W, 800 - 1045 m, 14 June 1975, *S.A. Mori et al. 6622* (MO); Vicinity of La Mesa, N of El Valle de Antón,

along east edge of Cerro Gaital, on hogback ridge leading to summit, 08°37'N 080°08'W, 900 - 1000 m, 13 July 1987, *T.B. Croat 67258* (MO); La Mesa, above El Valle de Antón, ca. 2 km W of Cerro Pilón on slopes of steep hill, 08°37'30"N 080°07'30"W, 860 - 900 m, 21 July 1976, *T.B. Croat 37328* (MO); La Mesa, above El Valle de Antón, ca. 2 km W of Cerro Pilón on slopes of steep knife-like ridge, 08°37'40"N 080°07'35"W, 900 - 930 m, 22 July 1976, *T.B. Croat 37440* (MO); Alto Calvario, ca. 4.6 mi above El Copé, 08°39'N 080°36'W, 800 m, 26 March 1993, *T.B. Croat 74860* (MO); Vicinity of La Mesa, N of El Valle de Antón, along east edge of Cerro Gaital, on hogback ridge leading to summit, 08°37'N 080°08'W, 900 - 1000 m, 13 July 1987, *T.B. Croat 67214* (MO); Vicinity of El Copé, N slope of Cordillera, ca. 0.5 miles N of Continental Divide at Alto Calvario, ca. 5.6 miles N of El Copé, 08°40'41"N 080°35'47"W, 800 m, 31 March 1993, *T.B. Croat 75097* (MO); La Mesa (above El Valle de Antón), 08°38'45"N 080°08'00"W, 13 April 1971, *T.B. Croat 14374A* (MO); On Atlantic slope near the Continental Divide along lumbering road N of El Copé, 9.4 km above El Copé (2.2 km N of lumber sawmill), 08°40'21"N 080°35'44"W - 08°40'30"N 080°33'25"W, 750 - 900 m, 20 January 1978, *T.B. Croat 44745* (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, 07 July 1994, *T.B. Croat & G. Zhu 76716* (MO); El Copé. Collections made on the Atlantic side, 08°40'30"N 080°36'30"W, 1200 m, 23 June 1979, *T. M. Antonio 1181* (MO); El Copé. Collections made on the Atlantic side, 08°40'30"N 080°36'30"W, 1200 m, 23 June 1979, *T. M. Antonio 1152* (MO); La Pintada. Vicinity of El Copé, 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°39'54"N 080°35'21"W - 08°39'21"N 080°35'21"W, 680 - 770 m, 25 March 1993, *T.B. Croat 74824* (MO); 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°40'41"N 080°35'47"W - 08°41'04"N 080°35'50"W, 710-800 m, 22 June 1988, *T.B. Croat 68706* (MO); **Colón:** South approach of Cerro Bruja from Río Escandaloso, 09°28'30"N 079°34'00"W, 3000 ft, 18 May 1978, *B. E. Hammel 3116* (MO); Santa Rita Ridge, logging area 19 km from Transisthmian highway, 09°23'45"N 079°39'15"W, 28 January 1968, *J.D. Dwyer 8582A* (MO); **Panamá:** Cerro Brewster, on Guna Yala border, c. 9°20'N, 79°15'W. Mossy, summit forest, 800-850 m, 09°20'N 079°15'W, 800-850 m, 20 November 1985, *G. McPherson 7572* (MO); Cloud forest on Cerro Campana near Florida State University building, 08°41'30"N 079°54'58"W, 26 May 1971, *T.B. Croat 14788* (MO); Road past Altos de Pacora, 3-3.5 mi NE of Altos de Pacora, 7.8-8.2 mi above Pan Am Highway, 11.1-11.6 mi beyond Lago Cerro Azul, 09°15'N 079°25'W, 700 - 750 m, 19 June 1988, *T.B. Croat 68686* (MO); Capira. Cerro Campana in forest along trail from 2700 ft. to top (ca. 3200 ft.), 08°41'26"N 079°55'15"W, 2700 - 3200 f, 2 July 1978, *B. E. Hammel 3787* (MO); Cerro Campana, Summit and upper trail, 08°41'19"N 079°55'18"W, 3500 f, 19 September 1975, *J.T. Witherspoon & F. Witherspoon 8467* (MO); Cerro Campana along trail to summit, 08°41'24"N 079°55'01"W, 730 m, 22 June 1972, *T.B. Croat 17199* (MO); Middle slopes of Cerro Campana, ca. 1 mile from Interamerican Highway, 08°43'09"N 079°53'25"W, 150 m, 15 June 1976, *T.B. Croat 35996* (MO); **Guna YalaGuna Yala:** Cerro Brewster, 09°19'N 079°16'W, 800 - 900 m, 16 October 1984, *G.C. de Nevers et al. 4037* (MO); **Veraguas:** Santa Fe. 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 27479* (MO); Vicinity of Santa Fé, along dirt road between Santa Fé and Río San Luis, past Escuela Circolo Alto de Piedra, ca. 5 mi N of school, 08°33'N 081°08'W, 670 m, 28 Jun 1987, *T.B.*

Croat 66967 (MO); Vicinity Santa Fé, along road between Santa Fé and Calovebora, 1.7 miles past Alto Piedra School, 1.5 miles beyond Quebrada Cosilla (previously referred to as Río Primero Braso), 08°31'28"N 081°07'50"W, 570 m, 13 July 1994, *T.B. Croat & G. Zhu 76812* (MO).

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Stenospermation niquense Croat & O. Ortiz, **sp. nov.** — Type: PANAMA. Darién: Serranía de Pirre, ca. 12 km due north of Alturas de Nique; *Lower montane rain forest*, 1520–1560 m, 27 July 1976, *Croat 37912* (holotype, MO- 2381475).

Diagnosis. *Stenospermation niquense* is characterized by its epiphytic scandent habit, elongated, slender, dark gray-brown-drying internodes lacking cross-veins, petioles sheathed 0.7–0.9 their length with the sheath bluntly rounded at apex, oblong-elliptic, gradually acuminate blades with the upper surface closely ribbed and sparsely granular with few cross-veins, densely short pale-lineate.

Epiphytic vine; internodes longer than broad, 1.5–4.5 cm long, 4.5–5.0 mm diam, drying dark gray-brown, seemingly glaucous, narrowly and bluntly ribbed longitudinally, lacking cross-veins, the underlying tissue light yellow-brown, finely striate; roots few, usually only one per node; **petioles** 8.5–13.5 cm long, sheathed 0.7–0.9 their length; **sheath** 7.7–9.7 cm long, bluntly rounded at apex, drying dark brown, moderately conspicuous, persisting intact; **blades** oblong-elliptic, 17.8–21.4 cm long, 4.7–6.4 cm wide, 3.0–4.4 times longer than wide, 1.5–2.3 times longer than petioles, gradually acuminate at apex, narrowly acute at base, drying dark brown and weakly glossy above, slightly paler, yellow-brown and semiglossy below, inequilateral, one side 5–10 mm wider; midrib slightly raised, several irregularly ridged, concolorous to dark above, narrowly rounded, finely ridged, darker below; primary lateral veins moderately obscure on both surfaces, mostly 1.0–1.5 cm apart; **upper surface** closely ribbed and sparsely granular with few cross-veins, densely short pale-lineate; lower surface sparsely and uniformly low-ridged and granular without any obvious short pale lineations. INFLORESCENCE not seen. **Figures 175–177.**

Distribution — *Stenospermation niquense* is endemic to Panama, known only from the Cerro Pirre region at 1520–1560 m elevation in a *Lower montane rainforest* life zone.

Comments — *Stenospermation niquense* has been confused with *Stenospermation whitefoordiae* from the Pacific coastal lowlands of southwest Darién province but that species has proportionately more gray-brown blades which are densely rowed-areolate on the upper surface. It has also been confused with *S. dasae* from Bocas del Toro but that species dries with a smoother unribbed stem and has leaves which are typically broadest above the middle and are more abruptly acuminate with more conspicuous thinner pale-lineations.



Figure 175: *Stenospermation niquense*, TYPE Croat 37912



Figure 176: *Stenospermation niquense*, Paratype Croat 37877



Figure 177: *Stenospermaton niquense*, Upper blade surface, TYPE Croat 37912

Etymology — *Stenospermaton niquense* is named for the Alturas de Nique a part of the Cerro Pirre massif in Darién where the species was discovered.

Paratype — **Panama: Darien:** Serranía de Pirre, along steep narrow ridge from Alturas de Nique to Cerro Pirre, ca. 9–10 km due N of Alturas de Nique, ca. 8 km W of Cana gold mine, 07°49'N 077°43'W, 1520-1560 m, 27 July 1976, T.B. Croat 37877 (MO- 2416616)

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Stenospermatum nusigandense Croat, **sp. nov.** — Type: PANAMA. Guna Yala: Nusigandi along El Llano-Cartí Road, 0.7 m beyond Cuna Headquarters, 11.6 km N of Panamanian Hwy (the Headquarters is located 10.9 km N of Panamanian Hwy); 09°18'N, 79°49'W; 450 m, 3 April 1993, *Croat 75122* (holotype, MO-4342343, isotypes K, PMA, US)

Diagnosis: *Stenospermatum nusigandense* is characterized by its epiphytic habit, moderately elongated internodes, blackish drying narrow leaves, slender, moderately sheathed petioles with the sheath somewhat free-ending and the free part very slender, narrowly oblong-elliptic, dark brown-drying, narrowly long-acuminate blades as well as by the short-pedunculate inflorescence with a short-stipitate, white, cylindroid-tapered spadix with a dried sunken style with a raised round stigma.

Appressed epiphyte; stems to ca. 1 m long; internodes 1.2–4.0 cm long, dark green and weakly glossy to semiglossy, soon turning gray-brown, drying dark brown to black, finely ridged, sometimes grayish yellow-brown; **petioles** 5.5–9.2 cm long, sheathed 0.5 to nearly fully their length; **sheath** 2.8–6.6 cm long, incurled, free-ending to truncate at apex, narrowly rounded; free part of petiole (0.7) 2.5–3.0 cm long, subterete, narrowly and obscurely sulcate, drying dark brown to black. LEAVES erect-spreading; **blades** narrowly elliptic, 13.5–22.5 cm long, 2.1–3.3 cm wide, 5.2–8.2 times longer than wide, 2.1–5.6 times longer than petioles, narrowly long-acuminate at apex, narrowly acute at base, moderately coriaceous, weakly glossy to semi glossy, moderately bicolorous, moderately coriaceous, conspicuously bicolorous, semi-glossy, drying dark brown to blackened; midrib narrowly sunken above, convex, narrow-rounded and slightly paler below; primary lateral veins scarcely visible; **upper surface** with the minor veins narrowly and finely raised, weakly and minutely granular, sparsely short-pale-lineate; lower surface finely ridged to granular- ridged, moderately raised and narrowly rounded, interspersed at 1 mm with the intervening area, finely ridged with long trichosclereids present just beneath the surface. INFLORESCENCE semi-erect to erect, shorter than the leaves, not cernuous; peduncle 3.6–5.3 cm long; spathe not seen; **spadix** cylindroid-tapered, weakly stipitate 1–4 mm, white, drying black, 4.1–5.1 cm long, 0.8–1.2 cm diam.; pistils 1–2 mm diam., drying irregularly prismatic; style irregularly shaped along margins with the margins raised, broadly concave medially; stigma prominently raised, 1.5 mm diam., more or less round with the margins whitish and the middle blackened; berries unknown. Flowers in late March. **Figures 178–184.**

Distribution — *Stenospermatum nusigandense* is endemic to Panama, known only from the region of the type locality along the El Llano-Cartí Road in at 450 m in a *Tropical wet forest* life zone. Occurring at least sometimes with *S. sessile*.

Comments — *Stenospermatum nusigandense* is most similar to some forms of *S. andreanum* owing to its short-pedunculate inflorescence and the short pale-lineations on the upper surface. *Stenospermatum nusigandense* differs from *S. angustifolium* but its more coriaceous, more blackish-drying blades, more conspicuously sheathed petiole and more prominently free-ending petiole sheath as well as by its thicker, more ellipsoid spadix.

Etymology — *Stenospermatum nusigandense* is named for the type locality in the Comarca of Guna Yala, formerly San Blas, on the Caribbean slope.



Figure 178: *Stenospermation nusigandense*, Habit of cultivated plant, TYPE Croat 75122, MBG Greenhouse 2014_10_06 6, Photo Randy Headrick



Figure 179: *Stenospermation nusigandense*, Stem and leaves, TYPE Croat 75122, MBG Greenhouse 2014_10_06 7 Photo Randy Headrick



Figure 180: *Stenospermaton nusigandense*, Inflorescence, TYPE Croat 75122, MBG Greenhouse 2014_10_15 2 Photo Randy Headrick



Figure 181: *Stenospermaton nusigandense*, Inflorescence, TYPE Croat 75122, MBG Greenhouse 2014_10_06 2 Photo Randy Headrick



Figure 182: *Stenospermation nusigandense*, TYPE Croat 75122



Figure 183: *Stenospermatum nusigandense*, TYPE Croat 75122

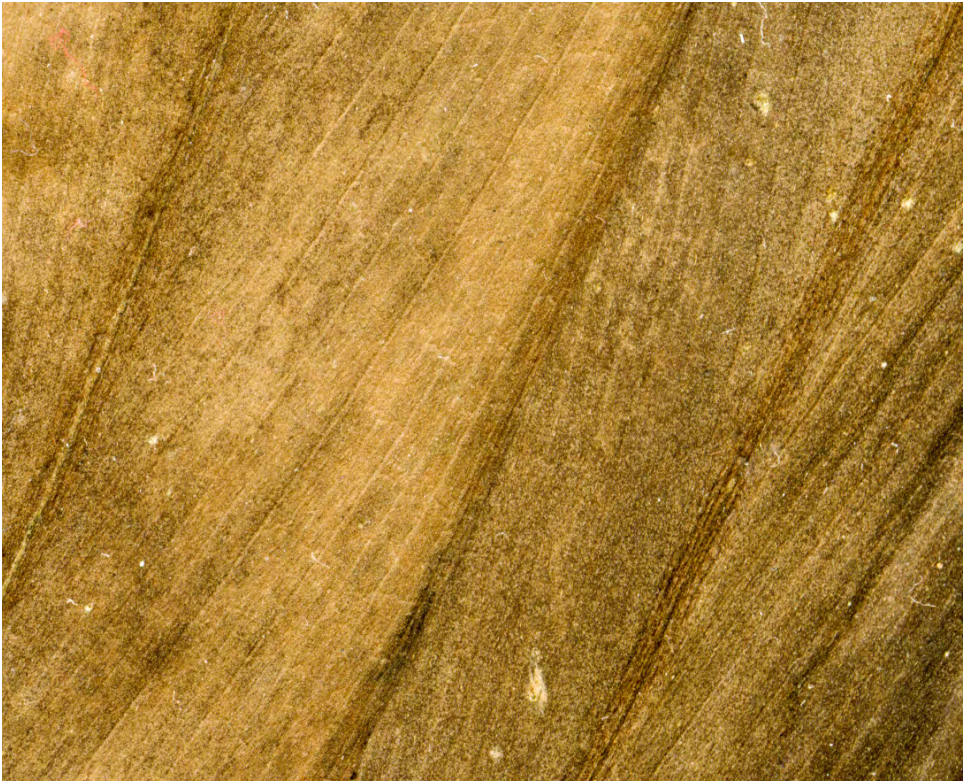


Figure 184: *Stenospermation nusigandense*, Upper blade surface, TYPE Croat 75122

Paratype — **Panama, Panamá**, Chepo, Along El Llano Carti-Tupile road; 12 mi above Pan-Am Hwy. Primary forest. 09°18'40"N 078°56'40"W, 200–500 m, 26 March 1973, *Liesner 1160* (MO-1088234).

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Steno spermation ortizii Croat **sp. nov.** — Type: PANAMA. Chiriquí, District of Gualaca, “Reserva Forestal Fortuna. Divisora Continental.” 08°47’01”N, 82°12’54”W, 1154 m, 9 November 2013, *O.Ortiz, B.Juvenal, F.Miranda 1810* (holotype, MO-6581423; isotype, PMA-107423).

Diagnosis. *Stenospermation ortizii* is characterized by its modest size, moderately short internodes which are scarcely visible owing to overlapping petiole sheaths, the nearly fully sheathed moderately dark brown-drying matte petioles with the sheath attenuate at apex, moderately coriaceous, ovate-elliptic, narrowly acuminate, dark brown-drying blades as well as by the erect inflorescence with a cream spadix with a terete stigma.

Epiphyte or sometimes terrestrial to 60 cm tall; internodes moderately short, smooth, 1–2 cm long, 2–3 cm diam., smooth, drying red-yellow to blackened, mostly obscured by the petiole sheaths; **petiole** 13.8–28.6 cm long, sheathed 0.84–0.88 its length (sheathed throughout on leaf subtending inflorescence), drying dark brown to dark green-brown and matte; **sheath** 11.6–13.5 cm long, rounded to acute at apex, often ending imperceptibly, erect with margin thin, persisting intact; free part of petiole 1–5 cm long, weakly to narrowly sulcate. LEAVES spreading; **blades** elliptic to ovate-elliptic, 13.1–30.1 cm long, 6.0–9.4 cm wide, 2.5–3.9 times longer than wide, 0.9–1.3 times longer than petiole, drying dark green-brown, moderately coriaceous, semiglossy; midrib weakly sunken, conspicuously lighter than surrounding tissue; primary lateral veins not visible; **upper surfaces** weakly ridged, with minor veins bluntly and weakly raised, spaced 1.5–2.0 mm apart, densely and uniformly, moderately, conspicuously granular-ridged, uniformly colored, sparsely and faintly sunken short-pale-lineate, sometimes finely but prominently areolate-ridged and lacking short-pale-lineations, sometimes densely dark granular-punctulate; lower surfaces weakly ridged, closely parallel striations between ridges, uniformly colored. INFLORESCENCE cernuous to erect, bracteate, rising above leaves to about as long as the leaves; peduncle 33.2–34.1 cm long, drying cream, turning yellow, densely and minutely granular; spathe not seen; **spadix** stipitate 5–8 mm, 6.2 cm long, cream to yellow, drying dark brown; peduncle 14–20 cm long, 4–6 mm diam., dark brown, flattening to 6–10 mm and manila to yellow-brown when older; pistils closely aggregated; style quadrangular to hexangular, 2.0–2.6 mm diam., drying dark brown, matte, sometimes pustular; stigma mammillate, weakly raised, circular 0.4–0.7 mm diam., drying dark brown ringed by yellow; stamens obovoid, arising below pistils. INFRUCTESCENCE to 14 cm long, 2 cm diam.; berries drying light brown on sides; seeds 8–10 per berry, drying light brown, narrowly beaked with a smooth subglobular to oval body, 2.8–3 mm long, 1.2–1.4 mm diam., slightly narrower than wide. Flowers have been seen in bud in March, in flower in May and June and in fruit in November. **Figures 185–193.**

Distribution — *Stenospermation ortizii* is endemic to Panama, known only from the Province of Chiriquí at 850–1890 m elevation in a *Premontane rain forest* life zone and in Bocas del Toro Province at Cerro Colorado in *Lower montane wet forest* at ca. 1500.

Comments — *Stenospermation ortizii* might be confused with *Stenospermation quichense* which has blades of similar shape and color with a similar shaped and sized stipitate spadix but *S. quichense* differs by having smaller leaves, a less well-sheathed petiole, smaller blades (less than 21 x 7 cm) and by having the upper blade surface drying densely areolate-ridged and lacking



Figure 185: *Stenospermatum ortizii*, Habit of flowering plant, O. Ortiz 2800, Photo O. Ortiz

short pale lineations. Another species from the region with similar leaves is *S. hageniorum* which differs by having more elliptic leaf blades with many, faint, rather long, pale lineations owing to the areolate-ridged upper surface.

Hammel 8432 is noteworthy since the label notes indicate that it was collected at 1889 m near Palo Alto only 4.5 miles from Boquete but Google Earth shows no elevation nearly as high as 1889 m in this location and the collection was most likely to have been made somewhere between 1300 and 1400 m at that distance from Boquete. The estimate made with Google Earth following the western branch of the Río Palo Alto to 1400 m is at 08°49'N, 82°25'W. Any further up the river would have been too far from Boquete. Hammel also collected the species on May 8, 1978, at what he called Cerro Hornito but also at the same elevation.

Stenospermatum ortizii was reportedly visited by Diptera (*Ortiz et al.* 1810).

Etymology — *Stenospermatum ortizii* is named for Orlando Ortiz who collected the specimen in 2013. Orlando is a Panamanian botanist, received his Master's Degree at the Universidad de Panamá and is presently studying at the Free University of Berlin for his Ph.D. He is an authority on Araceae in Panama and is an excellent collector, vigorously visiting some of the most remote parts of Panama where he has discovered many new species. His work was honored with a Smithsonian Tropical Research Institute research grant and the A. Gentry Research Award at the Missouri Botanical Garden.



Figure 186: *Stenospermaton ortizii*, Stem showing leaf bases, Paratype *O. Ortiz* 2800, Photo O. Ortiz



Figure 187: *Stenospermation ortizii*, Leaves adaxial surface, Paratype O. Ortiz 2800, Photo O. Ortiz



Figure 188: *Stenospermaton ortizii*, Leaves showing abaxial surface, Paratype O. Ortiz 2800, Photo O. Ortiz



Figure 189: *Stenospermation ortizii*, Inflorescence, Paratype *O.Ortiz 2800*, Photo O. Ortiz



Figure 190: *Stenospermation ortizii*, TYPE Ortiz 1810

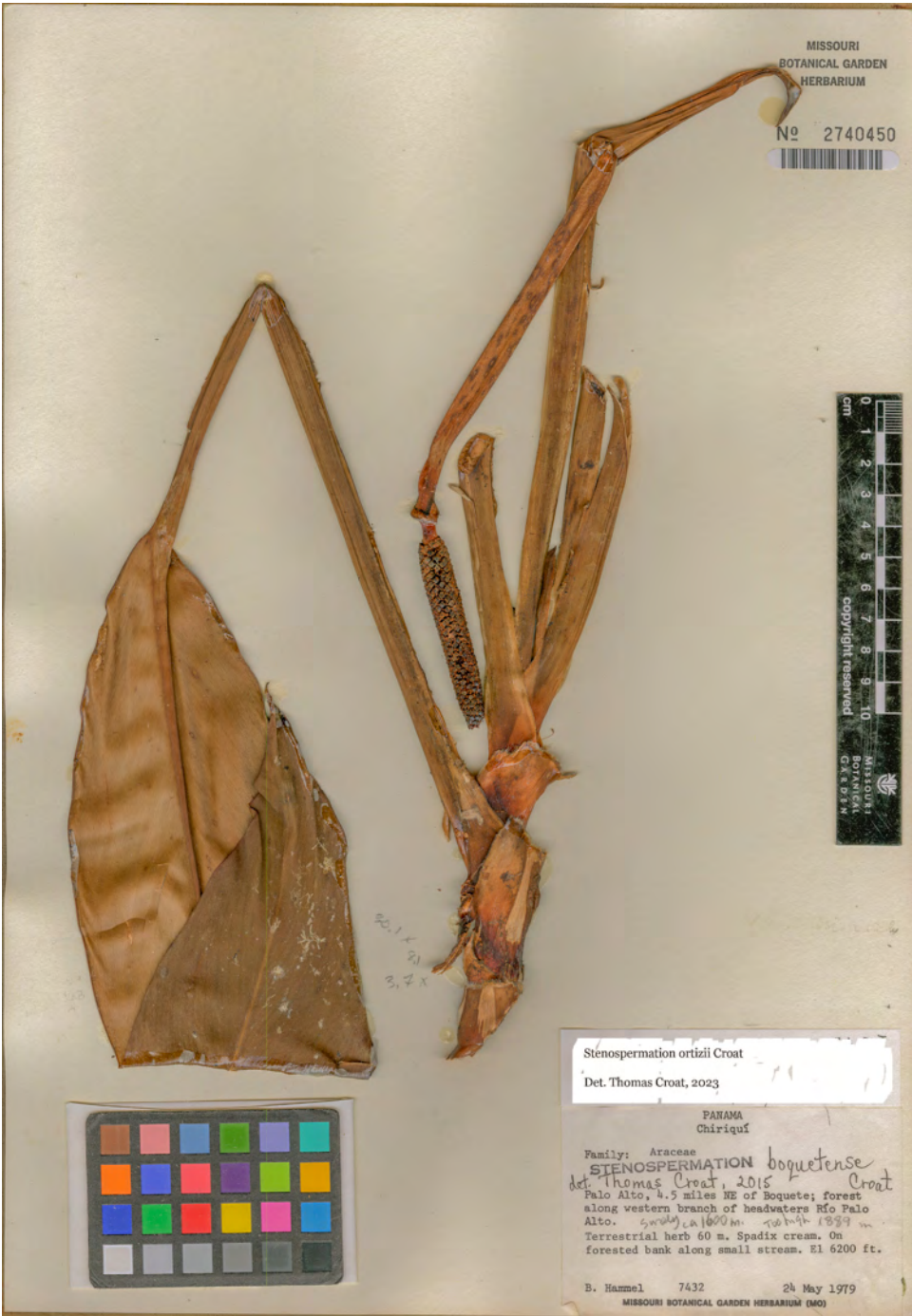


Figure 191: *Stenospermation ortizii*, Paratype Hammel 7432



Figure 192: *Stenospermation ortizii*, Paratype Kress et al. 86-1939



Figure 193: *Stenospermatum ortizii*, Upper blade surface, TYPE Ortiz 1810

Paratypes — Panama. Chiriquí: Fortuna Lake Area, along road which departs from just S of the Continental Divide, 1 mi W to near where road ends, then along trail that follows the Continental Divide. 08°44'N 081°17'W, 1200 m, 29 March 1993, *Croat 74974* (MO BC -10881502017); ca 5 km N of Fortuna Dam, trail along Continental Divide. Palo Alto, 4.5 miles NE of Boquete; forest along western branch of headwaters Río Palo Alto, (ca. 08°25'N, 82°25'W), 1889 m, 24 May, 1979, *B. Hammel 7432* (MO, PMA); Boquete. Tree Trek Mountain Resort, 08°48'56"N, 082°23'17" W, 1958 m, *O. Ortiz et al. 2800* (MO); Cerro Hornito, 1889 m, 8 May, 1978, *B. Hammel 3073* (MO). **Chiriqui-Bocas del Toro**, 08°45'N 082°15'W, 1200–1300 m, 25 April 1998, *S. Thompson 4960* (CM).

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Stenospermation palosecense Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: La Pata de Cedro; ridgetop; 09°04.270'N, 82°44.174'W, 1750 m, 13 March 2004, *A.K. Munro & E. Alfaro 4367* (holotype, PMA-67973; isotypes BM, CR, MO, MEXU). [note: only PMA seen]

Diagnosis. *Stenospermation palosecense* is characterized by its mostly epiphytic habit, short prominently folded-ridged and densely granular, yellowish brown, irregularly dark-spotted internodes, petioles sheathed 0.6–0.9 their length, the sheath narrowly acute at apex, lanceolate-elliptic, narrowly short-acuminate, brownish-drying blades, the upper surface with scarcely visible minor veins with the intervening area conspicuously and tightly areolate, weakly and sparsely short pale-lineate as well as by the long-pedunculate, cylindroid-tapered, stipitate, cream-colored spadix with a darker brown-drying apical sterile portion.

Epiphytic to 4 m high or terrestrial; internodes 1.5–2.0 cm long, drying ca. 1.5 cm diam., medium yellow, prominently folded-ridged and densely granular, irregularly dark-spotted; **petioles** 22.3–32.6 cm long, sheathed 0.6–0.9 their length, drying light brown; **sheath** 19–21 cm long, narrowly acute at apex, margin slightly darker brown, persisting intact; free part of petiole 1.8–6.2 cm long; geniculum 2.0–2.2 cm long; **blades** lanceolate-elliptic, 28.4–34.7 cm long, 8.0–9.4 cm wide, 1.7–2.7 times longer than broad, 1.1–1.3 times longer than petioles, narrowly short-acuminate at apex, acutely to weakly attenuate at base, subcoriaceous, drying dark brown, matte above, scarcely paler and dark brown, matte below; midrib drying deeply sunken and concolorous above, moderately paler, yellowish brown, matte, narrowly rounded, densely granular; primary lateral veins 8–10 per side, obscure, departing midrib at 25–30°; **upper surface** with minor veins scarcely visible, seen as distinct only by being wider and slightly paler, the intervening area conspicuously and tightly areolate, weakly and sparsely short pale-lineate. INFLORESCENCE erect, long-pedunculate; peduncle 40.5–42.0 cm long, drying flattened, 7–9 mm diam., pale yellow; spathe not seen; **spadix** cylindroid-tapered, stipitate 8–11 mm (stipe light brown, 3 mm diam.), 7.5–9.2 cm long, 1.0–1.2 cm diam., cream-colored, narrowly rounded at apex; pistils tightly aggregated, 1.6–3.6 mm wide, square to broadly hexagonal; style drying weakly domed, medium brown, matte, smooth at 30 x magnification; stigma rounded, slightly raised, drying darker; stamens 0.8 mm long and wide, held just above the level of styles; apical sterile portion 1.2 cm long, drying darker brown than

the remainder of the spadix, pistils larger than on the remainder of spadix, 3.6–4.0 mm diam., more irregularly shaped. **Figures 194–198.**

Distribution — *Stenospermaton palosecense* is endemic to Panama, known only from Bocas del Toro Province at 1735–1750 m in a *Lower montane rain forest* life zone.

Comments — *Stenospermaton palosecense* is closest to *S. topalisense* from Darién Province in Panama in the Parque Nacional del Darién at 800–850 m. That species differs by having the leaf blades 4.3–5.0 times longer than broad and petioles which are sheathed 0.5–0.7 their length with the margins of the sheath papery and at least in part deciduous. In contrast *S. palosecense* is from Bocas del Toro Province at 1735–1750 m and has the leaf blades 3.2–3.5 times longer than broad with the petioles sheathed 0.2–0.5 their length and the sheath margins thin but not papery and not conspicuous.

Etymology — *Stenospermaton palosecense* is named for the type locality in the Bosque Protector Palo Seco in Bocas de Toro Province.

Paratype — Panama. Bocas del Toro: Reserva Palo Seco, Caribbean slope of Cerro Fabrega at foot of “Falso Fabrega”, second northernmost tributary (on map) of Río Colubré; 09°09'53"N, 82°39'39, 1735 m, 13 March 2004, *A.K.Munro & S.Cafferty 4989* (PMA).



Figure 194: *Stenospermaton palosecense*, TYPE *Monro & Alfaro 4367*, Photo A. Monro



Figure 195: *Stenospermation palosecense*, Paratype *Monro & Cafferty 4989*, Photo A. Monro



Figure 196: *Stenospermatum paloscense*, TYPE Monro & Alfaro 4367



Figure 197: *Stenospermation paloscense*, Paratype Monro & Cafferty 4989



Figure 198: *Stenospermation palosecense*, Upper blade surface, Paratype *Monro & Cafferty* 4989

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Stenospermatum pamsleeperae Croat, **sp. nov.** — Type: COSTA RICA. Heredia: forest between Río Peje and upper Río Guácimo, Atlantic slope of Volcán Barva; 10°16.5'N, 84°05'W, 10 November 1986, *M.H. Grayum, C. Haufler & M. Roos 7773* (holotype, MO-3489981; isotype CR)

Diagnosis. *Stenospermatum pamsleeperae* is characterized by its appressed-climbing epiphytic habit, stems branching horizontally, internodes longer than broad, slender petioles sheathed 0.6–0.8 their length the sheath acute to bluntly rounded at apex with margins persisting intact, the free part of petiole sharply C-shaped and shallowly sulcate, its oblong to oblong-lanceolate, brownish drying acuminate blades 4.6–7.0 times longer than broad with the upper surface drying evenly and closely rowed-areolate with short pale lineations as well as a greenish white spathe and a white, cylindroid, stipitate spadix with oval stigmas.

Appressed-climbing epiphyte to 2.0–2.5 m above ground; branches extending laterally from tree, stem internodes 2 cm diam., drying dark brown to blackened, sometimes reddish brown, smooth to markedly and deeply ridged-grooved, matte, 7–9 mm diam.; **petioles** 9.5–25.0 cm long, sheathed 0.6–0.8 their length, moderately slender, drying yellow-brown, minutely granular, coarsely ribbed, matte; **sheath** 7.8–15.0 cm long, finely ribbed, margins erect, persisting intact, acute to bluntly rounded at apex, not free-ending; free part of petiole sharply C-shaped, shallowly sulcate, 1.7–10 cm long; **blades** oblong to oblong-lanceolate, 15.7–34.0 cm long, 4.6–7.0 times longer than broad, 1.3–1.9 times longer than petiole, slightly inequilateral, one side 2–4 mm wider, gradually and narrowly acuminate at apex, narrowly acute to attenuate at base, moderately coriaceous, weakly glossy above, semiglossy below, drying thinly coriaceous, moderately dark gray-brown matte above, yellow-brown, somewhat glossy below; midrib obscure, broadly raised, concolorous above, narrowly rounded, drying several-ribbed, slightly darker below; **upper surface** drying moderately flat with the ribs weakly raised or obscure, mostly 1–2 mm apart, evenly and closely rowed-areolate, the short lineations merely a discoloration of the normal rows of cells; lower surface closely ribbed to irregularly striate throughout with an apparent lack of any pale lineations. INFLORESCENCE with peduncle limply pendent; spathe greenish white, 11.5 cm long, long-attenuated at apex, pendent, markedly ribbed on the inner dried surface, drying yellow-brown outside with faint close ribbing; **spadix** 6.8 cm long, 8 mm diam. midway, 1 cm diam. at apex, bluntly rounded, white; styles 2–3 mm diam., rounded-prismatic to irregularly rhombic, truncate, matte, dark brown; stigma oval, 0.8–1.0 mm long, funnel-shaped with a light brown margin. **Figures 199–202.**

Distribution — *Stenospermatum pamsleeperae* is endemic to Costa Rica known from the Cordillera de Talamanca at 1150–1500 m in *Premontane rain forest* in Heredia and Limón provinces and in *Lower montane rain forest* in Cartago Province.

Comments — *Stenospermatum pamsleeperae* has been confused with *Stenospermatum spruceanum* Schott which has proven to be a very different species from the Amazon basin. In recent years this new species was also confused with *S. luisgomezii*, another species described in this manuscript but that species has thicker, smaller, more dark-drying leaves with the upper surface closely ribbed and more prominently short pale-lineate.



Figure 199: *Stenospermatum pamsleeperae*, TYPE Grayum 7773



Figure 200: *Stenospermatum pamsleeperae*, Paratype G. Herrera 5187



Figure 201: *Stenospermation pamsleeperae*, Paratype Grayum 6302



Figure 202: *Stenospermatum pamsleeperae*, Upper blade surface, Paratype G. Herrera 5187

Etymology — *Stenospermation pamsleeperae* is named for the late Pam Sleeper who, with her husband Mike Grayum, made the first collection of the species. Pam and Mike once lived in a house near the Tapantí reserve and spent a lot of time together exploring the region.

Paratypes — **Costa Rica. Cartago:** Along trail leading eastward into mountains from road into Tapantí reserve, ca. 1 km S of junction of Quebrada Salto and Río Grande de Orosí, 09°43'N, 83°47'W, 1500–1800 m, 1 February 1986, *M. Grayum et al.* 6302 (MO-3446559); **Limón:** Cantón de Talamanca, Bratsi, Anumbri, Alto Lari, Kivut, 09°24'15"N, 83°05'15"W, 1300 m., 6 March, 1992, *G. Herrera* 5187 (CR, MO-4358387).

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Stenospermation pirrense Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Darién: Parque Nacional Darién, Serranía de Pirre, Rancho Plástico, 07°59'13"N, 077°42'28"W, 1127 m, 20 July 2016, *O.Ortiz* 2631 (holotype, MO-6868205; isotypes PMA, US)

Diagnosis. *Stenospermation pirrense* is characterized by its sprawling epiphytic scandent habit, frequently pendent-spreading branches, elongated maroon internodes which dry dark brown and conspicuously ribbed, slender, heavily sheathed petioles which are sheathed $\frac{1}{2}$ – $\frac{3}{4}$ with the sheath apex rounded and often weakly free-ending, its lanceolate to oblanceolate or oblong-elliptic to lanceolate-elliptic, gradually long-acuminate, slightly bicolorous blades as well as the long and narrowly pedunculate inflorescence with a cupuliform spathe that is white inside, yellow outside at anthesis and the stipitate yellowish to orangish spadix as well as orange berries.

Scandent, slender, low-climbing epiphyte or vine to an unknown height, sometimes growing in a large mass with numerous stems, sometimes terrestrial to 60 cm tall; internodes longer than broad, (1.0)1.4–4.0 cm long, drying 3.6–4.0 mm diam., smooth, drying red-yellow to dark grayish brown or blackened, matte, coarsely and narrowly ribbed, mostly obscured by the petiole sheaths. LEAVES erect-spreading, scattered along the distal half of the stem; **petioles** (2.9)6.0–8.3 cm long, sheathed usually 0.5–0.95, rarely nearly as long as petioles; **sheath** narrow, (2.2)5.7–8.8 cm long, scarcely 5 mm high on side, narrow and rounded, weakly free-ending at apex, weakly protruding above the point of attachment; margin persisting intact; free part of petiole lacking or up to 3.8 cm long, terete; **blades** lanceolate to oblanceolate or oblong-elliptic to lanceolate-elliptic, 8.5–20.9 cm long, 2.3–8.1 cm wide, 2.4–5.3 times longer than wide, 2.4–4.8 times longer than petioles, inequilateral (one side 2–5 mm wider), gradually long-acuminate and often down-turned at apex, acute to attenuate at base, moderately bicolorous, drying usually greenish gray, dark gray-green to light gray-green, sometimes yellow brown above, slightly paler and greenish gray to yellowish gray below, matte on both surfaces; midrib drying weakly raised and concolorous above, narrowly raised and paler or darker below; primary lateral veins not apparent; **upper surface** with minor veins close and weakly raised, sometimes not apparent, densely short pale lineate, minutely and densely granular and irregularly ridged, intervening space irregularly striate, irregularly dark-punctulate; lower

surface weakly ridged, smooth, granular, sometimes irregularly dark-punctulate, usually lacking short pale lineations, weakly raised and closely spaced below. INFLORESCENCE erect, held among the leaves, cernuous below the spathe; peduncle (6)10–18 cm long, 1 mm diam., drying brown; spathe 6–7 cm long, only slightly longer than spadix, narrowly acuminate at apex, broadly elliptic to ovate at anthesis, green in bud, white inside, yellow outside at anthesis; **spadix** 4–6 cm long, 5–7 mm diam., stipitate 4–6 mm (may be sessile in bud), yellow to orange, narrowly cylindroid (5–8 times longer than broad), weakly tapered near apex; pistils closely aggregated; styles drying tightly aggregated, subquadrangular to irregularly rounded-prismatic, (2.0) 2.5–3.0 mm wide, drying dark brown, matte, flat; stigma elliptic to oblong, sharply sulcate 0.6–0.8 mm long, 0.5 mm wide; weakly raised, somewhat funnel-shaped; stamens arising slightly above the style. INFRUCTESCENCE with berries orange. Flowering buds in December and April, flowers in December and July, fruits developing in July, August and December. **Figures 203–207.**

Distribution — *Stenospermatum pirrense* is endemic to Panama, known only from Darién Province at 900–1400 m elevation in cloud forest in a *Premontane rain forest* life zone. It could be reasonably expected in adjacent Chocó Department in Colombia.

Comments — *Stenospermatum pirrense* is most similar to *Stenospermatum angustifolium* Hemsl. but differs from that species by its yellowish spathe, yellow to orange spadix and orange berries. In the key the species tracks to *S. copense* from Coclé Province at 609 m elevation but *S. copense* differs in having the peduncle less than 8 cm long with the spadix 3.5 times longer than wide. In contrast *S. pirrense* occurs on Cerro Pirre in Darién Province at 800–1200 m elevation and has the peduncle usually 12 to 18 cm long

Etymology — *Stenospermatum pirrense* is named for the type locality on Cerro Pirre in Panama.

Paratypes — **PANAMA. Darién:** Parque Nacional Darién, Cerro Pirre., 07°46'00"N 077°44'06"W, 1400 m, *A. Zapata et al.* 1578 (PMA); Summit of Cerro Pirre., 07°55'21"N 077°42'57"W - 07°55'40"N 077°42'12"W, 1000 - 1400 m, 29 December 1972, *A. H. Gentry & A.F. Clewell* 6949 (MO); On ridge of Cerro Pirre. [Original coordinates 8°00'N, 77°45'W], 07°56'N 077°42'W, 1000 - 1080 m, 14 September 1989, *G. McPherson* 14088 (MO); Parque Nacional Darién, caminando entre Campamento Rancho Frío No. 2 hacia la cima de Cerro Pirre., 08°00'N 077°45'W, 700 - 1000 m, 7 February 1991, *H. Herrera et al.* 856 (MO); Cerro Pirre. Cloud forest, 07°51'N 077°44'W, 3700 f, 14 December 1962, *J.A. Duke* 6579A (MO); Ridgetop area N of Cerro Pirre, between Cerro Pirre top and Rancho Plástico., 07°51'N 077°42'W, 1200 - 1400 m, 14 November 1977, *J.P. Folsom et al.* 6316 (MO); Cuasí-Cana Trail between Cerro Campamiento and La Escalera to "Paramo", east of Tres Bocas., 07°44'N 077°44'W - 07°46'N 077°47'W, 30 April 1968, *J.H. Kirkbride, Jr. & James A. Duke* 1274 (MO); Serranía de Maje. Reserva privada Chucanti 8°47' 45" N 78°27'47"W, 1325 m, *O. Ortiz* 3173 (MO); SW ridge leading to Alturas de Nique, on border with Colombia., 07°42'30"N 077°45'12"W, 900 - 1000 m, 30 December 1980, *R.L. Hartman* 12427 (MO); Serranía de Pirre, N end of range, 2-3 mi N of Cerro Pirre, 07°56'N 077°42'W, 1000 - 1100 m, 31 December 1978, *R.L. Hartman* 8531 (MO); SW ridge leading to Alturas de Nique on the Colombian border., 07°42'N 077°46'W, 800 - 900 m, 28 December 1980, *R.L. Hartman* 12340 (MO); Serranía Pirre, 1.5-2.5 mi S on ridge from intersection with trail down to

Rancho Frío. Clouf forest. [Original coordinates 8°01'N, 77°43'W], 07°57'N 077°43'W, 900 - 1000 m, 11 July 1977, *R.L. Hartman et al. 4501* (MO); Serranía de Pirre, trail 2-2.5 mi due S from Cerro Pirre, 07°47'N 077°43'W, 1200 m, 21 July 1977, *R.L. Hartman et al. 4730* (MO); Serranía Pirre, 1.5-2.5 mi S on ridge from intersection with trail down to Rancho Frío. Clouf forest. [Original coordinates 8°01'N, 77°43'W], 07°57'N 077°43'W, 900 - 1000 m, 11 July 1977, *R.L. Hartman et al. 4484* (MO); Serranía de Pirre, Cerro Pirre, on trail just SW of summit, 07°56'N 077°42'W, 1300 m, 15 July 1977, *R.L. Hartman et al. 4803* (MO); Middle slopes on W side of Cerro Pirre., 07°56'N 077°45'W, 800 - 1050 m, 29 June 1988, *T.B. Croat 68936* (MO); Chepigana. Cerro Pirre., 07°50'N 077°44'W - 07°56'N 077°44'W, 2500 - 4500 ft, 09 August 1967 - 10 August 1967, *J.A. Duke & T. S. Elias 3691* (UC); Cerro Pirre., 07°50'N 077°44'W - 07°56'N 077°44'W, 2500 - 4500 ft, 09 August 1967 - 10 August 1967, *J.A. Duke & T. S. Elias 13817* (MO);



Figure 203: *Stenospermation pirrense*, Habit of flowering plant, TYPE O. Ortiz 2631, Photo O. Ortiz



Figure 204: *Stenospermatum pirrense*, Inflorescence, TYPE *O.Ortiz* 2631, Photo O.Ortiz



Figure 205: *Stenospermation pirrense*, Inflorescence, TYPE *O. Ortiz* 2631, Photo O. Ortiz



Figure 206: *Stenospermation pirrense*, Paratype Kirkbride 1274



Figure 207: *Stenospermation pirrense*, Upper blade surface, Paratype Kirkbride 1274

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Stenospermatum pteropus Grayum, *Phytologia* 82(1):30-57. 1997. TYPE: Costa Rica. Limón: Alto Urén, subiendo por la fila entre la margen derecha de la Quebrada Chaho y la margen izquierda del Río Lorni, Cerro Láubeta, 9°23'10"N, 83°00'25"W, 1190 m, 26 July 1989, *G. Herrera 3353* (holotype, MO-3853475, isotypes, CR, K, USJ).

Epiphyte; internodes (0.7)1.0–1.3 cm long, drying 4–5 mm diam., light brown, coarsely ridged longitudinally, semiglossy; **petioles** 1.6–3.5 cm long, sheathed to leaf base or slightly below the base of blade; **sheath** broadly spreading, 4–6 mm from side to side, emarginate to inequilaterally emarginate at apex, drying dark brown, margin thick, persisting intact, fully covering petiole; **blades** 5.5–9.3 cm long, 1.2–2.0 cm wide, 3.7–4.6 times longer than wide, 4.4 times longer than petioles, lanceolate to oblong-lanceolate or narrowly elliptical, drying dark brown and matte above, moderately paler and yellow-brown, matte to weakly glossy below, narrowly long-acuminate to narrowly acute and apiculate at apex, obtuse at base; midrib drying narrowly rounded on both surfaces; minor veins prominulous on both surfaces, closely paralleling the midrib, concolorous; **upper surface** with veins difficult to discern, the entire surface wide areolate, sometimes with faint short pale lineations; lower surface closely striate-pustular, lacking pale lineations. INFLORESCENCES shorter than leaves; peduncles 2.5–4.0 cm long, drying light brown, coarsely ridged, 1 mm diam.; spathe 2.2 cm long, color unknown; **spadix** 1.8–2.0 cm long, 4 mm diam. ca. 9 mm shorter than spathe, color unknown, stipitate 0.3–0.4 cm; pistils 3–5 visible per spiral; style 1.0–1.5 mm, irregularly rounded with a more or less crenate margin on drying, deeply funnelform, dark brown. Berries unknown. Flowers in July. **Figures 208-210.**

Distribution — *Stenospermatum pteropus* is endemic to Costa Rica known only from the type collection from the Atlantic slope of Cordillera de Talamanca at ca. 1200 m.

Comments — *Stenospermatum pteropus* is characterized by its epiphytic habit, small slender stem, many small leaves scattered on the stem with moderately short internodes, fully sheathed, broadly winged petioles, small more or less lanceolate, moderately bicolorous, brown-drying leaf blades with a few pairs of veins visible and paralleling the midrib as well as by the short-pedunculate inflorescence with a slender peduncle and green spathe and spadix.

Owing to its small size and small, more or less lanceolate leaf blades and broad spreading, fully sheathed petioles the species is not confused with any other in Central America *Stenospermatum pteropus* is somewhat like *S. parvum* Croat from the Amazon basin in Ecuador but that species differs by having proportionately longer, less conspicuously narrow-winged petioles and proportionately more elliptic blades. Among species in Central America *Stenospermatum pteropus* is perhaps most similar to *S. angustifolium*, but that species differs in having usually larger leaf blades with erect petiole sheaths and a sessile spadix.

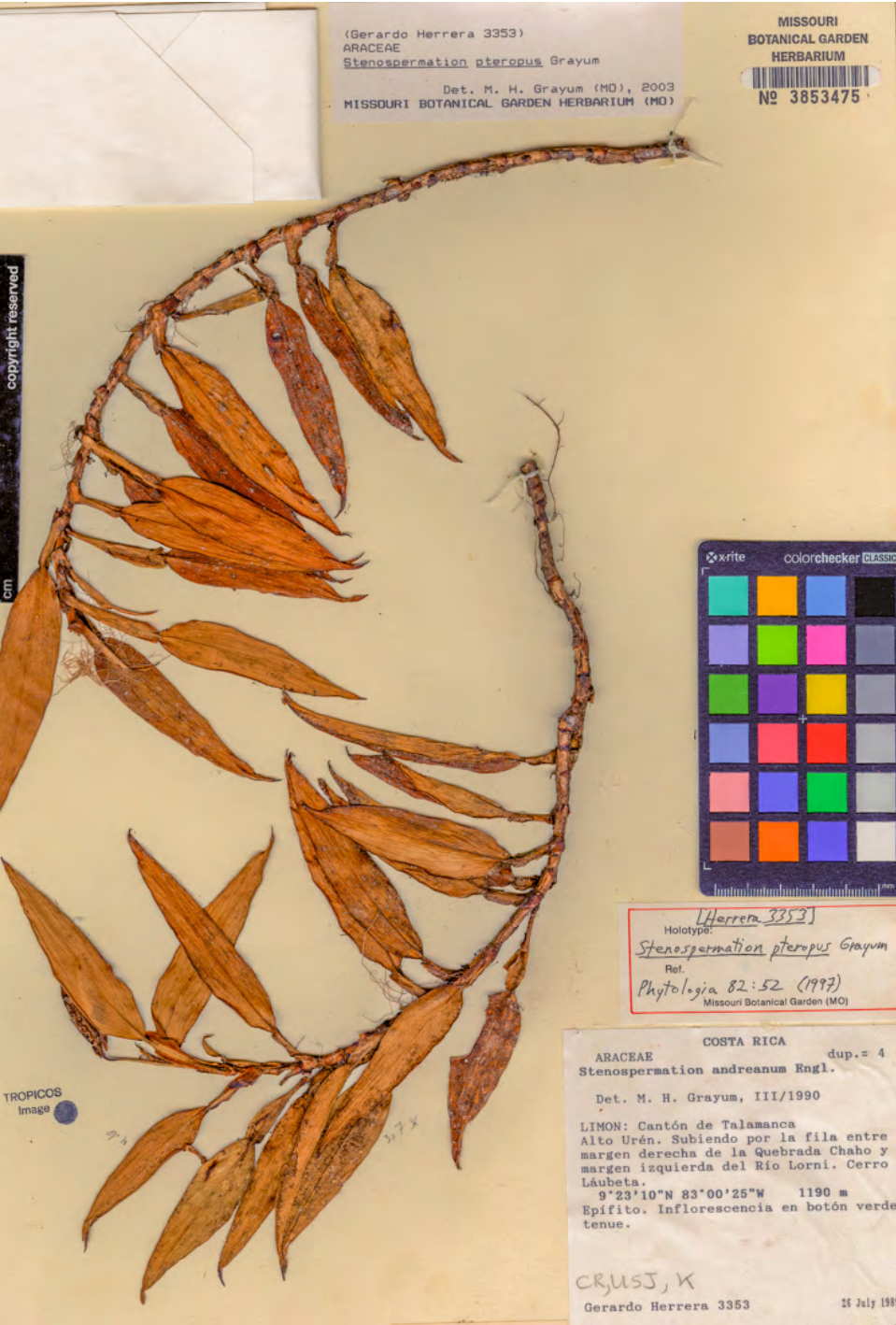


Figure 208: *Stenospermaton pteropus*, TYPE G. Herrera 3353 (MO)



Figure 209: *Stenospermatum pteropus*, Isotype G. Herrera 3353 (CR)



Figure 210: *Stenospermaton pteropus*, Upper blade surface, TYPE *G. Herrera 3353*

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Stenospermation pucuroense Croat, **sp. nov.** — Type: PANAMA. Darién: Parque Nacional del Darién along the Panama-Colombian border, near gold mine at headwaters of N branch of Río Pucuro, slopes of Cerro Tacarcuna, ca. 6 km N of Cerro Mali; 08°09'30"N, 77°15'00"W, 1300 - 1500 m, 27 October 1987, *B. Hammel, G. de Nevers & H. Herrera 16573* (holotype, MO-3496714).

Diagnosis. *Stenospermation pucuroense* is characterized by its epiphyte habit, black-drying internodes up to ca. 4 times longer than broad, petioles sheathed 0.4–1.0 their length, usually to near the apex, the sheath rounded to weakly free-ending on one side, acute on the other, its oblong-elliptic, narrowly long-acuminate, grayish brown-drying blades with the upper surface with minor veins narrowly raised, moderately acute and closely spaced with intervening area with some oblique ridging, areolate elevated areas and minute scalariform veins and with frequent short-pale-lineations as well as by its green spathe and sessile, cylindroid spadix with three flowers visible per spiral and orange berries.

Epiphyte; internodes short or to ca. 4 times longer than broad, 0.5–1.7 cm long, 5–6 mm diam. drying blackened; **petioles** 5.7–19.8 cm long, sheathed 0.4–1.0 their length, usually to near the apex (to within 5 mm), sometimes to 5 cm from base of blade; **sheath** narrow, incurled, rounded to weakly free-ending on one side, acute on the other, margin thin but apparently not deciduous; free part of petiole 0–10 cm long; **blades** oblong-elliptic, narrowly long-acuminate at apex, acute to weakly attenuate at base, 7.5–17.1 cm long, 2.2–4.4 cm wide, 3.5–4.0 times longer than broad, 0.8 times as long to 1.7 times longer than petioles, subcoriaceous, somewhat bicolorous, drying grayish brown and matte above, medium yellowish gray-brown and weakly glossy below; midrib drying deeply and narrowly sunken and slightly paler above, rounded, finely ridged and paler below; primary lateral veins not at all apparent on dried specimens on either surface; **upper surface** with minor veins narrowly raised, moderately acute and closely spaced with intervening area with some oblique ridging, areolate elevated areas and minute scalariform veins and with frequent short-pale-lineations; lower surface with minor veins scarcely distinguishable from ribs of intervening area, closely and uniformly fine-ridged below with sparse pale lineations. INFLORESCENCE about as long as the leaves; peduncle 19–23 cm long, ca. 1 mm diam. on drying; spathe 11.8 cm long, 5 mm diam. when furled, green, drying matte outside, semiglossy inside; **spadix** sessile, 3.5 cm long, cylindroid; flowers three visible per spiral, style irregularly 5- or 6-sided, drying brown, the margins thin and acute on the dried edge; stigma oval to rounded, prominently raised from the style surface, blackened on drying. INFRUCTESCENCE with berries orange. Flowering and fruiting in October. **Figures 211 & 212.**

Distribution — *Stenospermation pucuroense* is known only from the type locality in Panama but is certainly to be expected in adjacent Chocó Department in Colombia. It is known from 1300–1500 m elevation in a *Premontane rain forest* life zone.



Figure 211: *Stenospermation pucuroense*, TYPE Hammet 16573

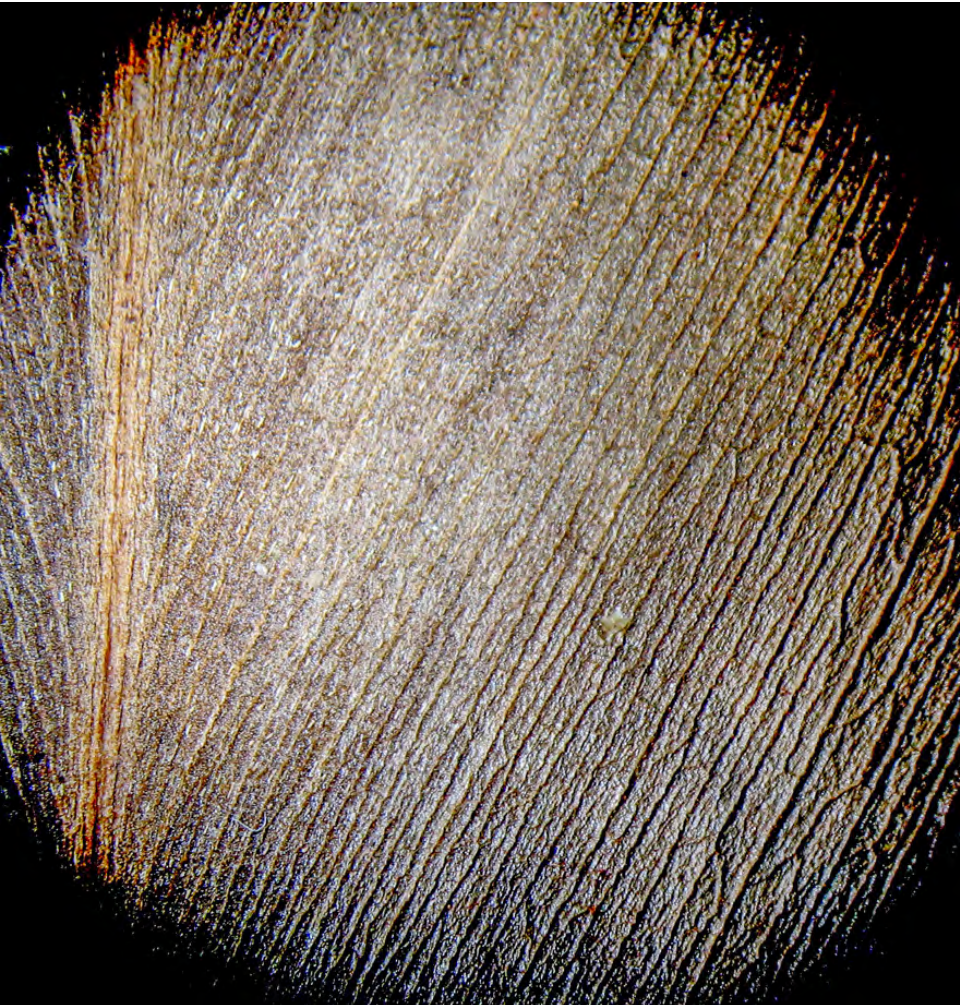


Figure 212: *Stenospermatum pucuroense*, Upper blade surface, TYPE *Hammel 16573*

Comments — *Stenospermatum pucuroense* appears to be closest to *Stenospermatum sapoense*, also from Darién Province on Cerro Sapo. That species differs by having shorter internodes, more dark-drying leaves, petioles with a broader prominently free-ending sheath and proportionately broader leaves (2.4–2.5 versus 3.3–3.5 times longer for *S. pucuroense*).

Stenospermatum pucuroense may also be confused with *Stenospermatum longispathum* from the western slope of Ecuador on Volcán Pichincha at 800 m elevation which also has a spathe much longer than the spadix. That species differs by having shorter leaves that are more rounded at the base, with the upper blade surface moderately smooth, lacking any prominent ribs on

drying and only very weakly short pale-lineate.

In Panama *Stenospermatum pucuroense* is most easily confused with *Stenospermatum multicostatum* which differs in having thicker, more elliptic, more bicolorous blades with petioles more thickly and prominently sheathed and prominently stipitate spadices which are almost as long as the spathe.

Etymology — *Stenospermatum pucuroense* is named for the type locality near the headwaters of the Río Pucro on the slopes of Cerro Tacarcuna.

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Stenospermatum purulhaense Croat, **sp. nov.** — Type: GUATEMALA. Bajo Verapaz: On highway to Cobán, 3 miles S. of Purulha on Hwy CA-14, 15°12'48"N, 80°12'48"W, 1748 m, 16 July 1977, *Croat 41187* (holotype, MO-2599976; isotype, BIGU).

Diagnosis. *Stenospermatum purulhaense* is characterized by its appressed-climbing epiphytic habit, short, thick internodes, petioles sheathed 0.7–0.9 their length, sheath ending acutely at apex and darker than shaft; large, dark brown-drying, elliptic, bluntly acute blades 2.6–2.7 times longer than wide, the upper surface with minor veins irregularly short-ribbed to sparsely pustular and usually densely granular

Appressed climbing epiphyte; internodes short, less than 1 cm long, 3.5–4.0 cm diam.; **petiole** 21.7–28.0 cm long, drying dark brown, finely many-ribbed, minutely granular, sheathed 0.7–0.9 its length; **sheath** 18.5–18.7 cm long, to 1.1 cm on the sides, drying black, persisting intact; free part of petiole 4.0–5.5 cm long; **blades** 29.6–30.5 cm long, 10.6–11.5 cm wide, 2.6–2.7 times longer than wide, 1.1–1.4 times as long as petioles, narrowly rounded to acute at apex, acute at base, drying dark brown and glossy on both surfaces; midrib broadly convex above, flattened, paler, many-ribbed and matte below; primary lateral veins close, 5–6 mm apart, weakly raised above, much less prominent below; **upper surface** with minor veins irregularly short-ribbed to sparsely pustular, usually densely granular, sometimes with a distinct medial rib; lower surface drying glossy, densely black-speckled, less densely pustular than upper surface, the individual veins scarcely apparent toward the margins with the surface uniformly striate and densely granular. INFLORESCENCE not seen. **Figures 213–216.**

Distribution — *Stenospermatum purulhaense* is endemic to Guatemala, known only from the type collection from Baja Verapaz Department at 1500 m in a *Premontane rain forest* life zone.



Figure 213: *Stenospermation purulhaense*, not collected, Purulha, Guatemala

Comments — *Stenospermation purulhaense* is apparently a close relative of *S. tuerckheimii* from the same region which shares the narrowly rounded blade apex and blades of a similar size and shape. The latter species differs in drying matte, lighter brown in color and in having an indistinct petiole sheath with the upper blade surface with the minor veins more individually distinct with the intervening area conspicuously granular with relatively few parallel ridges.

Etymology — *Stenospermation purulhaense* is named for the type locality near Purulha in Baja Verapaz Department of Guatemala.



Figure 214: *Stenospermaton puruhaense*, TYPE Croat 41187



Figure 215: *Stenospermatum purulhaense*, TYPE Croat 41187



Figure 216: *Stenospermaton_purulhaense*, Upper blade surface, TYPE *Croat 41187*

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Stenospermation quichense Croat, **sp. nov.** —Type: GUATEMALA. Quiché: Amacchel, Aldea Chel, Chajul, 15°42'51"N, 91°00'15"W, 1356 m, 22 April 2007, *J. Morales & M. Pérez 4615* (holotype, MO-6255611; isotype, USCG)

Diagnosis. *Stenospermation quichense* is recognized by its short slender internodes, intact brown-drying petioles which are sheathed about half to nearly throughout their length, inequilateral, elliptic, dark brown-drying blades which are acute at the apex and base with obscure veins as well as by its cylindroid stipitate spadix. Especially distinctive is the unusual pattern of the wrinkling on the upper dried surface.

Epiphyte; internodes short, drying light brown, densely and minutely granular, coarsely ribbed, sometimes drying dark brown in places; **petioles** 12.6–14.0 cm long, sheathed 0.5–0.9 their length, drying dark brown, matte, densely and minutely granular; **sheath** 6.7–11.5 cm long, erect, margin persisting intact, rounded at apex; free part of petiole (1.5)5.5–6.7 cm long; **blades** elliptic, 14.3–20.6 cm long, 5.1–6.5 cm wide, 2.3–3.6 times longer than broad, 1.1–1.6 times longer than petioles, inequilateral (one side 4 mm wider), acute and apiculate at apex, acute to almost obtuse at base; primary lateral veins moderately obscure, departing midrib at 30–40°; **upper surface** with weak, narrowly raised minor veins, these like the surface densely areolate-ridged with deeply scalloped areas between the ridges, lacking short pale lineations; lower surface with minor veins weakly raised and darker, densely and minutely granular and densely pale-speckled, otherwise smooth. INFLORESCENCE erect, shorter than the leaves; spathe not seen; **spadix** cylindroid, stipitate 6 mm, 6.5 cm long, 1.1 cm diam., narrowly rounded at apex, color at anthesis not known; pistils drying dark brown, 1.8–2.1 mm diam., irregularly shaped, square to irregularly 4–6-sided, the margins bluntly acute, well-raised above surface of style, round and dome-shaped with a pale rim around the margin. Flowering in April. **Figures 217 & 218.**

Distribution — *Stenospermation quichense* is endemic to Guatemala, known only from Quiché Department at 1356 m elevation in a *Premontane rain forest* life zone.

Comments — *Stenospermation quichense* is not confused with any other species but it resembles a very small specimen of *Rhodospatha latifolia* without prominent primary lateral veins.

Etymology — *Stenospermation quichense* is named for the type locality in Guatemala's Quiché Department.



Figure 217: *Stenospermation quichense*, TYPE J. Morales 4615



Figure 218: *Stenospermatum quichense*, Upper blade surface, TYPE *J. Morales* 4615

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Stenospermation ramonense Croat, **sp. nov.** — Type: COSTA RICA: Alajuela: Reserva Forestal San Ramón, sendero Miramar; 10°12'53"N, 84° 26'38"W, 1072 m [Google Earth], 2 November 1986, *G. Herrera Ch., V. Mora & D. Hernández* 168 (holotype, MO-3617426)

Diagnosis. *Stenospermation ramonense* is characterized by its epiphytic scandent habit, internodes slightly longer than broad, petioles sheathed 0.5–0.8 their length, finely areolate-striate, sheath ending acute to weakly rounded at apex, the sharply sulcate free part of petiole, the narrowly lanceolate to oblong-lanceolate, narrowly acute or sometimes weakly acuminate, scarcely bicolorous blades with the upper surface sparsely pustular, otherwise uniformly and minutely areolate-striate as well as by its stipitate cylindroid spadix with a short sterile segment at apex.

Epiphytic vine; internodes slightly longer than broad, 1–2 cm long, 4–5 mm diam., drying dark brown to blackened at the upper nodes, matte, yellowish gray and closely and irregularly ribbed lower down; **petioles** 13.5–19.7 cm long, sheathed 0.5–0.8 their length, finely ribbed abaxially, concolorous with sheath; **sheath** 6.2–8.5 cm long, finely areolate-striate, ending acute to weakly rounded at apex, not at all free-ending, margin persisting intact; free part of petiole 1.7–5.9 cm long, drying sharply sulcate; geniculum weak, slightly darker 5–8 mm long; **blades** narrowly lanceolate to oblong-lanceolate, 13.5–19.7 cm long, 2.6–3.1 cm wide, 2.6–3.1 times longer than wide, 1.1–1.7 times longer than petioles, narrowly acute or sometimes weakly acuminate at apex, narrowly acute to weakly attenuate at base, drying subcoriaceous, greenish gray and matte above, weakly if at all paler and semiglossy below; midrib narrowly and sharply sulcate and concolorous above, moderately and bluntly to acutely raised below; primary lateral veins not at all apparent; minor veins moderately visible, departing midrib at 10–20°, the more prominent ones 2–6 mm apart, narrowly rounded, the lesser merely convex; **upper surface** sparsely pustular, otherwise uniformly and minutely areolate-striate (including on ribs); lower surface uniformly and minutely striate, weakly granular, weakly pustular. INFLORESCENCE erect; peduncle 16 cm long, 2 mm diam.; spathe not seen; **spadix** 4.2 cm long, 8 mm diam., stipitate 7 mm (stipe 1.5 mm diam. dried), cylindroid, with short sterile segment at apex (ca. 5 mm long); styles truncate, matte, dark gray-brown, moderately close-spaced, 2–3 mm wide, mostly trapezoidal the corners often drying narrowed and somewhat pointed, dominated by conspicuous, somewhat raised, rounded to ellipsoid styles with thick light brown edges and blackened centers, 8–9 mm long in their broadest dimension; stamens pale tan, emerging at level of styles. **Figures 219 & 220.**

Distribution — *Stenospermation ramonense* is endemic to Costa Rica, known only from the type locality in Alejuela Province at 1072 m elevation in a *Premontane wet forest* life zone.

Comments — Owing to its gray-drying, scarcely bicolorous, mostly narrowly acute leaf blades with finely and uniformly rowed-areolate upper blade surfaces *Stenospermation ramonense* really does not resemble any other but it keys to near *S. pamsleeperae*, a species that differs by having larger, darker brown-drying, narrowly acuminate leaf blades, mostly 17–36 cm long and 3.0–5.7 cm wide with a uniform scattering of moderately faint short pale lineations. In contrast *S. ramonense* has gray-drying leaf blades which are mostly narrowly acute at apex and lack obvious short pale lineations.



Figure 219: *Stenospermatum ramonense*, TYPE G. Herrera 168

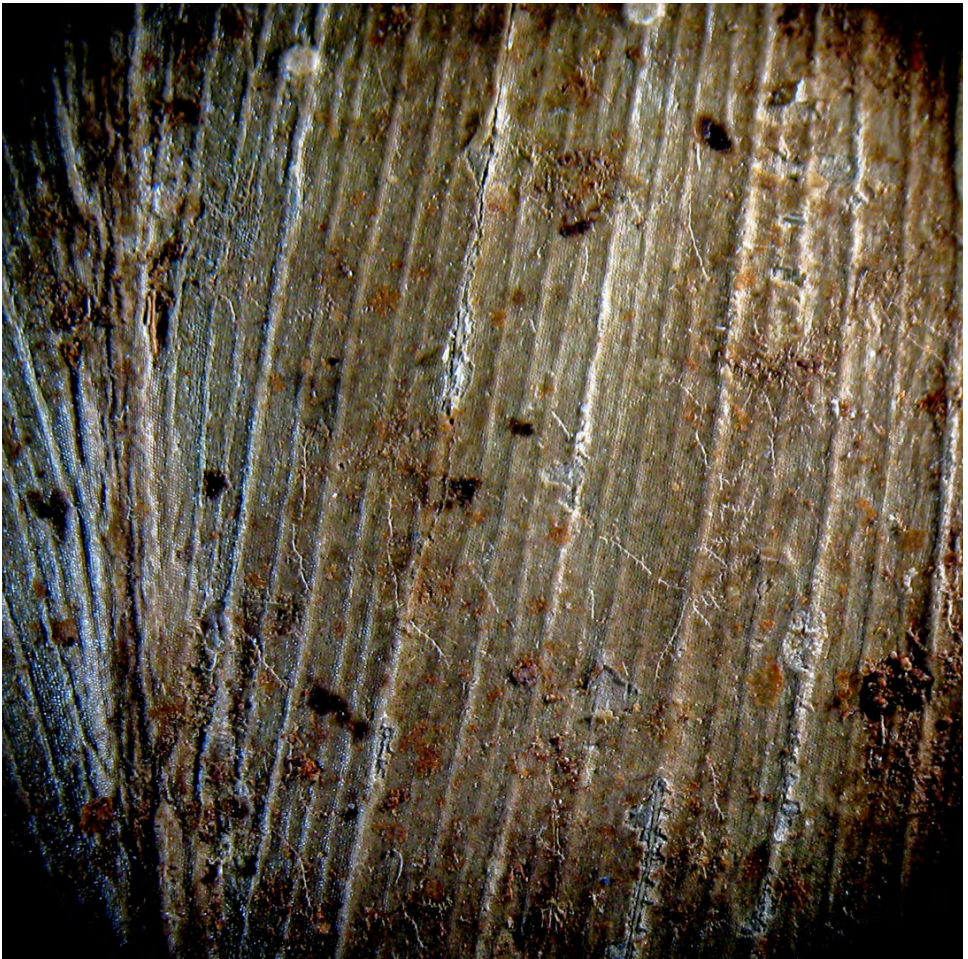


Figure 220: *Stenospermatum ramonense*, Upper blade surface, TYPE *G. Herrera 168*

Etymology — *Stenospermatum ramonense* is named for the type locality in the Reserva Forestal San Ramón in Alajuela Province.

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Stenospermation robustum Engl., Bot. Jahrb. 37:113. 1905. TYPE: Costa Rica. La Palma at 1459 m, *Tonduz 12525* (lectotype, CR designated by Nilsson Laurito & Umaña Dodero (1995: 74).

Epiphytic; stem robust; internodes short, 2 cm diam.; **petioles** 9.5–15.0 cm long, usually equal to the length of blade or about ½ as long, sheathed 0.6–0.9 their length, to 5 mm from base of blade, drying light brown to medium yellow-brown, weakly ribbed throughout; **sheath** cm long, 1.0–1.5 cm wide, ending acute at apex. LEAVES erect; **blades** subcoriaceous, oblong-elliptic, weakly acuminate at apex, acute at base, 15–20 cm long, 5–7 cm wide, two times longer than broad, 1.8 times longer than petioles, shortly and gradually acuminate at apex, acute at base, drying dark brown and matte above, slightly paler and weakly glossy below; midrib sunken and concolorous above, narrowly rounded and paler below; primary lateral veins not apparent; **upper surface** with minor veins sunken and concolorous, not markedly uniform or obvious, the intervening area markedly irregular and areolate ridged, sparsely short pale-lineate; lower surface with the minor veins more regularly spaced, weakly raised and narrowly rounded and darker below with the intervening area mostly 5-8-ribbed and granular, concolorous, sparsely short pale-lineate. INFLORESCENCE erect, long-pedunculate, held well above the leaves; peduncle 30 cm long; spathe not seen; **spadix** stipitate 1 cm, 10 cm long, 1.8 cm diam., pistils 5–6 mm long, 1.5 times longer than wide; style rhombic, 3–4 mm wide, coarsely pustular; stigma conical in side view, circular in top view, ca. 2 mm diam., the margins narrowly rounded, with a pale border and dark center; berries ovoid, many-seeded; seeds reniform. **Figures 221–223.**

Distribution — *Stenospermation robustum* is endemic to Costa Rica, known only from the type locality in San José Province at 1459 m in a *Premontane rain forest* life zone.

Comments — *Stenospermation robustum* is characterized by its epiphytic habit, short internodes, pale brown-drying, fully sheathed petioles, moderately coriaceous, elliptic, brown-drying, weakly acuminate blades which are acute at the base, weakly bicolorous with the upper surface with the minor veins sunken and concolorous, not markedly uniform or obvious, the intervening area markedly irregular and areolate ridged, sparsely short pale-lineate as well as by the long-pedunculate inflorescence with a stipitate cylindroid spadix.

Stenospermation robustum is closest to *S. sessile* Engl. which differs in having proportionately less prominently sheathed petiole which dry darker brown, rarely extend to the apex of the petioles and have a sheath margin that is thin, pale and somewhat fragile as well as by having a completely sessile spadix.



Figure 221: *Stenospermation robustum*, TYPE Tonduz 12525

vix 2 mm crassus, verisimiliter initio apice deflexus. Spatha ovato-oblonga acuminata, 0,8—1,1 dm longa, albo-viridis. Spadix cylindroideus stipite 5 mm longo suffultus,

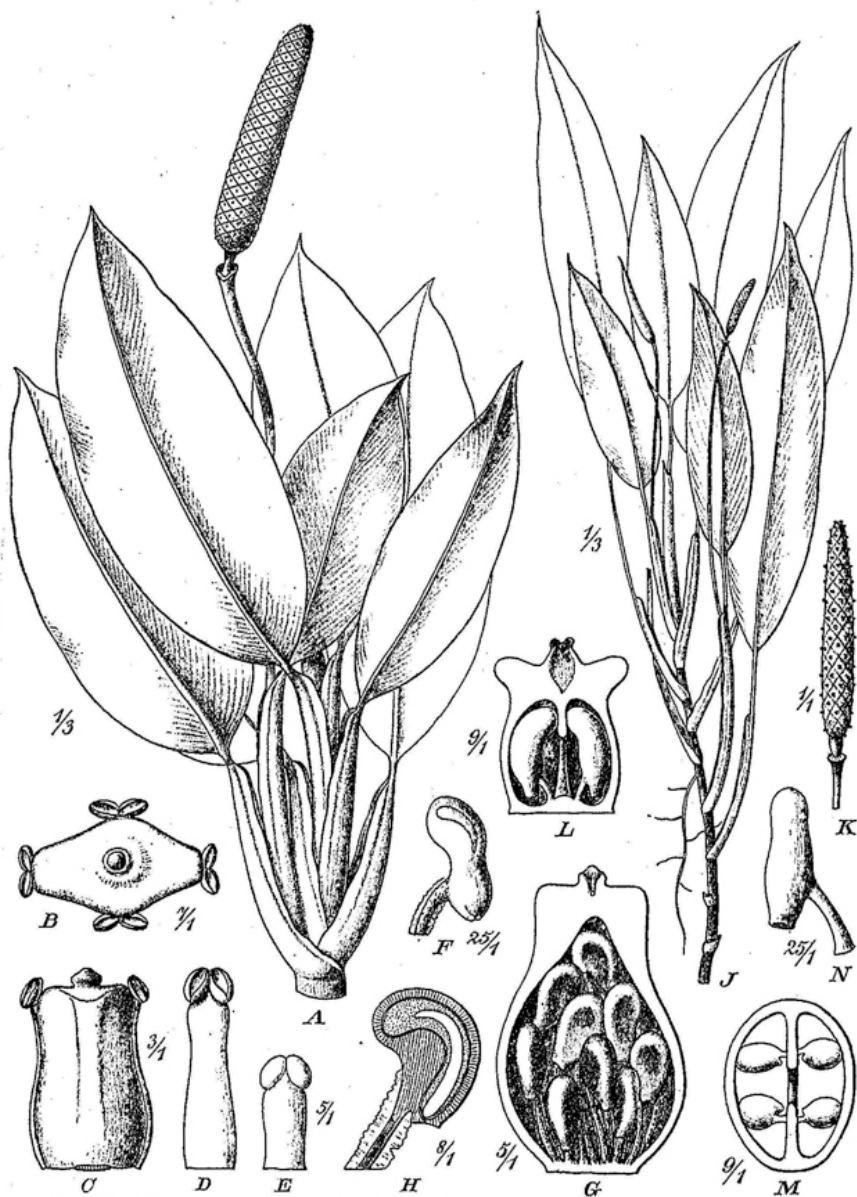


Fig. 35. A—H *Stenospermation robustum* Engl. A Habitus. B Flos supra visus. C Idem a latere visus. D Stamen a dorso visum. E Idem antice visum. F Ovulum. G Fructus || sectus. H Semen || sectum. — J—N *St. Weberbaueri* Engl. J Habitus. K Spadix. L Pistillum || sectum. M Idem = sectum. N Ovulum. (Icon. origin.)

Figure 222: *Stenospermation robustum*, drawing, Engl. Das Pflanzenreich, Monsteroideae, Figure 35. p. 86



Figure 223: *Stenospermatum robustum*, Upper blade surface, TYPE *Tonduz 12525*

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Stenospermatum santamariae Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Changuinola. Cerro Frio, Headwaters of Río Tskui, Point 22. 09°15'38"N, 82°30'15"W, 1200 m, 27 October 2008, L. Martínez, A.K. Monro & D. Santamaría 423 (holotype, PMA-80312, isotype, MO)

Diagnosis. *Stenospermatum santamariae* is characterized by its black drying internodes slender and longer than broad, fully sheathed petioles with truncate apex and with the margins intact, a sulcate geniculum, dark brown-drying, subcoriaceous, bicolorous, semiglossy, abruptly short-acuminate blades which are acute at the base as well as the prominently stipitate, yellow-green spadix.

Epiphyte; internodes longer than broad, 1–2 cm long, drying blackened, 6 mm diam.; **petioles** 16.5–27.3 cm long, sheathed essentially throughout; **sheath** 8.8–10.7 cm long, broad and drying medium brown, narrowly rounded and free-ending at apex, margins curled outward, remaining intact; **blades** broadly oblong-elliptic, inequilateral (one side 7 mm narrower), 16.5–27.2 cm long, 7.4–8.3 cm wide, 4.3–5.3 times longer than wide, nearly as long as petioles, subrounded and abruptly short-acuminate, downturned at apex, usually inequilateral and acute to narrowly rounded at base; midrib bluntly and weakly raised, concolorous above, weakly raised, finely ribbed and darker on drying; primary lateral veins scarcely apparent but visible veins ca. 5 mm apart, departing midrib at 35–45°; **upper surface** with minor veins 1.2–2.6 mm apart, weakly raised, the intervening area uniformly weakly areolate-ridged; lower surface uniformly and densely striate-granular. INFLORESCENCE long-pedunculate; peduncles drying dark brown, 3 mm diam.; spathe not seen; **spadix** yellow-green, stipitate 6 mm, 16 cm long, 9 mm diam, seemingly lacking a sterile segment at apex or at base; pistils 5–7 mm diam, ovary densely reddish-spotted throughout on the sides; styles elongated in the direction of the axis; styles rectangular in top view, drying dark brown, 3.2–3.6 mm long, 1.3–1.8 mm wide, the sides broadly scalloped in part; stigma oval, 0.8–0.4 mm wide, manila, deeply sunken inside. Flowering in late October. **Figures 224–228.**



Figure 224: *Stenospermatum santamariae*, Flowering plant detached TYPE L. Martínez et al. 423



Figure 225: *Stenospermation santamariae*, Inflorescence, TYPE *L. Martinez et al.* 423

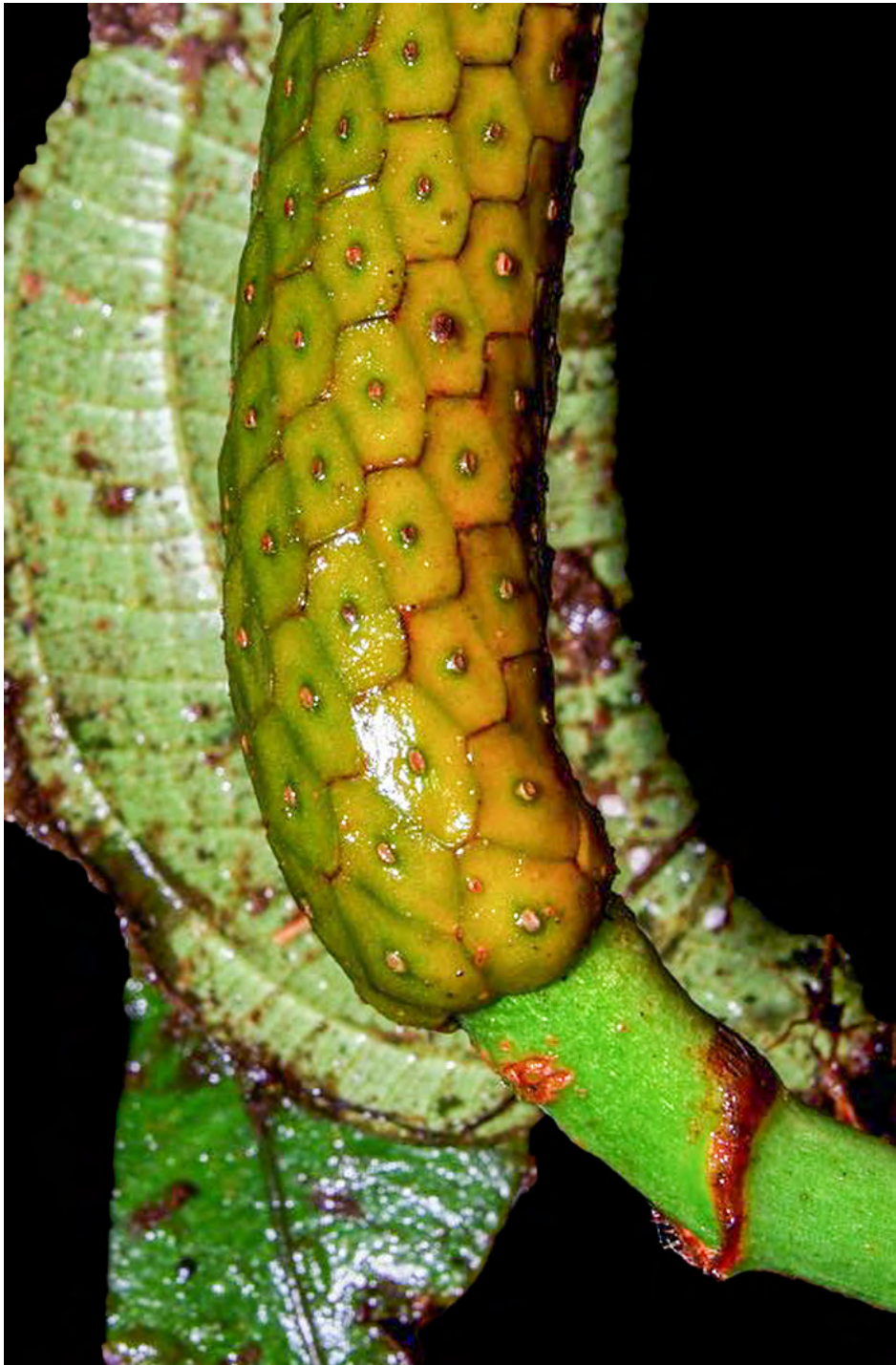


Figure 226: *Stenospermation santamariae*, Inflorescence, close-up, TYPE *L. Martinez et al.* 423



Figure 227: *Stenospermation santamariae*, TYPE L. Martinez et al. 423

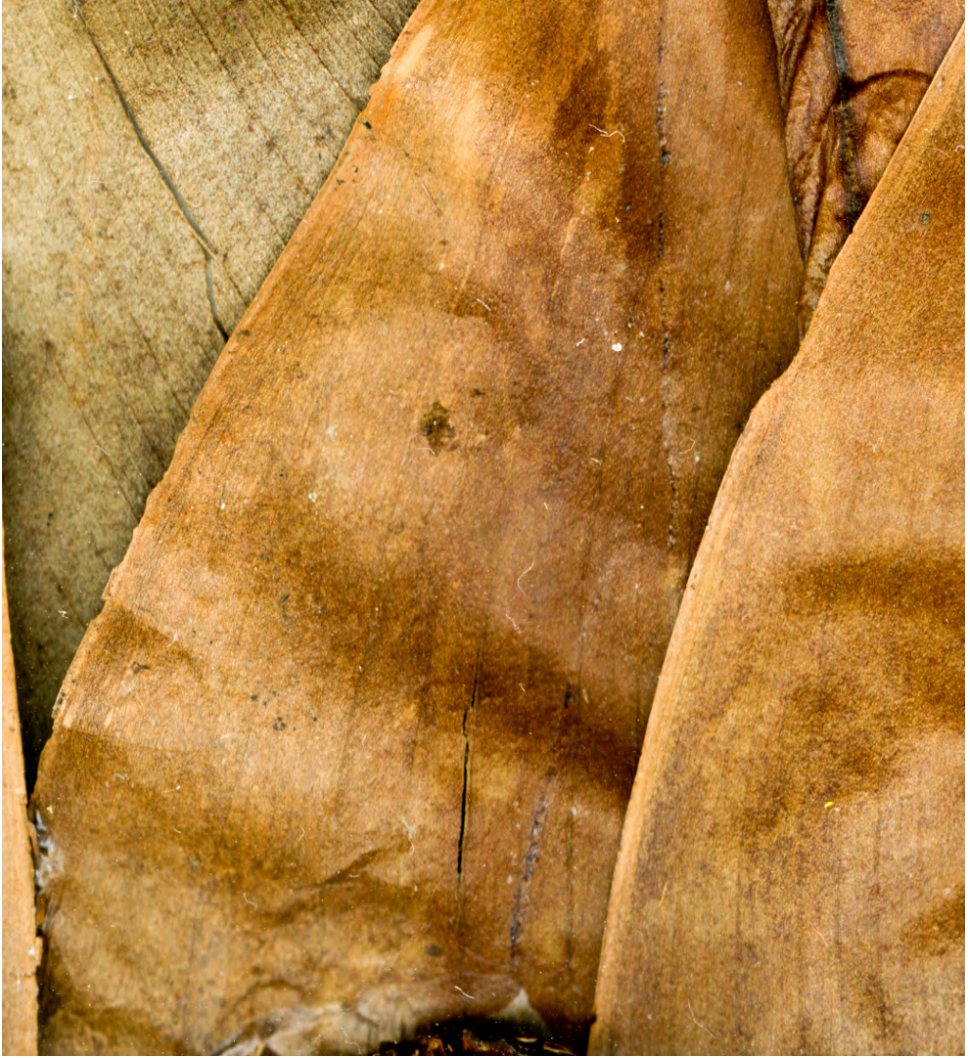


Figure 228: *Stenospermatum santamariae*, Upper blade surface, TYPE *L. Martinez et al.* 423

Distribution — *Stenospermatum santamariae* is endemic to Panama, known only from the type locality in Bocas del Toro Province at 1200 m in a *Tropical wet forest* life zone.

Comments — *Stenospermatum santamariae* is closest to *Stenospermatum marantifolium* Hemsl. which differs by having a paler, more greenish drying stems, thinner, usually more greenish-drying, more prominently acuminate blades and a proportionately shorter spadix with more slender pistils.

Etymology — *Stenospermatum santamariae* is named in honor of Costa Rican botanist Daniel Santamaria. Daniel is an expert on the Flora of Costa Rica and has made many collections of interesting and new species. Daniel and his wife Laura P. Lagomarsino are currently living in Baton Rouge, Louisiana where his wife teaches at Louisiana State University. Daniel has an adjunct appointment at both the Missouri Botanical Garden and at LSU.

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Stenospermatum sapoense Croat, **sp. nov.** — Type: PANAMA. Darién: South of Garachiné on western slope of Serrania Sapo, above place called Casa Vieja; along boundary trail of Darién National Park; forested slopes, 07°58'N, 78°23'W, 550–830 m, 25 May 1991, G. McPherson, N. Hensold, G. Palacios, H. Herrera & J. Polanco 15395 (holotype, MO-3854600; isotype, PMA)

Diagnosis. *Stenospermatum sapoense* is characterized by its epiphytic habit, blackish-drying vegetation, short internodes, petioles sheathed 50–89% their length, narrowly elliptic to elliptic-obovate, short-acuminate, inequilateral blades with the upper surface with close, prominently raised veins which are prominently short pale-lineate between the ribs as well as by the long-pedunculate inflorescence, cernuous, long, slender, white spathe that is 2.5 cm longer than the short, stubby, white spadix.

Epiphyte; internodes short 7–10 mm diam., drying coarsely ribbed, blackened, matte; **petioles** 8.5–16.0 cm long, sheathed 0.45–0.95 their length, drying dark brown to blackened; **sheath** 6.5–11.5 cm long, 5–7 mm wide, broadly rounded to prominently free-ending at apex, the margins persisting intact; free part of petiole deeply and narrowly sulcate, 0.6–2.7 cm long; **blades** oblong-elliptic to elliptic-obovate, 9.5–16.9 cm long, 3.4–5.9 cm wide, 2.4–3.5 times longer than wide, 0.6 times as long as to 1.5 times longer than petioles, drying dark brown to blackened; **upper surface** with minor veins 2–3 mm apart, weakly raised and slightly paler, the intervening area smooth and densely short pale-lineate, matte (magnified surface with cells all convex), lower surface moderately smooth, the minor veins 2–3 mm apart, darker than surface with the intervening area closely striate with short pale lineations. INFLORESCENCE erect, moderately long-pedunculate; spathe white, cernuous, 6.9–8.3 cm long, 6–7 mm diam., slender, long-acuminate, 2.9 times longer than spadix; **spadix** white, cylindroid, 5 mm diam.; pistils closely compacted, immature; style subtrapezoidal, 1.4–1.7 mm diam., flattened, drying yellow-brown, matte; stigma oval to rounded, 2.5 mm diam., drying blackened. Flowering in February and May. **Figures 229–231.**

Distribution — *Stenospermatum sapoense* is endemic to Panama, known only from the type locality in Darién Province at 550–830 m in a *Premontane wet forest* life zone.

Comments — *Stenospermatum sapoense* is seemingly most closely related to *S. pucuroense*, also from Darién Province, but that species differs by having longer internodes, paler-brownish-



Figure 229: *Stenospermatum sapoense*, TYPE McPherson 15395



Figure 230: *Stenospermation sapoense*, Paratype Hammel 1334



Figure 231: *Stenospermatum sapoense*, Upper blade surface, TYPE McPherson 15395

drying vegetation, petioles with narrower sheaths which end inconspicuously and usually acute at apex, proportionately more slender leaf blades which are 3.3–3.5 longer than broad (versus 2.4–2.5 times longer for *S. sapoense*).

Etymology — *Stenospermatum sapoense* was first collected by Barry Hammel in 1987, then later by G. McPherson in 1991, the latter collection serves as the type. *Stenospermatum sapoense* is named for the type locality on Cerro Sapo.

Paratype — Panama. Darién: Cerro Sapo, 08°20'N, 78°20'W, 400 feet (122 m), 4 February 1978, B.E. Hammel 1334 (MO).

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Stenospermatum sessile Engl., Bot. Jahrb. Syst. 37: 111. 1905. Type: Costa Rica. La Palma, 1550 m, [San José Province: Vasquez de Coronado, Vicinity of Alto La Palma, Road to Bajo La Hondura, 10°02'51"N, 83°59'14", W.A. *Tonduz 12447* (lectotype, CR; isoelectotype, B, US, designated by Nilsson Laurito & Umaña Doderó, 1995: 74).

Epiphyte; stems green to brown, 30–60 cm long, 1.1–2.0 cm diam., terete, stiff; internodes 0.5–2.0 cm long; cataphylls thick, 5–19 cm long, 0.7–3.5 cm wide, apiculate at apex, weathering, deciduous on the lower part of the stem. LEAVES erect-spreading, distichous, dispersed on stem or clustered at apex; **petioles** 9.5–33.0 cm long, 4–6 mm diam. midway, sheathed halfway to fully throughout petiole, the free portion (1)2–12(18) cm, flexible, green, subterete, narrowly and acutely sulcate to flattened adaxially; **sheath** coriaceous, (3)9–15(19) cm long, 1.5–2.0 cm wide, broad at base, narrowed at apex, eventually frayed and weathering along margin but with most of the margin persistent, free part of petiole (0.0)2.5–11.0 cm long; geniculum 1.0–2.5 cm long, shaped like the petiole but slightly thicker and paler; **blades** oblong-elliptic to oblanceolate-oblong, inequilateral, short-acuminate and turned downward at apex (the acumen apiculate), acute at base, (13.5)18.0–32.7 cm long, (4.6)6.0–10.5 cm wide, broadest at the middle, 2.4–3.1(4.8) times longer than broad, the margin turned downward, dark green and semiglossy above, slightly paler and matte below, drying dark brown and matte to weakly glossy above, slightly paler and matte below; midrib narrowly sunken above with a broad, flat, discolorous border near the apex, narrowly rounded and much paler below; primary lateral veins moderately obscure, 6–9 per side, departing midrib at 20–40°, slightly raised above, flat below, curved to the margin, drying slightly raised above, flat below; interprimary veins the same as the primary lateral veins above; secondary veins obscure; **upper surfaces** with minor veins narrowly rounded, sometimes moderately acute, concolorous, the intervening area densely and irregularly striate-ridged, sometimes with cross veins or dense granulations, sometimes weakly short pale-lineate; lower surfaces densely granular-striate, sometimes faintly short-pale-lineate. INFLORESCENCE usually solitary, sometimes two or three per axil, equal to or shorter than the leaves; peduncle 12.0–28.5 cm long, 4–5 mm diam. midway, terete, recurved near apex, 1.3–2.2 times as long as the petioles; spathe moderately thick, white to yellow at anthesis, oblanceolate-oblong, semiglossy on both surfaces, 3.5–13.5 cm long, 5.3–6.7 cm wide, broadest above the middle, usually 1.5–4 times as long as the spadix, promptly deciduous, short-acuminate at the apex; **spadix** sessile, white to yellow, cylindric, cernuous near apex, 2.5–7.5 cm long, 5–9 mm diam. midway; styles irregularly hexagonal to rhombic, 1.4–2.5 mm long in direction of axis, 2.5–3.9 mm wide perpendicular to axis, 5–7 flowers in the principal spiral, 7–9 flowers in the alternate spiral, the sides parallel to each flower in the principal spiral; jaggedly to slightly sigmoid in the alternate spiral; tepals matte; stigma 0.2–0.7 mm long, 0.5–0.7 mm wide, emergent, tan, circular and sticky; stamens with filaments 2.5 mm long, anthers cream; thecae ellipsoid, not divaricate; pollen white. INFRUCTESCENCE with spadix 4.5–6.0 cm long, 1.2–2.0 cm wide; berries translucent white with an orange tip, juicy; seeds 1.7–2.3 mm long, 0.8–0.9 mm wide. Flowering throughout the year; fruiting from July to October. **Figures 232–240.**

Distribution — *Stenospermatum sessile* ranges from Costa Rica to Panama and perhaps Colombia [see discussion below] at (300)750–1300(1800) m in *Premontane wet forest*, *Premontane rain forest*, *Tropical wet forest*, *Lower montane moist forest* and *Premontane moist forest* life zones.



Figure 232: *Stenospermation sessile*, Flowering plant. *Harrison & Harrison 628* Photo J. Harrison



Figure 233: *Stenospermation sessile*, Habit, cultivated at MO, *Croat 37560*

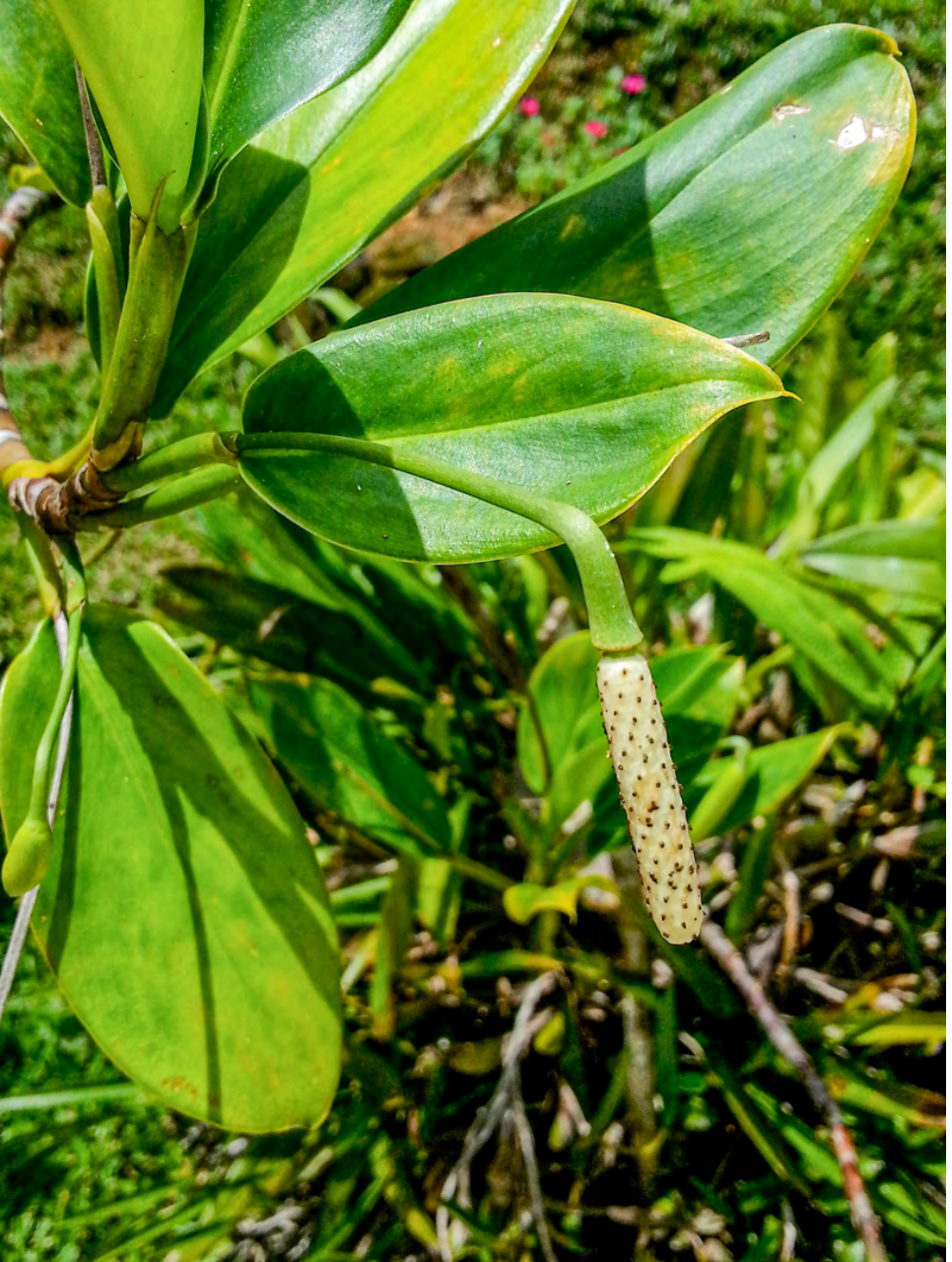


Figure 234: *Stenospermation sessile*, Habit of flowering plant, inflorescence, *Harrison & Harrison 627*, Photo J. Harrison



Figure 235: *Stenospermatum sessile*, Habit of cultivated plant, Croat 37560

Comments — *Stenospermatum sessile* is characterized by its epiphytic habit, moderately elongated stems with internodes usually slightly longer than broad, distichous leaves, petioles sheathed halfway to nearly throughout petiole, oblong-elliptic to oblanceolate-oblong, inequilateral, short-acuminate and down-turned blades with the upper surfaces with minor veins usually narrowly rounded and the intervening area densely and irregularly striate-ridged, sometimes with cross veins or dense granulations, sometimes weakly short pale-lineate; lower surfaces densely granular-striate, sometimes faintly short-pale-lineate. It is also distinguished by the spathe being 0.5 to 4.0 times as long as the spadix and translucent white berries with an orange tip.

The distribution reported for Colombia is questionable. The collection *A. Juncosa* 2576A at MO from the Bolívar–Quibdó road at km 175-6, 465 m previously determined as *Stenospermatum sessile* differs in having the upper leaf blade surface markedly granular, not conspicuously striate-ridged.

Additional Specimens Seen — **COSTA RICA. Alajuela:** Tapanti bosque tropical lluvioso premontano, 1300 — 1700 m, 26 October 1983, I.A. Chacón G et al. 1545 (MO); Jamaical, San Ramón, 1200 m, 29 Jun 1982, R.Á. Ocampo S. 3645 (MO); Monteverde, road to TV towers, Pacific slope, lower montane wet forest, 10°18'N 84°48'W, 1500 m, 14 Nov 1986, W.A. Haber & E. Bello C. 6242 (MO); Monteverde; Veracruz river valley south of Reserve; Pacific slope wet forest, 10°15'N 84°46'W, 1300 — 1500 m, 22 August 1986, W.A. Haber et



Figure 236: *Stenospermation sessile*, TYPE Tonduz 12447



Figure 237: *Stenospermation sessile*, Wilbur et al. 16085



Figure 238: *Stenospermation sessile*, Grayum & Sleeper 3770



Figure 239: *Stenospermation sessile*, Churchill 4858



Figure 240: *Stenospermation sessile*, Upper blade surface, *Grayum* & *Sleeper* 3770

al. 5384 (MO); Reserva Biológica Monteverde, Cerro Negro, continental divide with Atlantic slope exposure. Lower montane rainforest, 10°19'48"N 084°49'48"W, 1700 m, 12 September 1985, *E. Bello* C. 3246 (MO); Reserva Forestal San Ramón, sendero Miramar, 10°12'53"N 084°36'28"W, 800 - 1000 m, 2 noviembre 1986, *G. Herrera Ch et al.* 168A (MO); Reserva Forestal San Ramón near of the station, 10°12'36"N 084°36'00"W, 900-1000 m, 6 February 1991, *J. Bittner* 613 (MO); Reserva Forestal San Ramón Near of the station G 8, 10°12'36"N 084°36'00"W, 900-1000 m, 6 February 1991, *J. Bittner* 634 (MO); Road heading NW from San Ramón, between Los Angeles and the Río Cataratta, fencerows and remnant, 10°12'36"N 084°21'00"W, 850 - 1100 m, 16 June 1983, *K. Barringer* 3192 (MO); Vicinity of Finca Peñas Blancas, E slope of Cerros Centinelas, Monte Verde Reserve, Cordillera de Tilarán, 10°18'00"N 084°46'48"W, 1300-1450 m, 9 June 1985, *M.H. Grayum* 5363 (MO); Along road between San Ramón and Bajo Rodríguez, vicinity of Km markers 11-12, ca. 7 km NW of Los Angeles, 11-12 km NW of San Ramón, 10°10'40"N 084°34'10"W, 1025-1100 m, 3 September 1996, *T.B. Croat* 78878 (CR, MO); Along road between San Ramón and Balsa, 5.7 mi N of San Ramón (center), ca. 1 mi S of Angeles Sur, 10°07'12"N 084°28'12"W, 1200 m, 02 February

1979, *T.B. Croat 46840* (MO); Cordillera de Tilarán. Along road between San Ramón and Bajo Rodríguez, vicinity of Balsa, 8.9 mi NW of center of San Ramón, 10°10'30"N 084°30'00"W, 1100 m, 26 September 1987, *T.B. Croat 68033* (MO); Reserva Monteverde Río Peñas Blancas, 10°20'N 084°43'W, 820 m, 10 June 1987, *W.A. Haber & E. Cruz L. 7246* (MO); Monteverde Cloud Forest Reserve, Peñas Blancas river valley, Atlantic slope rain forest, farms of Jesus Rojas and Alejandro Garcia, 10°20'N 084°45'W, 900 m, 28 Nov 1986, *W.A. Haber & E. Bello C. 6437* (MO); Monteverde Reserve, El Valle trail, on continental divide with Atlantic exposure, 10°20'N 084°50'W, 1600 m, 27 October 1985, *W.A. Haber & E. Bello C. 3246* (MO); Reserva Monteverde, Poco Sol, 13 km South Fortuna, 10°21'N 084°41'W, 700 - 900 m, 20 August 1989, *W.A. Haber & W. Zuchowski 9343* (CR, MO); Upper drainage of the Río Peñas Blancas below Monteverde Cloud Forest Nature Reserve. [original label coordinates: 9°17'N, 84°86'W], 10°18'00"N 084°43'48"W, 1250 - 1350 m, 25 February 1977 - 26 February 1977, *W.C. Burger et al. 10791* (MO); San Carlos. Entrando por San Vicente, faldas del Cerro Platanar, 10°17'17"N 084°22'58"W, 1600 - 1600 m, 20 July 2000, *A. Rodríguez 6030* (CR, MO); Peñas Blancas, 10°18'24"N 084°44'19"W, 900 m, 10 julio 1985, *W.A. Haber & E. Bello C. 1932* (MO); San Ramón. Cerro Pata de Gallo, San Rafael de San Ramón, 10°01'53"N 084°28'23"W, 1542 m, 28 febrero 1983, *A. Carvajal U. 433* (MO); trail 2 km N of field station, 10°12'36"N 084°36'00"W, 1000 m, 20 October 1993, *J. Bittner & G. Herrera Ch. 2118* (CR); 10 km north-northwest of San Ramón by road on way to San Lorenzo, 2.5 km south of Balsa, 10°09'00"N 084°28'48"W, 1200 m, 25 April 1983, *R.L. Liesner & E.J. Judziewicz 14978* (MO); 15 km northwest of San Ramón by air, Cerro Azahar, headwaters of Río San Pedro, by road, 9 km northwest of San Ramón to Piedades Norte, then three more km northwest 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.L. Liesner et al. 15474* (MO); N of Berlin, 10°00'36"N 084°28'12"W, 1400 m, 1 February 1984, *R. Khan et al. 750* (BM); Along road from San Ramón northward through Balsa, ca. 13.8 km north of bridge over Quebrada Volio and ca. 4.6 km north of bridge over (apparently) Río Balsa, at small stream (Río San Luis), 10°12'00"N 084°30'36"W, 900 - 1000 m, 29 August 1979, *W.D. Stevens 13749* (MO); Along road from San Ramón northward through Balsa, ca. 16.7 km north of bridge over Quebrada Volio and ca. 7.5 km north of bridge over (apparently) Río Balsa, at bridge over stream (Río Cataratas), cloud forest on steep slope between road and stream. [original label coordinates: 10°10-15'N, 84°30-35'W], 10°13'55"N 084°31'03"W, 700 - 800 m, 29 August 1979, *W. D. Stevens 13874* (MO); Along road from San Ramón northward through Balsa, ca. 5.7 km north of bridge over Quebrada Volio, southwest of road, 10°07'48"N 084°28'48"W, 1100 - 1150 m, 10 September 1979, *W.D. Stevens 14125* (MO); **Cartago:** Alvarado. Marshy pasture with numerous scattered trees heavy with epiphytes about 7.3 km northeast of Pacayas, 09°57'36"N 083°45'36"W, 5200 f, 7 January 1972, *R.L. Wilbur et al. 16085* (MO); Hills south of Cartago, 09°49'12"N 083°55'48"W, *C. H. Lankester 78* (K); Ca. 2.5 km south of Muñeco, cloud forests bordered by pastures and disturbed sites, 09°46'12"N 083°54'00"W, 1500 m, 25 February 1978, *F. Almeda & K. Nakai 3943* (MO); Cerro Jucosal, 09°48'36"N 083°54'00"W, 5450 f, 3 March 1928, *H.E. Stork 1117* (MO); El Guarco. In area at headwaters of Quebrada Molejones and Quebrada Cascajal, ca. 1 km northeast of Cangreja, 09°48'N 083°58'W, 1700 - 1800 m, 27 February 1987, *M.H. Grayum et al. 8082* (CR, MO); 10 km south of Cartago by air, along confluence of Río Empalme and Río Estrella, 1 km south of Palo Verde by road, Paloverde is 1.5 km south of Pan American Highway on road to Estrella, 09°45'36"N 083°57'00"W, 1450 m, 21 April

1983, *R.L. Liesner & E.J. Judziewicz 14529* (MO); Paraíso. Parque Nacional Tapantí, Macizo de La Muerte, cuenca del Reventazón, camino a Tausito, 1 km después del Alto Tractor, 09°44'05"N 083°46'42"W, 1500 m, 14 marzo 2000, *L.Acosta & V.H. Ramírez 630* (MO); Narrow ridge west of Río Grande de Orosi, between Río Dos Amigos and Río Villegas, 09°42'00"N 083°46'48"W, 1650 m, 11 August 1984, *M.H. Grayum et al. 3770* (MO); Tapantí Watershed Preserve, ca. 20 miles southwest of Paraíso, along old road just beyond first large bridge within the preserve, 09°39'36"N 083°42'36"W, 05 February 1979, *T.B. Croat 47026* (MO); Turrialba. Bosque secundario viejo, a la orilla del sendero, Moravia de Chirripó, 09°49'12"N 083°26'24"W, 1400 - 1600 m, 11 January 1983, *I.A. Chacón G. 293* (MO); Guanacaste: Chiripa, Tilarán, 4 Km Norte de La Florida. Bosque muy húmedo premontano, 10°26'N 084°54'W, 1100 m, 14 January 1987, *W.A. Haber & E. Bello C. 6549* (MO); Las Nubes, 1 km N Las Nubes village, 8 km NW Monteverde, premontane rain forest, 10°22'N 084°51'W, 1200 m, 31 August 1989, *W.A. Haber & W. Zuchowski 9490* (CR, MO); Tilarán. Z.P. Arenal-Monteverde. Cuenca del San Carlos. San Gerardo Biological Station. Forest patch between station and Sendero Tabacon, 10°22'00"N 084°47'00"W, 1200 m, 08 January 1996, *D.S. Penneys 985* (CR, MO). **Heredia:** Forest between Río Peje & Río Sardinalito, Atlantic slope of Volcán Barva, 10°17'30"N 084°04'30"W, 700 - 750 m, 2 April 1986, *M.H. Grayum 6689* (MO); Forest between Río Peje and upper Río Guácimo, Atlantic slope of Volcán Barva. 10°16.5'N 84°05'W 1100-1150 m, 10°16'12"N 084°04'48"W, 1100 - 1150 m, 10 Nov 1986, *M.H. Grayum et al. 7771* (MO); Heredia. Finca Murillo. Entre trampa malaise #1 y #6, 10°14'07"N 084°07'04"W, 1500 - 1600 m, 11 April 2005, *D. Solano 2146* (CR, MO); **Limón:** Cordillera de Talamanca. N flank of Fila Matama in headwaters of Río Boyei, 09°45'00"N 083°18'36"W, 1200 - 1300 m, 16 August 1995, *M.H. Grayum 11019* (MO); Talamanca. P.N. Cordillera de Talamanca; Cordillera de Talamanca. Cima a la derecha unión Ríos Lori y Coén. Entre Ujarrás y San José Cabécar, 09°24'00"N 083°13'12"W, 1600 m, 4 April 1993, *Á. Fernández 1017* (CR, MO); **Puntarenas:** Reserva Biológica Monteverde Refugio Veracruz, Finca Los Salazar. Río Veracruz, Vertiente Pacífica, 10°15'00"N 084°48'00"W, 1500 m, 9 January 1990, *E. Bello C. 1724* (CR, MO); Reserva Biológica Monteverde Refugio Veracruz, Finca Los Salazar. Río Veracruz, Vertiente Pacífica, 10°15'00"N 084°48'00"W, 1500 m, 9 January 1990, *E. Bello C. 1711* (MO); Reserva Biológica Monteverde. Río Veracruz, 10°20'24"N 084°43'12"W, 1300 m, 4 May 1991, *E. Bello C. & et al. 2718* (CR, MO); Monteverde, Research Forest. (lower montane rain/wet forest), 1.5 km S of Reserve Hdqtrs, 10°20'N 084°50'W, 1520 m, 15 September 1988, *S.W. Ingram 227* (MO); Monteverde Cloud Forest Reserve. In Research Forest (lower montane rain/wet forest); 1.5 km S of Reserve Hdqtrs, 10°20'N 084°50'W, 1520 m, 01 November 1988, *S.W. Ingram 280* (MO); Monteverde Reserve. 1 km SW Station, in leeward cove forest, 10°18'00"N 084°48'00"W, 1500 - 1550 m, 5 February 1992, *S.W. Ingram & K. Ferrell-Ingram 1262* (MO); Monteverde Cloud Forest Reserve; Sendero Pantanoso; swampy area on continental divide, 10°20'N 084°50'W, 1500 - 1600 m, 25 June 1986, *W.A. Haber 5206* (MO); Monteverde community, Pacific slope. Pacific slope. 10.18N 84.48W 1500 m 9 October 1989 W. Haber & W. Zuchowski, 10°18'N 084°48'W, 1500 m, 9 October 1989, *W.A. Haber & W. Zuchowski 9532* (MO); Monteverde, Cloud Forest Reserve, Cordillera de Tilarán. Lower montane rain forest. (Holdridge Classification) Pacific slope of Continental Divide, 10°15'36"N 084°46'12"W, 1500 - 1620 m, 29 December 1984, *W.Z. Pounds 393* (MO); Provinces of Puntarenas and Alajuela, evergreen cloud forest and wet wind-gap formations (lower montane and premontane rain forest life zone) on and near the Continental Divide about 2 to 5 km east and southeast of

Monteverde, 10°18'21"N 084°46'47"W, 1580 - 1700 m, July 1983, *K. Barringer & E.A. Christenson 4189* (MO); Monteverde, road to TV Tower, 10°18'36"N 084°47'24"W, 1700 m, 24 August 1985, *W.A. Haber 2404* (MO); San Luis river valley, 1.5 km upstream from village of San Luis, 10°17'13"N 084°49'44"W, 1000 m, 18 June 1985, *W.A. Haber & B. E. Hammel 1783* (MO); Monteverde Reserve, La Ventana, 10°18'22"N 084°46'57"W, 1600 m, 12 julio 1985, *W.A. Haber & E. Bello C. 1987* (MO); San José: Moravia. Pastures and roadbanks along CR 220 between Alto de la Palma and Bajo La Hondura, 5-8 km north of San Jerónimo, 10°03'22"N 083°59'17"W, 1400 - 1500 m, 17 October 1974, *J.F. Utley & K. Burt-Utley 1419* (MO); Vazquez de Coronado. Vecindade de Alto La Palma, camino a Bajo La Hondura, 10°02'51"N 083°59'14"W, 1500 m, 21 enero 2017, *B. E. Hammel et al. 27271, 27273. 27275* (CR); Bajo de Hondura, Parque Nacional Braulio Carrillo, 10°04'N 083°58'W, 1100 - 1200 m, 23 January 1983, *G. Davidse et al. 23211* (MO); Cordillera Central, La Palma, pasturelands and bordering forest along Highway 220, 10°02'24"N 083°58'48"W, 4200 - 4400 f, 23 May 1972, *J.L. Luteyn 3001* (MO); Parque Nacional Braulio Carrillo, Quebrada Molinete, 10°09'00"N 083°55'12"W, 600 m, 13 febrero 1984, *L. Diego Gómez P et al. 21101* (MO);

PANAMA. Bocas del Toro: Vicinity of Fortuna Dam. Trail along continental divide. [Coordinates on original label: 8°55'4"N, 82°10'4"W], 08°46'11"N 082°13'11"W, 1300 - 1400 m, 06 February 1987, *G. McPherson 10375* (MO); Along Bocas Del Toro-Chiriquí border. Fortuna Dam area, 08°46'09"N 082°12'59"W, 1200 - 1300 m, 06 March 1986, *G. McPherson 8614* (MO); Road from Fortuna Dam to Chiriquí Grande, 3 mi from Continental Divide, 08°47'N 082°11'W, 650 m, 22 September 1984, *H. W. Churchill & A. Churchill 6213* (MO), 6214 (MO); Prov. Cerro Colorado, 9.2 miles W of Chamé; along trail E of road which leads down to stream, 08°35'N 081°50'W, 1450 - 1480 m, 06 July 1988, *T.B. Croat 69043* (MO); Cerro Colorado, ca. 8.6 mi W of Chamé, ca. 3 mi beyond junction of road which goes S to old construction camp for copper ore exploration. Along trail N of divide toward Atlantic slope which leads down a rocky stream, 08°35'N 081°50'W, 1450 - 1480 m, 07 July 1988, *T.B. Croat 69130* (MO); Cerro Colorado, along road between Río San Felix and mining exploration camp, 7 mi W of Chamé, along trail through Guaymí village, 08°35'N 081°50'W, 1500 m, 8 July 1988, *T.B. Croat 69204* (MO); Along road between Fortuna Dam and Chiriquí Grande, 7.3 mi N of bridge over Fortuna Dam, 3.2 mi N of Continental Divide. [Coordinates on original label: 08°45'N 82°15'W], 08°49'00"N 082°12'36"W, 700 m, 10 March 1985, *T.B. Croat & M.H. Grayum 60284* (MO); Along Continental Divide from road branching N off main Fortuna-Chiriquí Grande Highway near Continental Divide, 1.1 miles from main highway, 08°44'N 082°17'W, 1200 m, 11 March 1985, *T.B. Croat & M.H. Grayum 60291* (MO); Changuinola. PILA. Point 12, ca. 3 km from estación de Alto Urí, 09°04'18"N 082°42'12"W, 1700 m, 15 April 2008, *A.K. Monro et al. 5915* (MO, PMA); Cerro Frío, headwaters of Río Tskui. Point 4. [Coordinates on label: 09.26101N 82.50xxxW], 09°15'39"N 082°30'00"W, 1100 m, 28 October 2008, *A.K. Monro et al. 6382* (MO, PMA); PILA. Cattle pasture below station bldg.: relict trees, fragments & forest edge. Disturbed & secondary forest edge, pasture created in 1970's. Una colaboracion de la Universidad de Panama (PMA), el Instituto Nacional de Biodiversidad (INB) y The Natural History Museum, London (BM), con el apoyo de Iniciativa Darwin, 09°03'27"N 082°42'18"W, 1500 m, 21 April 2008, *D. Santamaría et al. 7522* (IBE, MO, PMA); Cerro Frío, headwaters of Río Tskui. Point 22, 09°15'38"N 082°30'15"W, 1200 m, 27 October 2008, *L. Martínez et al. 422* (MO, PMA).

Chiriquí: Fortuna Field Station: Cordillera, 08°43'00"N 082°16'00"W, 6 December 1997, *D.W. Roubik & L. Quiroz 1260* (MO); Near Fortuna Dam, along Quebrada de Arena, just

south of continental divide, 08°45'N 082°15'W, 1100 m, 05 December 1985, *G. McPherson* 7798 (MO); Near Fortuna Dam, along trail near forestry station towards river, 08°45'N 082°15'W, 1150 m, 23 October 1985, *G. McPherson* 7262 (MO); Fortuna Dam area. Unnamed creek to E of road flowing into Río Hornito near Quebrada Moro, 08°42'N 082°14'W, 1200 m, 16 June 1984, *H. W. Churchill* 5466 (MO); Fortuna Dam area. Trail along Continental Divide to W of Oleoducto road, leading to unamed ridge top, 08°47'N 082°13'W, 1200 - 1500 m, 25 May 1984, *H. W. Churchill* 5305 (MO); Fortuna Dam area, ravine to W of road down to Río Hornito S of reservoir. Alt. 1200 m. 8°42'N, 82°14'W, 08°42'N 082°14'W, 1200 m, 15 June 1984, *H. W. Churchill* 5447 (MO); Fortuna Dam area. North fork of Quebrada de Arena, near Continental Divide. Alt. 1100 m. 8°46'N, 82°12'W, 08°46'N 082°12'W, 1100 m, 08 February 1984, *H. W. Churchill* 4858 (MO); Fortuna Dam area, ravine to W of road down to Río Hornito S of reservoir. Alt. 1200 m. 8°42'N, 82°14'W, 08°42'N 082°14'W, 1200 m, 15 June 1984, *H. W. Churchill* 5446 (MO); Fortuna Dam area. Along Quebrada Bonito to W of road, 08°45'N 082°13'W, 1100 m, 08 February 1984, *H. W. Churchill et al.* 4908, 4807 (MO); Fortuna, camino de quebrada Bonita llegando por el embalse hacia el norte, 08°45'19"N 082°15'16"W, 1130 - 1150 m, 08 abril 1987, *I.A. Valdespino et al.* 612 (MO); Distrito: Nole Duima. Corregimiento: Chami. Road to Cerro Colorado; 35-37 km N of San Felix, 08°29'33"N 081°45'47"W, 1450 - 1550 m, 6 August 2003, *J.L. Clark & J. Morale* 8675 (MO, PMA, US); Along trail between N fork of Río Palo Alto and Cerro Pate Macho, ca. 6 km NE of Boquete, 08°48'00"N 082°23'30"W, 1600 - 1700 m, 06 February 1986, *M.H. Grayum et al.* 6362 (MO); Reserva Forestal Fortuna. Sendero La Casa rosada. Bosque cercano al rio Hornito, 08°42'00"N 082°13'26"W, 1147 m, 31 January 2013, *O. Ortiz, A. Guevara & Franklin Miranda* 1177 (CAS, MO, PMA); Boquete. Tree Trek Mountain Resort, 08°48'56"N 082°23'17"W, 1958 m, 24 August 2018, *O. Ortiz et al.* 3320 (MO, PMA); Trail east from Fotuna Dam Camp to La Fortuna. On high plateau, 08°43'N 082°15'W, 1500 m, 27 February 1985, *R.J. Hampshire & C. Whiteford* 159 (BM); Between Los Planes de Hornito and Fortuna Lake. Near road. [Coordinates on original label: 08°40'N, 082°13'W], 08°39'12"N 082°12'36"W, 1200 m, 02 March 1985, *R.J. Hampshire & C. Whiteford* 255 (BM); Trail west from Fortuna Dam Camp to La Fortuna. [Coordinates on original label: 08°43'N, 082°14'W], 08°44'N 082°16'W, 1300 m, 24 February 1985, *R.J. Hampshire & C. Whiteford* 48 (BM); Along road and into forests 10 km N of Los Planes de Hornito, IRHE Fortuna Hydroelectric Project. Premontane rainforest, 08°45'N 082°12'W, 1100 - 1200 m, 10 May 1982, *S. Knapp* 5022 (MO); Along road and into forests 10 km N of Los Planes de Hornito, IRHE Fortuna Hydroelectric Project. Premontane rainforest, 08°45'N 082°12'W, 1100 - 1200 m, 10 May 1982, *S. Knapp* 5014 (MO); Near La Sierpe, ca. 0.5 km N of Río Chiriquí. IRHE Fortuna Hydroelectric Project, 08°46'N 082°12'W, 1000 - 1100 m, 11 May 1982, *S. Knapp* 5057 (MO); Cerro Colorado, 50 km N of San Félix on the continental divide, 08°31'55"N 081°48'50"W - 08°32'12"N 081°49'00"W, 1200 - 1500 m, 18 August 1975, *S.A. Mori & R.L. Dressler* 7839 (MO); Ca. 5 km E of Fortuna Dam, along trail crossing Río Hornito. [Coordinates on original label: 08°45'N, 082°15'W], 08°43'N 082°12'W, 1100 - 1300 m, 26 April 1988, *S.A. Thompson* 5007 (MO); Cerro Colorado, above San Félix along mining road 18-27 miles off of Pan-American Highway (above Chame or turn-off to Escopeta), 08°32'N 081°49'W, 1200 - 1500 m, 12 March 1976, *T.B. Croat* 33108, 33109 (MO); Along continental divide on Cerro Colorado, on upper mining road 20-28 miles from San Félix, 08°32'N 081°49'W, 1200 - 1500 m, 14 March 1976, *T.B. Croat* 33352 (MO); Along continental divide on Cerro Colorado, on upper mining road 20-28 miles from San Félix,

08°32'N 081°49'W, 1200 - 1500 m, 14 March 1976, *T.B. Croat* 33392 (MO); Cerro Colorado, along road to copper mine, 34.1 km beyond bridge over Río San Félix near town of San Felix, (13.1 km beyond turnoff to Escopeta), 08°31'14"N 081°48'36"W, 1390 m, 15 July 1976, *T.B. Croat* 37279 (MO); Cerro Colorado, along road to copper mine, 34-35.6 km above the Río San Félix, (13-14.6 km beyond turnoff to Escopeta). Disturbed primary forest; cloud forest, 08°31'15"N 081°47'36"W, 1390 - 1410 m, 15 July 1976, *T.B. Croat* 37215 (MO); Along road between Gualaca and Fortuna dam site, 10.1 mi NW of Los Planes de Hornito, 08°45'N 082°17'W, 1250 m, 10 April 1980, *T.B. Croat* 50042 (MO); Along road between Gualaca and Fortuna dam site, N of Gualaca on Río Chiriquí; 17.3 miles beyond bridge over Río Estí; 7.2 miles beyond Los Planes de Hornito, 08°40'24"N 082°13'00"W, 1400 m, 28 November 1979, *T.B. Croat* 48802 (MO); Along road between Fortuna Lake and Chiriquí Grande; 4.5-5 km N of dam over Fortuna Lake, 08°45'N 082°13'W, 1100 - 1135 m, 08 March 1985, *T.B. Croat* 59959, 59968 (MO); Along road to Fortuna dam site on Río Chiriquí, N of Gualaca, 8.2 mi beyond the lane to house of Francisco Linares, 19.1 mi beyond bridge over Río Estí; Los Planes de Hornito; 8.5 mi beyond jct. of road to tunnel, 08°42'N 082°14'W, 1300 m, 27 Nov 1979, *T.B. Croat* 48728 (MO); Along road between Gualaca and the Fortuna dam site 10.1 mi NW of Los Planes de Hornito, 08°42'N 082°14'W, 1300 m, 8 April 1980, *T.B. Croat* 49834 (MO); Along the road between Gualaca and the Fortuna Dam site, at 10.1 mi NW of Los Planos de Hornito, 08°43'N 082°14'W, 1260 m, 10 April 1980, *T.M. Antonio* 4185 (MO); Boquete. Fortuna dam site; continental divide, 08°44'41"N 082°14'56"W, 1100 m, 09 February 1985, *H. van der Werff & C. van Hardeveld* 6782 (MO); Gualaca. Reserva Forestal Fortuna. Division Continental, 08°46'39"N 082°12'35"W, 1025 m, 11 December 2013, *O. Ortiz* 1862 (MO); Reserva Forestal Fortuna. Division Continental, 08°46'39"N 082°12'35"W, 1025 m, 11 December 2013, *O. Ortiz* 1862 (PMA); Reserva Forestal Fortuna. Cerro La Pava, 08°43'04"N 082°14'06"W, 1239 m, 07 marzo 2014, *O. Ortiz et al.* 2129 (MO); Reserva Forestal Fortuna. Sendero Hornitos, 08°40'22"N 082°12'58"W, 1509 m, 05 November 2013, *O. Ortiz et al.* 1745 (MO, PMA). **Coclé:** El Valle, *Timothy C. Plowman* 14116 (F,SEL); 3-mountain ridge above El Valle. [Coordinates on original label: 8°40'N, 80°10'W], 08°37'00"N 080°07'00"W - 08°37'30"N 080°08'00"W, 900 - 1000 m, 24 July 1983, *C.W. Hamilton et al.* 4117 (MO); La Mesa, above El Valle de Antón, N of Cerro Gaital. [Coordinates on original label: 08°37'N, 80°06'W], 08°38'45"N 080°08'00"W, 850 m, 26 July 1984, *G.C. de Nevers et al.* 3511 (MO); Between Cerro Pilón and El Valle de Antón, 08°37'N 080°06'W - 08°38'N 080°08'W, 700 - 900 m, 15 August 1967, *J.A. Duke & J.D. Dwyer* 13969 (MO); Along Atlantic side of continental divide above sawmill above El Copé. Elev. ca. 1000 m. Wet tropical forest. 8.40'N, 80.37'W, 08°40'N 080°37'W, 1000 m, 25 July 1983, *J.S. Miller et al.* 840 (MO); Above El Potroso sawmill at Continental Divide, 08°40'36"N 080°36'36"W, 1200 - 1300 m, 25 October 1980, *K.J. Sytsma* 1891 (MO); Hills N of El Valle, E slope and ridges leading to Cerro Gaital. [Coordinates on original label: 08°40'N, 080°07'W], 08°37'36"N 080°07'18"W, 900 - 1000 m, 30 May 1982, *S. Knapp* 5338 (MO); 6 mi N of El Copé: on Atlantic side of Continental Divide. [Coordinates on original label: 08°38'N, 080°35'W], 08°41'30"N 080°36'18"W, 750 - 800 m, 08 April 1988, *S.A. Thompson* 4752 (MO); Along road past Furlong's Finca, due N of Cerro Pilón, 08°38'N 080°06'W - 08°39'N 080°07'W, 880 m, 22 July 1976, *T.B. Croat* 37555 (MO); On Atlantic slope near the Continental Divide along lumbering road N of El Copé, 9.4 km above El Copé (2.2 km N of lumber sawmill), 08°40'21"N 080°35'44"W - 08°40'30"N 080°33'25"W, 750 - 900 m, 20 January 1978, *T.B. Croat* 44746 (MO); Along road past Furlong's Finca, due N of Cerro Pilón, 08°38'N 080°06'W

- 08°39'N 080°07'W, 880 m, 22 July 1976, *T.B. Croat 37539* (MO); Near continental divide along lumber road 5.2 mi N of El Copé, 1.5 mi N of lumber camp. Cloud forest on steep slopes, 08°40'20"N 080°35'44"W, 900 m, 19 January 1978, *T.B. Croat 44570* (MO); Along road past Furlong's Finca, due N of Cerro Pilón, 08°38'N 080°06'W - 08°39'N 080°07'W, 880 m, 22 July 1976, *T.B. Croat 37575, 37577* (MO); La Mesa above El Valle; in forest on both sides of junction with road to Cerro Pilón, 08°38'00"N 080°07'30"W, 800 m, 21 July 1974, *T.B. Croat 25400* (MO); Vicinity of La Mesa, N of El Valle de Antón, along steep slopes above water reservoirs, ca. 1 km W of road between Finca Mandarinas and Finca Furlong, 08°38'N 080°09'W, 800 - 900 m, 12 July 1987, *T.B. Croat 67202* (MO); La Mesa, above El Valle de Antón, ca. 2 km W of Cerro Pilón on slopes of steep knife-like ridge, 08°37'40"N 080°07'35"W, 900 - 930 m, 22 July 1976, *T.B. Croat 37488* (MO); Along road past Furlong's Finca, due N of Cerro Pilón, 08°38'N 080°06'W - 08°39'N 080°07'W, 880 m, 22 July 1976, *T.B. Croat 37560* (MO); La Mesa above El Valle de Antón, 08°39'N 080°08'W, 850 m, 26 July 1984, *W.G. D'Arcy et al. 15812* (MO); La Pintada. Alto Calvario Region, vicinity of old saw mill works, 4.5 miles N of El Copé; 2.5 miles N of Escuela Barrigón, 08°39'11"N 080°36'21"W - 08°39'36"N 080°36'21"W, 580 - 740 m, 12 September 1987, *T.B. Croat 67499* (MO); Colón: Santa Rita Ridge road, 21-26 km from Transisthmian Highway. [Coordinates on original label: 09°25'N, 079°37'W], 09°22'30"N 079°39'30"W - 09°24'30"N 079°41'00"W, 500 - 550 m, 04 July 1982, *S. Knapp 5884* (MO); Donoso. Teck Cominco Petaquilla mining concession. Forest along ridge road. Collected with M. Merello, 08°49'33"N 080°40'11"W, 300 m, 24 February 2008, *G. McPherson 20213* (MO); **Darién:** Near top of westernmost peak of Cerro Tacarcuna massif, 08°10'N 077°18'W, 1720 m, 21 July 1976, *A. H. Gentry et al. 16903* (MO); **Panamá:** Cerro Campana, 08°40'N 079°55'W, 700 m, 8 September 1982, *C.W. Hamilton et al. 1156* (MO); Cerro Brewster, on Guna Yala border. Summit, 09°20'N 079°15'W, 800 - 850 m, 20 November 1985, *G. McPherson 7528* (MO); Approx. 24K from turn off to Los Altos de Cerro Azul from "Fucer," reached from town of "24 Diciembre" off Inter-American Highway; Station 50M beyond first hill beyond Lost Altos de Cerro Azul subdiv, entrance to Cerro Jefe, about 3K from summit, 06 April 2014, *J.S. & L. Harrison 627, 628* (MO, PMA); Cerro Campana, tropical moist forest, trail leading to cross, 08°42'N 079°55'W, 2700 f, 18 September 1980, *K.J. Sytsma 1201* (MO); sendero de Interpretación, 1 km al este del Campamento de los guardabosques de INRENARE, 08°40'N 079°55'W, 800 - 900 m, 13 May 1993, *M.D. Correa A. & E. Montenegro 9540* (STRI); Along road 1 km sw of Cerro Jefe summit, 09°13'N 079°21'W, 950 m, 08 junio 2014, *O. Ortiz et al. 2411* (MO); Headwaters of the Río Utiwe, Cerro Jefe, 2 km from last branch in road to summit. Along a small stream in low cloud forest, 09°15'N 079°30'W, 900 m, 13 September 1981, *S. Knapp 1201* (MO); 6-7 miles from Pan American Highway on El Llano-Carti Road, 09°12'N 079°00'W, 400 m, 26 February 1982, *S. Knapp & J. Mallet 3858* (MO); East slope of Cerro Jefe. Along dirt track near radio tower, 09°15'N 079°30'W, 950 - 1000 m, 20 May 1982, *S. Knapp & J. Mallet 5205, 5206* (MO); Road past Altos de Pacora, 3-3.5 mi NE of Altos de Pacora, 7.8-8.2 mi above Pan Am Highway, 11.1-11.6 mi beyond Lago Cerro Azul, 09°15'N 079°25'W, 700 - 750 m, 19 June 1988, *T.B. Croat 68660* (MO); Cerro Jefe, vicinity of summit, 09°14'N 079°22'W, 850 m, 8 July 1987, *T.B. Croat 67061* (MO,US); Guna Yala (formerly San Blas) Nusigandi, along El Llano-Carti Road, 0.7 miles beyond Cuna Headquarters, located 10.9 miles N of Pan-American Highway, 11.6 miles N of Pan-American Highway, 09°18'N 078°59'W, 450 m, 03 April 1993, *T.B. Croat 75124* (CAS, L, MEXU, 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 079°29'W, 770 m, 4 July 1994, *T.B. Croat & G. Zhu* 76629 (MO); Vicinity of Cerro Jefe, along road between Cerro Jefe and Altos de Pacora, 0.5 mi from turn-off to Cerro Jefe radio tower, 0.2 mi from turn-off to La Eneida, 09°15'N 079°30'W, 820 m, 4 July 1994, *T.B. Croat & G. Zhu* 76599 (MO, PMA); Cerro Campana, 08°42'N 079°55'W, 2500 ft, 17 August 1982, *W.G. D'Arcy & C.W. Hamilton* 14927 (MO); Capira. Cerro Campana; cloud forest, 08°41'31"N 079°55'02"W, 800 m, 1 September 1970, *H. Kennedy* 486 (MO); Cerro Campana ro Campana, Summit and upper trail, 08°41'19"N 079°55'18"W, 3500 f, 19 September 1975, *John T. Witherspoon* 8268 (MO); cloud forest, 08°41'N 079°54'W, 600 m, 8 August 1970, *James L. Luteyn & Helen Kennedy* 1793 (MO); *Cecerspoon & Fran Witherspoon* 8470, 8472 (MO); Cerro Campana, tropical moist forest. Premontane wet forest, trail leading to cross, 08°42'N 079°55'W, 2800 - 2900 f, 17 September 1980, *K.J. Sytsma* 1156, 1162 (MO); Cerro Campana, 45 km SW of Panama City on Inter-American Hwy, 08°41'14"N 079°55'19"W, 300 - 1020 m, 8 August 1975, *Scott A. Mori & A. Bolten* 7682 (MO); Along trail to top Cerro Campana, 08°41'14"N 079°55'19"W, 600 - 1020 m, 13 October 1974, *Scott A. Mori & Jacquelyn A. Kallunki* 2469 (MO); Cerro Campana; N slope, 08°41'14"N 079°55'19"W, 850 m, 15 September 1974, *Scott A. Mori, Jacquelyn A. Kallunki, R.L. Dressler & Paul J. M. Maas* 1926 (MO); Cerro Campana, along trail to summit, 08°41'27"N 079°55'02"W, 780 - 875 m, 20 July 1974, *T.B. Croat* 25191 (MO); Chepo. El Llano to Cartí Road, 13 km N of Panamerican highway, woods with understory cut out, 09°16'42"N 078°55'51"W, 13 April 1977, *J.P. Folsom* 2569 (MO); Along road from PanAm Hwy near El Llano to Caribbean coast at Cartí. About 11 km from PanAm Hwy, 09°16'02"N 078°55'52"W, 27 February 1985, *Lucinda A. McDade* 818 (DUKE); El Llano-Cartí highway, about 17 km north of El Llano, 09°17'55"N 078°56'10"W, 8 February 1974, *R.L. Dressler* 4586 (MO); El Llano-Cartí Road, 23.4 km from Inter-American Highway, 09°18'24"N 078°57'01"W, 350 m, 13 April 1975, *Scott A. Mori & Jacquelyn A. Kallunki* 5571 (MO); El Llano-Cartí Road, 7-12 km from Interamerican Highway, 09°17'45"N 078°56'15"W, 360 - 400 m, 18 July 1974, *T.B. Croat* 25121 (MO); Panamá. Near summit of Cerro Jefe, 09°14'02"N 079°22'30"W, 900 - 1000 m, 21 July 1972, *A. H. Gentry & John D. Dwyer* 5546 (MO); Cerro Jefe, near summit; windswept cloud forest, 09°14'02"N 079°22'30"W, 1000 m, 30 April 1993, *Donald R. Hodel, J. Benzie & C. Hubbuch* 1248 (MO); Top of Cerro Jefe, 09°14'02"N 079°22'30"W, 3140 f, 7 April 1966, *Edwin L. Tyson* 3597 (SCZ); Top of Cerro Jefe, 09°14'02"N 079°22'30"W, 2700 - 3000 ft, 09 July 1966, *Edwin L. Tyson, John D. Dwyer & Kurt E. Blum* 4352 (SCZ, MO); Cerro Jefe, on top near antenna; cloud forest, 09°14'02"N 079°22'30"W, 4000 f, 19 January 1977, *J.P. Folsom & B. Harp* 1379 (MO); Cerro Jefe, trail leading W from summit, 09°14'02"N 079°22'30"W, 900 - 1000 m, 24 September 1975, *John T. Witherspoon & Fran Witherspoon* 8494 (MO); Cerro Jefe, trail leading W from summit, 09°14'02"N 079°22'30"W, 900 - 1000 m, 24 September 1975, *John T. Witherspoon & Fran Witherspoon* 8488 (MO); Cerro Jefe, summit area, 09°14'02"N 079°22'30"W, 900 - 1000 m, 29 August 1975, *John T. Witherspoon et al.* 8268 (MO); Cerro Jefe, 1.5 km before weather station, 09°12'50"N 079°23'05"W, 850 - 900 m, 07 October 1980, *K.J. Sytsma* 1471 (MO); Cerro Jefe, 1.5 km before weather station, 09°12'50"N 079°23'05"W, 850 - 900 m, 07 October 1980, *K.J. Sytsma* 1483 (MO); Cerro Jefe, 09°12'50"N 079°23'05"W, 850 - 900 m, 29 October 1980, *K.J. Sytsma* 2008 (MO); Cerro Jefe, 09°14'02"N 079°22'30"W, 700 - 1000 m, 3 May 1999, *R. Gottsberger* 15-RG-3 (ULM); Cerro Jefe, 09°14'02"N 079°22'30"W, 1000 m, 14 July 1975, *Scott A. Mori* 7124 (MO); Cerro Jefe. Along trail on ridge running NE from summit, 09°14'02"N 079°22'30"W, 1000 m, 11 May 1975, *S.A. Mori & J.A. Kallunki* 6073 (MO);

Vicinity of Cerro Jefe, 4.6 km beyond peak on road to Altos de Pacora, 26.3 km from the Inter-American Highway, 09°14'20"N 079°20'25"W, 600 m, 12 June 1976, *T.B. Croat* 35922 (MO); Cerro Jefe, along road just below the summit, 09°15'N 079°30'W, 17 June 1994, *T.B. Croat & G. Zhu* 76209A (MO); Vicinity of Cerro Jefe, near tower, 09°12'50"N 079°23'05"W, 2400 ft, 23 May 1980, *T. M. Antonio* 4744 (MO); Cerro Jefe. Beside radio tower, 09°12'50"N 079°23'05"W, 900 m, 27 June 1984, *W.G. D'Arcy, H. W. Churchill & G.C. de Nevers* 15503 (MO); **Guna Yala** Nusigandi, along El Llano-Carti Road, 0.7 miles beyond Cuna Headquarters, located 10.9 miles N of Pan-American Highway, 11.6 miles N of Pan-American Highway, 09°18'N 078°59'W, 450 m, 03 April 1993, *T.B. Croat* 75124 (CAS, L, MO); Trail to Cerro Óbu (Habu of maps) from Río Urgandi; (Río Sidra), 09°23'N 078°48'W, 100 - 300 m, 24 June 1986, *Greg C. de Nevers, Heraclio Herrera & Ernesto Gernado* 8011 (MO); Cerro Obu, 09°23'N 078°48'W, 400 - 500 m, 25 June 1986, *Greg C. de Nevers, Heraclio Herrera & Ernesto Gernado* 8066 (MO); **Veraguas**: Ridge of Cordillera de Tute, trail to Cerro Tute, above Escuela Agrícola Alto de Piedra, just W of Santa Fé. Premontane wet forest, 08°32'N 081°07'W, 800 - 1350 m, 5 June 1982, *S. Knapp & R.L. Dressler* 5444 (MO); Santa Fe. "Cerro Tute" ridge up from former Escuela Agrícola, Santa Fé, 08°35'N 081°05'W, 1100 - 1400 m, 15 July 1983, *C.W. Hamilton & K. Krager* 3983 (MO); 5 miles W of Santa Fé on road past Escuela Agrícola Alto Piedra on Pacific side of divide, 08°30'48"N 081°06'59"W, 800 - 1200 m, 18 March 1973 - 19 March 1973, *R.L. Liesner* 902 (MO); N of Santa Fé, ca. 2 km N of Escuela Agrícola Alto de Piedra, 08°31'22"N 081°07'33"W, 900 m, 17 October 1974, *S.A. Mori & J.A. Kallunki* 2582 (DUKE, MO); Cerro Tute, ca. 10 km NW of Santa Fé. On lower slopes, 08°30'11"N 081°06'06"W, 750 - 1000 m, 2 August 1975, *S.A. Mori et al.* 7552 (MO); Cerro Tute, ca. 10 km NW of Santa Fé. On lower slopes, 08°30'11"N 081°06'06"W, 750 - 1000 m, 2 August 1975, *S.A. Mori et al.* 7555 (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* 76880 (MO); Vicinity of Santa Fé, along road between Alto Piedra and Calovebora, 0.5 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* 76882 (CAS, MO, NY); 0.2 miles beyond fork in road at Escuela Agrícola Alto Piedra on road to Rio Calovebora, 08°30'49"N 081°06'56"W, 750 m, 03 April 1976, *T.B. Croat & J.P. Folsom* 33961 (MO); Along banks of 1st river on road between Escuela Agrícola Alto Piedra and Río Calovebora, 08°31'26"N 081°07'46"W, 500 m, 4 April 1976, *T.B. Croat & J.P. Folsom* 34151 (MO);

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Stenospermatum solanoi Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Changuinola. Parque Nacional La Amistad, margins of Quebrada Yobo, tributary of Río Uri; 09°03'25"N, 82°42'23"W, 1452 m, 16 April 2008, *D. Solano & A. De Sedas Maltez 5382* (holotype, PMA-70315), isotype (MO-6720987).

Diagnosis. *Stenospermatum solanoi* is characterized by its appressed-climbing epiphytic growth which becomes loose and spreading; elongated internodes, petioles sheathed 0.6–0.9 their length, sheath acute at apex, narrowly oblong-elliptic, abruptly short-acuminate, dark brownish-drying blades 3.1–4.0 times longer than broad with the minor veins of the upper surface moderately raised, narrowly raised to bluntly acute with the intervening area subreticulate, sparsely and thickly granular as well as the moderately thin white spathe and the somewhat tapered yellowish spadix that is only about 1 cm shorter than the white spathe with a circular stigma.

Appressed-climbing epiphyte becoming loose and spreading; internodes to 5 cm long, 5 mm diam.; **petioles** 6.6–17.7 cm long, sheathed 0.6–0.9 their length; **sheath** 6–12 cm long, to 1 cm high on the sides, moderately coriaceous, drying dark brown, acute at apex, the margin persisting intact; free part of petiole 4.7–5.0 cm long; geniculum 9–10 mm long, drying dark brown, weakly ribbed, finely striate, deeply sulcate adaxially; **blades** narrowly oblong-elliptic, 12.5–21.0 cm long, 3.1–6.3 cm wide, 3.1–4.0 times longer than broad, 1.1–1.8 times longer than petioles, weakly short-acuminate at apex, narrowly acute at base, slightly inequilateral, one side 3 mm narrower, gray-brown and matte above, reddish brown and matte below; primary lateral veins not apparent; **upper surface** with minor veins 1.0–1.5 mm apart, thick, moderately raised, narrowly raised, bluntly acute, concolorous, the intervening area subreticulate, sparsely and thickly granular; lower surface with veins moderately obscure, otherwise finely granular-striate. INFLORESCENCE erect, peduncle terete, 13.5 cm long, drying light yellow-brown, ca. 2 mm diam.; spathe white, drying moderately thin, light brown, 9.5 cm long, 1.3 cm diam. when furled, narrowly acuminate; **spadix** yellowish, 8.5 cm long, 1 cm diam.; styles 1.2–1.6 mm diam, prismatic, drying light brown, irregularly 6-sided, the edges thin, sometimes concave; stigma circular, 0.5–0.6 mm, raised and about as high as wide, drying dark brown. Flowering in April. **Figures 241 & 242.**

Distribution — *Stenospermatum solanoi* is endemic to Panama, known only from the type locality at 1452 m in a *Lower montane rain forest* life zone.

Comments — *Stenospermatum solanoi* is perhaps most related to *Stenospermatum sessile* which differs by having short internodes, the petiole sheath much thicker with a thin, brownish, frayed margin and a cylindroid usually whitish spadix with a rounded apex. In contrast *S. solanoi* has elongated internodes to 5.5 cm long, the petiole sheath only weakly frayed and a moderately long-tapered, yellow spadix.

Etymology — *Stenospermatum solanoi* is named in honor of Panamanian botanist Daniel Solano who collected the type specimen



Figure 241: *Stenospermatum solanoi*, TYPE D. Solano et al. 5382



Figure 242: *Stenospermation solanoi*, Upper blade surface, TYPE *D*. Solano *et al.* 5382

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Stenospermation steyermarkii Bunting, Acta Bot. Venez. 10 (1–4): 321–322. 1975. Type: VENEZUELA. Terr. Delta Amacuro, along lower section of river, upstream from Casa Cuyubini. Inundated forest, Río Cuyubini, alt. 90 m, 12 Nov 1960, *J.A. Steyermark 87511* (holotype, VEN; isotype, NY).

Epiphytic or terrestrial, 70–80 cm tall; stems with internodes very short, 0.5–1.5 cm long, 2.0–3.5 cm diam.; cataphylls thick, 9.0–19.5 cm long, ribbed throughout, acuminate apiculate, (the apiculum 2.3 cm long), persisting, like petiole in color and shape. LEAVES erect-spreading to spreading, drying green to yellow-green to yellow-brown; **petioles** 8.5–30.0 cm long, 1/3 to 1/6 as long as the blades, flexible, pale green, sheathed throughout (rarely to only 0.67–0.85 their length); **sheath** 8.5–30.0 cm long, 2.5–4.0 cm wide midway, inequilateral at apex, obtuse on one side, acute on the other, free part of petiole usually lacking, sometimes up to 2.0 cm long; geniculum 2.5–3.0 cm long, obscure, slightly paler than petiole; **blades** oblong-oblongeolate, short-acuminate to inequilateral at apex, obtuse on one side, acute on the other (the acumen apiculate), acute at base, 24.5–56.5 cm long, 7.5–10.0 cm wide, (2.7)5.2–6.8(7.3) times longer than wide, broadest midway or in distal 2/3rd of blade, subcoriaceous, semiglossy, weakly bicolorous, dark green above, slightly paler below, drying greenish gray to brownish and matte above, yellowish brown to grayish brown and weakly glossy below, margin turned upward or slightly downward; midrib broadly sunken and paler with a narrow sulcus, paler than surface, drying narrowly sunken above, prominently raised below and concolorous to slightly paler, drying flattened, concolorous with up to 10 moderately acute ribs; primary lateral veins 9–15 per side, departing midrib at 15–25°, arcuate-ascending to the margin, not at all raised on either surface; **upper surface** with the minor veins narrowly and irregularly raised (a series of seemingly stacked narrow ribs) with the intervening areas densely and narrowly ribbed, the ribs somewhat irregularly directed and seemingly interwoven, these sometimes alternating with a single row of minute areolae, usually also densely to sparsely short pale-lineate with cellular inclusions but usually not noticeably granular above, sometimes with the striations replaced with regions of thick granulated, weakly bullate or low areas of more widely spaced ridges; lower surface with minor veins irregularly and rather prominently raised with the intervening areas minutely and irregularly costate, weakly granular, not short pale-lineate; prophylls 2 cm long. INFLORESCENCE usually solitary, cernuous near the apex, longer than leaves; peduncle 33–52 cm long, 9 mm diam. midway, stiff, (the epidermis usually tan and loosely attached), 2–3 times longer than petioles; spathe reflexed, held usually at 45° from peduncle, thick, greenish at anthesis, oblong-elliptic, semiglossy on upper surface, matte on lower surface, 9.5–13.5 cm long, 6–8 cm wide, broadest at the middle, deciduous, acuminate at apex, (the acumen inrolled) surrounding peduncle at base, white to pale green; **spadix** white to yellowish or yellow-orange, stipitate (stipe 0.7–2.0 cm long), cylindroid, slightly tapered toward the apex or at both ends, 5.5–12.0 cm long, 1.0–1.3 cm diam. midway, 5–8 mm diam. near apex; flowers hexagonal to broadly rhombic, 2.6–3.7 mm long in direction of axis, 2.1–3.8 mm wide perpendicular to axis, the sides straight often somewhat unequal, 5–10 flowers visible in the principal spiral, 7–11 flowers visible in the alternate spiral; tepals matte; stigma 0.7–1.2 mm long, 0.5–0.9 mm wide, round, brown, prominently sunken in the middle; thecae oblong, not divaricate, pollen white, circular with a smooth surface. INFRUCTESCENCE (dry) with spathe deciduous; spadix 8–19 cm long, 1–2 cm wide; fruits yellow to orange; seeds (dry), 2.0–2.6 mm long, 0.8–1.0 mm wide. In Panama flowering appears to be bimodal with flowering commencing in the late rainy season as early as October and extending into the dry

season from December through March and with fruits maturing as early as April but flowering begins again in the early rainy season in June and July and extends into August. There appears to be a pause in flowering activity in April and May and again in September and October. **Figures 243–251.**

Distribution — *Stenospermatum steyermarkii* ranges from Panama (Bocas del Toro, Veraguas, Coclé, Colón, Panamá, Canal Zone & Darién) to Colombia (Chocó, Antioquia, Valle, Cauca), Ecuador (Sucumbios, Napo, Morona-Santiago, Zamora-Chinchipe), Peru (Huanuco, Loreto, Pasco & San Martín), Venezuela (Amazonas, Bolívar, Delta Amacuro), the Guianas (French Guiana, Suriname), and Brazil (Roraima). In Panama the species ranges at 100–1325 m, mostly below 1000 m. In Colombia collections have been made at 30–2330 m and in Peru from 350–1294 m; *Tropical wet forest, Premontane rain forest* life zones.

Comments — *Stenospermatum steyermarkii* is characterized by its short internodes, fully sheathed petioles, oblong-oblongeolate, short-acuminate, grayish brown-drying blades which are acute at base and usually more than 5 times longer than wide as well as the cernuous inflorescence with a reflexed spathe and a stipitate, white to yellowish cylindroid spadix and orange berries.

Owing to its oblong-oblongeolate, rather pale-drying blades with a long, usually fully sheathed petiole, the species is not easily confused with any other but in the key the species comes out with *Stenospermatum adsettiorum*, a species from Cerro Jefe, which differs by having moderately coriaceous, dark gray brown-drying leaves with petioles sheaths thick with a thin brownish, somewhat broken up margin. *S. steyermarkii* also tracks to *S. luisgomezii* which differs in having proportionately much narrower blades and a petiole sheath that is much thinner and fragmented.

Gómez de Pérez (1983) considered *Stenospermatum steyermarkii* to be a synonym of *S. multiovulatum* (Engl.) N.E.Br. but the latter species differs by having leaf blades which are oblong-elliptic and thinly coriaceous with the upper blade surface very flat and moderately featureless with the minor veins scarcely visible, scarcely raised and with the intervening area densely and thickly short pale-lineate and densely and faintly obliquely transverse ribbed. At present *S. multiovulatum* is known for certain only from the western slopes of the Cordillera Occidental west of Cali, Colombia.

Additional specimens seen — **BRAZIL. Roraima:** Auaris, 04°03'N 064°22'W, 1969, *Ghilleen T. Prance & et al.* 9626 (INPA,US); **COLOMBIA.** Bajo Calima Region: along road between Buenaventura to Málaga, 4.5 km W of main road at turnoff Km 28, 03°59'N 077°03'W, 50 - 150 m, 3 August 1993, *D. Bay* 255 (MO); **Antioquia:** Mpio. de La Unión; Km 33 of road Sonsón-La Unión (23 km from La Unión), Lat. 5°52'N, Long. 75°18'W, alt 2330 m; disturbed vegetation between road and stream near bridge, 05°52'N 075°18'W, 2330 m, 8 December 1986, *J.L. Zarucchi & N. Bedoya* 4514 (MO); Mutatá. 200–400 m, 27 Julio 1978, *R. Fonnegra G.* 906 (HUA); **Cauca:** 1600 - 1800 m, 30 December 1883, *F. C. Lehmann* 3032 (B, UC); **Chocó:** Along road between Pueblo Rico (Risaralda) and Istmina (Chocó), along Quebrada Antón, 15 km W of Santa Cecilia, 6 km W of Chocó-Risaralda border, ca. 20 km E of Playa del Oro, along stream, 05°20'30"N 076°13'45"W, 240 m, 23 February 1990,



Figure 243: *Stenospermation steyermarkii*, Habit of flowering plant, Croat 74170



Figure 244: *Stenospermation steyermarkii*, Croat 83619 MBG Greenhouse, Photo L Jan-kowski



Figure 245: *Stenospermation steyermarkii*, Habit of flowering plant, Croat 33595



Figure 246: *Stenospermation steyermarkii*, Croat 83619, MBG Greenhouse, Photo L Jankowski



Figure 247: *Stenospermation steyermarkii*, Inflorescence, *Croat 33595*

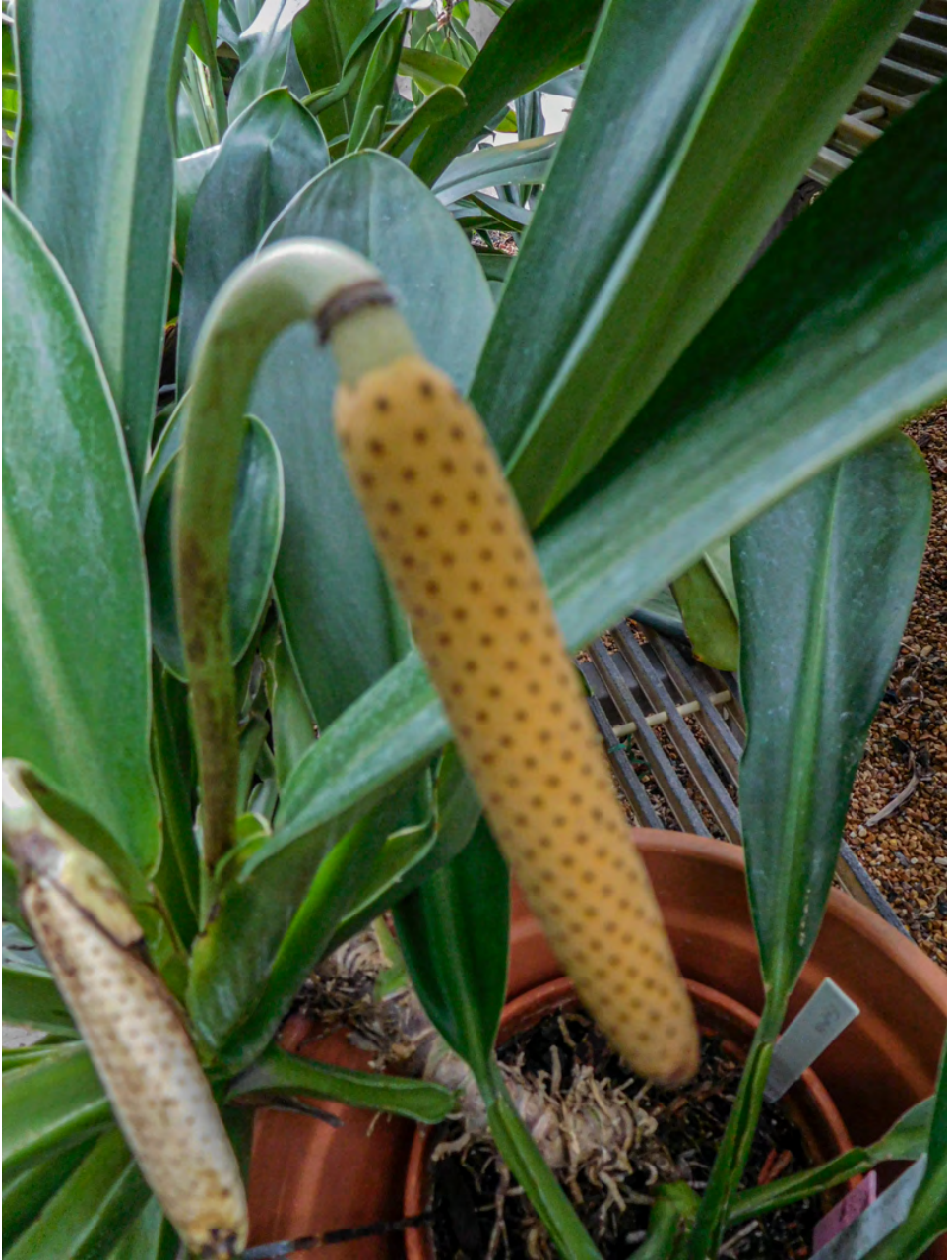


Figure 248: *Stenospermatum steyermarkii*, Croat 83619, MBG Greenhouse, Photo L Jankowski



Figure 249: *Stenospermatum steyermarkii*, Croat 37356



Figure 250: *Stenospermatum steyermarkii*, Churchill 4166

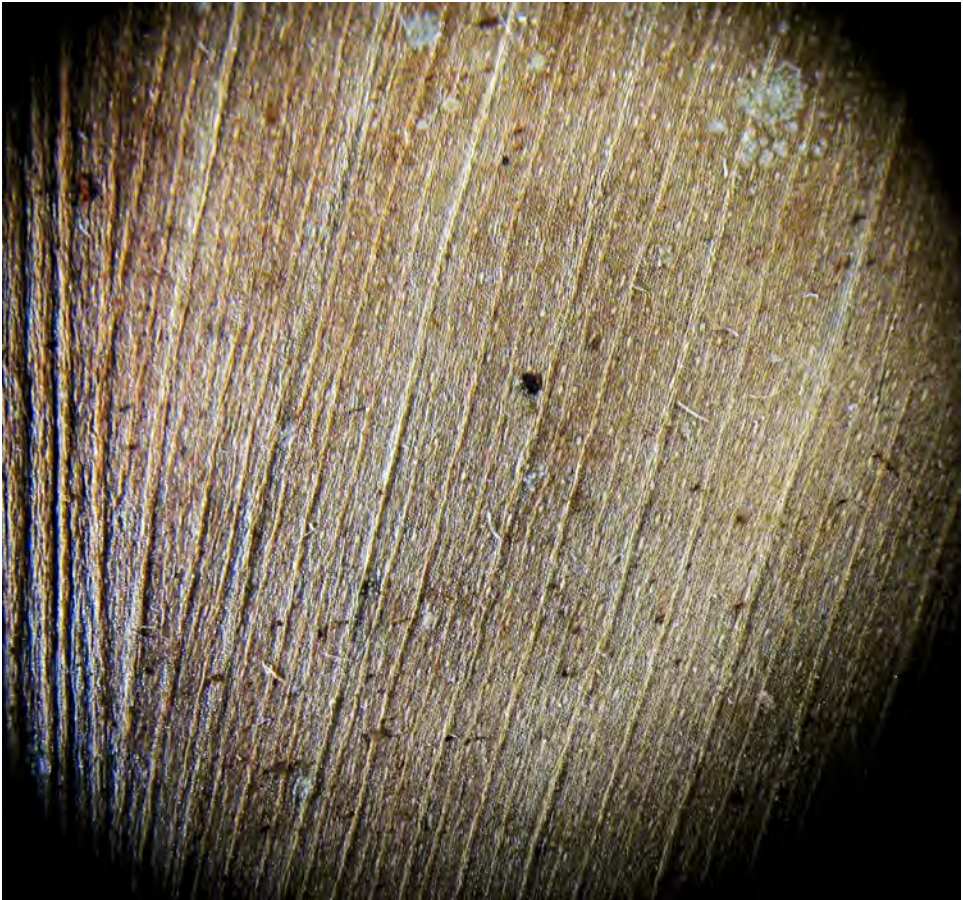


Figure 251: *Stenospermatum steyermarkii*, Upper blade Surface, *de Nevers et al.* 6251

T.B. Croat 70928 (MO); Nuquí. Corregimiento de Arusi, Estación Biológica El Amargal, 05°34'N 077°31'W, January 1999 - April 1999, *J. Jácome* 57 (COL); Corregimiento Arusi; vic. of Arusi, Estación Biológica El Amargal, 05°34'14"N 077°30'10"W, 30 m, 17 June 2000, *T.B. Croat & M. Mora* 83661 (=Mora 279) (COL, MO); Riosucio. Zona de Urabá. Cerros del Cuchillo. Camino de Cidon a la Cumbre Sureste. Bosque primario, 50 - 100 m, 23 Jun 1988, *D. Cárdenas* L. 2097 (MO); **Nariño:** Ricaurts. Lescalidol La Plannda, 1900 m, 28 November 1976, *O. Salazar de Benavides* 742 (MO); **Valle del Cauca:** Punta Arenas, north shore of Buenaventura Bay; Near Buenaventura. Forest near Campamento de Pulpapel, 25 enero 1971, *H. Kennedy* 787 (MO); Bajo Calima Region; along road between Buenaventura and Málaga; vicinity of Km 50.7, right (N side) of road in deep ravine along stream, 04°02'N 077°05'W, 12 July 1993, *T.B. Croat & D. Bay* 75694 (CHOCO, MO); Vicinity of Bahía Málaga, near Base Naval Málaga, along trail along the edge of the bay west of base headquarters, 03°58'N 077°21'W, 20 m, 30 July 1997, *T.B. Croat & J.F. Gaskin* 80612 (CUVC, MO); Along road from Buenaventura to Bahía Málaga, vicinity Km 37, 03°59'N 076°59'W, 50 m,

13 July 1997, *T.B. Croat & J.F. Gaskin* 79786 (CUVC, MO); 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 & J.F. Gaskin* 80543 (MO); Buenaventura. Bajo Calima, Concesión Pulpapel. Lowland rain forest, 03°55'00"N 077°00'00"W, 100 m, 20 January 1988, *H. van der Werff & M. Monsalve* B. 9651 (MO); Bajo Calima Region: along road between Buenaventura and Málaga, on Carretera Hanz (lumber extraction road N of main Buenaventura- Málaga Road). Elev. less than 100 m, 04°03'N 077°03'W, 1 March 1990, *T.B. Croat* 71089 (COL, HUA, MO); Bajo Calima, within forestry concession of Cartón de Colombia, between Buenaventura and Río Calima, 6.5 km. beyond the Porton Tomar (at Km 27), 22.3 km beyond Camp Portada Pulpapel, 33.3 km beyond main Calí-Buenaventura Highway. Primary forest, 04°02'N 077°07'W, 50 m, 6 July 1986, *T.B. Croat* 61289 (MO); Bajo Calima, within forestry concession of Cartón de Colombia, between Buenaventura and Río Calima, 6.5 km. beyond the Porton Tomar (at Km 27), 22.3 km beyond Camp Portada Pulpapel, 33.3 km beyond main Calí-Buenaventura Highway. Primary forest, 04°02'N 077°07'W, 50 m, 6 July 1986, *T.B. Croat* 61290 (CUVC, MO); Vicinity of Bajo Calima: Along road past Pulpapel Headquarters (at km 17) to Bahía de Málaga; at Km 44 from the main Cali-Buenaventura highway. Elevation less than 100 m, 04°03'N 077°08'W, 05 February 1990, *T.B. Croat & J. Watt* 70204 (MO); Bajo Calima Region: along the road between Buenaventura-Málaga at km 51.3, deep gorge in virgin forest, 04°09'N 077°11'W, 100 m, 8 February 1990, *T.B. Croat & J. Watt* 70370 (MO); **ECUADOR**. Received from David Metzger. Origin: Ecuador, 25 October 1996, *T.B. Croat* 78437 (MO); March 1991, *T.B. Croat* 81352 (MO); **Morona-Santiago**: NW range Cordillera del Cóndor; base camp overlooking Río Zamora-río Piuntza, ca. 1 hr. by trail N from base camp; cloud forest, 1850 m, 5 January 1972, *Bruce MacBryde* 971 (MO); **Napo**: Jatun Sacha reserve, lowland rain forest, 01°04'S 077°37'W, 430 m, 9 Nov 2006, *S. Trogisch et al.* 273 (ECUAMZ, GOET, MO, QCA). **Sucumbíos**: Lago Agrio. Reserva Cuyabeno. Río Cuyabeno, 2-3 km arriba de Laguna Grande. Area inundada estacionalmente por aguas negras, 00°00'S 076°14'W, 230 m, 16 noviembre 1991, *Walter A. Palacios et al.* 9034 (MO, QCNE); **Zamora-Chinchipe**: Yantzaza. Cordillera del Cóndor. Carretera desde Los Encuentros hacia el Cerro Machinaza. Parroquia Los Encuentros, Barrio San Antonio. Suelos formados por fragmentación de roca arenisca, arenosos y arcillosos. Bosque muy húmedo, denso y alto, 03°49'39"S 078°31'05"W, 1470 m, 17 July 2005, *Wilson Quizhpe* 1546 (LOJA, MO); **FRENCH GUIANA**. Station des Nouragues - Bassin de l'Arataye, m, 23 September 1995, *A. Cockle* 116 (MO); "Layon Roche Bateau - 1, Région de Saül", m, 14 October 1976, *B. Granville* 5374 "Réserve Naturelle de la Trinité, secteur Aimara", m, 25 January 2006, *C. Girod* 3443 (MO); montagne de l'Inini-Bassin de l'Inini, 03°30'N 053°30'W, 10 April 1986, *Christian P. G.-A. Feuillet* 3810 (CAY, MO); Galboa Mountains near Saul, 1979, *Determan* 27 (MO); "Sommet Tabulaire, Région des Emerillon", 24 August 1980, *G. Cremers* 6442 "Sommet Tabulaire, Région des Emerillon", m, 30 August 1980, *Georges Cremers* 6493 "Saut Iquissi, Bassin de la Mana", m, 11 August 1981, *Georges Cremers* 7479 "Saut Bambaye, Bassin de la Camopi", m, 15 March 1974, *J. J. de Granville* 2127 "Commune de Saül, Région de Saül", m, 1 January 1982, *J. J. de Granville* 5145 "Monts Kotika, plateau latéritique sommital", m, 23 February 2005, *J. J. de Granville* 16963 (CAY); Mont Atachi Bacca, REgion de l'Inini, 03°33'N 053°55'W, 500 m, 17 January 1989, *J. J. de Granville* 10704 (CAY); Mont Galbao. Secteur Est, 700 m, 17 January 1986, *J. J. de Granville* 8788 (CAY); "Montagnes Bellevue de l' Inini, Bassin de l'Inini", m, 14 August 1985, *J. J. de Granville* 7465 "Montagnes Bellevue de l' Inini, Bassin de l'Inini", m, 3 September 1985, *J. J. de Granville* 8030 (CAY); Mont Galbao. Secteur Est, 03°36'N 053°17'W, 600 m, 21

January 1986, *J. J. de Granville* 8881 (CAY); “Commune de Grand Santi, Centre d'Enfouissement Technique, Bassin du Maroni”, m, 17 January 2008, *Olivier Tostain* 1537 Réserve Naturelle des Nouragues : Station de l'Aratai, m, 21 February 2003, *P. Acevedo-Rodríguez* 12336(MO); “Commune de Saül, Région de Saül”, m, 23 September 1986, *R.C. Ek* 151 (CAY); “Piste de Carbet Maïs, Région de Saül”, m, 8 September 1989, *S.A. Mori* 20854 (MO); Saül: Monts La Fumée. Tropical Moist Forest, 03°37'N 053°12'W, 200 - 400 m, 8 October 1982, *S.A. Mori & et al.* 15072 (MO); “Layon Eaux Claires, Région de Saül”, m, 10 February 1993, *T.B. Croat* 74170 (MO); Cultivated Plants from Nancy Botanical Garden. Collected at Aratay, Saut Paré by Barrier & Feullet 373, Nancy # 81.3546, 8 March 2004, *T.B. Croat* 90320 (MO); **Cayenne**: embouchure de la riviere Grand Tamouri (affluent du Camopi) = Saut Bambaye, 15 March 1974, *J. J. de Granville* 2127 (P); Camopi. (affluent de l'Cyapock), rive droite de la crique Grand Tamouri a 3 km en amont de son embouchure. “Crique Grand Tamouri, Bassin de la Camopi”, 12 February 1968, *R.A. A. Oldeman & C. Sastre* 186 (P); **Saint-Laurent-du-Maroni**: Extremite NW, 550 m, 14 August 1985, *J. J. de Granville et al.* 7465 (P,U); La Carbet Mais trail, 03°37'N 053°12'W, 8 Sept. 1989, *S.A. Mori et al.* 20854 (NY); GUYANA. U. Takutu-U. Essequibo. Acarai Mts, 10 km S of Sipu River, upper slopes of hightst peak in central Acarai Mts, 01°19'58"N 058°57'54"W, 800 - 900 m, 05 September 1998, *H.D. Clarke et al.* 7537 (US); **PANAMA. Bocas del Toro**: NW ridge of Cerro Pate Macho from summit to Finca Serrano, 08°50'N 082°24'W - 08°52'N 082°25'W, 1200 - 2100 m, 27 May 1981, *K.J. Sytsma et al.* 4965 (MO); Along road between Chiriquí Grande and Fortuna, 13.2 miles W of Chiriquí Grande, 08°50'12"N 082°11'48"W, 310 m, 09 March 1985, *T.B. Croat & M.H. Grayum* 60129 (MO); **Canal Area**: Summit Garden, 09°03'52"N 079°38'58"W, 75 m, 24 March 1971, *T.B. Croat* 14041 (MO); **Chiriquí**: Cerro Colorado, on road, 35.6 km. from Río San Félix bridge, 08°31'56"N 081°49'15"W, 1390 m, 15 July 1976, *G.A. Sullivan* 401 (MO); Cerro Campana, 08°20'N 081°57'W, 400 m, 12 November 1963, *P.C. Hutchison & R.L. Dressler* 2973 (UC); Cerro Campana, 08°20'N 081°57'W, 400 m, 12 November 1963, *P.C. Hutchison & R.L. Dressler* 2966 (UC); **Coclé**: Near sawmill 16.7 km N of turnoff to Coclesito from Llano Grande, 08°45'N 080°29'W, 700 ft, 07 March 1978, *B.E. Hammel* 1839 (MO); 44 km N of Penonomé on road to Coclesito, 08°47'00"N 080°42'12"W, 300 - 500 ft, 21 February 1978, *B.E. Hammel* 1684 (MO); Road from La Pintada to Coclesito, 08°41'06"N 080°27'15"W, 600 m, 07 February 1983, *C.W. Hamilton & G.Davidse* 2858 (MO); Foot of Cerro Pilón, above El Valle de Antón, 08°38'06"N 080°06'42"W, 2000 ft, 27 March 1969, *D.M. Porter et al.* 4374 (MO); La Mesa, 2 km W of Cerro Pilón, 08°37'40"N 080°07'35"W, 860 m, 21 July 1976, *G.A. Sullivan* 464 (MO); Along Llano Grande to Coclesito road, above Cascajal, near divide, c. 8°42'N, 80°28'W. Forest. c. 500 m, 08°42'N 080°28'W, 500 m, 12 January 1986, *G. McPherson* 7987 (MO); Road to Coclesito 12 mi from Llano Grande. In forest, 08°47'N 080°28'W, 200 m, 17 December 1983, *H. W. Churchill et al.* 4166 (MO); Along road about 8 miles north of El Valle de Antón. La Mesa, at end of road to where it ends in farmer's field and then to the right, 08°38'48"N 080°08'03"W, 03 August 1970, *J.L. Luteyn & H. Kennedy* 1732 (MO); La Mesa, N of El Valle de Antón, 08°38'00"N 080°07'05"W, 840-880 m, 20 July 1990, *M.H. Grayum & R.J. Evans* 9904 (MO); El Valle Antón, a un Km de la Finca Gallinera Fidanque hacia la Mesa, 08°39'N 080°08'W, 18 October 1980, *M.D. Correa A. & V. Salazar* 4223 (MO); Parque Nacional Omar Torrijos. La Rica. Bosque cercano al rio Juan Julio. Bosque humedo con presencia de muchas quebradas, 08°42'43"N 080°35'30"W, 200 m, 22 julio 2013, *O. Ortiz* 1455 (PMA, MO); N of El Valle, between Cerro Caracoral and Cerro Gaital. [Coordinates on original label: 08°40'N,

080°07'W], 08°37'30"N 080°06'54"W - 08°37'48"N 080°07'24"W, 800 - 1000 m, 18 July 1982, *S. Knapp et al.* 6047 (MO); La Mesa, above El Valle de Antón, ca. 2 km W of Cerro Pilón on slopes of steep hill, 08°37'30"N 080°07'30"W, 860 - 900 m, 21 July 1976, *T.B. Croat* 37391 (MO); 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 080°07'W, 775 m, 25 March 1993, *T.B. Croat* 74786 (MO); La Mesa, above El Valle de Antón, ca. 2 km W of Cerro Pilón on slopes of steep hill, 08°37'30"N 080°07'30"W, 860 - 900 m, 21 July 1976, *T.B. Croat* 37356 (MO); La Mesa, above El Valle de Antón, ca. 2 km W of Cerro Pilón on slopes of steep hill, 08°37'30"N 080°07'30"W, 860 - 900 m, 21 July 1976, *T.B. Croat* 37412 (MO); La Mesa above El Valle; in forest on both sides of junction with road to Cerro Pilón, 08°38'00"N 080°07'30"W, 800 m, 21 July 1974, *T.B. Croat* 25356 (MO); 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 080°07'W, 775 m, 25 March 1993, *T.B. Croat* 74800 (MO); Vicinity el Valle de Antón, at forested flat area near Finca Macarenita at La Mesa, 08°36'N 080°07'W, 800 m, 6 July 1994, *T.B. Croat & G. Zhu* 76651 (CM, GB, EXU, MO, QCA, SAR, SEL, US, WIS); La Pintada. Parque Nacional G. D. Omar Torrios H. Río San Juan área de Calle Larguita (Palmarazo). A orilla de una trocha que conduce a la quebrada, 08°43'09"N 080°40'44"W, 198 m, 18 June 2013, *L. Martínez et al.* 1311 (MO); **Colón:** Trail from Alto Pacora to Cerro Brewster, 09°18'N 079°16'W, 750 m, 19 November 1985, *G.C. de Nevers et al.* 6251 (MO); Cedro Hueco, 08°59'43"N 080°33'54"W, 100 m, 20 August 2001, *J.A. Mendieta M.* 11-24 (MO, PMA); Distrito de Donoso. Area de Concesión Manera Panama. Coastal Road. Coordenadas en UTM: 537528 984923, 102 m, 22 mayo 2013, *O. Ortiz et al.* 1331 (MO, PMA); 10 miles southwest of Puertobelo, 2-4 miles from coast, 09°26'N 079°43'W - 09°26'N 079°44'W, 10 - 200 m, 24 March 1973, *R. L. Liesner* 1096 (MO); Vicinity of Río Indio on road from Portobelo to Nombre de Dios, 09°33'N 079°33'W, 22 March 1976, *T.B. Croat* 33595 (MO); Río Guanché above bridge on Portobelo Road; ca. 3 to 5 km above bridge, 09°30'N 079°37'W - 09°31'N 079°39'W, 50 - 200 m, 08 July 1976, *T.B. Croat* 36960 (MO); Santa Rita Ridge Road, along trail at end of road which goes to Río Indio, beginning 10.6 km from Iransisthmiam Hwy, 3 km beyond hydrographic station, 09°22'30"N 079°41'30"W, 380 m, 13 April 1976, *T.B. Croat* 34312 (MO); Donoso. Coclé del Norte, Minera Panama. Helipat C24. Coordenadas UTM 17 P 546957 992798, 55 m, 13 marzo 2010, *Á. Espinosa* 5649 (MO, PMA); San Juan del General, Conseción del Proyecto Mina de Cobre Panama, Botija, sendero dorado, 08°49'38"N 080°38'58"W, 199 m, 12 enero 2015, *J. De Gracia* 840 (MO); **Darién:** Serranía de Majé. Reserva Privada Chucanti, 08°47'31"N 078°26'51"W, 699 m, 24 March 2017, *O. Ortiz & et al.* 2760 (MO, PMA); Serranía de Cañazas. Reserva Privada Chucanti. Cerro Chucanti. Sendero hacia los helicópteros, 08°47'45"N 078°27'47"W, 1325 m, 29 agosto 2014, *O. Ortiz et al.* 2444 (MO); **Panamá:** Panamá & Comarca de Guna Yala, Valle de Madroño; ca. 10 road miles north of La Margarita (by Chepo); in forest just South of and on continental divide along main trail to Cangandi, 09°19'N 079°08'W, 350 - 450 m, 21 February 1986, *B. E. Hammel & G. McPherson* 14510 (MO); Along trail off Llano- Cartí road, c. 4.6 miles from junction with Pan-American Highway, 9°15'N, 79°00'W. Forest c. 350 m, 09°15'N 079°00'W, 350 m, 26 January 1986, *G. McPherson & M. Merello* 8150 (MO); Road to Cartí [Guna Yala], 19 km north of El Llano [Panamá], 09°23'N 078°58'W, 500 m, 13 March 1973, *P. Busey* 910 (MO); 8 km from Pan-American Highway on the El Llano-Cartí Road, Río Terable Valley. Tropical wet forest, 09°16'N 079°00'W, 300 - 400 m, 9 June 1982, *S. Knapp & R.J. Schmalzel* 5492 (MO); Originally vouchered as Hoover 1310; living collection

redescribed by Croat 1/21/00. 13.2 km along road to Cartí Suitupo from El Llano, 09°16'N 078°57'W, 370 m, 14 March 1986, *T.B. Croat 83619* (CAS, CM, F, K, MO, US); 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 079°29'W, 770 m, 4 July 1994, *T.B. Croat & G. Zhu 76626* (CAS, MO); Along road to Cartí Suitupo from El Llano; 13.2 km North of Pan American Highway, 09°16'N 078°57'W, 370 m, 11 February 1986, *W.S. Hoover 1310* (MO); Capira. Trail to top of Cerro Pelado, 08°39'18"N 080°05'55"W, 1000 m, 16 June 1979, *T.M. Antonio 1071* (MO); Cerro Campana, 08°41'14"N 079°55'19"W, 600 m, 31 August 1979, *T.M. Antonio 1709* (MO); Chepo. Between 6-12 km north of El Llano on Cartí road, 09°15'32"N 078°57'42"W - 09°16'32"N 078°55'49"W, 1200 ft, 13 January 1978, *B. E. Hammel 879* (MO); 16-18 km from Interamerican Highway on the El Llano-Cartí Road, 09°17'50"N 078°56'03"W, 400 m, 28 March 1974, *E.L. Tyson & M.H. Nee 7348* (MO); El Llano to Cartí Road, 13.7 km N of Pan-American Highway, 09°16'57"N 078°55'40"W, 08 June 1977, *J.P. Folsom 3585* (MO); El Llano to Cartí Road, 14 Km N of Panamerican Highway, cloud forest, 09°16'02"N 078°55'38"W, 350 - 500 m, 22 January 1977, *J.P. Folsom & J. Kauke 1410* (MO); El Llano-Cartí highway, ca 12 km north of El Llano, 09°16'02"N 078°55'39"W, 19 January 1974, *R.L. Dressler 4560* (MO); El Llano-Cartí Road, 18 km from Inter-American Hwy. Wet forest, 09°17'50"N 078°56'03"W, 350 m, 14 February 1975, *S.A. Mori et al. 4578* (MO); El Llano-Cartí Road, 9.8 km from Inter-American Hwy, 09°16'02"N 078°55'41"W, 1100 - 1200 ft, 28 December 1974, *S.A. Mori et al. 4162* (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 49113* (MO); El Llano-Cartí Road, 8.2 miles N of Inter-American Highway, 09°16'55"N 078°55'55"W, 300 - 350 m, 27 March 1976, *T.B. Croat 33686* (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 49110* (MO); Panamá. Cerro Jefe region, La Eneida, 09°11'22"N 079°23'05"W, 800 m, 2 September 1974, *H. Kennedy et al. 3376* (US); Cerro Jefe. 1.5 miles down right turnoff 6.7 miles past Goofy Lake, 09°12'41"N 079°22'55"W, 700 m, 27 December 1980, *K.J. Sytsma et al. 2872* (MO); Premontane wet forest along new El Llano-Cartí road, 8 km N of Pan-Am. Hwy at El Llano, 09°15'32"N 078°55'52"W, 450 m, 05 March 1974, *M.H. Nee & R. Warmbrodt 10369* (MO); 3 mi NE of Altos de Pacora. Campo Tres, 09°18'03"N 079°15'57"W, 500 - 800 m, 10 March 1973, *T.B. Croat 22721A* (MO); **Guna Yala:** Road from El Llano to Cartí, Pacific side, 09°20'N 079°00'W, 350 m, 13 February 1983, *C.W. Hamilton & H. Stockwell 2898* (MO); Road from El Llano to Cartí, Pacific side, 09°20'N 079°00'W, 350 m, 13 February 1983, *C.W. Hamilton & H. Stockwell 2904* (MO); El Llano-Cartí Road, Km 19.1, 09°20'N 078°58'W, 350 m, 08 March 1986, *G.C. de Nevers & H. Herrera 7250* (MO); Headwaters of Río Nergala along continental divide, 09°20'00"N 079°06'30"W, 350 m, 11 January 1985, *G.C. de Nevers & H. Herrera 4509* (MO); El Llano-Cartí Road, Km 27.6, Río Pingandi. [Coordinates on original label: 9°19'N, 78°55'W], 09°22'N 078°58'W, 150 m, 07 March 1985, *G.C. de Nevers et al. 5026* (MO); Nusagandi, along trail to Quebrada de Nusagandi, 09°18'20"N 078°58'01"W, 321 m, 21 February 1985, *H. van der Werff 7050* (MO); **Veraguas:** Santa Fe. Area propuesta para conservacion. Río Belen. Bosque cercano a las riberas del rio, 08°43'16"N 080°45'33"W, 306 m, 14 December 2013, *A. Zapata & et al. 3432* (MO, PMA); 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 27355* (MO); **PERU. Huánuco:** Huánuco. 29 August 1940, *Erik Asplund 13382* (S); Tulumayo entre Tingo Maria i Divisoria, 700 - 800 m, 5 August 1947, *R.*

Ferreira 2160 (US); Leoncio Prado. Dtto. Rupa Rupa; al este de Tingo María, cerca al Cerro Quemado, 09°18'05"S 075°59'16"W, 672 - 800 m, 4 May 1978, *J. Schunke* V. 10131 (MO); Dtto. Daniel Alomías Robles; Al oeste del Restaurante Cañabraba, circa a Delicias, 09°10'39"S 075°55'00"W, 800 - 900 m, 18 Jun 1976, *J. Schunke* V. 9318 (CM, MO); Along road between Tingo María airport and Huayna Capac, 10.0 km W of bridge over Río Huallaga, 09°14'56"S 076°02'16"W, 1294 m, 6 June 1998, *T.B. Croat & M. Sizemore* 81864 (MO, USM). **Loreto:** Maynas. Mishana, Río Nanay, halfway between Iquitos and Santa María de Nanay, upland forest on white sand, vicinity of Campamento Uno, 03°59'49"S 073°27'12"W, 150 m, 24 February 1981, *A. H. Gentry* 31698 (MO); **Pasco:** Oxapampa. Dist. Palcazú. Evaluación de los Recursos del Bosque 0.5ha. Reserva Comunal Yanesha. Comunidad Nativa San Pedro de Pichanaz, Sector Azulis, 10°26'44"S 075°06'21"W, 910 m, 18 Septiembre 2005, *A. Monteagudo et al.* 9950 (MO, USM); Along road Chatarra-Cacazu, disturbed forest, 10°32'S 075°04'W, 700 m, 13 July 2003, *H. van der Werff et al.* 18437 (MO); Dist. Palcazú. Comunidad Nativa Alto Lagarto - Reserva Comunal Yanesha, 10°08'04"S 075°22'06"W, 500 m, 12 September 2009, *R. Rojas & G. Ortiz* 6865 (MO, USM); Dist. Palcazu. Comunidad Nativa Alto Lagarto - Reserva Comunal Yanesha, 10°08'04"S 075°22'06"W, 500 m, 30 julio 2012, *R. Rojas et al.* 8505 (HOXA, HUT, MO, USM); Dist. Palcazu. Comunidad Nativa Alto Lagarto - Reserva Comunal Yanesha, 10°08'04"S 075°22'06"W, 500 m, 15 septiembre 2011, *R. Rojas & G. Ortiz* 8021 (HOXA, MO); **San Martín:** Mariscal Cáceres. Puente Pizana, (márgen derecha del río Huallaga). Dtto. Tocache Nuevo. Semiepífita en bosque alto; crece muy adherido al fuste de los árboles con mucha sombra, 350 m, 3 Jun 1974, *J. Schunke* V. 6886 (CM, MO, SEL, USM); Fundo Sin Sin, propiedad del Sr. Marcelo Ojea, 250 m, 4 August 1980, *J. Schunke* V. 12053 (IBE); Al este del caserío de Nuevo Progreso. Dtto. Uchiza, 500 m, 17 Jun 1969, *J. Schunke* V. 3143 (US); Distrito Tocache Nuevo, Río de la Plata, 08°10'S 076°25'W, 550 - 650 m, 2 November 1980, *T.B. Croat* 51010 (MO); SURINAME. Base of S cliffs, Arrowhead Basin, 500 m, 23 August 1944, *B. Maguire* 24459 (U); Base of S cliffs, Arrowhead Basin, 500 m, 23 August 1944, *Bassett Maguire* 24459 (NY); 550 - 710 m, 25 September 1975, *J.C. Lindeman & et al.* 381 (U); **Marowijne:** 04°16'N 054°44'W, 600 - 650 m, 5 December 2004, *M.J. Jansen-Jacobs* 6915 (U); **Sipaliwini:** Arrowhead Basin (Tafelberg). Arrowhead Basin on the south side following the rough trail to Grace Creek and the falls. High mixed tropical lowland forest of diverse hardwood species 20-30 m tall dominated by *Micrandra* sp, 03°54'30"N 056°10'35"W, 650 - 750 m, 9 July 2001, *T. Hawkins* 2220 (MO). **VENEZUELA.** **Amazonas:** Wiuiquiuia, 1954, *H. Ginés* 5666 (US); IVIC study site 4 km NE of San Carlos de Río Negro; ca. 20 km S of confluence of Río Negro & Brazo Casiquiare, 01°55'N 067°03'W, 120 m, 16 April 1979, *R.L. Liesner* 6671 (MO); **Bolívar:** 06°14'N 063°42'W, 175 m, 13 May-13 June 1987, *B. Stergios* 10404 (PORT); PIAR: West base of Amaruay- tepui, 2-3 km E of Río Acanan. 500 m. 5°56'N, 62°16'W. Tall, levas, dry forest with trees 35-40 m, 05°56'N 062°16'W, 500 m, 20 April 1986, *B.K. Holst & R.L. Liesner* 2634 (MO); Gran Sabana, 1150 m, 18 November 1978, *J.L. Luteyn & et al.* 6316 (NY); vic. Camp 1, Río Abacapa, *J.A. Steyermark* 74736 (NY); **Delta Amacuro:** Dpto. Antonio Díaz. Río Acure, entre la Piedrita y Baruma, 08°25'N 061°05'W, 0 m, February 1987, *Á. Fernández* 3797 (MO).

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Stenospermatum sullivanii Croat, **sp. nov.** — Type: PANAMA. Coclé: La Mesa, 2 km W of Cerro Pilón, 08°37'N, 80°08'W, 860 m, 21 July 1976, *G.A. Sullivan 470* (holotype, MO-2634278).

Diagnosis. *Stenospermatum sullivanii* is characterized by its epiphytic habit, short internodes, fully sheathed petioles with free-ending sheaths, small, oblong-oblongate, short-acuminate, dark brown-drying, moderately thin leaves with the minor veins of upper surface close and moderately raised with intervening areas more weakly fine-striate, weakly granular and densely short pale-lineate as well as by the somewhat cernuous white spathe and the short stipitate spadix that is only slightly shorter than the spathe.

Epiphyte; internodes short, ca. 1.5 cm diam., drying dark brown, densely pale-punctiform; **petioles** 4.0–4.5 cm long, fully sheathed; **sheath** free-ending at apex; free part of petiole lacking; **blades** oblong-oblongate, 9.0–19.6 cm long, 3.7–6.2 cm wide, 2.4–3.1 times longer than wide, 4.3 times longer than petioles, broadest above the middle, slightly inequilateral, one side 5 mm wider, short-acuminate at apex, acute at base, subcoriaceous, drying moderately thin, dark brown and matte above, moderately paler and medium yellow-brown below; **upper surface** with the minor veins close and moderately raised with intervening areas more weakly fine-striate, weakly granular and densely short pale lineate; lower surface with close distinctly raised veins and otherwise finely and uniformly striate. INFLORESCENCE weakly cernuous; peduncle 12.5 cm long, drying flattened, pale yellow-brown, 6 mm wide with loose epidermis; spathe white, 5.5 cm long, to 1.7 cm wide when still furled but loosened; **spadix** stipitate 5–6 mm, 4.8 cm long, 8 mm diam., slightly shorter than the spathe, narrowly acuminate; styles 1.9–2.4 mm wide, drying dark yellow-brown, matte; stigma oval, 7–8 mm long, 2–3 mm wide, slightly raised, drying blackened. Flowering late July. **Figures 252 & 253.**

Distribution — *Stenospermatum sullivanii* is endemic to Panama, known only from the type collection from Coclé Province at 860 m in a *Tropical wet forest* life zone.

Comments — *Stenospermatum sullivanii* has been confused with *Stenospermatum marantifolium* perhaps owing to its fully sheathed petioles with a broad sheath and its stubby spadix but that species typically has much larger leaf blades which are usually grayish and densely granular on upper surface and pale yellowish brown and not uniformly striate as well as having prominent cross-veins below and usually lack short pale lineations or they are weakly short-pale lineate. In contrast the leaf blades of *S. sullivanii* are dark brown and densely short-pale-lineate above and dark yellow-brown below.

Etymology — *Stenospermatum sullivanii* is named in honor of Gene A. Sullivan, formerly a graduate student under John Dwyer at St. Louis University. Gene collected in Panama for his field work and was on an expedition with the senior author on a trip to Cana when we climbed up the east slopes of Cerro Pirre in 1976 to the Alturas de Nique. Gene works at Stephen F. Austin State University in Texas and is a specialist on Rubiaceae.



Figure 252: *Stenospermation sullivanii*, TYPE Gene Sullivan 470

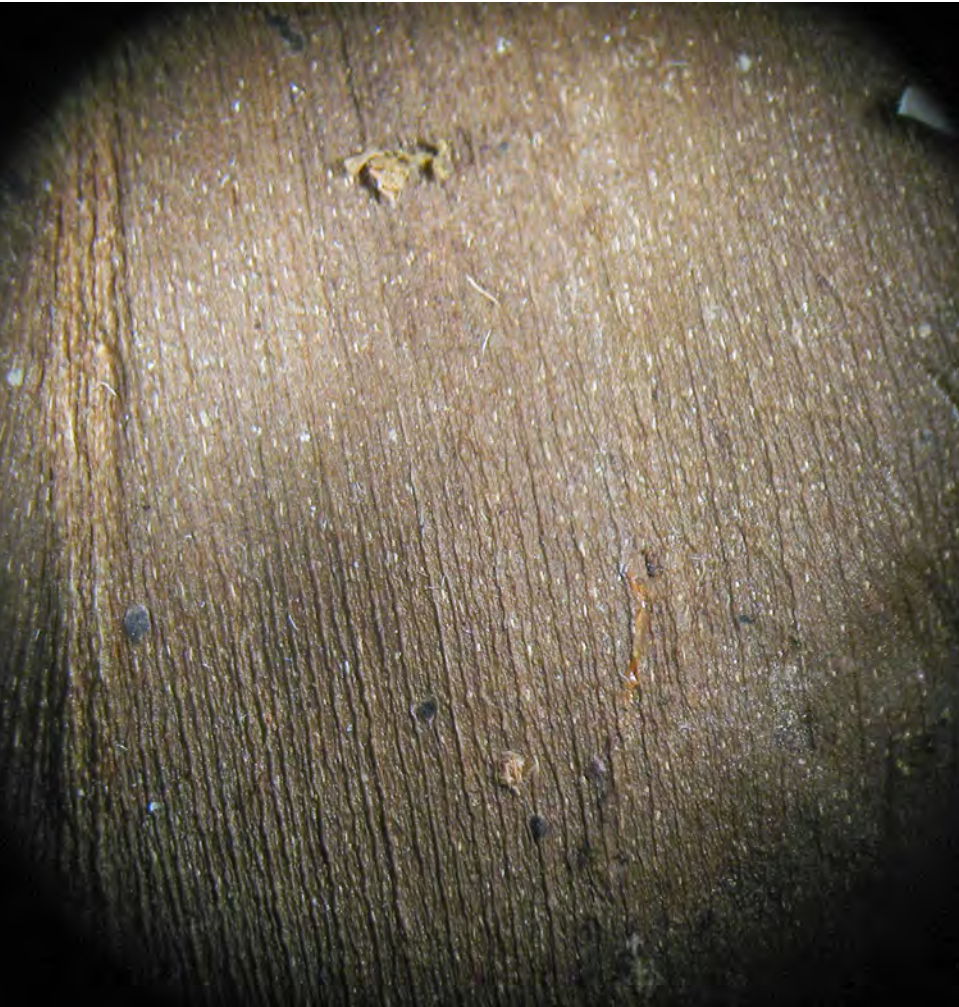


Figure 253: *Stenospermation sullivanii*, Upper blade surface, TYPE Gene Sullivan 470

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Stenospermation terrabaense Croat, **sp. nov.** — Type: COSTA RICA. San José: Pérez Zeledón, Cuenca Térraba-Sierpe, a la par de la Carretera Interamericana, al lo largo de la cuenca alta de Río Quebradas, 09°28'40.00"N, 83°41'25.0018"W, 1750 m, 03 June 2003, *B. Hammel & R. Kriebel 22805* (holotype, MO-6416461; isotype, CR)

Diagnosis. *Stenospermation terrabaense* is characterized by its epiphyte habit, short, black-drying internodes, petiole sheathed 0.4–0.8 its length, the sheath rounded to weakly free-ending at apex, narrowly oblong-elliptic to oblong-oblancoate, narrowly and gradually short-acuminate, dark brown-drying blades 3.7–5.8 times longer than wide with minor veins on upper surface narrowly and moderately acutely raised with the intervening area moderately smooth, densely and conspicuously short pale-lineate as well as by the erect, cream-colored, stipitate spadix with a bluntly triangular sterile tip.

Epiphyte, fertile at 8 m; internodes short, about as long as broad, 1–1.5 cm diam., drying blackened, matte, finely ribbed; **petioles** 16.5–27.5, sheathed 0.4–0.8 their length; **sheath** 22.3–13.8 cm long, to one cm high on the sides, rounded to weakly free-ending at apex, drying moderately thick, the margins slightly paler, persisting intact; free part of petiole (3.2)7.7–8.8 cm long; **blades** narrowly oblong-elliptic to oblong-oblancoate, 16.5–27.5 cm long, 3.7–5.8, 4.3–5.3 times longer than wide, 0.9–1.3 times longer than petioles, narrowly and gradually short-acuminate, short-apiculate at apex, narrowly acute at base, moderately coriaceous, drying dark brown and matte above, moderately paler, yellow-brown and semiglossy below; midrib convex and slightly paler above, finely ribbed, moderately raised and darker, irregularly ribbed below; primary lateral veins obscure; **upper surface** with minor veins narrowly and moderately acutely raised, moderately irregular, the intervening area moderately smooth, densely and conspicuously short pale-lineate; lower surface with the minor veins moderately raised, the intervening area finely and regularly striate-granular. INFLORESCENCE long-pedunculate; peduncle 38 cm long, 3 mm diam., light brown; spathe not seen; **spadix** erect, cream-colored, stipitate 3–4 mm, 5.7 cm long, 7 mm diam., the tip bluntly triangular, sterile, the lowermost flowers seemingly not differentiated; styles 2.2–2.4 mm wide, subrounded to irregularly quadrangular, drying dark brown, matte; stigmas subrounded to oval, 0.6–1.0 mm long, weakly raised, drying about the color of the style. Flowering in early June. **Figures 254 & 255.**

Distribution — *Stenospermation terrabaense* is endemic to Costa Rica, known only from the type in San José Province at 1750 m in a *Premontane wet forest* or *Premontane rainforest* life zone (located nearly on the border of both zones).

Comments — In appearance *Stenospermation terrabaense* most closely resembles *S. castanoanum* which has blades of similar size, shape and texture and which are also dark brown on the upper surface. The latter differs in having blades which are less bicolorous, petioles more prominently sheathed and a cream-colored spadix. In addition, *S. castanoanum* has the minor veins of the upper surface closer together, more regularly spaced and with the intervening area faintly striate, conspicuously crustose-granular with the short pale-lineations obscure to lacking. In contrast the upper surface of *S. terrabaense* has the minor veins more irregular and thinner with a greater array of short pale lineations.



Figure 254: *Stenospermation terrabaense*, TYPE Hammel & Kriebel 22805

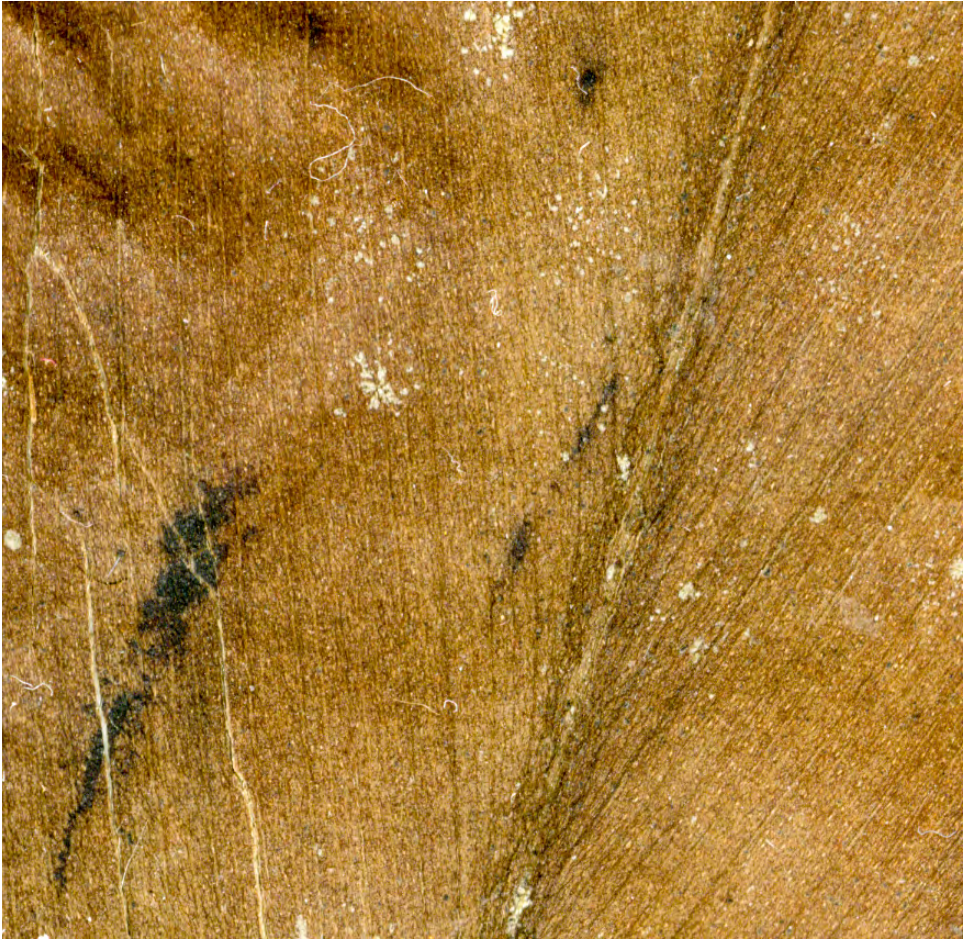


Figure 255: *Stenospermaton terrabaense*, Upper blade surface TYPE *Hammel & Kriebel*

22805

Etymology — *Stenospermaton terrabaense* is named for the type locality in the valley of the Río Térreba.

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Stenospermation topalisense Croat, **sp. nov.** — Type: PANAMA. Darién: Parque Nacional del Darién, ridge between Río Topalisa and Río Pucuro, ca. 17 km E of Pucuro; La Laguna area; back ca. 1 km towards Pucuro; 08°03'30"N, 077°17'00"W, 800-850 m, 19 October 1987, B. Hammel, G. de Nevers, H. Cuadros & H. Herrera 16306 (holotype, MO-3611627)

Diagnosis. *Stenospermation topalisense* is characterized by its epiphytic habit, long peduncle, petiole sheathed to nearly 2/3 its length with a thin, somewhat flaky margin, elongated, acuminate, somewhat grayish drying, upper blade surface with close raised veins and short-pale-lineations, a long-pedunculate infructescence, cernuous peduncle and a long cream spathe.

Epiphyte; internodes drying slightly longer than broad, 1.5–2.2 cm long, ca. 1.5 cm diam., medium brown, matte, densely granular; cataphylls absent; **petioles** 18.5–21.0 cm long, sheathed 0.5–0.7 their length, drying densely granular; **sheath** 10.5–14.8 cm long, 1.0–1.3 cm high, free-ending at apex, margins papery, grayish, in part deciduous; free part of petiole 3.0–6.7 cm long; **blades** elliptic-oblong to oblong-oblongeolate, 30.0–37.2 cm long, 6.4–8.0 cm wide, 4.3–5.0 times longer than wide, 1.4–2.0 times longer than petiole, chartaceous to subcoriaceous, acuminate at apex, acute to weakly attenuate at base, dark green and matte above, moderately paler below, drying matte to weakly glossy on both surfaces, drying gray-brown above, yellowish brown below; midrib narrowly sunken, drying sunken but raised along its margins; primary lateral veins scarcely apparent, minor veins departing midrib at 20–25°; **upper surface** with minor veins closely spaced and weakly raised, concolorous with the intervening area with some short subequal ribs and a dense array of minute, closely spaced striations, densely and weakly granular and pale speckled, sparsely and weakly short pale-lineate, with minute pale pustules; lower surface granular-ridged, lacking short-pale-lineations; minor veins faint. INFLORESCENCE 68.7 cm long; peduncle erect, 50 cm long, sheathed; spathe drooping, elliptic, 18.7 cm long, 2.4 cm wide, 2.6 times as long as peduncle, cream, drying yellow-brown; **spadix** cream, stipitate 8.5 mm, cylindroid, 11.9 cm long, 9 mm diam., drying dark brown; flowers hexagonal, 4 visible per spiral, drying dark brown with light brown stigmas; pistils oblong, short; style truncate, hexagonal, 2.0–2.4 mm diam., drying dark brown, matte, minutely papillate; stigma oblong 0.6–0.8 mm long. Flowering late October. **Figures 256 & 257.**

Distribution — *Stenospermation topalisense* is endemic to Panama, known only from the type in Darién Province at 800-850 m in a *Tropical wet forest* life zone.

Comments — *Stenospermation topalisense* can be confused with *Stenospermation steyermarkii* which differs in having shorter internodes than *S. topalisense* with the former at 0.5–1.5 cm long, the later at 1.5–2.2 cm long, a much broader petiole sheath, oblong-oblongeolate leaves



Figure 256: *Stenospermation topalisense*, TYPE Hammett et al. 16306



Figure 257: *Stenospermation topalisense*, Upper blade surface, TYPE Hammel et al. 16306

that are 3.7–4.6 times longer than wide (versus elliptic-oblong and 1.5–2.2 for *S. topalisense*) that are more acute and inequilateral at apex.

Etymology — *Stenospermatum topalisense* is named for the type locality at Río Topalisa in Darién Province.

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Stenospermatum tuerckheimii (Engler & K.Krause) Croat, **comb. nov.** — Basionym: *Rhodospatha tuerckheimii* Engler & K.Krause, Das Pflanzenreich IV. 23B(Heft 37): 92. 1908. — Type: GUATEMALA. Alta Verapaz, 3800 feet, Pansama, 1 May 1887, *H. von Tuerckheim 1103* (holotype, B-100419024, photo 60001; isotype, US-936787-bar code 0087925).

Diagnosis: *Stenospermatum tuerckheimii* is characterized by its short internodes, the nearly fully sheathed, medium brown-drying, oblong-elliptic blades 2.9 times longer than broad, which are narrowly rounded at the apex and base as well as by its long-pedunculate inflorescence with the spadix about 2/3 as long as the spathe.

Epiphyte; internodes short, 2.0 cm diam.; **petioles** 19.0–20.5 cm long, drying dark brown; **sheath** 15.0–24.5 cm long, 1.2 cm wide midway, ending acutely at apex, free part of petiole 2.7–4.5 cm long; **blades** oblong-elliptic, 22–33 long, 7–11 cm wide, 2.3–2.6(2.9) times longer than broad, 1.1–1.2 times longer than petioles, narrowly rounded at apex with an obscure point, obtuse to rounded at base, slightly inequilateral (one side 3–5 mm wider), subcoriaceous, drying dark gray-brown, matte above, scarcely paler dark gray-brown and weakly glossy below; midrib sunken above, drying broadly convex to flat, slightly paler above, drying narrowly rounded, prominently ribbed, finely granular, dark-punctate, paler below; primary lateral veins scarcely visible, 1.0–1.5 cm apart, scarcely more prominent than minor veins, departing midrib at 30–45°; **upper surface** with minor veins moderately spaced, mostly 3.5–4.5 mm apart, narrowly and irregularly raised, concolorous; intermediate area with one or two slightly lower, more discontinuous ribs, densely areolate-ridged, sparsely thick granular and sparsely short-pale-lineate; lower surface with minor veins obscurely raised, darker, intervening area densely areolate, pale and thick granular. INFLORESCENCE erect, held about as high as the leaves or slightly shorter than leaves, aromatic (fide Tuerckheim); peduncle 19.5–30.0 cm long, ca. 5 mm diam., drying light brown, finely striate and densely dark-granular, flattening in age and one cm wide; spathe white, oblong-elliptic, 10.0–13.5 cm long, 1.5–2.5 cm diam. when furled, nearly 5 cm longer than spadix at anthesis, acuminate; **spadix** cylindroid, white, stipitate 1.2 cm, 9 cm long, 1.0–1.2 cm diam., weakly tapered near apex; styles subtrapezoidal to rounded, 2.6–4.0 mm diam., drying light brown, flattened and smooth; stigma rounded, slightly raised; stamens 0.8 mm long, 0.7 mm wide, drying light brown, oval, held well above tepals. **Figures 258–262.**



Figure 258: *Stenospermation tuerckheimii*, Habit, Guatemala vic. Purulha, Photo J. Vannini



Figure 259: *Stenospermation tuerckheimii*, TYPE H. von Tuerckheim 1103(US)



Figure 260: *Stenospermaton tuerckheimii* TYPE H. von Tuerckheim 1103(MBB)



Figure 261: *Stenospermation tuerckheimii*, Paratype Lehmann 1359



Figure 262: *Stenospermatum tuerckheimii*, Upper blade surface, *TYPE H. von Tuerckheim 1103*

Distribution — *Stenospermatum tuerckheimii* is endemic to the type locality in Baja Verapaz Department of Guatemala at 1200–1700 m in a region of *Premontane rain forest*.

Comments — *Stenospermatum tuerckheimii* is apparently a close relative of *S. purulhaense* from the same region and which shares the narrowly rounded blade apex and blades of a similar size and shape. The latter species differs in drying glossy and dark brown and by having a distinct black-drying petiole sheath which contrasts sharply with the dark brown shaft as well by having the minor veins on the upper surface weakly raised with the intervening area nearly equally irregularly subparallel-ridged and conspicuously granular, lacking short pale lineations. In contrast, the upper surface of *S. tuerckheimii* dries matte, is much less ridged and much more granular with the minor veins much more obvious and distinct from the intervening areas and in addition they are sparsely short pale-lineate.

The two elements in this species, a collection from Alta Verapaz at Pansmalá and a collection from Baja Verapaz at Purulha are close together geographically (separated by only ca. 30 km). However, Jay Vannini (pers. comm.), the person most familiar with the phytogeography of Guatemala, states that Pansmalá and Purulhá are phytogeographically distinct and that the two areas have quite distinct palm and fern flora. For this reason, he suggests that it would be best to restudy the two areas for their aroid floras too.

It is uncertain why Engler & K. Krause decided to publish this species in *Rhodspatha* since it possesses typical *Stenospermation* leaves with the blades lacking obvious primary lateral veins.

Etymology — *Stenospermation tuerckheimii* was named for the German plant collector Han von Türrckheim who collected the type specimen. He was born May 27, 1853, in Karlsruhe, Germany and died there February 7, 1920. Türrckheim, trained as a lawyer, emigrated to Guatemala in 1877 and spent 30 years as a coffee farmer and German consul in Cobán, Guatemala. He also made extended botanical explorations in Guatemala and later in Hispaniola (1909–1910).

Additional specimen seen— Guatemala, Alta Verapaz: Vic. Psamalá, ca. 1158 m, ca. 15°12'48"N, 80°12'48"W, 28 April, 1882, *Lehmann 1359* (holotype, B).

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Stenospermation vallense Croat, **sp. nov.** — Type: PANAMA. Coclé: El Valle area, N of El Valle de Antón, small patch of virgin forest between fork in road near Finca Mandarinas, along road to Finca Furlong, 08°37'N, 80°08'W, 785 m, 11 July 1987, *T.B. Croat 67105* (holotype, MO-3582941).

Diagnosis. *Stenospermation vallense* is characterized by its epiphytic habit, blackish-drying foliage, essentially fully sheathed petioles with the margins persisting intact, the narrowly oblanceolate blades which are obtuse and weakly short-acuminate at apex and scarcely bicolorous and semiglossy on both surfaces as well as by the cernuous inflorescence with a white spathe and spadix.

Epiphyte; internodes short, 1.5 cm diam., drying dark brown, finely ribbed and densely short pale-lineate; **petioles** 17.5–18.0 cm long, sheathed almost throughout, drying black; **sheath** 14.5–19.0 cm long, acute at apex; margins persisting intact, not discolored; free part of petiole 1.0–1.5 cm long, sulcate; **blades** narrowly oblong-oblanceolate, 36–38 cm long, 4.5–4.9 times longer than wide, 2.0–2.1 times longer than petioles, obtuse to acute and narrowly short-acuminate at apex, narrowly acute at the base, scarcely inequilateral, drying blackish; midrib broadly and weakly raised, densely short pale-lineate above, flattened, finely and irregularly striate and sparsely somewhat longer pale-lineate below; primary lateral veins not apparent on either surface; **upper surface** with minor veins closely spaced, weakly raised, the intervening area densely striate granular, densely short pale-lineate; lower surface with minor veins modestly raised, concolorous with the intervening area densely striate-granular and conspicuously pustular, sparsely short pale-lineate. INFLORESCENCE erect; peduncle 24.7 cm long, drying dark brown, 3 mm diam.; spathe cernuous, white (lost); **spadix** stipitate one cm, eight cm long, two cm diam., four times longer than wide, cylindroid, white, lacking sterile flowers at base; pistils closely aggregated; style (1.8)2.2 — 4.0(7.0) mm broad, quadrangular to obovate, flat and matte above; stigma subrounded, deeply sunken, lacking a pale margin. Flowering in July. **Figures 263 & 264.**

Distribution — *Stenospermation vallense* is endemic to Panama, known only from the type in Valle Department at 785 m in a *Premontane rain forest* life zone.'



Figure 263: *Stenospermation vallense*, TYPE Croat 67105



Figure 264: *Stenospermation vallense*, Upper blade surface, TYPE Croat 67105

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Etymology — *Stenospermation vallense* is named for the type locality near El Valle de Antón in Coclé Province.

Stenospermation veraguense Croat, **sp. nov.** — Type: PANAMA. Veraguas: Valley of Río Dos Bocas along road between Escuela Agrícola Alto Piedra and Calovebora, 15.6 km NW of Santa Fe, primary forest along old trail to Santa Fe, steep forested hill east of river, 450–550 m, 31 August 1974, *T.B. Croat 27684* (holotype, MO-2276326).

Diagnosis. *Stenospermation veraguense* is characterized by its epiphytic appressed-climbing and branched habit, internodes longer than broad, distichous leaves, petioles sheathed 0.58–0.85 their length, the sheath acute to rounded at and not markedly free-ending at apex, narrowly lanceolate to oblong-lanceolate, narrowly long-acuminate, dark brown-drying blades 4.2–6.7 times longer than broad, minor veins close and moderately raised on upper surface with intervening areas slightly less prominently 2–4-ribbed, these alternating with fine striations, abundant cross-veins and short pale lineations as well as a pendent inflorescence with a cream-colored spadix with white berries.

Epiphytic vine, appressed-climbing and branched with branches spreading; internodes 1.5–2.0 cm long, drying 6–8 mm diam., grayish brown to yellowish brown with areolate to granular reticulations, sometimes dark short-lineate. LEAVES distichous, closely spaced along the ends of branches; **petioles** 9.3–16.7 cm long, sheathed 0.58–0.85 their length; **sheath** 7.3–9.8 cm long, acute to rounded at apex, not markedly free-ending; **blades** narrowly lanceolate to oblong-lanceolate, 12.4–19.7 cm long, 4.2–6.7 times longer than broad, 0.9–1.7 times longer than petioles, narrowly long-acuminate, drying dark brown, matte above, moderately paler and semiglossy below; **upper surface** with the minor veins close and moderately raised with intervening areas slightly less prominently 2–4-ribbed, these alternating with fine striations, abundant cross-veins and short pale lineations; INFLORESCENCE pendent; peduncle 18.0–25.5 cm long, 1.5 mm diam. and dark brown on drying; spathe not seen; **spadix** 5.6–8.3 cm long, 7–9 mm diam., cream-colored. INFRUCTESCENCE 11.3 cm long, 1.3 cm diam., with berries white. **Figures 265–268.**

Distribution — *Stenospermation veraguense* is endemic to Panama, known only from Veraguas Province in the vicinity of Santa Fe and on Cerro Tute at 480 to 1050 m elevation in *Premontane rain* and *Lower montane rain forest* life zones.

Comments — *Stenospermation veraguense* is close to *Stenospermation mcphersonii* which differs by having the upper blade surface lacking obvious longitudinal ribs or they are low and obtuse while the entire surface dries uniformly rowed-areolate-granular and also lacks discrete short pale lineations. It also occurs at somewhat higher elevation, 1100–1200 m in Bocas del Toro Province. In contrast the upper blade surface of *S. veraguense* has obvious longitudinal ribs, mostly spaced 1–2 mm apart or sometimes to one cm apart and the intervening area is granular to rowed-granular and with conspicuous, dense, discrete, short-pale-lineations.

Etymology — *Stenospermation veraguense* is named for the type locality in Veraguas Province.

Paratypes — PANAMA. Veraguas: Santa Fe. Slopes of Cerro Tute, near Escuela Agrícola Alto Piedra, NW of Santa Fé; virgin forest along trail to summit, 08°30'20"N 081°07'14"W,

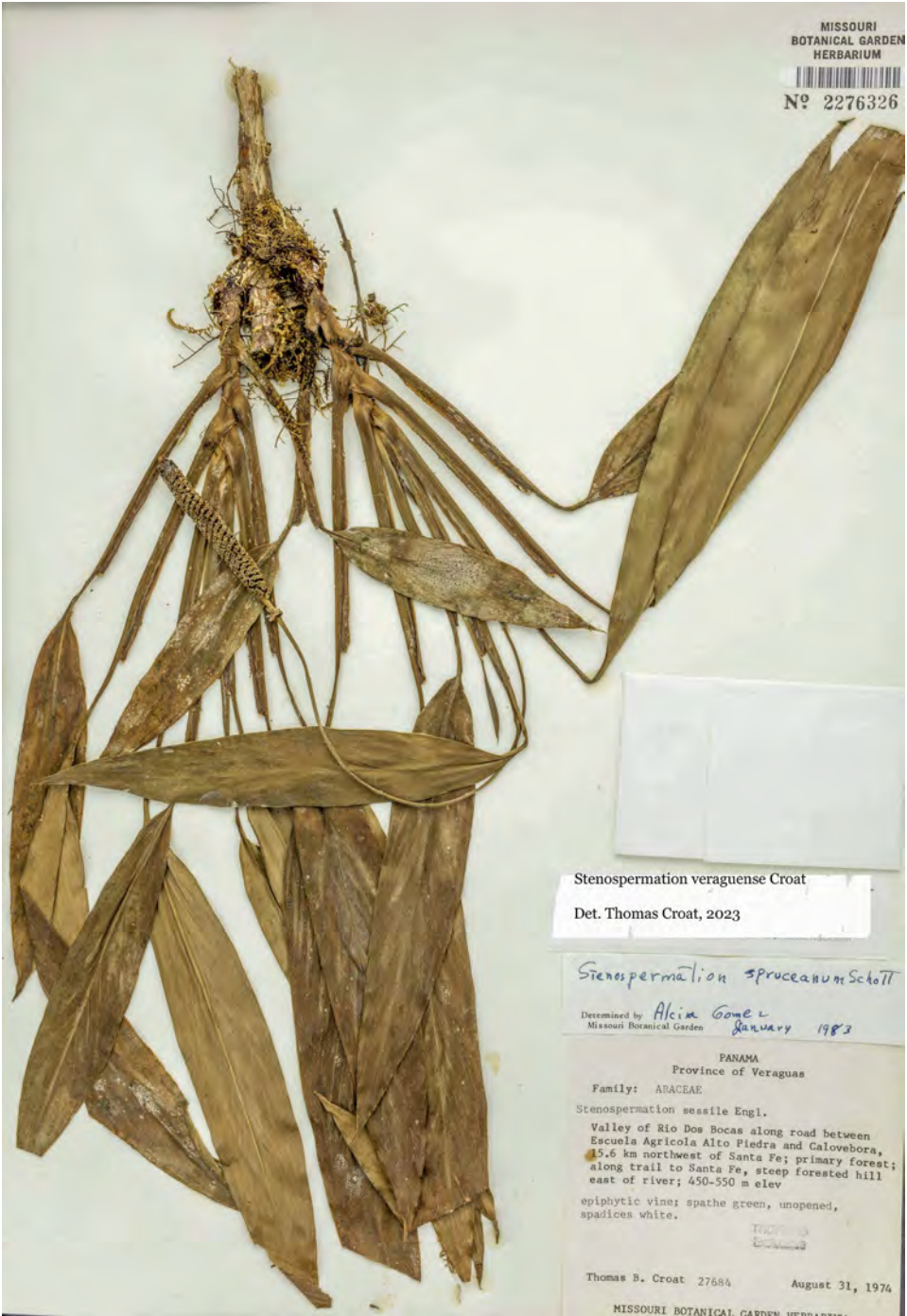


Figure 265: *Stenospermation veraguense*, TYPE Croat 27684



Figure 266: *Stenospermation veraguense*, Paratype Antonio 1982



Figure 267: *Stenospermation veraguense*, Paratype Antonio 4995



Figure 268: *Stenospermation veraguense*, Upper blade surface, TYPE Croat 27684

1000 — 1050 m, 30 Nov 1979, *T.B. Croat 48930* (MO); Vicinity of Sante 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)., 08°33'N 081°08'W, 480 m, 28 June 1987, *T.B. Croat 66919* (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, 3600 ft, 29 Jun 1980, *T. M. Antonio 4995* (MO); Vicinity of Escuela de Agricultura Alto Piedra, near Santa Fé. Along trail to the top

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of Cerro Tute, 08°28'56"N 081°05'53"W, 3200 — 3500 ft, 06 October 1979, *T. M. Antonio* 1982 (MO).

Stenospermatum whitefordiae Croat & O. Ortiz, **sp. nov.** — Type: PANAMA. Darién: Rio Coclecito, 07°17'49"N, 077°58'09"W - 07°17'449"N - 077°57'40"W, ranging from the town of Coclecito to upriver on the Río, *C. Whiteford & A. Eddy* 219 (holotype, MO-1873517; isotypes, BM, PMA-39064, US)

Diagnosis. *Stenospermatum whitefordiae* is characterized by its epiphytic habit, slender internodes longer than broad, yellow-brown to dark brown petioles sheathed 0.5–1.1 their length, the sheath rounded at apex, often weakly free-ending at apex, elliptic to oblanceolate-elliptic, gradually short-acuminate, yellow-brown to gray-brown-drying blades 3.0–4.3 times longer than broad, the upper surface closely and weakly ribbed (2–3 mm apart), the intervening area densely striate and areolate ribbed, lacking any short pale lineations as well as the weakly cernuous inflorescence with green style and sessile spadix with rounded stigma.

Epiphytic near ground level; internodes mostly 2.0–3.5 cm long, 4–9 mm diam., drying yellow-brown to dark brown, initially matte, finely and closely striate-ribbed, becoming more coarsely ribbed lower down, the ribs more widely spaced, sometimes semiglossy. LEAVES 19.8–33.0 cm long; **petioles** 6.3–10.0 cm long, sheathed 0.5–1.1 their length, narrowly several-ribbed abaxially, more weakly so on the sides; **sheath** 5.5–8.8 cm long, rounded at apex, often weakly free-ending, more weakly ribbed than shaft with intervening mixture of short and long minor ribs, the margin intact, curled inward; free part of petiole 0.6–4.5 cm long; **blades** elliptic to oblanceolate-elliptic, 13.5–20.0 cm long, 4–7 cm long, 3.0–4.3 times longer than broad, 1.6–2.6 times longer than petioles, gradually short-acuminate at apex, acute to bluntly acute at base, subcoriaceous, weakly bicolorous, drying yellow-brown to gray-brown and matte above, yellow-brown and weakly glossy below; midrib broadly rounded, irregularly ribbed, concolorous above, narrowly rounded, finely and more prominently ribbed, slightly paler below; **upper surface** closely and weakly ribbed below (ribs 2–3 mm apart), the intervening area densely striate and areolate ribbed, lacking any short pale lineations; **lower surface** coarsely and evenly granular-striate. INFLORESCENCES up to four in the upper leaf axils, weakly cernuous; peduncle 16–20 cm long, 3.5–4.0 mm diam., yellow-brown; spathe green, about twice as long as the spadix in bud; **spadix** likely green, 4 cm long, 6 mm wide; styles closely spaced on drying, mostly quadrangular, sometimes prismatic-rounded, 1.4–2.0, mm wide, yellowish tan, matte, truncate, the margins subacute; stigma weakly stalked, rounded, the outer edge sometimes light brown, center blackened. **Figures 269–271.**

Distribution — *Stenospermatum whitefordiae* is known only from the type collection in Panama in a Tropical moist forest life zone at below 35 m elevation.

Comment — The coordinates listed in Tropicos for the type specimen [07°17'N 077°58'W - 07°17'N - 077°59'W;] were inaccurate and according to Google Earth they should be 07°17'49"N, 077°58'09"W - 07°17'449"N - 077°57'40"W



Figure 269: *Stenospermatum whitefordiae*, TYPE Whitefoord & Eddy 219

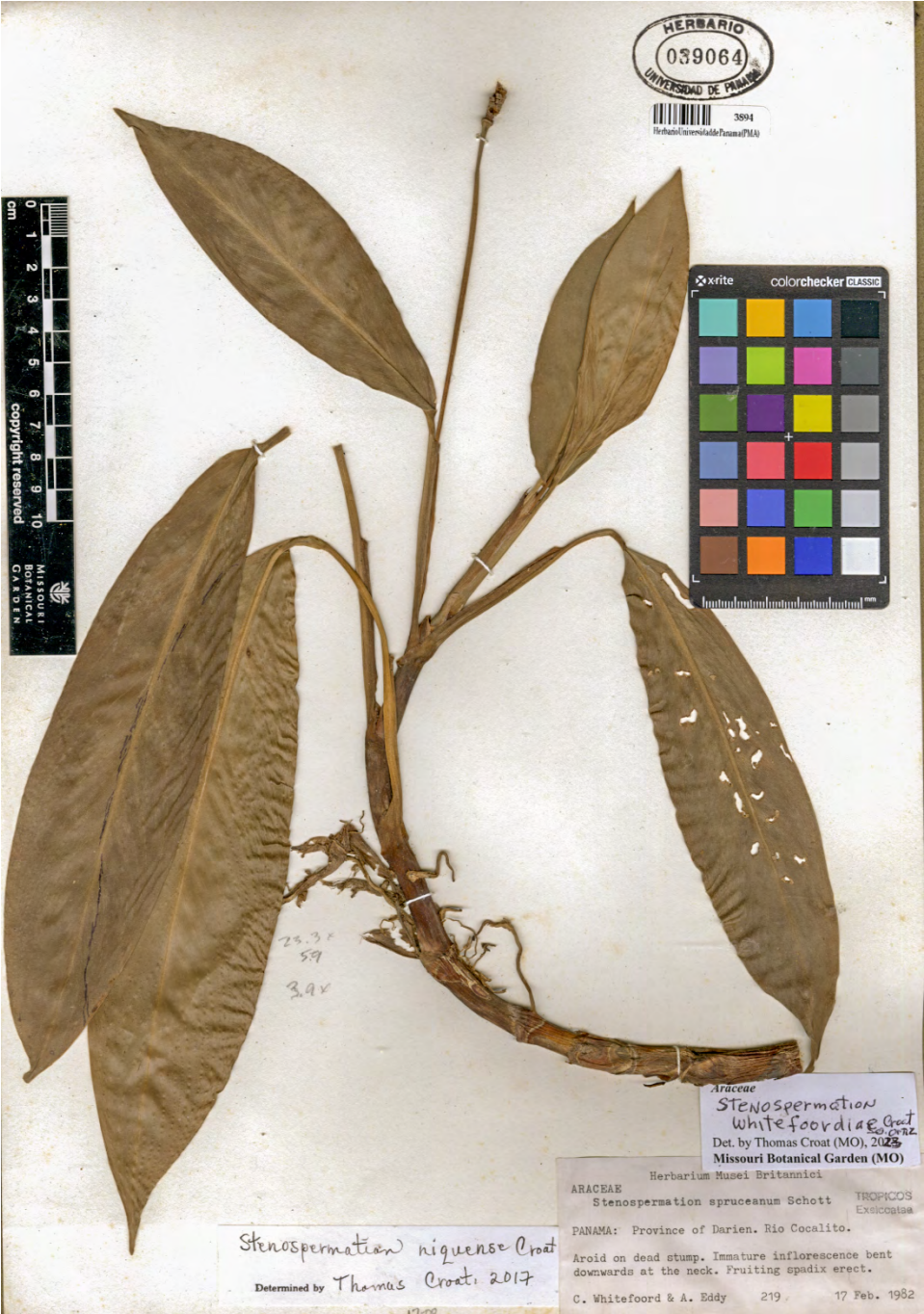


Figure 270: *Stenospermaton whitefoordiae*, TYPE Whitefoord & Eddy 219



Figure 271: *Stenospermaton whitefoordiae*, Upper blade surface, TYPE Whitefoord & Eddy 219

Etymology — *Stenospermaton whitefoordiae* is named for British botanist Caroline Whitefoord who collected the type specimen. Whitefoord, born in London in 1933, worked primarily with West Indian and Central American plants and had a special interest in Ochnaceae. Educated at the Royal School, Bath, and South Devon Technical College in Torquay, she began her career at the Natural History Museum in London in 1953 as a scientific assistant,

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she became Assistant Experimental Officer in 1961 and from 1965–1993 she held the position of Higher Scientific Officer. Following her retirement, she continues her work at the museum as a research associate.

Stenospermatum wongiae Croat & O. Ortiz, **sp. nov.** — Type: PANAMA. Veraguas: Parque Nacional Omar Torrijos, bosque cercano al Río Tife, entrado por los terrenos de Sr. Ife Quiroz, 08°38'53"N, 080°04'42"W, 1000–1100 m, 26–29 Julio 2001, *B. Wong 7-641A* (holotype PMA-6727866; isotype, PMA-0113365)

Diagnosis. *Stenospermatum wongiae* is characterized by its elongated, blackish-drying internodes, petioles sheathed 0.71–0.75 their length, the sheath weakly free-ending at apex, elliptic, yellow-brown-drying, gradually down-turned, acuminate blades 2.1–2.3 times longer than broad, its apparent near lack of short pale lineations on the upper blade surface, a stipitate, cylindroid spadix with a weakly pointed apex.

Habit unknown; internodes longer than broad; **petioles** 10.5–12.8 cm long, sheathed 0.70–0.75 their length, ending abruptly and rounded, weakly free-ending at apex; **sheath** 7.9–9.4 cm long, usually free-ending at apex; free part of petiole 2.6–3.6 cm long, geniculum 1.0–1.3 cm long, not always apparent; **blades** elliptic, 11.0–14.5 cm long, 5–7 cm wide, 2.1–2.3 times longer than wide, 1.0–1.4 times longer than petioles, gradually acuminate and down-turned at apex, acute at base, subcoriaceous, moderately bicolorous, drying dark brown and matte above, paler yellow-brown and weakly glossy below; midrib narrowly rounded and drying slightly paler above, narrowly rounded, drying weakly ribbed and nearly concolorous below; primary lateral veins fewer than 10 per side but often indiscernible, departing midrib at 30–40°; **upper surface** with the major ribs 4–7 mm apart with the intervening area less prominently ribbed with smaller, nearly equally spaced ribs with sparse and inconspicuous cross-veins and short pale-lineations only at high magnification; lower surface evenly and conspicuously striate-granular. INFLORESCENCE erect; peduncle 23.5 cm long, 4 mm diam., drying yellowish brown; spathe not seen; **spadix** stipitate (stipe 8 mm long, 2 mm diam.), sub-erect, 8.1 cm long, 6 mm diam., 13.5 times longer than wide, bluntly pointed at apex, color not reported. **Figures 272–274.**

Distribution — *Stenospermatum wongiae* is endemic to Panama, known only from the specimen from Cerro Pelado in Veraguas Province at 1000–1000 m in a *Premontane dry forest* life zone.

Comments — *Stenospermatum wongiae* is seemingly most similar to *Stenospermatum filamatamense* occurring in Costa Rica at 1400 m elevation but that species differs by having conspicuous short pale lineations on the upper surface. In contrast *S. wongiae* was found at about 1000 m in Veraguas Province in central Panama and generally lacks short pale lineations or they are otherwise inconspicuous. In the key *S. wongiae* tracks to both *S. castanoanum* and *S. folsomii*, both of which differ in having leaf blades proportionately longer than broad (3.4–4.6 times longer than broad) versus having the leaf blades only 2.4–2.5 times longer than broad in *S. wongiae*.

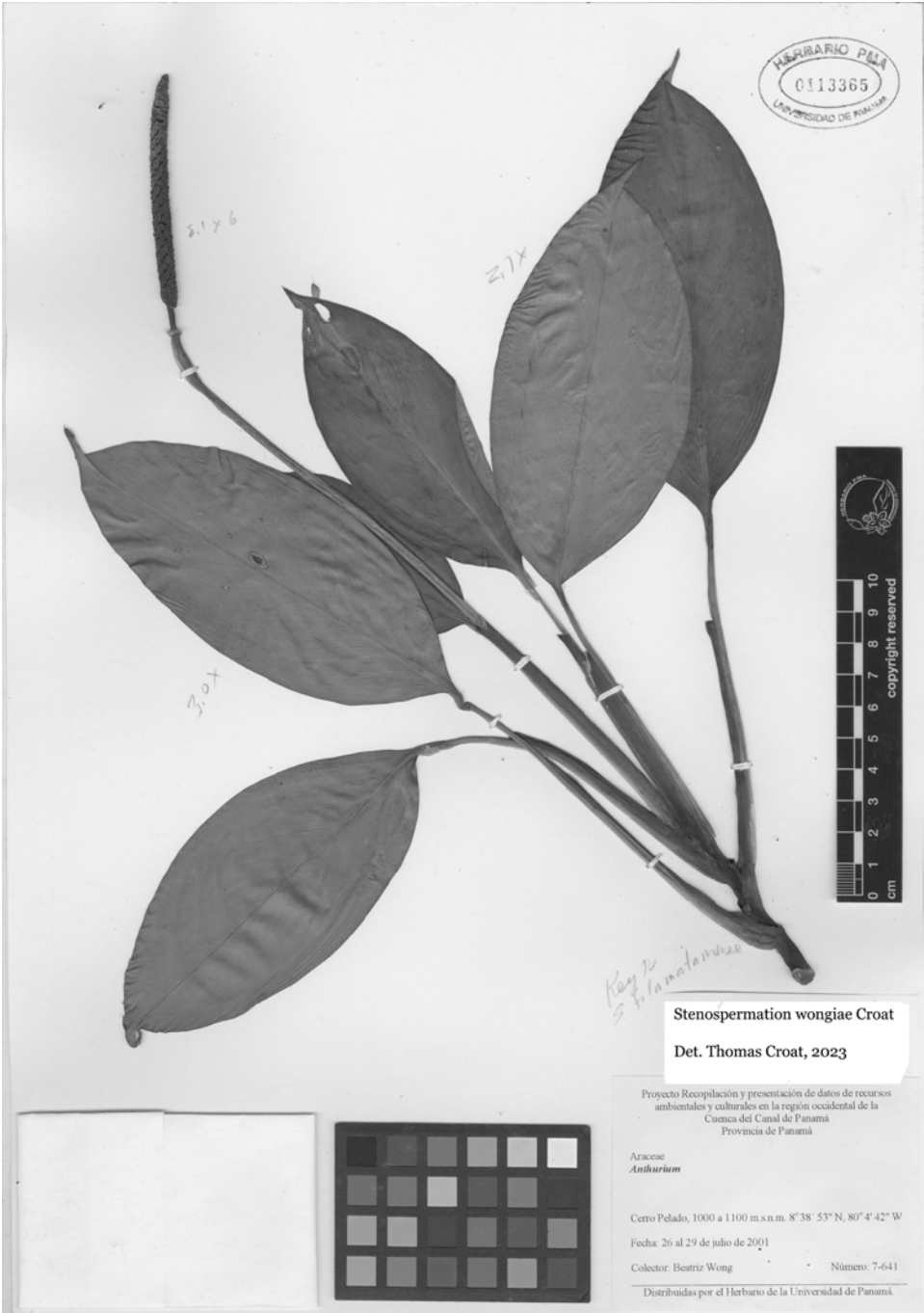


Figure 272: *Stenospermation wongiae*, Holotype Wong 7-641A, PMA-0113365



Figure 273: *Stenospermaton wongiae*, Isotype Wong 7-641A, MO-6183189



Figure 274: *Stenospermation wongiae*, Upper blade surface, Isotype Wong 7-641A

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Etymology — *Stenospermatum wongiae* is named in honor of Panamanian botanist Beatrice Wong who collected the type specimen while a student at the University of Panama.

Stenospermatum zapatae Croat & O. Ortiz, **sp. nov.** — Type: PANAMA. Coclé: Parque Nacional Omar Torrijos, bosque cercano al Río Tife, entrado por los terrenos de Sr. Ife Quiroz, 08°43'10"N, 080°38'04"W, 239 m, 17 Julio 2013, *A. Zapata, O. Ortiz, I. Quiroz & L. Mora 3191* (holotype MO-6727866; isotype, PMA)

Diagnosis. *Stenospermatum zapatae* is characterized by its terrestrial habit, elongated slender internodes, petioles sheathed 0.5–0.7 their length, the sheath narrowly rounded at apex, oblong-elliptic, gradually short-acuminate, brownish-drying blades with the upper surface drying closely and evenly low-ridged with the intervening space striate-granular, sparsely and inconspicuously short pale-lineate as well as the stipitate, yellowish green spadix.

Terrestrial, to less than one m tall; internodes mostly broader than long, sometimes longer than broad, to one cm long, drying 5 mm diam., drying dark brown, densely pale granular; **petioles** 23–28 cm long, drying dark brown, matte, finely striate, non-granular, sheathed 0.4–0.7 their length; **sheath** 11.2–17.7 cm long, drying darker brown, narrowly rounded at apex, the margin persisting intact, the free part of petiole 8.2–12.2 cm long, drying sulcate; **blades** oblong-elliptic, 16.0–23.9 cm long, 5.4–6.7 cm wide, 3.5–4.2 times longer than broad, 0.8–1.1 times as long as petioles, gradually short-acuminate at apex, narrowly acute at base, gradually short-acuminate and downturned at apex, narrowly acute at base, subcoriaceous, drying dark gray-brown and matte above, dark yellow-brown and weakly glossy below; **upper surface** closely and evenly low-ridged, the intervening space striate-granular, sparsely and inconspicuously short pale-lineate; lower surface evenly and regularly striate-granular and sparsely short pale-lineate. INFLORESCENCE erect, long-pedunculate; peduncle 34 cm long, slender, drying dark brown, 2 mm diam.; spathe not seen; **spadix** stipitate 5 mm, 8 cm long, 6 mm diam., yellowish green; style 1.8–2.0 mm diam., mostly quadrangular, dark brown, matte, truncate; stigmas 0.7–0.9 mm long, subrounded to oblong, light brown on margins, dark brown medially. **Figures 275 & 276.**

Distribution — *Stenospermatum zapatae* is endemic to Panama, known only from the type specimen from Coclé Province at 239 m in a *Tropical wet forest* life zone.

Comments — *Stenospermatum zapatae* is most easily confused with *S. angustifolium* which differs in having the leaves with petioles sheathed to near the apex in contrast to having the leaves sheathed to only the middle of the petioles and 7–12 cm from the base of the blade for *S. zapatae*.

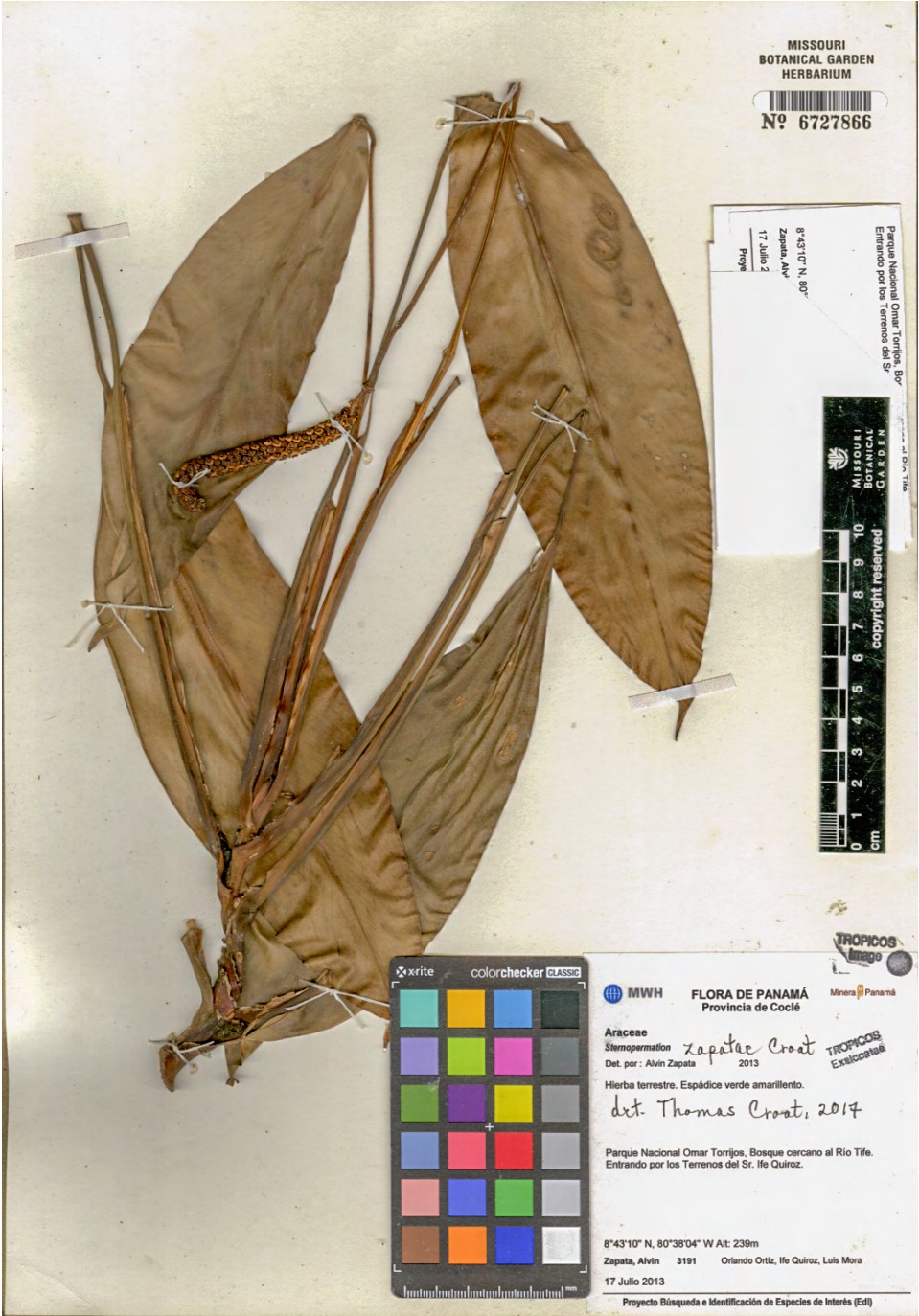


Figure 275: *Stenospermaton zapatae*, TYPE Zapata et al. 3191

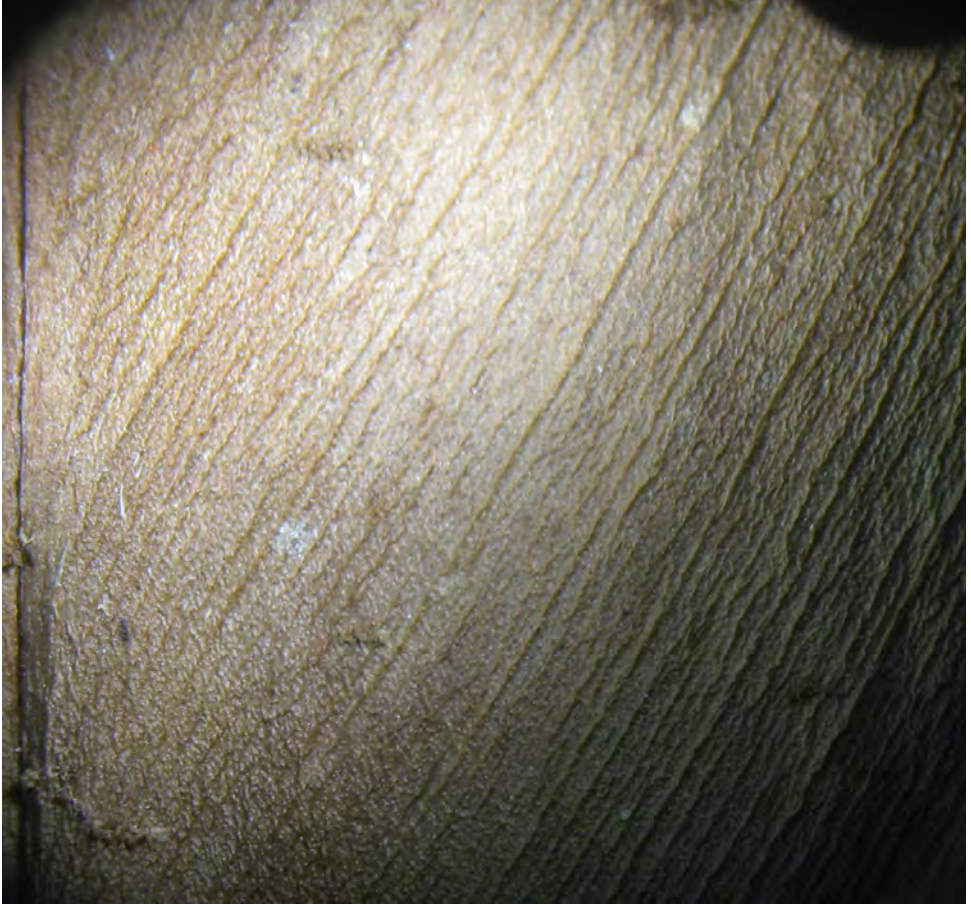


Figure 276: *Stenospermation zapatae*, Upper blade surface TYPE Zapata 3191

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Etymology — *Stenospermatum zapatae* is named in honor of Panamanian botanist Alvin Zapata who collected the type specimen. Zapata is an excellent and skilled plant collector who has found many new species.

Stenospermatum zurquiense Croat, **sp. nov.** — Type: COSTA RICA. Heredia. Braulio Carrillo, area Zurquí, 10°03'00"N, 084°01'48"W, 1800 m, 24 February 1983, L.D. Gómez 20002 (holotype MO-3160578; isotype CR)

Diagnosis. *Stenospermatum zurquiense* is recognized by an epiphytic habit, slender internodes slightly longer than broad and drying finely ribbed and dark brown, petioles shorter than blades and sheathed to about 3/4 their length, drying sharply and deeply sulcate at least toward the apex, ovate-lanceolate (more or less elliptic), gray-green-drying blades that are three times as long as wide, more or less acute at apex with a short apiculum, as well as by the inflorescence slightly longer than leaves with an inflated, yellow-brown, semiglossy peduncle, a somewhat cernuous green spathe which prominently overtops the white, shortly stipitate, cylindroid spadix which is about 2/3 as long as the green spathe.

Epiphyte; internodes finely ribbed, 1.1–1.2 cm long, 6 mm diam., drying dark brown; **petioles** 12.1–13.0 cm long, sheathed 0.77–0.83 times the petiole length; **sheath** 9.0–9.5 cm long, acute at apex; margins incurled, thick, persisting intact; **blades** subcoriaceous, ovate-elliptic, 15.5–16.2 cm long, 5.0–5.1 cm wide, 3.1–3.2 times as long as wide, 1.24–1.28 times longer than petiole, acute at apex, acute at base, drying incurled, yellow-brown; midrib sunken; primary lateral veins weakly visible on upper surface; **upper surface** finely low-ribbed with the intervening area irregularly areolate-ridged and sparsely short-pale-lineate, minor veins closely spaced; lower surfaces finely ridged, smooth in between ridges. INFLORESCENCE slightly longer than leaves, bracteate; peduncle 25.4 cm long, somewhat cernuous near apex, bent at ca. 90° below spathe, drying finely sulcate, with inflated yellow-brown epidermis, semiglossy, 2.6 times longer than spathe; spathe green turning red, drying yellow, 9.5 cm long, ca. 2/3 as long as spathe; **spadix** cylindroid, stipitate 6 mm, 6 cm long, 1.1 cm diam. midway, white, drying brown-grey with many nectar droplets at anthesis; flowers 6 visible per spiral; style 2–3 mm diam., more or less hexagonal, drying light greenish brown, matte, finely whitish speckled, granular-puberulent around margins; stigma ellipsoid to subrounded, scarcely raised, drying blackish, 0.5 mm diam. **Figures 277 & 278.**

Distribution — *Stenospermatum zurquiense* is endemic to Costa Rica, known only from Zurquí at 1800 m elevation in a *Premontane rain forest* transition to *Lower montane rain forest* life zone.

Comments — L.D. Gómez (Gómez 20002) reported that the spadix was heavily visited by *Trigona* bees indicating a possible bee pollination syndrome in tribe (*Monsteroideae*) where most genera are believed to be beetle pollinated.

Stenospermatum zurquiense can be confused with *S. quichense*, but they are both endemic to their respective countries of Costa Rica and Guatemala. *Stenospermatum quichense* differs by



Figure 277: *Stenospermation zurquiense*, TYPE L. D. Gomez 20002



Figure 278: *Stenospermatum zurquiense*, Upper blade surface TYPE *L. D. Gomez* 20002

having prominently ridged dry stems, proportionately shorter petiole sheaths with darker brown-drying leaves that lack short pale lineations and have the upper surface conspicuously areolate-ridged with deep areolate pockets in the surface.

Stenospermatum zurquiense is also similar to *S. fortunense* from Panama in the Fortuna area of Chiriquí Province but that species differs by having more elliptic to broadly oblanceolate, gradually acuminate leaf blades that are broadest above the middle and more finely granular, not coarsely areolate-ridged.

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Etymology — *Stenospermatum zurquiense* is named for the type locality near Zurquí in Heredia Province.

SPECIES NOT BEING DESCRIBED AS NEW.

***Stenospermatum* sp. #1. Panama.** Chiriquí: Along highway between Gualaca and Chiriquí Grande, along boundary trail between Bocas del Toro Province and Chiriquí Province, beginning from gravel road which leads west off main pavement just south of Continental Divide; 08°45'N 082°18'W, 1170–1250, 26 June 1987, *Croat 66843* (MO-3614480-81).

Epiphyte; internodes 2–3 cm long, 2–4 cm diam., drying yellow-brown, densely and minutely purple-speckled with dots and short dashes; **petioles** (17)19–22 cm long, yellow-green, matte; **sheath** extending to near the apex, 18–21 cm long, curved inward, persisting intact, free part of petiole less than one cm long; **blades** (18.4)32.0–33.3 cm long, 11.2–13.4 cm wide, (1.6)2.3–2.8 times longer than wide, 1.6–1.7 times longer than petioles, broadest near middle, gradually short-acuminate at apex, broadly acute to acute at base, moderately inequilateral, one side 1.4 cm wider, coriaceous, dark green and semiglossy above, glossy below, drying dark brown and matte above, moderately paler and yellow-brown below; midrib obtusely sunken and paler above, convex and paler below, drying broadly convex and paler, roughened but not ribbed, densely and inconspicuously short pale-lineate; primary lateral veins scarcely visible above, not visible below; **upper surface** with minor veins moderately prominent, 2–4 mm apart, narrowly rounded, the intervening area irregularly folded and ribbed but with ribs essentially parallel, sparsely but conspicuously sunken short pale-lineate; lower surface densely and uniformly granular-striate. INFLORESCENCE with old peduncle 40.5 cm long, otherwise sterile. **Figures 279–281.**

This species is certainly new but grows in a preserved area where it will almost certainly be recollected in fertile condition so it will not be described here. The species occurs with and somewhat resembles *Stenospermatum ortizii*, which also has dark brown-drying blades but has petioles which are not sheathed to the apex and have the upper surfaces densely granular on drying.

SPECIES EXCLUDED FROM THE REGION

***Stenospermatum spruceanum* Schott.** This species, though reported by Alcira Gómez de Pérez in an unpublished Master's thesis (1983) and repeated by Grayum (2003) for the Manual de Plantas de Costa Rica does not occur anywhere near Central America. *Stenospermatum spruceanum* is instead endemic to South America, to an area north of the Amazon River in Brazil and in adjacent southern Venezuela and the Guianas (Guyana and French Guiana). *Stenospermatum spruceanum* has typically larger leaf blades than the two Central American species with which it has been confused, namely *S. luisgomezii* and *S. multicostatum*, and has the minor venation pattern on upper surface drying very different from the species with which it was confused in Central America. On *S. spruceanum* the minor veins are narrowly rounded and irregularly raised with intervening area densely and conspicuously areolate ridged and undulated, frequently branched and discontinuous, with the larger intervening veins differing only in being more continuous, not closely parallel, as they are in *S. luisgomezii* and

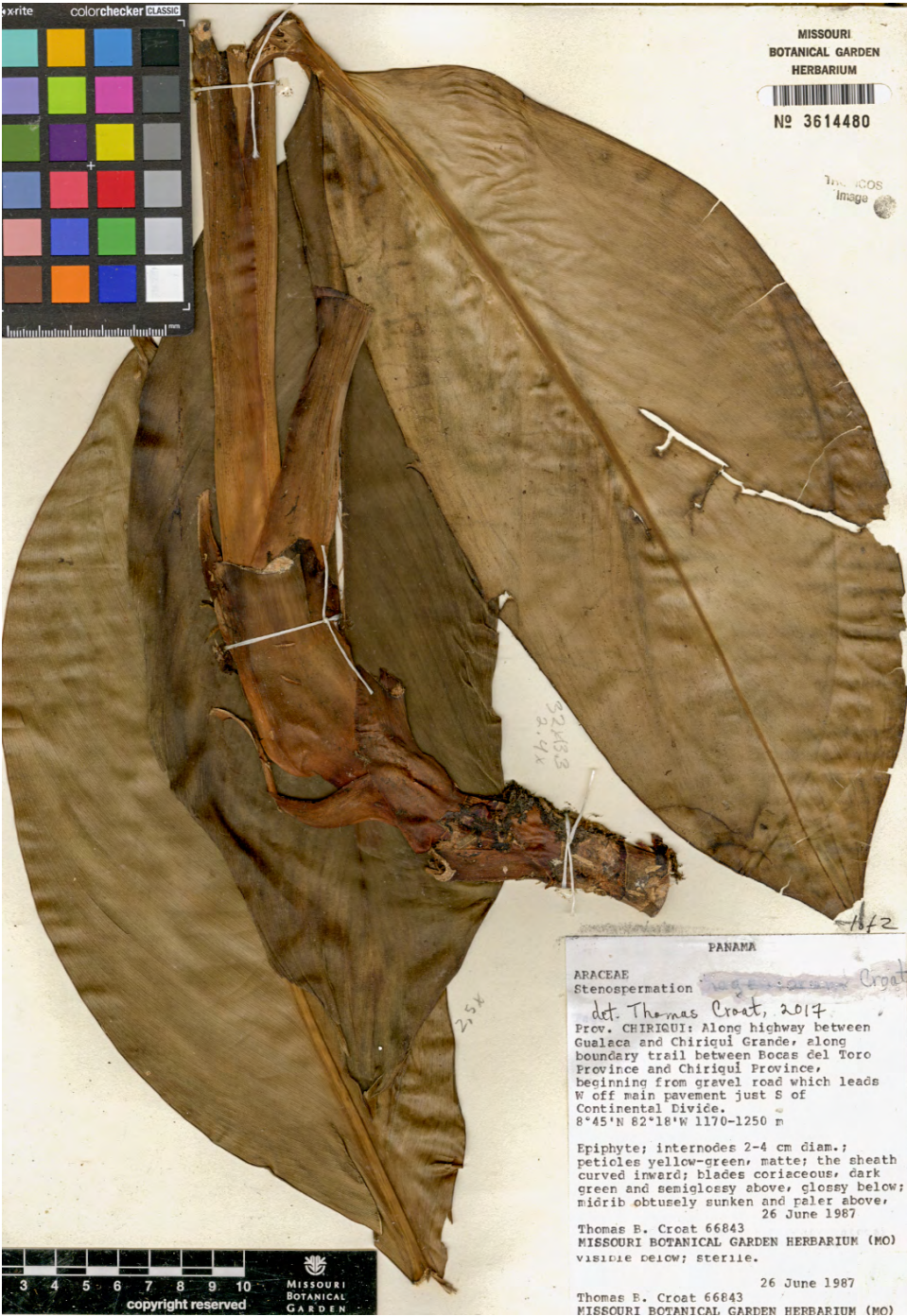


Figure 279: *Stenospermation* sp # 1, Croat 66843(sheet 1)

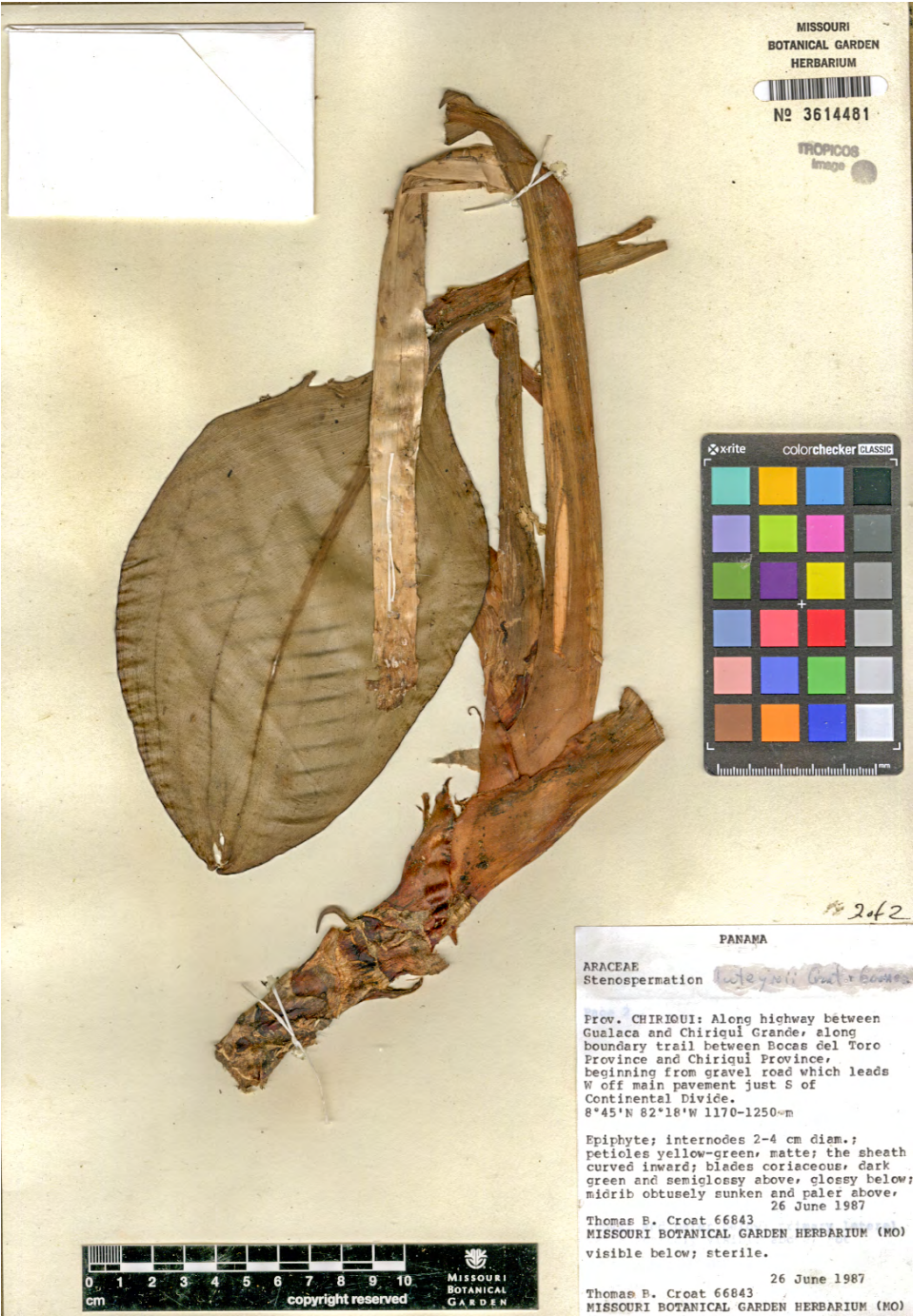


Figure 280: *Stenospermaton* sp. #1. Croat 66843(sheet 2)



Figure 281: *Stenospermation* sp. #1. Upper leaf scan, *Croat 66843*

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S. multicostatum. In contrast to *S. spruceanum*, both *S. multicostata* and *S. luisgomezii* have their minor veins on the upper surface all raised, closely spaced and continuous, totally lacking the irregularity of *S. spruceanum*.

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Appendix 1. STENOSPERMATION OF CENTRAL AMERICA

S. adsettiorum Croat, O.Ortiz & J.Harrison

S. angustifolium Hemsl.

S. bocachirens Croat

S. brakoae Croat

S. brewsteremse Croat

S. calvarioense Croat

S. castanoanum Croat

S. cerrofríoense Croat

S. chagrense Croat & O.Ortiz

S. chucantiense Croat & O.Ortiz

S. coques Al.Rodr., O.Ortiz & M.Cedeño

S. copense Croat

S. darienense Croat

S. dasae Croat

S. densiovulatum Engl.

S. donosoense Croat & O.Ortiz

S. dressleri Croat

S. dukei Croat & Castaño-Rub.

S. ellipticum Croat & D.C.Bay

S. filamatamense Croat

S. folsomii Croat

S. fortunense Croat

S. gaitalense Croat

S. hageniorum Croat

S. hampshireae Croat

S. heraclioi Croat

S. herrerae Croat

S. hodelii Croat

S. kamemotoanum Croat

S. loiselleae Croat

S. luisgomezii Croat

S. luteynii A.P.Gómez ex Croat et al.

S. majus Grayum

S. maloneanum Croat

S. marantifolium Hemsl.

S. martinezii Croat & O.Ortiz

S. mcphersonii Croat

S. mesaense Croat

S. monroi Croat

S. morii Croat

S. multicostatum Croat

S. niquense Croat & O.Ortiz

- S. nusigandense Croat
- S. ortizii Croat
- S. palosecense Croat
- S. pamsleperae Croat
- S. pirrense Croat & O.Ortiz
- S. pteropus Grayum
- S. pucuroense Croat
- S. purulhaense Croat
- S. quichense Croat
- S. ramonense Croat
- S. robustum Engl.
- S. santamariae Croat
- S. sapoense Croat
- S. sessile Engl.
- S. solanoi Croat
- S. steyermarkii Bunting
- S. sullivanii Croat
- S. terrabaense Croat
- S. topalisense Croat
- S. tuerckheimii (Engl. & K.Krause) Croat
- S. vallense Croat
- S. veraguense Croat
- S. whitefoordiae Croat & O.Ortiz
- S. wongiae Croat & O.Ortiz
- S. zapatae Croat & O.Ortiz
- S. zurquiense Croat
- S. sp. #1

Appendix 2.

STENOSPERMATION	SC	G	N	CR	P
<i>S. adsettiorum</i> Croat	1				1
<i>S. angustifolium</i> Hemsl.	1		1		
<i>S. bocachirens</i> Croat	1				1
<i>S. brakoae</i> Croat	1				1
<i>S. brewsteriense</i> Croat	1				1
<i>S. calvarioense</i> Croat	1				1
<i>S. castanoanum</i> Croat	1				1
<i>S. cerrofríoense</i> Croat	1				1
<i>S. chagrense</i> Croat & O.Ortiz	1				1
<i>S. chucantiense</i> Croat & O.Ortiz	1				1
<i>S. copense</i> Croat	1				1

<i>STENOSPERMATION</i>	SP	G	N	CR	P
<i>S. coques</i> Al.Rodr., O.Ortiz & M.Cedeño	1			1	
<i>S. darienense</i> Croat	1				1
<i>S. dasae</i> Croat	1				1
<i>S. densiovulatum</i> Engl.	1				
<i>S. donosoense</i> Croat	1				1
<i>S. dressleri</i> Croat	1				1
<i>S. dukei</i> Croat	1				1
<i>S. ellipticum</i> Croat & D.C.Bay	1				
<i>S. filamatamense</i> Croat	1			1	
<i>S. folsomii</i> Croat	1				1
<i>S. fortunense</i> Croat	1				1
<i>S. gaitalense</i> Croat	1				1
<i>S. hageniorum</i> Croat	1				1
<i>S. hampshirae</i> Croat	1				1
<i>S. heraclioi</i> Croat	1				1
<i>S. herrerae</i> Croat	1			1	
<i>S. hodelii</i> Croat	1				1
<i>S. kamemotoanum</i> Croat	1				1
<i>S. loiselleae</i> Croat	1			1	
<i>S. luisgomezii</i> Croat	1			1	
<i>S. luteynii</i> A.P.Gomez ex Croat et al.	1				1
<i>S. majus</i> Grayum	1			1	
<i>S. maloneanum</i> Croat	1		1		1
<i>S. marantifolium</i> Hemsl.	1		1		
<i>S. martinezii</i> Croat & O.Ortiz	1				1
<i>S. mcphersonii</i> Croat	1				1
<i>S. mesaense</i> Croat	1				1
<i>S. monroi</i> Croat	1				1
<i>S. morii</i> Croat	1				1
<i>S. multicostatum</i> Croat	1				1
<i>S. niquense</i> Croat	1				1
<i>S. nusigandense</i> Croat	1				1

<i>STENOSPERMATION</i>	SP	G	N	CR	P
<i>S. ortizii</i> Croat	1				1
<i>S. palosecense</i> Croat	1				1
<i>S. pamsleeperae</i> Croat	1			1	
<i>S. pirrense</i> Croat & O.Ortiz	1				1
<i>S. pteropus</i> Grayum	1			1	
<i>S. pucuroense</i> Croat	1				1
<i>S. purulhaense</i> Croat	1	1			
<i>S. quichense</i> Croat	1	1			
<i>S. ramonense</i> Croat	1			1	
<i>S. robustum</i> Engler	1			1	
<i>S. santamariae</i> Croat	1				1
<i>S. sapoense</i> Croat	1				1
<i>S. sessile</i> Engler	1				
<i>S. solanoi</i> Croat	1				1
<i>S. steyermarkii</i> Bunting	1				
<i>S. sullivanii</i> Croat	1				1
<i>S. terrabaense</i> Croat	1			1	
<i>S. topalisense</i> Croat	1				1
<i>S. tuerckheimii</i> (Engl. & K. Kr.) Croat	1	1			
<i>S. vallense</i> Croat	1				1
<i>S. veraguense</i> Croat	1				1
<i>S. whitefoordiae</i> Croat & O.Ortiz	1				1
<i>S. wongiae</i> Croat & O.Ortiz	1				1
<i>S. zapatae</i> Croat & O.Ortiz	1				1
<i>S. zurquiense</i> Croat	1			1	
Total <i>Stenospermation</i>	68	3	3	12	46

Appendix 3. Endemic *Stenospermatum* Species in Central America

STENOSPERMATUM ENDEMIC	G	N	CR	P
<i>S. adsettiorum</i> Croat				1
<i>S. angustifolium</i> Hemsl.				
<i>S. bocachirensense</i> Croat				1
<i>S. brakoae</i> Croat				1
<i>S. brewsteriense</i> Croat				1
<i>S. calvarioense</i> Croat				1
<i>S. castanoanum</i> Croat				1
<i>S. cerrofríoense</i> Croat				1
<i>S. chagrense</i> Croat O.Ortiz				1
<i>S. chucantiense</i> Croat & O.Ortiz				1
<i>S. copense</i> Croat				1
<i>S. coques</i> Al.Rodr., O.Ortiz & M.Cedeño			1	
<i>S. darienense</i> Croat				1
<i>S. dasae</i> Croat				1
<i>S. densiovulatum</i> Engl.				
<i>S. donosoense</i> Croat				1
<i>S. dressleri</i> Croat				1
<i>S. dukei</i> Croat				1
<i>S. ellipticum</i> Croat & Bay				
<i>S. filamatamense</i> Croat			1	
<i>S. folsomii</i> Croat				1
<i>S. fortunense</i> Croat				1
<i>S. gaitalense</i> Croat				1
<i>S. hageniorum</i> Croat				1
<i>S. hampshirae</i> Croat				1
<i>S. heraclioi</i> Croat				1
<i>S. herrerae</i> Croat			1	
<i>S. hodelii</i> Croat				1
<i>S. kamemotoanum</i> Croat				1
<i>S. loiselleae</i> Croat			1	
<i>S. luisgomezii</i> Croat			1	
<i>S. luteynii</i> A.P.Gómez & Croat				1
<i>S. majus</i> Grayum			1	

<i>S. maloneanum</i> Croat				1
<i>S. marantifolium</i> Hemsley				
<i>S. martinezii</i> Croat & O.Ortiz				1
<i>S. mcphersonii</i> Croat				1
<i>S. mesaense</i> Croat				1
<i>S. monroi</i> Croat				1
<i>S. morii</i> Croat				1
<i>S. multicosdatum</i> Croat				1
<i>S. niquense</i> Croat				1
<i>S. nusigandense</i> Croat				1
<i>S. ortizii</i> Croat				1
<i>S. palosecense</i> Croat				1
<i>S. pamsleeperae</i> Croat			1	
<i>S. pirrense</i> Croat & O.Ortiz				1
<i>S. pteropus</i> Grayum			1	
<i>S. pucuroense</i> Croat				1
<i>S. purulhaense</i> Croat	1			
<i>S. quichense</i> Croat	1			
<i>S. ramonense</i> Croat			1	
<i>S. robustum</i> Engler			1	
<i>S. santamariae</i> Croat				1
<i>S. sapoense</i> Croat				1
<i>S. sessile</i> Engler				
<i>S. solanoi</i> Croat				1
<i>S. steyermarkii</i> Bunting				
<i>S. sullivanii</i> Croat				1
<i>S. terrabaense</i> Croat			1	
<i>S. topalisense</i> Croat				1
<i>S. tuerckheimii</i> (Engl. & K.Kr.) Croat	1			
<i>S. vallense</i> Croat				1
<i>S. veraguense</i> Croat				1
<i>S. whitefoordiae</i> Croat & O.Ortiz				1
<i>S. wongiae</i> Croat & O.Ortiz				1
<i>S. zapatae</i> Croat & O.Ortiz				1
<i>S. zurquiense</i> Croat			1	
Total <i>Stenospermatum</i> Endemics	3	0	12	

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