

A revision of *Rhodospatha* Poepp. (Araceae–Monsteroideae: Anepsiadeae) for Mexico and Central America

Thomas B. Croat¹, Xavier Delannay²

¹P.A. Schulze Curator, Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166

²Aroid Research Group, Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166

*corresponding author Email: Thomas.croat@mobot.org

ABSTRACT

This work is the first revision of *Rhodospatha* in Central America. The last full revision of *Rhodospatha* (Engler & Krause, 1908) treated six species in the genus but only two, *R. moritziana* Schott and *R. wendlandii* Schott were from Central America. Treated here are a total of 16 species for the region, eight of which are new, *R. antonioana* Croat, *R. burgeri* Croat, *R. dressleri* Croat, *R. guanchensis* Croat, *R. heraclioana* Croat, *R. knappiae* Croat, *R. morii* Croat, and *R. vandaniilssoniae* Croat & Grayum

Key Words Araceae, *Rhodospatha*, Central America, Anepsiadeae, new species

INTRODUCTION

History of *Rhodospatha*

The genus *Rhodospatha* was described by Poeppig in 1845 in Poeppig & Endlicher's *Nova genera et species plantarum* (Poeppig, 1845) and was the only genus described in the Araceae by Poeppig and one of only a few genera not described by Linnaeus, Schott or Engler. That work described two species from Peru, *R. latifolia* Poeppig and *R. oblongata* Poeppig. Both have proven to be among the most common, widespread species in South America. In 1857 Schott described *R. moritziana* Schott (Schott, 1857), based on a specimen collected by Moritz in Venezuela. A year later, in 1858 Schott published his *Genera Aroidearum* (Schott, 1858a) in which he recognized three different genera based on material currently recognized as *Rhodospatha*. In that work he described two additional new genera. He created a new genus *Anepsias* for *R. moritziana*, based the apparent distinction of having a greater number of locules (2–6 for *Anepsias* versus a maximum of 2 for *Rhodospatha*). This distinction has proven unwarranted (see discussion of ovules under section on MORPHOLOGY) and the genus was reduced once again to *Rhodospatha* (Croat, 1978, p. 219).

In the same 1858 work he also described a new genus *Atimeta* with two species, *A. videniana* Schott and *A. martii* Schott. The genus *Atimeta* was distinguished from *Rhodospatha* based on the lowermost flowers on the spadix being merely pistillate. The character has proven to be variable. The genus *Atimeta* was synonymized with *Rhodospatha* by Engler and both species were synonymized with *R. oblongata*. In the same publication under the genus *Rhodospatha* he described *R. poeppigii* Schott, later synonymized by Engler (1908) with *R. latifolia*.

Rhodospatha heliconiifolia Schott was described in a separate publication in 1858 (Schott, 1858b) from a cultivated collection of unknown origin. Between 1860 and 1864 Schott described an additional four species in three different publications (Schott, 1860, 1861, 1864). These were *R. lechleriana* Schott, synonymized by A. Engler with *R. latifolia*, *R. surinamensis* Schott, synonymized by A. Engler with *R. oblongata*, *R. blanda* Schott, described from Ilheos in Bahia and will be synonymized in a full revision of *Rhodospatha* (Delannay & Croat, in prep.) with *R. latifolia*, and *R. wendlandii* Schott, described from Costa Rica. The latter is another widespread species ranging from Mexico to Colombia. Thus, by the end of Schott's career with *Rhodospatha* in 1860 there were only four described species which are currently recognized, namely *R. latifolia*, *R. heliconiifolia*, *R. oblongata*, and *R. wendlandii*.

In 1881, Adolf Engler began his work with *Rhodospatha* by describing *Rhodospatha blanda* ssp. *melinonii*, a taxon which has proven to be a *Heteropsis*. Later in their treatment in *Das Pflanzenreich* Engler & Krause (1908) resurrected var. *melinonii* as a distinct species *Rhodospatha melinonii* (Engl.) Engl. & K.Krause from *R. blanda* ssp. *melinonii*. Jonker & Jonker (1953), during their studies on the Flora of Suriname, recombined *R. melinonii* with *Heteropsis* as *H. melinonii* (Engl.) A.M.E. Jonker & Jonker.

Another cultivated plant of unknown origin, *Rhodospatha picta* G. Nicholson, was described by George Nicholson in the *Gardener's Dictionary* in 1887 (Nicholson, 1887). This has generally been treated as a synonym of *R. moritziana*, though its identity is uncertain as it has not yet been typified, and it appears to be based on *Spathiphyllum pictum* W.Bull which in turn has been viewed as a synonym of *Dieffenbachia seguine* (Jacq.) Schott.

The turn of the century brought a flurry of activity with *Rhodospatha*. Between 1905 and 1910 twelve names were published in *Rhodospatha*, primarily by Engler and his associate Kurt Krause and by Luis Sodiro in Ecuador. In 1905, *Rhodospatha longipes* Engl. was described from Nariño Department of Colombia. In 1908 Engler & Krause published a revision of *Rhodospatha* in *Das Pflanzenreich*. This revision included eleven names and included the publication of three new species, *R. densinervia* Engl. & K.Krause from Ecuador; *R. costaricensis* Engl. & K.Krause which has been transferred to *Monstera* (Croat & Grayum, 1987) and *R. tuerckheimii* Engl. & K.Krause. This has proven to be a *Stenospermatum*. Also included in this revision was the doubtful (see above) *R. picta*

Thus Engler & Krause's 1908 revision contained only six species that are still recognized as legitimate species in *Rhodospatha*: *R. densinervia* Engl. & K. Krause, *R. heliconiifolia* Schott, *R. latifolia* Poeppig, *R. longipes* Engl., *R. oblongata* Poeppig, and *R. wendlandii* Schott. Of these, only *R. wendlandii* is in Central America.

Published in the same year as Engler's *Das Pflanzenreich* revision but apparently too late to be seen by Engler, Sodiro (1908) described *Rhodospatha dammeri* Sodiro, *R. dissidens* Sodiro, *R. kraenzlinii* Sodiro, *R. macrophylla* Sodiro, *R. robusta* Sodiro, and *R. statutii* Sodiro. Nearly all these taxa are based only on specimens that are deposited at the Sodiro Herbarium in Quito (QPLS) and are unable to be borrowed and are still poorly known. The type of *R. statutii* has never been located and its placement is uncertain. *Rhodospatha macrophylla* is believed to be synonymous with *R. densinervia* Engler & K.Krause.

Two years after their revision of *Rhodospatha*, a species was described from Bolivia, *R. boliviensis* Engl. & K.Krause. It was later synonymized with *R. latifolia*.

In 1913 another species of cultivated origin, *Rhodospatha forgeti* N.E.Brown, (purportedly from Costa Rica) was described (Brown in Stapf, 1913). While the species is a distinct one, its exact provenance was unknown for more than 100 years. Recently the species was rediscovered and redescribed and the new details are included in this revision since for more than 100 years its exact provenance was unknown (Cedeño et al., 2023).

Little activity took place with actual species of *Rhodospatha* for the next 28 years. Only one species, *R. venosa* Gleason (Gleason, 1929) was described during this period. Then in 1931, J.F. Macbride transferred all Peruvian *Stenospermation* to *Rhodospatha*. These new combinations included *R. crassifolia* (Engl.) J.F.Macbr., *R. flavescens* (Engl.) J.F.Macbr., *R. mathewsii*, (Schott) J.F.Macbr., *R. popayanensis* (Schott) J.F.Macbr., *R. spruceana* (Schott) J.F.Macbr., and *R. weberbaueri* (Engl.) J.F.Macbr. *Stenospermation* is a distinct genus, in no way confused with *Rhodospatha*, so all of these transfers were unnecessary.

The next *Rhodospatha* species described were from Central America. The first was *R. nervosa* Lundell, (Lundell, 1941), now synonymized with *R. wendlandii*. In 1954 E. Matuda transferred *Monstera roseospatha* Matuda to *Rhodospatha*. This taxon is now considered *R. wendlandii*.

No activity with *Rhodospatha* took place for another 21 years when a number of species were described, principally by G.S. Bunting. These included *R. badilloi* G.S.Bunting, *R. perezii* G.S.Bunting and *R. bolivariana* G.S.Bunting (Bunting, 1975), *R. falconensis* G.S.Bunting, *R. guasarensis* G.S.Bunting and *R. steyermarkii* G.S.Bunting (Bunting, 1986) as well as *R. brachypoda* G.S.Bunting and *R. cardonae* G.S.Bunting (Bunting, 1988). Michael Madison described *R. pachysperma* Madison (Madison, 1976). That species is synonymous with *R. venosa* Gleason.

Thus, at the beginning of the work by Croat a total of 22 recognized species had been described. *Rhodospatha pellucida* Croat & Grayum, a species ranging from Nicaragua to Panama was published in 1999 (Croat, 1999). Croat & Bay (2004) published *R. monsalvae* Croat & D.C.Bay in their studies on the Flora of Bajo Calima. Owing to the work on the Flora of Río Cenepa in Amazonas State of Peru, five new species, *R. acosta-solisii* Croat, *R. brentberlinii* Croat, *R. katipas* Croat, *R. mukuntakia* Croat, and *R. piushaduka* Croat were described (Croat et al., 2005). In 2010 *R. herrerae* Croat & P.Huang was published for studies with the Flora of La Planada in Nariño Department in Colombia (Croat et al., 2010). In 2012 a Brazilian species, *R. arborescens* Temponi & Croat was published (Temponi et al., 2012). More recently,

R. barbourii Croat (Croat, 2021) and *R. neillii* Croat (Delannay & Croat, 2021) were also published.

Independently from this work, in 2019, *R. rupicola* Edwin Trujillo, Zuluaga & Alzate-Lozano from Colombia was also published (Alzate-Lozano S, Trujillo-Trujillo E, Zuluaga A. 2019).

Most recently, three new species, *Rhodospatha osaensis* Croat, Grayum & M.Cedeño, *R. antonensis* Croat & O.Ortiz and *R. ovatifolia* Croat, Grayum & M.Cedeño, were described and the rediscovery of *R. forgetii* was reported by Cedeño-Fonseca et al. (2023).

Materials and Methods

The study is based on an almost 50 year-long study of the genus throughout its range by first author (Croat), observations and collections in more than 5000 separate sites throughout the neotropics as well as a two-year NSF funded field study devoted specifically to the study of *Rhodospatha* (1990–1993). A total of more than 1500 collections were studied and measured by both authors, principally those housed at the Missouri Botanical Garden (the world's largest assemblage of aroid specimens) or on loan from dozens of other institutions. The first author personally visited more than 75 herbaria in Europe, North America, Central America and South America during work under an OPUS grant between 2015 and 2017.

The Lucid keys mentioned in this paper were the result of technology developed by the University of Melbourne but Lucid, Inc. is presently an independent company that markets this product. The tool we are using is a computer-generated key developed by the Royal Botanic Gardens Kew and the Missouri Botanical Garden that contains all important taxonomic characters of all species. It works by a process of elimination using only the most conservative and least variable characters. At present keys have been developed for *Adelonema*, *Anthurium*, *Dieffenbachia*, *Dracontium*, *Philodendron*, *Spathiphyllum*, *Stenospermation*, *Rhodospatha* and *Xanthosoma* [The latter two authored by Xavier Delannay] and work is under way to develop a Lucid Key for *Chlorospatha* and *Monstera*. These are largely unpublished, especially those with large numbers of new species but it is intended that all these keys will be placed online for public use. For examples of published keys see: <http://www.lucidcentral.com>.

All descriptions presented here are as complete as possible, following a pattern modified from that of Croat & Bunting (1979), with particular details ascribed to the surface features and vegetative morphology owing to the large number of sterile species recognized.

Life zone ecology mentioned is based on the Holdridge life zone maps where they exist and in areas where they do not exist (Mexico) estimates are sometimes made based on experience and comparison to other areas visited.

Current Revision

So, at the beginning of this revision, a total of five *Rhodospatha* species had been published for Central America. In this revision, we are publishing 8 new species. Those new species are:

- *R. antonioana* Croat
- *R. burgeri* Croat
- *R. dressleri* Croat
- *R. guanchensis* Croat
- *R. heraclioana* Croat
- *R. knappiae* Croat
- *R. morii* Croat
- *R. vandanilssoniae* Croat & Grayum

Eight already published species are also included here, for a total of 16 species being treated in this revision (Table 1). The published species are:

- *R. antonensis* Croat & O.Ortiz
- *R. forgetii* N.E.Brown
- *R. monsalveae* Croat & D.C.Bay
- *R. moritziana* Schott
- *R. osaensis* Croat, Grayum & M.Cedeño
- *R. ovatifolia* Croat, Grayum & M.Cedeño
- *R. pellucida* Croat & Grayum
- *R. wendlandii* Schott

Intergeneric Relationships

Rhodospatha is a member of subfamily *Monsteroideae*, a group with three monophyletic, molecular based tribes, *Anepsiadeae* (incl. *Heteropsidaeae*), *Monstereae* (incl. *Anadendreae* Bogner & J.French) and *Spathiphyllaeae* Engl. (Cusimano et al., 2011; Tam et al, 2004; Cabrera et al., 2008). The *Monstereae* contains six genera, *Amydrium* Schott, *Anadendrum* Schott, *Rhaphidophora* Hassk., *Epipremnum* Schott, *Scindapsus* Schott and *Monstera* Schott. The *Anepsiadeae* contains *Alloschemone* Schott, *Rhodospatha* Poepp., *Stenospermatum* Schott and *Heteropsis* Kunth. The first five genera of the *Monstereae* are strictly palaeotropical and not closely related to *Rhodospatha*. Only *Monstera* could in any way confused with *Rhodospatha* in the neotropics and it differs radically in having reticulated tertiary veins. In the *Anepsiadeae* the generic distinctiveness is even more pronounced since *Alloschemone* and *Heteropsis* are radically different than *Rhodospatha*. While anyone closely familiar with aroid genera would not confuse most of the species of *Rhodospatha* with either *Monstera* or *Stenospermatum* all three of the genera mentioned have had members described in the wrong genus and a few species are sufficiently close to other genera that some might be mis-determined. A key which follows, modified from *Genera of Araceae*, gives the technical characters to separate *Rhodospatha*, *Stenospermatum* and *Monstera*.

1. Seeds globose to oblong, 6–22 mm long, the raphe S-shaped; endosperm absent; ovules 2 per locule; leaf blades variously shaped, often perforated or pinnatifid or both ***Monstera***
- 1a. Seeds fusiform, claviform or lenticular, less than 3 mm long; endosperm present; ovules (2)3-many per locule; leaf blades entire

2. Ovary with placenta basal; seed fusiform to claviform; leaf blades thickly coriaceous *Stenospermatum*
 2a. Ovary with placentation axile; seed lenticular and flattened, strongly curved; leaf blades mostly membranaceous *Rhodospatha*

Despite their strong dissimilarities, *Rhodospatha* has been confused with *Stenospermatum* by some authors, particularly J.F. MacBride (1936). For his treatment of the Araceae for the Flora of Peru, he considered them the same genus and transferred many species of *Stenospermatum* into *Rhodospatha*. The two genera are dramatically different, especially in the nature of their leaves with *Rhodospatha* typically having larger, somewhat banana-like leaves with conspicuous primary lateral veins and *Stenospermatum* having generally smaller leaves with the primary lateral veins obscure or difficult to discern in living condition. *Rhodospatha* typically has the primary lateral veins interrupted by a descending and ascending order of interprimary veins whereby the interprimary veins (these usually alternating with the primary lateral veins) are themselves separated from the adjacent veins by yet another even smaller vein. Thus the order would be thick, thin, medium, thin, thick with this pattern being endlessly repeated. This odd pattern is found only in *Spathiphyllum* and *Rhodospatha* among the Neotropical genera. Typically, species of *Rhodospatha* have from one to three interprimary lateral veins on each side between each consecutive pair of primary lateral vein. Each interprimary vein is interceded by yet smaller interspaced veinlets with the intervening area comprising relatively uniform minor veins. In contrast, the veins of *Stenospermatum*, even on dried specimens where the veins are more apparent, are more nearly uniform, albeit richer in micro-characters such as short pale lineations, cross-veins, closely aligned areolate cells or close ridges or striations. In a comparable fashion *Rhodospatha* micro-characters are usually restricted to speckling or larger discolored punctations. While living *Stenospermatum* plants have few differences on fresh leaves, their dried leaf surfaces are remarkably different based on the nature of the venation of the upper blade surface. See for example Figs. 3–8 in Natalia Castaño's unpublished thesis on the *Stenospermatum* of Colombia (Castaño Rubiano, 2010). The same is the true for the dried upper blade surfaces of *Rhodospatha* but the characters in *Rhodospatha* are considerably fewer in both number and quality for being distinct.

MORPHOLOGY

Vegetative growth

Rhodospatha species are usually appressed-climbing epiphytes growing to usually no more than 3 or 4 meters but can occasionally be slightly higher in trees. Some species can flower at no more than 2 m from the ground. Another habit forms are species that grow along streams on banks or in rocky habitats, for example *R. moriztiana* that has a stem creeping across the ground with leaves rarely more than 2 m from the soil. In rare situations, *R. moriztiana* may also climb trees in the same habitat, especially in heavily shaded areas with high humidity.

Stems range in diameter from about 1 cm to 5 cm and while most have short internodes, usually broader than long or about as broad as long, younger plants typically have moderately long internodes; flagelliform shoots are often formed which allow a plant to spread and range broadly searching for other host plants. Unlike most *Monstera* the stems of many terrestrial

species (e.g. *M. ovata* Croat & Grayum) with strictly terrestrial habit usually form stilt roots in the lower part of the stem to help support the erect stem. While *Monstera* usually have heteromorphic development of leaves with juvenile and adult leaves being markedly different, the juvenile leaves of *Rhodospatha* are not markedly different from the adult blades except by being smaller and usually narrower. Seeds typically germinate in the soil on the forest floor and after developing into a small seedling, branches growing scototropically creep with long internodes across the forest floor, stopping to establish yet another small plant. Eventually this creeping growth finds a tree or rock where growth becomes phototropic and upright. Further growth leads to shorter and thicker internodes resulting in an adult plant. As in *Monstera* (Madison, 1977; Cedeño et al., 2022) growth is rarely static and plants can branch, grow to the ground and find another tree so a single plant can eventually range into several trees.

Petioles in *Rhodospatha* are typically heavily sheathed but the extent of sheathing varies from species to species. The petiole sheath provides other good characters in that the sheath margins can be deciduous or persistent and they can persist intact or as fibers or with a thin hyaline margin.

Leaf blades in *Rhodospatha* are typically large and fan-like, usually somewhat oblong-elliptic to oblong or oblong-oblongate with the blades merely subcoriaceous, rarely more coriaceous and mostly semiglossy on both surfaces. Blades are typically acuminate at the apex and acute to rounded at the base, rarely weakly subcoriaceous.

The midrib is uniformly sunken and most commonly somewhat paler on the upper surface and typically thick and narrowly rounded on the lower surface with prominent primary lateral veins, these sunken above and narrowly rounded below with interprimary lateral veins 1 or 2, sometimes three between each pair of primary lateral veins. The ranking of these intermediate veins is not regular but instead they are alternatively thicker or thinner in a repeating ascending and descending manner. A similar venation pattern is often present with *Spathiphyllum* but *Stenospermation* has a more regular pattern of primary lateral veins, albeit one of an extremely weak nature (scarcely apparent on fresh leaves and even weak on dried specimens).

Inflorescences

Inflorescences are born at or near the apex of the stem and solitary (although two or more inflorescences can be born in close succession and thus be present at the same time). Nevertheless, the spathe of adjacent inflorescences are never in flower simultaneously on the same plant.

Peduncles are erect, typically stout, usually moderately elongate. Commonly the peduncle is erect with the spathe held erect. This contrasts with the related *Stenospermation* where many species have peduncles that are cernuous with the spathe turned upside down. The spathe begins to loosen on the morning and afternoon of first day of flowering. Pollination is carried out by beetles who enter the spathe even before it opens by crawling through the space created at the base of the spadix. Typically, by the following morning the spathe is open but ready to fall off with the spadix covered with a messy liquefied gel.

The spathe of *Rhodospatha* is typically large and conspicuous, boat-shaped and broadly ovate or oblong-ovate, abruptly cuspidate, yellowish white, cream, purplish or pink within, caducous after anthesis. It encircles the spadix several times so that when it begins to loosen it expands laterally, blousing out with a space below the leading edge that enables insects, even rather large beetles to crawl into the spiraled layers of the spathe to get inside the now much enlarged chamber. The spathe begins to loosen during the afternoon of the first night's flowering episode. So far as we know, no thermogenic heat peaks occur but pollination takes place sometime during the first night, if at all. The spathe by early morning is open but typically loosening and non-functional. For this reason, herbarium specimens with intact spathes are rare since it is rare for plant collectors to be in the field in the early morning hours.

The spadix may be sessile or stipitate and is moderately long cylindroid-tapered, commonly at least weakly tinged reddish, purplish, or orangish, sometimes also bluish green and glaucous. The flowers are arranged in tight spirals with many flowers visible per spiral. The flowers are naked with four stamens but are not exposed. Instead, the pollen is extruded and accumulates on the spadix and is particularly evident as a slushy mess on the spadix in the early morning hours after anthesis.

Pollination might be effected by dynastine scarab beetles that enter the spathe during the female-receptive period when the spathe is still partially furled. Beetles enter the spathe late in the day when the spathe first begins to loosen and leave the following day when the spathe begins to fall off. See for example *Grayum* & *Schatz* 5260, *R. pellucida*.

In the same way that mature open spathes are only rarely studied because they are not frequently seen, the berries are mysteriously poorly known. In the nearly 60 years that the senior author has been studying in the tropics, and three years devoted to a study of *Rhodospatha* no seemingly mature berries were observed. The pistils become thickened, even subfleshy and colorful but never to the point that they were loosened and easily removable. They never appeared mature in the same manner as with other aroid genera. Alternatively, they never appear to be eaten or partly eaten so how they are dispersed remain a mystery.

TAXONOMIC REVISION

Rhodospatha Poepp. in Poeppig & Endlicher, *Nov. Gen. Sp.* 3: 91. 1845. — Type: *Rhodospatha latifolia* Poepp. (lectotype, designated by Nicolson in *Taxon* 16: 518. 1967).

Anepsias Schott, *Gen. Aroid.* 73. 1858. — Type: *Anepsias moritzianus* (Schott) Schott [= *Rhodospatha moritziana* Schott]

Atimeta Schott, *Gen. Aroid.* 71. 1858. — Type: *Atimeta videniana* Schott [= *Rhodospatha oblongata* Poepp.].

Trichosclereids abundant; evergreen, usually climbing herbs, producing flagelliform shoots. LEAVES many, distichously arranged; petiole geniculate apically, sheath long, persistent to

marcescent; **blade** oblong-elliptic, ± oblique, always entire; primary lateral veins pinnate, numerous, running into distinct marginal vein, secondary and tertiary laterals parallel-pinnate, higher order venation transverse-reticulate. INFLORESCENCE usually solitary; peduncle shorter to longer than petiole; **spathe** broadly ovate or oblong-ovate, abruptly cuspidate, yellowish white, cream, purplish or pink within, caducous after anthesis; **spadix** long-stipitate to sessile, cylindric-conic, basal flowers sometimes sterile or female and scattered; flowers bisexual, perigone absent; stamens 4, free, filaments linear-oblong, flattened, connective slender, thecae ovoid to ellipsoid, dehiscing by longitudinal slit; pollen extruded in strands, fully zonate or inaperturate, hamburger-shaped or ellipsoid to oblong, medium-sized (mean 47 µm, range 34–57 µm), exine densely to sparsely foveolate and nearly psilate to obscurely fossulate or verrucate; gynoeceum compressed obconic to cylindric, ovary 2-locular, ovules usually numerous per locule, rarely few (*R. venosa*), anatropous to hemianatropous, funicle fairly long, placenta axile, rarely sub-basal, stilar region well-developed, broader than ovary, prosmatic, truncate to convex apically, stigma elliptic to linear, usually longitudinal; berry cylindric-prismatic, truncate, many- to few-seeded; seeds rounded-reniform, flattened, testa brittle, very hard, smooth or with verrucose crest, embryo rather large, strongly curved, endosperm present but sparse. $2n=28$, 56.

Distribution — 137 neotropical species in tropical humid to wet forests. Nineteen species occur in Mexico and Central America (Table 1).

KEY TO SPECIES OF *RHODOSPATHA* FOR MEXICO AND CENTRAL AMERICA

- 1a.** Appressed-climbing epiphyte; **petioles** sheathed throughout most of their length; sheath deciduous; **blades** usually 2.5–3 times longer than wide, usually drying dark brown to gray brown above, dark brown to reddish brown, not reddish-dotted below; primary lateral veins 22–60 per side, departing midrib at ca 60–70°; cross-veins lacking; peduncles 12–29 cm long; spathe **usually white to cream**, 20–44 cm long; Mexico to Colombia *R. wendlandii* Schott
- 1b** Not as above; either terrestrial, or with petioles not sheathed to apex; blades not 2.5–3 times longer than wide or not drying as above, or with cross-veins or red-brown dots below; primary lateral veins usually fewer or not departing at more than 60°; peduncles less than 30 cm or spathe less than 20 long; Costa Rica and Panama;
- 2a.** Terrestrial plants **3**
- 2b.** Appressed-climbing epiphyte **8**
- 3b.** Petiole sheath persisting intact..... **4**
- 3b.** Petiole sheath deciduous..... **7**
- 4a.** Blades drying medium green on the upper surface, light yellowish green below; species of Panama *R. guanchensis* Croat
- 4b.** Blades drying brown on the lower surface **5**

- 5a. Blades drying dark brown to blackened above; species of Costa Rica and Panama
 *R. ovatifolia* Croat, Grayum & M.Cedeño
- 5b. Blades not drying dark brown to blackened above; species of Panama **6**
- 6a. Blades drying grayish above, lower surface densely dark-granular-speckled
 *R. dressleri* Croat
- 6b. Blades drying brown, not grayish, lower surface not densely dark-granular-speckled
 *R. antonensis* Croat & O. Ortiz
- 7a. Large plants with ovate-elliptic blades drying light to medium greenish brown, densely covered with minute reddish brown dots below; primary lateral veins widely spaced; species ranging widely from Costa Rica to western Ecuador along the Pacific side and to Venezuela ..
 *R. moritziana* Schott
- 7b. Smaller plants with elongated blades drying dark brown, not densely covered with minute reddish brown dots; primary lateral veins more narrowly spaced; species from Panama.....
 *R. antonioana* Croat
- 8a. Blades drying light grayish green or light greenish brown above, light yellowish green below; species from Costa Rica..... **9**
- 8b. Blades drying medium to dark brown or green above..... **10**
- 9a. Blades 4.8 times longer than wide, drying light greenish brown above
 *R. osaensis* Croat, Grayum & M.Cedeño
- 9b. Blades 3–3.4 times longer than wide, drying light grayish green above
 *R. forgetii* N.E.Brown
- 10a. Blades elongated, 5.8–10 times longer than wide; species from Panama
 *R. morii* Croat
- 10b. Blades less 5 times longer than wide **11**
- 11a. Petioles with the sheath persisting intact..... **12**
- 11b. Petioles with the sheath deciduous **15**
- 12a. Small plants with elongated internodes, oblong-lanceolate blades 9.5–26.5cm long, 3.2–5.1 times longer than wide and small inflorescences (less than 18 cm long); species from Costa Rica and Panama..... *R. burgeri* Croat
- 12b. Larger plants with blades to 56 cm long and less than 3.5 times longer than wide **13**
- 13a. Relatively small plants with stems less than 2 cm diam and blades less than 11 cm wide, drying yellowish brown to yellowish green and with the primary lateral veins as well as many interprimary and minor veins bordered with continuous or intermittent dark black lines; species growing from Costa Rica and Panama to the Pacific slopes of Colombia and northern Ecuador..... *R. pellucida* Croat & Grayum
- 13b. Larger plants with blades drying medium to dark brown above, without the black lines along the veins..... **14**

- 14a.** Plants growing in high elevation cloud forests at 1500–1700 m; blades drying dark brown on both surfaces; species from Costa Rica and Panama
 *R. vandaniissoniae* Croat & Grayum
- 14b.** Plants growing at lower elevations at 700–1200 m; blades drying medium brown above and yellowish below; species from Panama *R. antonensis* Croat & O.Ortiz
- 15a.** Blades drying dark green above, dark reddish-brown below, primary lateral veins closely spaced (mostly 5–10 mm apart), especially near the base; species ranging from Panama to Colombia and Ecuador on the Pacific slopes from sea level to 1800 m
 *R. monsalveae* Croat & D.C.Bay
- 15b.** Blades drying dark brown above..... **16**
- 16a.** Large plants with blades to 72 cm long, drying medium reddish brown below; species ranging from Mexico to Panama and Northern Colombia..... *R. wendlandii* Schott
- 16b.** Smaller plants with blades less than 30 cm long, drying dark brown on both surfaces; species from Panama *R. heraclioana* Croat

SPECIES DESCRIPTIONS

Rhodospatha antonensis Croat & O.Ortiz, Aroideana 46(3): 90–95. 2023. — Type: PANAMA. Coclé: La Mesa, above El Valle de Antón, 900–1173 m, 13 Apr. 1971, *T.B. Croat* 14382 (holotype, MO-2057839; isotype, NY).

Terrestrial, erect or decumbent or epiphyte to 3 m high; **internodes** short, less than 0.5 cm long, 2–3 cm diam. (drying 2 cm diam.), drying yellow-brown with prominent longitudinal ridges and smaller transverse cracks. LEAVES erect-spreading; **petioles** 26–37 cm long, sheathed to within 3–5 cm of the blade, thicker than broad above sheath, drying dark reddish brown and weakly sulcate adaxially at apex, weakly striate toward the base abaxially, sheath margins drying reddish brown, paler than the remainder of petiole, mostly deciduous with some fragments remaining, only weakly fibrous; **blades** oblong-elliptic, somewhat inequilateral, 25–56 cm long, 12.0–22.5 cm wide, 2.0–2.4 times longer than wide, abruptly acuminate at apex, obtuse to rounded at base, dark green and matte above, moderately paler and semiglossy below, drying grayish brown to brown above, yellow-brown below; midrib narrowly sunken above, narrowly raised (much thicker than broad) beneath, drying minutely granular; **primary lateral veins** 38–40 per side, departing midrib at 70–80°, not markedly downturned at the midrib, weakly curved to the margins, 4–9 mm apart near the center of blade (2–5 mm near the base), somewhat round-raised, drying weakly granular, only slightly darker than the surface; interprimary veins usually only one between each pair of primaries, with 1 or 2 pairs of minor veins between the interprimary and the primary veins; cross-veins present but inconspicuous on drying, the lower surface obscurely reddish dotted on magnification. INFLORESCENCE with peduncle to 20 cm long, drying 7 mm diam., yellowish brown, minutely warty in transverse rows; **spathe** white, to 16 cm long, acuminate at apex, promptly deciduous; **spadix** to 13 cm long, 1.8 cm diam., weakly stipitate; flowers ca. 17 visible per spiral, a few flowers in the lowermost spiral sterile, to 1.8 mm long, drying more or less bowl-shaped; pistils 1.2–1.8 mm diam., more or less rhomboid, covered with a frost-like gray covering on drying; stigmas

oblong, 0.8–1.0 mm long, 0.3 mm wide, prominently raised on drying; stamens 0.8–1.0 mm long, 0.3–0.4 mm wide. **Figures 1–6.**

Distribution — *Rhodospatha antonensis* is endemic to central Panama, known only from the region of El Valle de Antón at La Mesa and on Cerro Pilón at 700 to 1200 m in a *Tropical wet forest*.

Comments — The species is characterized by its coarsely fissured yellow-brown dried stems, and its oblong-elliptic blades with the lower surface drying yellowish brown. It could be confused with *Rhodospatha knappiae* but differs from that species in having blades 2.0–2.4 times longer than wide (versus 2.7–4.9 times longer than wide for *R. knappiae*).

In the publication of this species (Cedeño et al., 2023), the authors greatly broadened the species concept for *R. antonensis*, extending the range to central Costa Rica. The following collections taken from that work are, in the opinion of the senior author of this paper, another species. Compared to the Panamanian *R. antonensis*, all have leaves which dry darker brown and have blades that are proportionately narrower, ranging from 2.9–5.6 times longer than broad, have primary lateral veins more widely spaced and departing the midrib at a more acute angle. Though Croat was a co-author of the above cited paper, his role was in providing the original concept of the species *R. antonensis*, not in extending its range to central Costa Rica where few, if any, other Aroid species from El Valle de Antón or Cerro Campana are known to occur.

Since the Costa Rican material which was included in *R. antonensis* was segregated from other similar Costa Rican species, especially *R. knappiae*, we have chosen to assume that this may be another as yet unrecognized species, but not *R. antonensis* or *R. knappiae* so these seemingly aberrant collections are merely listed here and are not otherwise a part of this present revision of *Rhodospatha* in Mexico and Central America:

COSTA RICA. **Alajuela:** 840–950 m, 22 January 1986, *M.H. Grayum, P.J. Sleeper, T. Ray, C. Alvarado, A.R. Smith & T. Béliz 6182* (MO); 800–1000 m, 10 March 1985, *C.M. Taylor & C. Skotak 4804* (DUKE); **Cartago:** Turrialba, 1200–1300 m, 30 Jun 1976, *T.B. Croat 36643* (MO); **Heredia:** 500–600 m, 18 February 1984, *T.D. Pennington, P.E. Sánchez & N. Zamora 11536* (K); 450–550 m, 14 February 1986, *M.H. Grayum & P.J. Sleeper 6530* (MO); 700–800 m, 03 April 1986, *M.H. Grayum 6707* (CR); 760 m, 28 May 1976, *T.B. Croat 35789* (MO); 500–600 m, 18 February 1984, *T.D. Pennington, P.E. Sánchez & N. Zamora 11526* (K); 500–600 m, 18 February 1984, *T.D. Pennington, P.E. Sánchez & N. Zamora 11528* (K); 500–600 m, 18 February 1984, *T.D. Pennington, P.E. Sánchez & N. Zamora 11534* (K); 750 m, 22 January 1983, *G.E. Schatz 693* (DUKE); Limón prov.: 850 m, 11 April 1989, *R. Robles & A. Chacón 2753* (CR, MO); San Jose prov.: Vazquez de Coronado, 400–1500 m, 28 July 1985, *B.E. Hammel & J. Trainer 14252* (MO).

The Panamanian specimens included by Cedeño et al. (2023) included specimens that are treated in the present revision as three distinct species, namely *R. antonensis* Croat & O. Ortiz, *R. antonioanum* Croat and *R. dressleri* Croat. Compared to the material included from Costa Rica in the publication of *R. antonensis*, these three Panamanian species have more broadly



Figure 1: *Rhodospatha antonensis*. Habit. Photo *O.O. Ortiz 4319*, El Valle de Antón, Panama, photo *O. Ortiz*

ovate leaf blades which are 1.8–2.4 times longer than broad and dry mostly yellowish brown or grayish. The characters separating them are exhibited in the key.

Additional specimens seen of R. antonensis sensu strictiore: PANAMA. **Coclé:** North slope and summit of Cerro Pilón, 08°38'N, 80°06'W, 900–1173 m, 16 March 1973, *T.B. Croat 22931* (MO); La Mesa above El Valle, along road which ends in pasture, 08°38'N, 80°07'W, 810 m, 21 July 1974, *T.B. Croat 25322* (RSA, MO); El Valle de Anton, carretera que va desde Mara Ahogado hacia Altos del Maria, 1024 m, 22 February 2021, *O.O. Ortiz et al. 4205* (PMA); El Valle de Antón. Camino hacia Cerro Llorón, 08°39'25"N, 80°06'26"W, 731m, 13 June 2021, *O.O. Ortiz et al. 4319* (MO, PMA).

***Rhodospatha antonioana* Croat, sp. nov.** — Type: PANAMA. Panamá: Cerro Campana, ca. 1 mi. from Interamerican Highway ca. 08°41'23"N, 79°55'02"W, 600–800 m, 15 June 1976, *T.B. Croat 35965* (holotype, MO-2381572).

[*Rhodospatha antonensis* Croat & O.Ortiz, *Aroideana* 46(3): 90. 2023, *pro parte, quoad specim. cit. Antonio 4924* (MO), *Croat 35965* (MO), *Thompson 4596* (CM), not as to the type].



Figure 1: *Rhodospatha antonensis*. Habit. Photo O.O. Ortiz 4319, El Valle de Antón, Panama, photo O. Ortiz



Figure 3: *Rhodospatha antonensis*. Inflorescence. Photo O. Ortiz 4319, El Valle de Antón, Panama, photo O. Ortiz.



Figure 4: *Rhodospatha antonensis*. Flowers with stamens exserted, T.B. Croat 25322



Figure 5: *Rhodospatha antonensis*. T.B. Croat 22931



Figure 6: *Rhodospatha antonensis*, T.B. Croat 14382 TYPE

Diagnosis: The species is characterized by being both terrestrial and an appressed-climbing epiphyte, with short internodes 1.0–1.5 cm diam., petioles 19–33 cm long and sheathed 3/4 their length, oblong-elliptic blades (26–40 cm x 10–15 cm) with 25–28 primary lateral veins per side, a short peduncle (4.5–7.0 cm long), rounded and apiculate spathe only 4.5 cm long with a small white spadix (4.5 cm long).

Appressed climbing epiphyte or terrestrial; **internodes** short near the apex, up to 3 cm long lower down, 1.0–1.5 cm diam., drying light brown, longitudinally fissured and sometimes transversely cracked as well; **petioles** sheathed to about 3/4 their length, weakly sulcate above sheath, 19–33 cm long; geniculum ca. 2 cm long; sheath thin, brownish, promptly deciduous; **blades** oblong-elliptic, slightly inequilateral **Figure 7: *Rhodospatha antonioana*, T.M. Antonio 4924** lateral 26–40 cm long, 10–15 cm wide, 2.6 times longer than wide, acuminate at apex, acute and briefly attenuate at base, dark green and matte above, moderately paler and semiglossy below, drying dark brown above, dark yellowish brown below; midrib sunken above, prominently raised, thicker than broad below, drying granular; **primary lateral veins** 25–28 per side, departing midrib at 25–35°, weakly arching to the margin; interprimary veins usually 1 between each pair of primaries; minor veins usually interconnected with faint tertiary veins. INFLORESCENCE very short, erect; peduncle 4.5–7.0 cm long, drying 1.5–3.0 mm diam.; **spathe** to 4.5 cm long, 2 cm diam. when unopened, oblong-ellipsoid, white, drying dark brown, rounded at apex and weakly apiculate, promptly deciduous; **spadix** 4.0–4.5 cm long, drying 6–7 mm diam., cylindroid to clavate, white, rounded at apex; flowers ca. 9 per spiral; pistils irregular, subrounded to bluntly 4–6 sided, the apex drying matte, covered with a gray frost-like layer; stigmas oblong-elliptic, 0.7–1.0 mm long, 0.3–0.5 mm wide, drying black and sometimes with a pale margin; anthers shortly exerted above the pistils, drying light brown, 0.6 mm long, 0.3–0.4 mm wide. INFRUCTESCENCE greenish, to 14 cm long and 1.1 cm diam.. **Figures 7—9.**

Distribution — *Rhodospatha antonioana* is endemic to Panama, known only from two collections on Cerro Colorado in Panama Province at 50–915 m in a *Premontane wet forest* life zone.

Etymology — The species is named in honor of Tom Antonio, who collected the species while working for the Missouri Botanical Garden as the Curator of Summit Herbarium.

Comments — It is probably most closely related to *Rhodospatha knappiae* which has blades of similar shape and coloration. That species differs in having a spadix typically several times larger. It might also be confused with *R. burgeri* which differs in having blades less than 30 cm long and less than 6 cm wide with the petiole sheath persistent. In contrast *R. antonioana* has blades more than 35 cm long and more than 10 cm wide with the petiole sheath deciduous or with some dried fragments persisting.

A single fruiting collection from the type locality (*Croat 17192*) was epiphytic and had somewhat darker brown-drying leaves. It is probably also this species but when in fruit has a peduncle to 14.5 cm long with the infructescence greenish, to 14 cm long and 1.1 cm diam.

Paratypes: PANAMA. **Panamá:** Cerro Campana along trail to summit, 08°41'01"N,



Figure 7: *Rhodospatha antonioana*, T.M. Antonio 4924



Figure 8: *Rhodospatha antonioana*, T.B. Croat 17192



Figure 9: *Rhodospatha antonioana*, T.B. Croat 35965

79°55'02"W, 730 m, 2 June 1972, *T.B. Croat 17192* (F, MO); Vicinity of Cerro Campana along trail near tower, 08°41'14"N, 79°55'19"W, 3000 ft, 22 June 1980, *T.M. Antonio 4924* (MO); Cerro Campana: along trail to top, 08°40'N, 79°50'W, 3000 ft, 26 March 1988, *S.A. Thompson 4596* (CM).

Rhodospatha burgeri Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Along road between Fortuna Dam and Chiriquí Grande, ca. 10 mi. N of the Continental Divide and ca. 2 mi. E of main hwy., 08°45'N, 82°15' W, 300 m, 15 April 1987, *G. McPherson 10833* (holotype, MO-3474594).

Diagnosis: The species is characterized by its small size, elongate internodes, slender petioles, small, narrow, elongate, dark brownish leaves and small inflorescence (entire inflorescence is less than 18 cm long).

Appressed-climbing epiphyte; **internodes** slender, longer than broad, the lower leafy nodes 1–4 cm long, <1 cm diam., drying 4–6 mm diam., yellowish brown, closely and acutely ribbed, the epidermis sometimes cracking free. LEAVES scattered in the upper half of the stem; **petioles** slender, 7.0–19.5 cm long, 3–4 mm diam. midway, gradually tapered to 3 mm diam. near apex, sheathed to the geniculum, drying blackened, finely striate; sheath entire, erect to incurled; geniculum 1.0–1.5 cm long, ca. 2 mm diam., narrowly weakly sulcate, the margins acute and continuous with the blade margin; **blades** oblong-lanceolate, usually markedly inequilateral, 9.5–26.5 cm long, 1.7–5.5 cm wide, 3.2–5.1 times longer than wide (averaging 4.2 times longer than wide), ca. 1.5 times longer than the blades, gradually acuminate and sometimes weakly falcate at apex, obtuse to rounded at base, often inequilateral at base, one side rounded, one side obtuse, dark green and moderately concolorous, matte on both surfaces, drying matte, dark brown to grayish brown and weakly granular on magnification above, drying somewhat yellowish brown and minutely pale speckled on magnification beneath; midrib narrowly concolorous above, narrowly sunken, slightly thicker than broad below; **primary lateral veins** 16–19 per side, departing midrib at 40–45°, 9–15 mm apart, prominently down turned along the midrib and weakly to prominently curved to the margin, drying frequently undulate, weakly raised and concolorous above, more prominently raised beneath and paler than the surface; interprimary veins 1 or 2 between each pair of primary lateral veins with 1–3 intervening minor veins between the interprimaries and the primaries; cross-veins numerous, but inconspicuous. INFLORESCENCE arising from one of the uppermost axils; peduncles 7.0–9.3 cm long, drying 2 mm diam., **spathe** greenish white, to 8.5 cm long, <3.5 cm wide when fully unrolled, acuminate and tightly inrolled at apex; **spadix** 6.0–6.5 cm long, 6–9 mm diam., sessile or stipitate 4 mm, pale greenish white, cylindroid, bluntly rounded at apex; flowers ca. 10 visible per spiral; pistils 1.4–1.8 mm diam., irregularly 4–6 sided, rhombic to quadrangular and truncate at apex, drying gray and densely covered with a gray, frostlike covering, the sides straight to concave or rarely convex; stigmas oblong to broadly elliptic, 0.5–0.6 mm long, 0.3–0.4 mm wide, becoming concave medially at anthesis; anthers tan, ca. 1 mm long, 0.6 mm wide, the thecae moderately divaricate. **Figure 10.**

Distribution — *Rhodospatha burgeri* is known from southeastern Costa Rica and adjacent northeastern Panama from 50–300 m in a *Premontane wet forest* life zone.



Figure 10: *Rhodospatha burgeri*. G. McPherson 10833

Etymology — The species is named in honor of the late William C. Burger who collected the first specimen and whose efforts in understanding and recording the flora of Costa Rica have resulted in numerous important publications. Burger spent most of his career working at the Field Museum in Chicago working primarily on the Flora of Costa Rica as editor of *Flora Costaricensis*.

Comments — In Central America the species is most similar in superficial ways to *Rhodospatha morii* but that species has proportionately longer, reddish brown leaves with the base acute and with the lower surface matte, minutely granular and with raised tertiary veins. In contrast, *R. burgeri* has proportionately shorter blades with the leaf bases rounded and the lower surface smooth and glossy with the tertiary veins not markedly raised.

Rhodospatha burgeri is also similar in appearance to *R. acosta-solisii* from the eastern slopes of the Andes in Ecuador and occurring at over 1500 m elevation. That species differs however in having more oblong-elliptic blades and in having rugose stems. It is also similar to *Rhodospatha pranceana* Croat (ined.), from Peru: Loreto, which differs in having a smooth stem and a petiole sheath that extends to the base of the blade and obscuring the geniculum.

Paratype: COSTA RICA. **Limón**: Evergreen forest (tropical-premontane wet forest transition) and secondary growth near the Río Catarata (Río Sand Box) in the hills between BriBri on the Río Sixaola and the Caribbean coastal plain, 09°37'48»N 82°48'36»W, 50–100 m, 7–9 September 1978, *W.C. Burger & T.M. Antonio 10924* (F).

Rhodospatha dressleri Croat, **sp. nov.** — Type: PANAMA. Panamá: Cerro Campana, ca., 600–800 m, ca. 08°41' N, 79°55' W, 30 September 1976, *R. Dressler 3046* (holotype, PMA-6160).

[*Rhodospatha antonensis* Croat & O.Ortiz, *Aroideana* 46(3): 90. 2023, *pro parte, quoad specim. cit. Dressler 3046* (MO), not as to the type].

Diagnosis: The species is characterized by its short internodes with the epidermis prominently ridged and somewhat flaking, its narrowly obovate, elliptic, gray-drying blades 1.3–2.3 times longer than broad, and by its interprimary veins usually lacking.

Habit unknown, probably terrestrial; **internodes** short, 1.0–1.5 cm diam., epidermis drying yellow-brown, prominently ridged and somewhat flaking; **petioles** 23.5–27.0 cm long, sheathed most of its length, free part 3 cm long, sharply sulcate on drying, dark brown; **blades** narrowly obovate-elliptic 31.5–37.5 cm long, 16.9–17.1 cm wide, 1.3–2.3 times longer than broad, 1.1–1.3 times longer than petioles, rounded and abruptly short-acuminate at apex, inequilaterally rounded at base, subcoriaceous, dark green and matte above, slightly paler and weakly glossy below, drying gray and matte and smooth above, semiglossy and grayish yellow-brown, densely dark-granular-speckled below; midrib drying sunken and slightly paler above, narrowly raised and more or less concolorous below; **primary lateral veins** departing midrib at 65–70°, sunken above, drying concolorous above, narrowly rounded-raised and slightly darker

below; interprimary veins often lacking but with usually 2 minor veins present between each pair of primary lateral veins; cross-veins lacking. INFLORESCENCE erect, short-stipitate; peduncle 15 cm long, drying 4 mm diam., brownish; **spathe** drying dark brown, 15.5 cm long, ca. 10 cm wide when flattened, surfaces matte, densely pale-granular on both surfaces; **spadix** 12.8 cm long, 10 mm diam., weakly glossy, weakly stipitate, stipe 3 mm long; pistils sub-quadrangular, 1.6–2.1 mm long and wide; mature berries not seen. **Figure 11.**

Distribution — *Rhodospatha dressleri* is endemic to Panama, known only from the type locality on Cerro Campana at 600–800 m in a *Tropical moist forest* life zone.

Etymology — The species is named in honor of the late Robert Dressler who spent most of his career with the Smithsonian Tropical Research Institute and who collected the type specimen. Dressler, an orchid specialist, had a good eye for interesting and rare aroids and collected many of them during the course of his work.

Comments — The species is apparently closely related to *Rhodospatha antonensis* known only from nearby El Valle de Antón at La Mesa and on Cerro Pilón. That species differs by having the upper blade surfaces drying dark brown, not grayish, lacking dark blackish speckles on the upper surface and lacking the conspicuous dark speckles on the lower surface as well as by having a longer peduncle to 25 cm long.

Rhodospatha forgetii N.E.Br. ('*Forgetii*') in Stapf, Bull. Misc. Inform. Kew 1913(9): 358. 1913. — Type: Cultivated Hort. Sander, St. Albans, Herts., England, ex Costa Rica (orig. coll. L. Forget, precise locality unknown), 2 August 1913, *N.E. Brown, s.n.* (holotype, K).

Robust appressed-climbing epiphyte. JUVENILE PLANTS: terrestrial appressed; stems green, glossy, smooth, cylindrical; **internodes** 3–5 cm long, 3.0–6.0 mm diam.; **petioles** dark green, smooth, 7–30 cm long; **blades** lanceolate to elliptic, inequilateral, acute to narrowly rounded at the base, acuminate at apex, 12–25 × 4.5–8.0 cm. ADULT PLANTS: root climbers; **stems** dark-green, glossy, cylindrical or slightly flattened, smooth; **internodes** 6–8 cm long, 1.9–2.7 cm diam.; anchor roots light brown; feeder roots dark; petiole light-green, smooth, 24–71 cm long, sheathed to base of the geniculum; petiole sheath deciduous with fibrous remains; geniculum smooth, sunken adaxially, convex abaxially, 2–6 cm long; **blades** lanceolate to elliptic, inequilateral, 33–82 × 11.9–29.9 cm, 2.7–3 times longer than wide, subcoriaceous, with the new leaves reddish, cuneate to attenuate at base, acuminate at apex, decurrent on the geniculum; midrib sunken adaxially, convex abaxially; **primary lateral veins** 23–27 per side, sunken adaxially, prominent abaxially; collective veins not visible; secondary veins prominent and parallel towards the margin; margins undulate. INFLORESCENCES in ascending stems, 1 or 2 simultaneously at flowering time, arranged in the axils of the leaves or into a green cataphyll; peduncle smooth, 13.5–26.0 cm long; **spathe** acuminate to long-acuminate, membranous, completely open, with margins overlapping at base, brownish-orange externally during development, pale pink externally and internally at anthesis, 18.1–36.0 × 6.5–9.0 cm, up to 6 cm longer than the spadix, with longitudinal pinkish veins internally at anthesis, not deciduous; **spadix** cylindroid and weakly tapered to the blunt apex, 11.2–22.0 cm long, 1.1–1.6 cm diam., with 9–11 flowers in principal spiral and 17–19 in the alternate spiral, lilac during development and pinkish at anthesis, sessile or stipitate up to 6 mm; flowers



Figure 11: *Rhodospatha dressleri*. R. Dressler 3046 TYPE

5–6 mm long; stamens 1.5–5.0 mm long; anthers 0.5–1.0 mm long; ovary quadrangular in longitudinal section, 2–3 × 1.3–2.0 mm; style quadrangular or hexagonal, 1.3–20 × 1.8–2.7 mm; stigmatophore columnar; stigma linear with a transparent stigmatic secretion; berries unknown; seeds unknown. Flowering has been recorded in April. The above description of *R. forgetii* is taken in its entirety from Cedeño et al., 2023. **Figures 12–15.**

Distribution — The species is endemic to Costa Rica. It is located in the region of Pérez Zeledón, at about 1800 m, on the Pacific slope in the Cordillera de Talamanca in *Tropical wet forest* and *Premontane rain forest* life zones, in primary forest.

Comments — *Rhodospatha forgetii* could be confused with *Rhodospatha wendlandi*, but differs in having oblong or lanceolate to elliptical blades (vs. oblong-oblancoate blades), cuneate to attenuate at base (vs. rounded to truncate, or subcordate), and pinkish, naviculiform spathes (with broad margins overlapping at base) (vs. lanceolate, white to creamy spathes). *Rhodospatha forgetii* is the only species of the genus with non-deciduous pinkish spathes at male anthesis. The spathe remained open for two days with overlapping margins at the base, releasing a very candy scent only during the night (Cedeño et al., 2023)

Additional specimens seen: COSTA RICA. **San José:** Pérez Zeledón, Reserva Cloudbridge, 1800 m, 25 April 2023, *O. Cubero 01* (USJ); San José, Pérez Zeledón, Reserva Cloudbridge, 1800 m, 25 April 2023, *O. Cubero 02* (USJ); San José, Pérez Zeledón, Reserva Cloudbridge, 1800 m, 25 April 2023, *O. Cubero 03* (USJ). *Cultivated material:* **Costa Rica:** Cultivated at the Hort. Edinburgh, *Hort. Edinb. s.n.* (K).

Rhodospatha guanchensis Croat, **sp. nov.** — Type: PANAMA. Colón: Río Guanche, along highway between Colón and Portobello, 3 km w of highway, 28 February 1986, *B.Hammel & G.McPherson 14571* (holotype, MO 3491515-16).

Diagnosis: The species is characterized by its terrestrial habit, its ovate-elliptic, green-drying blades with weakly subcordate base and prominent cross veins but especially by its petioles which are sheathed to only 1/2 their length.

Terrestrial; stems not seen; **petioles** 68–82 cm long, weakly ribbed adaxially, drying gray-green adaxially and on sheath, usually yellowish green toward apex and on the unsheathed portion, tan-brown at base on that portion covered by the next higher petiole, sheathed 2/5 to 1/2 their length; sheath entire; geniculum 2.5–3.0 cm long, positioned 2.5 cm below the blade, drying darker green and narrower than the rest of the petiole, 3–4 mm diam.; **blades** ovate-elliptic, 47.0–53.7 cm long, 21.8–26.0 cm wide, 2.0–2.3 times longer than wide, gradually long-acuminate at apex, rounded and weakly cordulate at base, drying gray-green above, much paler and yellow-green beneath; midrib weakly sunken and concolorous above, thicker than broad and slightly darker beneath, drying matte with numerous minute white raphide cells; **primary lateral veins** 23–30 per side, departing midrib at 70–90°, markedly curved upward to the margin (especially in outer 1/3), drying round-raised; interprimary veins 1 between each pair of primaries and with 1 or 2 additional minor veins intervening between the primary and interprimary veins; cross veins numerous and conspicuous on drying on lower surface; tertiary veins moderately visible on lower surface. **INFLORESCENCE** 42–56 cm long; peduncle



Figure 12: *Rhodospatha forgetii*. Habit of flowering plant. Photo O. Cubero



Figure 13: *Rhodospatha forgetii*. Habit of flowering plant. Photo O. Cubero



Figure 14: *R. forgetii*. The specimen is N.E. Brown s.n., holotype (K)



Figure 15: *Rhodospatha forgetii*. L. Forget s.n., inflorescence (K) Cultivated at the Hort. Edinburgh, Hort. Edinb. s.n.

30–40 cm long, drying tan, 5–6 mm diam.; **spathe** not seen; **spadix** yellow-green at anthesis becoming gray-green, 9–14 cm long, drying 9–12 mm diam, stipitate 7–8 mm, the stipe 3–4 mm diam.; flowers 14–17 visible per spiral; pistils mostly bluntly 4- or 5-sided, to almost rounded, 1.2–1.4 mm diam, covered on apex with a dense grayish frost-like covering; stigma oblong-elliptic, black, 0.6–0.8 mm diam., 0.4–0.5 mm wide, moderately elevated on drying, concave medially. INFRUCTESCENCE ca. 1.5 cm diam.; seeds rounded, 0.8 mm diam, 1.5 mm thick, white with red-brown outer border. **Figures 16–24.**

Distribution — *Rhodospatha guanchensis* is endemic to Panama, known only from the type locality in Colón Province of Panama in *Tropical wet forest* at 10–100 m elevation.

Etymology — The species is named for the type locality along the Río Guanche in Colón Province.

Comments — *Rhodospatha guanchensis* occurs with the much more abundant *R. moritziana* Schott and both occur on slopes along riverbanks.

It is similar to *Rhodospatha zamorana* Croat (ined.; Delannay & Croat, in prep.) from Ecuador, but that species has petioles sheathed nearly throughout and blades with dark margined primary lateral veins and inconspicuous cross veins. Another similar species is *R. sparrei* Croat (ined.; Delannay & Croat, in prep.) which also has fully sheathed petioles and blades lacking cross veins on the lower surface with both surfaces minutely granular rather than smooth as in *R. guanchensis*.

Paratypes: PANAMA. **Colón**: Río Guanche, between Puerto Pílon and Portobello, ca. 1.5 miles S of road, 09°30'N 79°39'W, 100 m, 19 June 1994, *T.B. Croat & G.H. Zhu 76252* (COL, CUCV, HUA, MO); Along Río Guanche, 3–5 km above bridge on Colón–Portobello Road, 09°30'N 79°39'W, 30–100 m, 22 September 1996, *T.B. Croat 75358* (MO); Ca. 2–3 miles up the Río Guanche, lowland rainforest, 09°30'30"N 79°39'30"W, 10–20 m, 19 January 1973, *Helen Kennedy & Robin B. Foster 2206* (MO).

Rhodospatha heraclioana Croat, **sp. nov.** — Type: PANAMA. Kunayala: Río Playon Chico, bajando hacia la desembocadura; 09°15'N 78°15'W, 50–100 m, 1 March 1992, *Heracio Herrera, Jimmy Mojica & Johny Morris 1165* (holotype, MO- 4257187; isotype, PMA).

Diagnosis: The species is characterized by its small size, elongate, light brown, conspicuously fissured stems, pale yellow-brown, sharply longitudinally ridged stems with elongated internodes, nearly fully sheathed petioles with the sheath persisting intact, narrowly elliptic to narrowly ovate-elliptic, brown-drying blades which are 2.5–3.6 times longer than wide, undulate primary lateral veins, moderately short-pedunculate, short-stipitate inflorescence with a pinkish spadix.

Appressed-climbing epiphytic in understory; **internodes** ca. 1 cm diam., drying 9–11 mm diam., pale yellow-brown, sharply longitudinally ridged; **petioles** 12.0–16.5 cm long, sheath extending to within 5–11 mm from blade; geniculum 1.0–1.5 cm long, sharply and narrowly



Figure 16: *Rhodospatha guanchensis*. Petioles and inflorescence in habitat, T.B. Croat & G.H. Zhu 76252



Figure 17: *Rhodospatha guanchensis*. Adaxial leaf surface, T.B. Croat & G.H. Zhu 76252, cultivated at MO. Photo L. Jankowski



Figure 18: *Rhodospatha guanchensis*. Abaxial leaf surface, T.B. Croat & G.H. Zhu 76252, cultivated at MO. Photo L. Jankowski

sulcate, the margins often minutely wavy; sheath 3-5 mm high, drying dark brown, matte, margins entire; **blades** narrowly elliptic to narrowly ovate-elliptic, 14.2-29.1 cm long, 5.6-7.5 cm wide, 2.5-3.6 times longer than wide, 1.0-1.6 times longer than petioles, inequilateral, one side 5-7 cm wider, acute to narrowly acuminate with a short apiculum, dark green and matte above, moderately paler and semiglossy below, drying dark brown and matte, minutely areolate-granular above, dark reddish brown, weakly glossy and minutely granular below; midrib sunken and concolorous above, narrowly round-raised, minutely granular and concolorous below; **primary lateral veins** 9-14 per side, departing midrib at 40-55°, 5-11 mm apart, prominently undulate on drying; interprimary veins 1 between each pair of primaries and with no additional minor veins obvious between the primary and interprimary veins; cross-veins not visible. INFLORESCENCE shorter than leaves; peduncle 5-11 cm long, 3.5 mm diam.; **spathe** less than 13 cm long; **spadix** pink when immature, pale pink at anthesis becoming dark brown, 9.9-11.0 cm long, drying 12 mm diam, stipitate 10 mm, the stipe 4 mm diam.; flowers 12 or 13 visible per spiral; pistils mostly bluntly 4- or 5-sided, 4-5 mm long, 5-6 mm wide, covered on apex with a dense grayish frost-like covering; stigma oblong-elliptic, black, 0.6-0.7 mm diam., 0.2-0.4 mm wide, moderately elevated on drying, concave medially. INFRUCTESCENCE not seen. **Figure 25.**



Figure 19: *Rhodospatha guanchensis*. Stem & petiole bases, T.B. Croat & G.H. Zhu 76252, cultivated at MO. Photo L. Jankowski

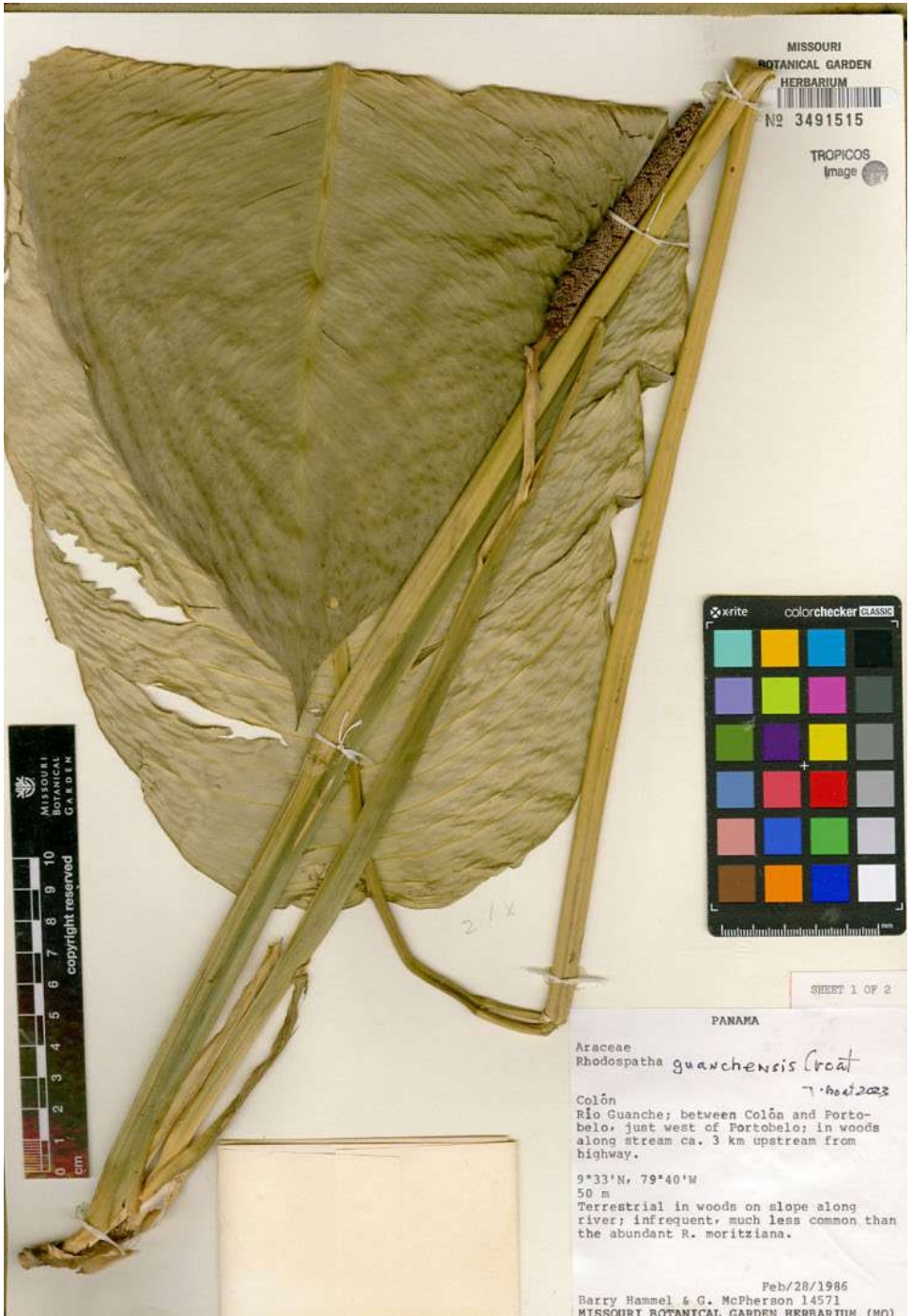


Figure 20: *Rhodospatha guanchensis*. B.E. Hammel & G. McPherson 14571, TYPE (Sheet 1)

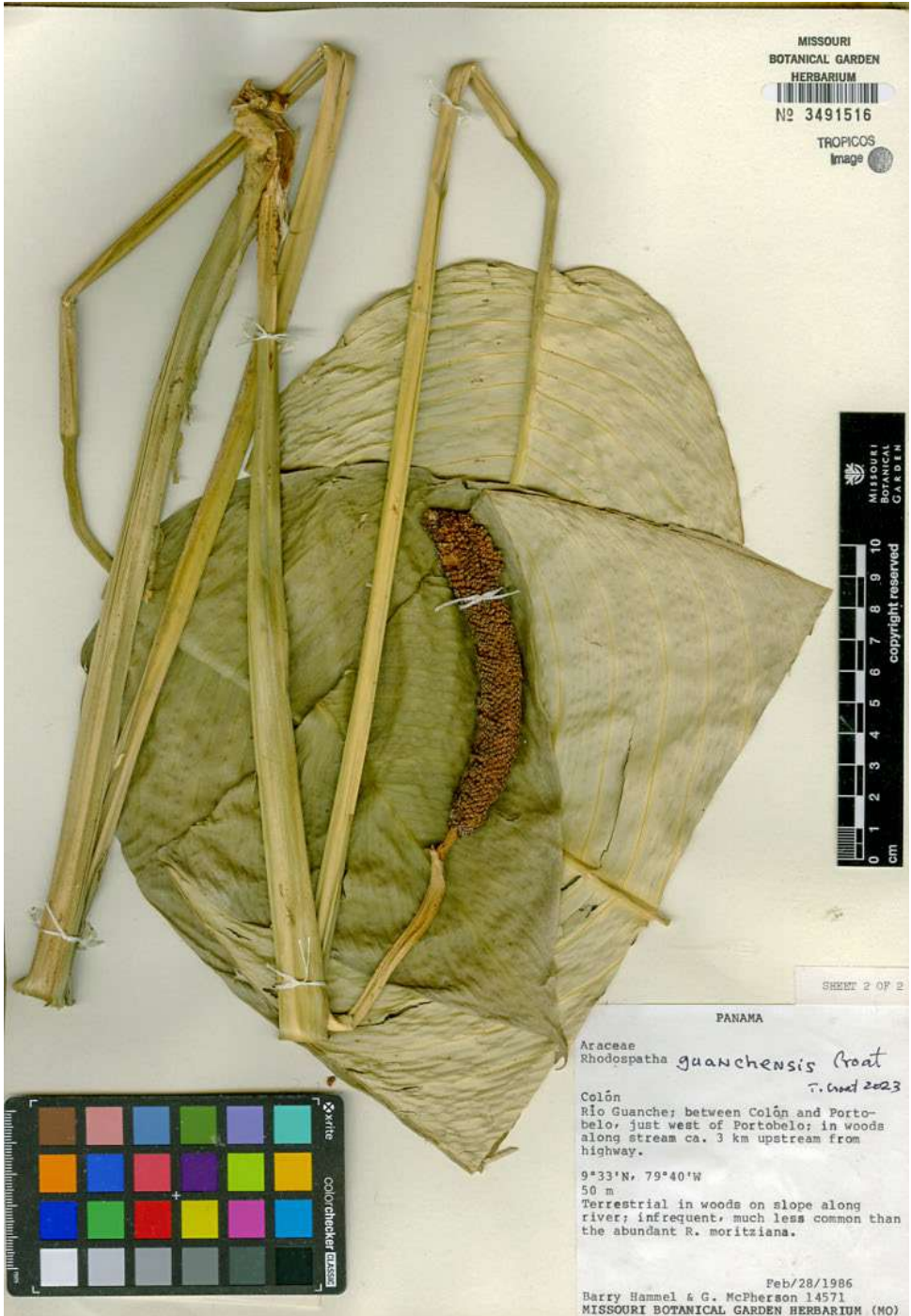


Figure 21: *Rhodospatha guanchensis*. B.E. Hammel & G. McPherson 14571, TYPE (Sheet 2)



Figure 22: *Rhodospatha guanchensis*. T.B. Croat & G.H. Zhu 76252 (Sheet 1)



Figure 23: *Rhodospatha guanchensis*. T.B. Croat & G.H. Zhu 76252 (Sheet 2)



Figure 24: *Rhodospatha guanchensis*. H. Kennedy & R.B. Foster 2206

Distribution — *Rhodospatha heraclioana* is endemic to Panama, known only from the type locality in Comarca Guna Yala at 50–100 m in a *Premontane wet forest* life zone.

Etymology — The species is named for indigenous botanist Heraclio Herrera who collected the type specimen. Heraclio is an experienced botanist, having collected over 16,000 numbers and was essential to have on expeditions into his native Comarca Kunayala.

Comments — The species is most easily confused with *Rhodospatha wendandii* but that species is a much larger plant with much larger blades (to 72 cm long), that dry medium reddish brown below. In contrast, *R. heraclioana* has blades less than 30 long and dry darker brown on both surfaces.

Rhodospatha knappiae Croat, **sp. nov.** — Type: PANAMA. Chiriquí: Trail west from Fortuna Dam Camp to La Fortuna, broadleaf cloud forest; 08°44'N 82°16'W, 1300 m, 28 February 1985, R.J. Hampshire & C. Whitefoord 170 (holotype, MO-5447297; isotype, BM).

Diagnosis: The species is characterized by its appressed-climbing epiphytic habit, short internodes, often with close transverse fissures, closely spaced, distichous, long-petiolate leaves; dark brown-drying petioles which are usually sheathed to the base of the geniculum with the sheath margin deciduous, mostly oblanceolate, abruptly acuminate, inequilateral leaf blades which are inequilaterally acute at the base, typically dark brown-drying or dark gray-brown-drying and matte on upper surfaces and yellowish brown and semiglossy below with many close primary lateral veins, a short-pedunculate inflorescence, a white spathe, cream to yellow slender spadix and yellow berries.

Appressed-climbing epiphyte usually growing at less than 3 m on tree or banks of ravine; **internodes** typically very short near apex but to about 1.0–1.5(2.0) cm long lower down, 1.5–2.5 cm diam., light brown-drying, usually drying longitudinally ridged, closely transverse-fissured. LEAVES distichously arranged on stem, long-petiolate; **petioles** 13.5–39.0 cm long, sheathed (0.5) 0.7 to fully throughout; geniculum drying much darker, 1.5–3.0 cm long; sheath mostly deciduous, sometimes with elongate fragments, sometimes with fibers, especially near the base; **blades** oblanceolate to elliptic-oblanceolate to narrowly elliptic, 25.5–57.3 cm long, 7.2–14.0(18.7) cm wide, (1.6) 2.7–4.9(5.4) times longer than wide, (0.7) 1.0–2.7 times longer than petioles, inequilateral (one side 1.0–1.5 cm wider), abruptly to gradually acuminate at apex, inequilaterally acute or sometimes rounded at base, dark green and matte or matte-subvelvety above, paler and semiglossy below, drying dark brown to dark gray-brown and weakly glossy above, somewhat paler and yellowish brown to grayish yellow-brown and semiglossy below; midrib sunken and concolorous above, narrowly raised and slightly paler, densely granular, matte and somewhat rufescent below; **primary lateral veins** 28–32 per side, departing midrib at 45–65(70)°; usually with a single distinct interprimary vein and 1 or 2 minor veins between the primaries; distinct cross-veins lacking; reticulate veins inconspicuous to prominulous. INFLORESCENCE short pedunculate; peduncle 8–21 cm long, 5 mm diam.; **spathe** white to greenish yellow outside, white to cream inside, (8.8) 12–19(23) cm, 5–6 cm wide, long-acuminate at apex; **spadix** white to yellowish, sometimes pinkish cream, (8.8) 10.2–15.5(18.5). INFRUCTESCENCE with berries yellow, to ca. 5 mm long. **Figures 26–33.**



Figure 25: *Rhodospatha heraclioana*. H. Herrera, J. Mojica & J. Morris 1165 TYPE

Distribution — *Rhodospatha knappiae* ranges from Costa Rica on the Caribbean slope of the Cordillera de Tilaran, Cordillera Central and Cordillera de Talamanca to Panama, (Bocas del Toro, Chiriquí, Veraguas and Coclé Provinces) at 200–1500 m elevation in *Premontane rain forest* life zone.

Etymology — The first collection of the species was made by Tom Croat in 1974 at La Mesa above El Valle. It is named in honor of Dr. Sandra Knapp who collected the next fertile specimen in the Fortuna Dam area in 1982. Sandy was working for the Missouri Botanical Garden at the time collecting for the Flora of Panama Project. She now works at the Natural History Museum in London and is a specialist on Solanaceae.

Comments — Three sterile collections (*O.O. Ortiz 1462 & Espinosa 6137*) from lowland Coclé Province and *L. Martínez et al. 1529* from lowland Colón Province are from very low elevations (172–200 m and 270 m respectively and may prove to be another species but show no clear distinction from *R. knappiae*.

Rhodospatha knappiae is seemingly most closely related to *R. wendlandii* Schott but that species differs by having stems longitudinally ridged, blades more nearly elliptic and 0.9–3.1 times longer than wide, longer petioles typically 30–80 cm long, larger blades, typically 36–75 cm long x 15–35 cm and with 28–52(70) primary lateral veins per side as well as by a longer spadix (13–26 cm long). In addition, the dried blades of *R. wendlandii* are typically dark brown on the lower surface.

A collection from Costa Rica (*S. Martén 969*) from Heredia Province at Horquetas de Sarapiquí in the Reserva Rara Avis at 700 m is unusual for the species in having the petiole sheaths drying intact. It otherwise falls within the range of variation of *R. knappiae*.

Croat 60404 from the Fortuna Dam area on the Caribbean slope north of the Continental Divide at 820 m is unusual in have broader than normal leaf blades which dry dark brown but it otherwise fits well in *R. knappiae* in having a transversely fissured stem.

Paratypes: COSTA RICA. **Alajuela:** Canyon of Río Cariblanco and W slope and summit of ridge between Río Cariblanco and Quebrada Quicuyal, SW of Cariblanco, 10°15'36"N 084°12'00"W, 840 - 950 m, 22 January 1986, *M.H. Grayum, et al. 6182* (MO); **Heredia:** Horquetas de Sarapiquí. Reserva Rara Avis. Sendero Guácimo., 10°17'03"N 084°02'47"W, 700 m, 23 July 1995, *Silvana Martén 969* (CR). PANAMA. **Bocas del Toro:** On route from Gualaca to Chiriquí Grande along the oil pipeline just north of the continental divide; in forest W of pipeline rd at end of drivable road; 8°46'N, 82°17'W], 08°49'N 082°13'W, 850 - 950 m, 08 March 1986, *B.E. Hammel, G. McPherson & L. Sanders 14702* (MO); 3 km W from dirt road 50 m before Bocas del Toro/Chiriquí Grande road, then off foot path to W., 08°46'48"N 082°14'00"W, 1000 m, 25 April 1993, *D. R. Hodel, J. Benzie & C. Hubbuch 1244* (MO); Gualaca-Chiriquí Grande, 1.6 mi N of Continental Divide., 08°48'N 082°13'W, 850 m, 29 March 1993, *T.B. Croat 74932* (MO); Along road between Fortuna Dam and Chiriquí Grande, along gravel road which departs main hwy. near Continental Divide (4.5 mi N of bridge over Fortuna Lake), just S of border with Bocas del



Figure 26: *Rhodospatha knappiae*. Habit, T.B. Croat 74802



Figure 27: *Rhodospatha knappiae*. Flowering plant with spathe, T.B. Croat 74768



Figure 28: *Rhodospatha knappiae*. Stem showing typical transverse scars, T.B. Croat & G.H. Zhu 76389



Figure 29: *Rhodospatha knappiae*. E.H.S. Churchill et al. 4808



Figure 30: *Rhodospatha knappiae*. T.B. Croat 74966



Figure 31: *Rhodospatha knappiae*. S. Knapp 5056



Figure 32: *Rhodospatha knappiae*. T.D. Pennington 11526



Figure 33: *Rhodospatha knappiae*. C.M. Taylor & C. Skotak 4804

Toro Province. [Coordinates on original label: 08°44'N, 82°17'W], 08°47'06"N 082°13'18"W, 1170 m, 22 June 1987, *T.B. Croat 66654* (MO); Cerro Colorado, 6.5 mi W of Chamé. Steep forested slopes N of road, 08°35'N 081°50'W, 1630 m, 07 July 1988, *T.B. Croat 69144* (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 60352* (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 60324* (MO); Along highway, between Fortuna and Chiriquí Grande, 2.2 mi N of Continental Divide, 6.3 mi N of bridge over Fortuna Lake. 08°46'06"N 082°12'30"W, 820 m, 12 March 1985, *T.B. Croat & M.H. Grayum 60404* (MO, PMA, US); **Chiriquí:** La Fortuna dam area, north of dam; along Quebrada Arena downstream from road crossing; in swampy forest along stream near continental divide., 08°46'N 082°14'W, 1000 m, 10 February 1986, *B.E. Hammel 14436* (MO); Vicinity of Fortuna Dam. Above lake., 08°45'N 082°15'W, 1100 m, 06 August 1986, *G. McPherson 9839* (MO); Fortuna Dam area, N of reservoir. Quebrada Bonito to E of road., 08°45'N 082°13'W, 1100 m, 23 May 1984, *H.W. S. Churchill 5252* (MO); Fortuna Dam area. Along Quebrada Bonito to E of road., 08°45'N 082°13'W, 1100 m, 08 February 1984, *E.H. S. Churchill, G.C. de Nevers & H. Stockwell 4808* (MO); SE of Fortuna Lake. Forest near mouth of Río Hornito., 08°45'N 082°13'W, 1150 m, 4 March 1985, *Rachel J. Hampshire & Caroline Whiteford 304* (MO); ear 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, *Sandy Knapp 5056* (MO); Near site of dam, lower slopes of Cerro Fortuna. IRHE Fortuna Hydroelectric Project., 08°44'59"N 082°14'40"W, 1150 m, 18 June 1982, *S. Knapp & M. R. Vodicka 5575* (MO); Gualaca-Chiriquí Grande, 7.2 miles beyond Los Planes de Hornito., 08°44'N 082°14'W, 1165 - 1200 m, 19 September 1987, *T.B. Croat 67842* (MO); Gualaca-Chiriquí Grande 8.0 miles beyond Los Planes de Hornito; 6.9 miles beyond road turnoff to Caldera, 1.4 miles to W of Centro de Operaciones; along trail to Río Hornito and meteorological station., 08°44'00"N 082°14'30"W, 1010 - 1130 m, 21 September 1987, *T.B. Croat 67916* (MO); Vicinity of Fortuna Dam in valley of Río Chiriquí; along aqueduct trail for water supply for IRHE facilities., 08°45'N 082°18'W, 1100-1200 m, 21 June 1987, *T.B. Croat 66591* (MO); Vicinity of Fortuna Dam in valley of Río Chiriquí; along aqueduct trail for water supply for IRHE facilities., 08°45'N 082°18'W, 1100-1200 m, 21 June 1987, *T.B. Croat 66594* (MO); 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 082°17'W, 1200 m, 29 March 1993, *T.B. Croat 74966* (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 66842* (B,F,MO,NY); 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 60071* (MO); Palo Santo, 3 miles N of Volcán., 08°48'48"N 082°40'12"W, 1350 m, 19 February 1971, *T.B. Croat 13582* (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 48667* (MO); Gualaca-Chiriquí Grande, vicinity Lago Fortuna, along trail to meteorological station on Río Hornito departing from highway N side, ca. 0.5 km S of Centro de Científicos. 08°45'N

082°18'W, 1000 m, 24 July 1994, *T.B. Croat & G.H. Zhu 76389* (MO); Fortuna Dam Area, Fortuna-Chiriquí Grande, 1.8 mi NW of center of dam., 08°45'N 082°18'W, 1080 m, 27 June 1994, *T.B. Croat & G.H. Zhu 76498* (MO); Fortuna Dam Area, Fortuna-Chiriquí Grande, 5.3 miles N of center of Fortuna Dam, then 1.4 miles W along gravel road to Continental Divide Trail. 08°44'N 082°17'W, 23 June 1994, *T.B. Croat & G.H. Zhu 76342* (MO); Gualaca. Reserva Forestal Fortuna. Division Continental., 08°48'09"N 082°11'55"W, 961 m, 06 marzo 2014, *O.O. Ortiz & Villareal, Gabriel 2118* (MO); **Coclé**: El Copé. Forest on continental divide above town. 8°38'N, 80°38'W, 08°40'30"N 080°37'45"W, 700 - 900 m, 27 April 1985 - 29 April 1985, *B.E. Hammel 13657* (MO); Parque Nacional Omar Torrijos. La Rica. Bosque cercano al Río Juan Julio. 08°42'43"N 080°35'30"W, 200 m, 22 julio 2013, *O.O. Ortiz 1452* (MO, PMA); 5.5 mi N of El Copé: trail along Continental Divide. [Coordinates on original label: 08°38'N, 080°35'W], 08°40'24"N 080°35'48"W, 850 m, 07 April 1988, *Sue A. Thompson 4721* (CM, 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 37321* (MO); Near continental divide along lumber road 5.2 mi N of El Cope, 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 44590* (MO); Near continental divide along lumber road 5.2 mi N of El Cope, 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 44571* (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 67198* (MO, US); 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 74802* (MO); Alto Calvario along summit of Continental Divide, 5.5 mi N of El Copé; 3.5 mi N of Escuela Barrigón. 08°40'11"N 080°35'37"W, 850 m, 13 September 1987, *T.B. Croat 67579* (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.H. Zhu 76700* (MO); La Pintada. Parque Nacional G.D. Omar Torrijos H. Area de Calle Larguita (Palmarazo), camino a la zona de la quebrada la Sinforosa, 08°43'10"N 080°40'39"W, 172 m, 18 julio 2013, *Álex Espinosa 6137* (MO, PMA); Parque Nacional General de División Omar Torrijos Herrera. La Rica. Bosque cercano al río Juan Julio, 08°42'43"N 080°35'30"W, 200 m, 22 julio 2013, *O.O. Ortiz 1462* (MO, PMA); 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 68726* (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 74829* (B,K,MO,NY,US). **Colón**: Portobelo. Parque Nacional Portobelo. Cascajal. Bajo Bonito. Bosque cercano al Camino Real. 09°30'27"N 079°32'15"W, 270 m, 15 agosto 2013, *O.O. Ortiz 1529* (MO, PMA); **Panamá**: Cerro Campana, 6.1 miles above Pan-American Hwy. 3.2 miles beyond park entrance and Guarda Bosque Station, 08°41'N 079°56'W, 800 m, 23 March 1993, *T.B. Croat 74768* (MO); **Veraguas**: Distrito de Santa Fe. Area propuesta para conservación. Río Belón. 08°43'06"N 080°45'22"W, 207 m, 17 December 2013, *Alvin Zapata et al. 3462* (MO); Distrito de Santa Fe. Limite Norte del Parque Nacional Sante Fe. Qda El Centro, affluente de Río Dos Brazos, próximo a Río Veraguas. 08°42'19"N 080°53'17"W, 244 m, 08 febrero 2014, *Alvin Zapata et al. 3509* (MO); Santa Fe. Above Santa

Fe beyond Escuela Agrícola Interamericana, 1.8 miles beyond fork in road on Pacific slope; above rocky ravine on side of Cerro Tute. 08°30'49"N 081°02'11"W, 700 - 1000 m, 05 April 1976, *T.B. Croat 34152A* (MO); 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, 1000 - 1050 m, 30 November 1979, *T.B. Croat 48942* (MO); Cerro Tute region, above Sante Fé, 08°31'N 081°07'W, 800 - 1400 m, 20 March 1982, *W.J. Kress & S. Knapp 82-1420* (DUKE).

Rhodospatha monsalveae Croat & D.C.Bay, *Aroideana* 27: 90–129. 2004. — Type: COLOMBIA. Valle del Cauca: Bajo Calima Region; along road from Buenaventura to Río Calima, near km marker 14, ca. 4 km s. of Río Calima, 3°56'N, 76°59'W, less than 50 m, 21 Mar. 1984, *T.B. Croat 57526* (holotype, MO–3187779; isotypes COL, JAUM).

Usually an appressed–climbing epiphyte mostly to 2.5 m, rarely terrestrial as an adult; stems usually less than 1 m long; **internodes** short, mostly 3–5 cm diam on adult plants, (much smaller on preadult plants. JUVENAL PLANTS with internodes to about 8 cm long, 4 mm diam); the epidermis (where visible on the older part of the stem), green to gray, turning light brown, deeply and conspicuously longitudinally sulcate and sharply ridged, with transverse fissures; cataphylls 16–53 cm long, drying light brown with loose, dark brown margins. LEAVES held more or less erect; **petioles** sheathed to the geniculum, 22–62 cm long, pale green to medium green, minutely pale-speckled, drying usually reddish brown, sometimes yellowish brown, sometimes irregularly and deeply fissured on drying (the surface densely granular and with raphide cells on magnification); sheath drying dark brown, usually deciduous or with some pieces adhering along its length; geniculum sharply and broadly V-sulcate, 2–4 cm long, sometimes with a weak, spreading wing on the margins; **blades** subcoriaceous, oblong-elliptic to oblanceolate-elliptic, subcoriaceous, inequilateral (one side 1–3 cm wider than the other), 45–88 cm long, (11)15–29 cm wide, broadest at middle or slightly above the middle, (1.8) 2.8–3.8 times longer than broad, 1.1–2.0 times longer than petiole, obtuse and acuminate to abruptly acuminate at apex, acute to somewhat rounded and somewhat attenuate at base, (both apex and base more or less equilateral), semiglossy, slightly to conspicuously bicolorous, dark green above, moderately to much paler beneath, drying usually dark grayish green above, dark reddish brown below, sometimes dark brown above, yellowish brown below; midrib much paler and deeply sunken and marginally discolored in a band 3–5 mm wide along either side of midrib above, prominently raised and thicker than broad below, drying minutely granular on magnification; **primary lateral veins** to 50–60 (85) per side, departing midrib at 60–85° and only weakly curved to the margins, (sometimes departing midrib at an acute angle or in a narrow curve before spreading to the margin), 5–14 mm apart, mostly less than 10 mm apart, getting farther apart towards the apex of the blade, sunken above, raised below, drying somewhat lighter than surface below; interprimary veins usually 1 per pair of primary lateral veins, drying inconspicuously darker than or lighter than surface; minor veins mostly 1 or 2 between each pair of interprimary and primary lateral veins, sparsely granular on magnification; cross-veins oblique, weak to prominulous, more prominent toward the margins, usually branched, sometimes forming reticulate veins; the surface moderately glossy, moderately densely dark granular on magnification. INFLORESCENCE erect; peduncle 26–30 cm long, ca 1 cm diam; **spathe** greenish white, somewhat yellower toward the margins, white inside, 14–28 cm long, to 4.7 cm diam. (unfurled), to 8 cm wide when flattened, oblong–elliptic and narrowly long-acuminate before opening; **spadix** white to cream, yellow or yellowish tan, pale orange to pale purple-violet or reddish, becoming green post

anthesis (6) 11.0–20.5 cm long, 9–15 mm diam, stipitate to 1–3 cm, moderately tapered to a bluntly acute apex, becoming pale green post-anthesis; pistils mostly irregularly and smoothly to acutely 6-sided, frequently rhombic, sometimes appearing almost rounded, 1.4–1.8 mm diam, sometimes broader than long, the margins straight to convex or weakly sigmoid; style drying brownish and truncate at apex; sides of the pistils brown, sparsely warty; stigmas raised, drying black and shiny, oblong to oblong-elliptic to elliptic, 0.6–1.4 mm long, 0.2–0.5 mm wide, depressed medially, becoming somewhat rounded in fruit and often funnellform; anthers 0.6–0.8 mm long, 0.5 mm wide; sterile flowers only a few at the base of spadix (but at least one post-anthesis inflorescence with up to 3 cm of the spadix eaten away); INFRUCTESCENCE to 23 cm long, 2 cm diam; seeds reniform to rounded and flattened, 1.0–1.1 mm long, 0.8–1.0 mm diam, tan. **Figures 34–42.**

Distribution — *Rhodospatha monsalveae* ranges from Panama to Colombia (Antioquia, Chocó, Valle del Cauca, Nariño) and Ecuador (Carchi, Esmeraldas, Pichincha) from sea level to 2200 m where it is restricted to the Pacific slope in *Tropical wet forest* and *Tropical rain forest* transition to *Premontane wet forest* life zones.

Comments — The species is characterized by its light brown, conspicuously fissured stems, petioles sheathed to the geniculum, usually drying reddish brown with the sheath usually deciduous with dark brown persistent fragments, a sharply sulcate geniculum and blades which are more or less equilateral and decurrent at the base, drying usually grayish green above, reddish brown below with conspicuous, mostly oblique, cross veins that are frequently branched and with a lower surface that is minutely dark-granular on magnification.

Additional Specimens seen: COLOMBIA. **Antioquia:** Parque Natural “Las Orquideas”, Sector Calles Río Calles, above confluence of Río Polo, 1400 - 1430 m, *Álvaro Cogollo P. & et al.* 2759 (JAUM); Alto de Cueras, 10 km E of La Blanquita, 12 km W of Nutibara, cloud forest. Non-transect, 06°40'N 076°30'W, 1680 m, 2 March 1992, *A.H. Gentry, C.E. Barbosa & D. Cárdenas L.* 76030 (MO); Amalfi. Area de influencia del proyecto hidroeléctrico porce II. Bosque Caimán en la vía Medellín-Amalfi. 06°48'N 075°08'W, 950 m, 21 Agosto 1999, *A. A. Rivas & et al.* 81 (HUA); Area de influencia del proyecto hidroeléctrico porce II Bosque Normadia. En la vía Medellín-Amalfi. 06°47'N 075°08'W, 950 m, 22 mayo 1999, *A. A. Rivas & Juan C. Benavides* 50 (MO); Urrao. Las Orquídeas: Vereda Calles; Parque Nacional Natural Las Orquídeas; Quebrada Honda. Inventario Permanente de bosque húmedo premontano; en el filo al NW de La Cabaña Calles; Parcela W, subparcelas W 2-W 3. 06°29'N 076°14'W, 1300 m, 08 diciembre 1992, *J. Pipoly ..et al.* 16823 (MO); Corregimiento La Encarnación, vereda Calles, Parque Nacional Natural Las Orquideas, camino Calles - La Encarnación, después de la confluencia del río Polo y el río Calle y antes del río San Pedro, sitio La Quiebra. 06°30'N 076°14'W, 1600 - 1850 m, 31 enero 2011 - 02 febrero 2011, *Betancur et al.* 14915 (MO); **Cauca:** Parque Nacional Munchique, 3 km W of summit on road between Popayan and Viente de Julio. GPS coordinates. 02°32'05"N 076°58'37"W, 2275 m, 20 July 1997, *T.B. Croat & John F. Gaskin* 80127 (CAUP, MO); Along road between Popayan and Munchique; Parque Nacional Munchique, 7 km W of summit. GPS coordinates. 02°31'50"N 077°00'23"W, 2090 m, 19 July 1997, *T.B. Croat & J. F. Gaskin* 80057 (CAUP, MO); Along road from Popayan to Juntas through Parque Nacional Munchique, 21 km beyond summit, Pacific slope of Western Cordillera. GPS coordinates. 02°30'48"N 077°02'33"W, 900 m, 19 July 1997, *T.B. Croat & J.*



Figure 34: *Rhodospatha monsalveae*. Habit, Colombia, Valle: Bajo Calima, T.B. Croat 70179



Figure 35: *Rhodospatha monsalveae*. Habit of flowering plant, Colombia. Nariño: Ricaurte, Habit of type plant, T.B. Croat 57526



Figure 36: *Rhodospatha monsalvae*. Habit, leaves, adaxial surface, Colombia, Valle: Bajo Calima, T.B. Croat 70150

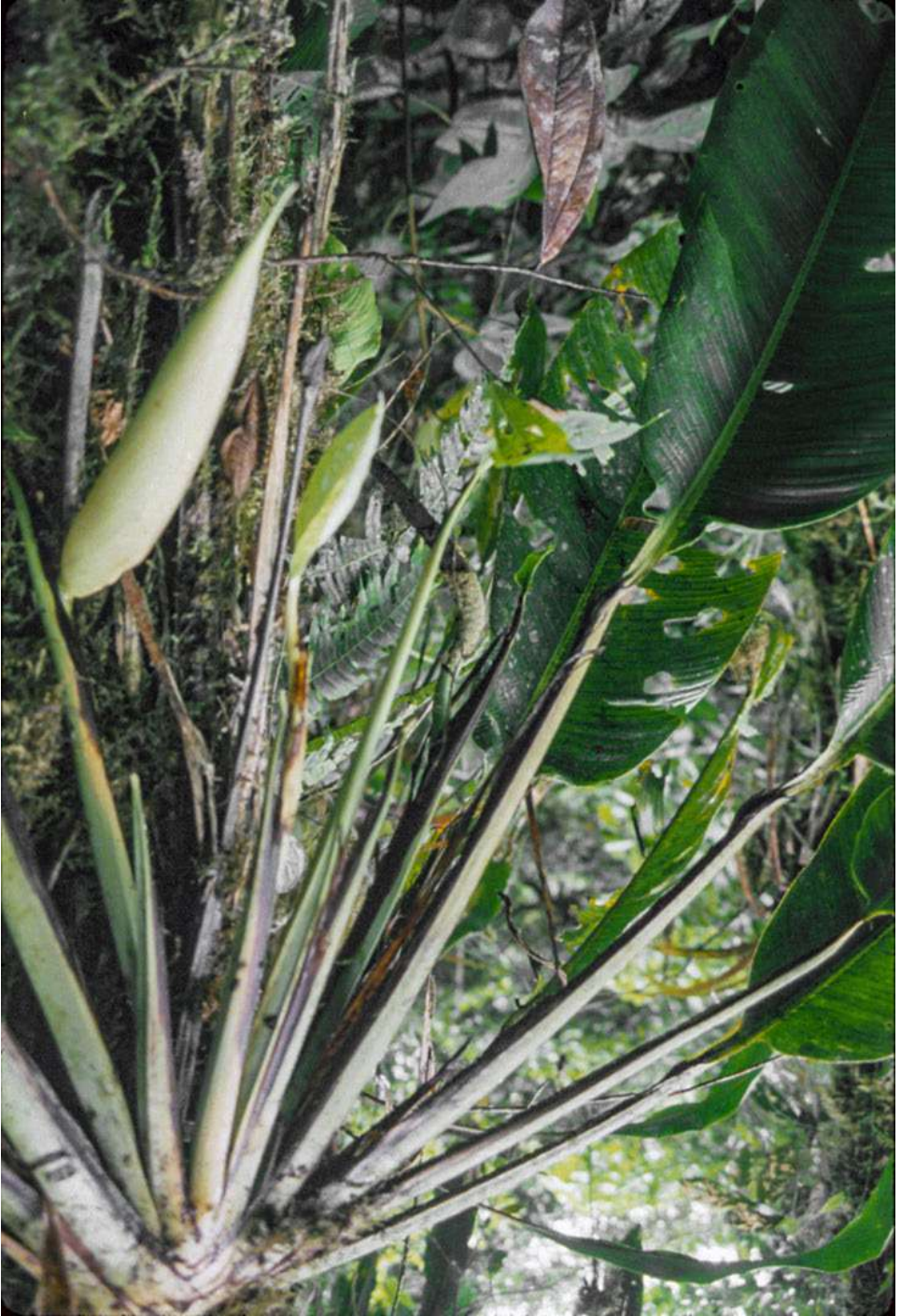


Figure 37: *Rhodospatha monsalveae*. Habit of flowering plant, Colombia. Nariño: Río Ñambí, T.B. Croat 72400



Figure 38: *Rhodospatha monsalvae*. Inflorescence, with droplets, T.B. Croat 71675



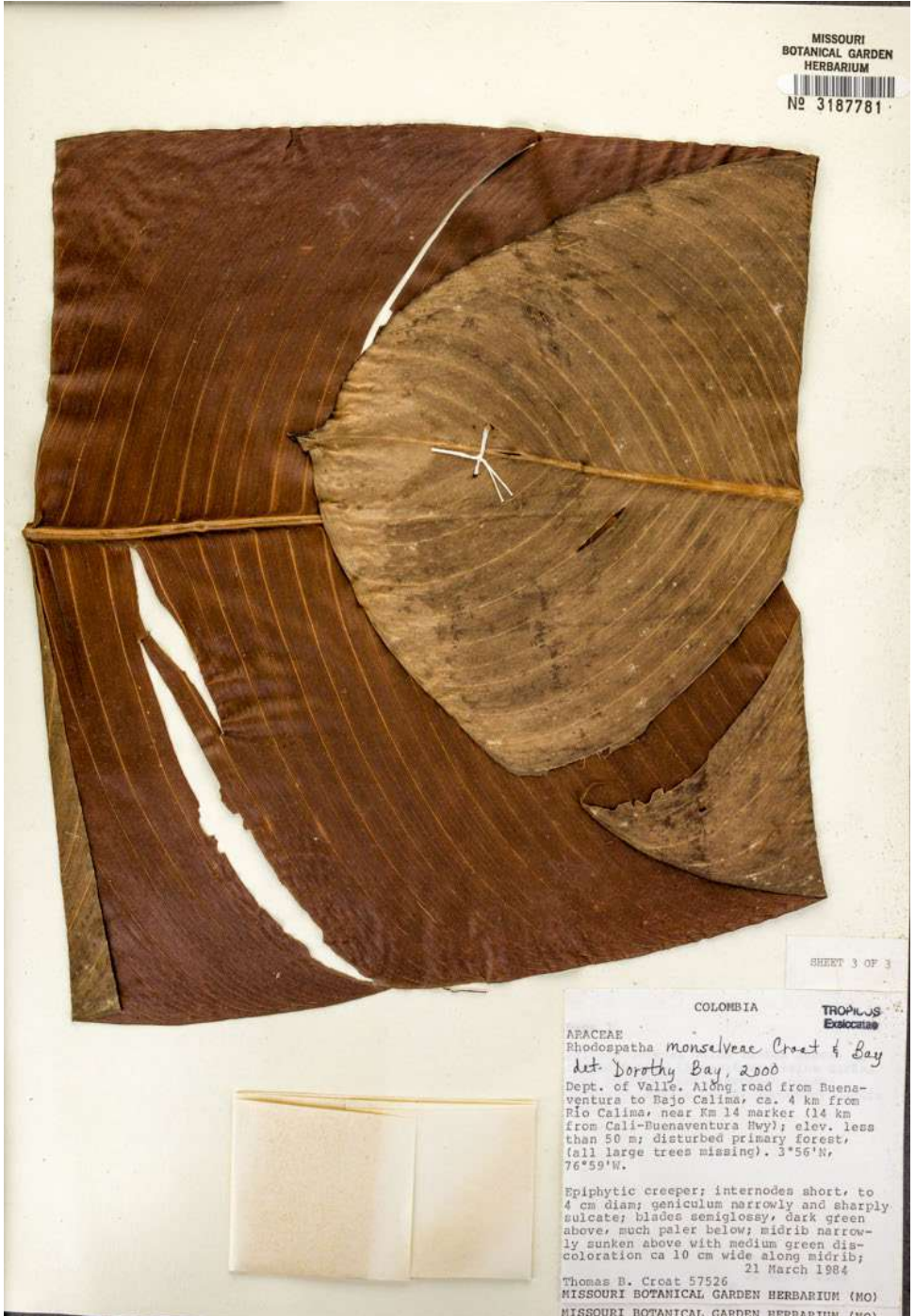
Figure 39: *Rhodospatha monsalvae*. Inflorescence post anthesis, T.B. Croat 72400



Figure 40: *Rhodospatha monsalvae*. T.B. Croat 57526, TYPE (Sheet 1)



Figure 41: *Rhodospatha monsalvae*. T.B. Croat 57526, TYPE (Sheet 2)



MISSOURI
BOTANICAL GARDEN
HERBARIUM
No 3187781

SHEET 3 OF 3

COLOMBIA **TROPICUS**
Ericaceae

APACEAE
Rhodospatha monsalvae Croat & Bay
det. Dorothy Bay, 2000

Dept. of Valle. Along road from Buena-
ventura to Bajo Calima, ca. 4 km from
Rio Calima, near Km 24 marker (14 km
from Cali-Buenaventura Hwy); elev. less
than 50 m; disturbed primary forest,
(all large trees missing). 3°56'N,
76°59'W.

Epiphytic creeper; internodes short, to
4 cm diam; geniculum narrowly and sharply
sulcate; blades semiglossy, dark green
above, much paler below; midrib narrow-
ly sunken above with medium green dis-
coloration ca 10 cm wide along midrib;
21 March 1984

Thomas B. Croat 57526
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)

Figure 42: *Rhodospatha monsalvae*. T.B. Croat 57526, TYPE (Sheet 3)

F. Gaskin 80079 (CAUP, MO); **Chocó:** Top of Serrania del Darien, 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 16806* (MO); Along road between Quibdó and Las Animas, ca 1 km N of Las Animas; disturbed forest with large trees missing. 05°14'N 076°40'W, 100 m, 15 April 1983, *T.B. Croat 55956* (CM, COL, JAUM, LE, MO, CHOCO); Along road between Quibdó and Lloro ca 5 km E of turnoff along Quibdó-Las Animas road ca 1 km S of ferry over Río Atrato; 5°29'N, 76°35'W; elev. ca 150 m. 05°29'N 076°35'W, 150 m, 16 April 1983, *T.B. Croat 56006* (COL, JAUM, MO); Vicinity of Quibdó, along road between Quibdó and Istmina at Km 4. Lower montane rain forest, 06°28'N 076°36'W, 100 m, 18 December 1980, *T.B. Croat 52242* (COL, JUAM, MO); Vicinity of Quibdó, along road between Quibdó and Istmina at Km 4. Lower montane rain forest, 06°28'N 076°36'W, 100 m, 18 December 1980, *T.B. Croat 52243* (COL, JUAM, MO); Along rd between Quibdó and Medellín, at Km 136.4, 63 Km E of Tutunendo 46 km west of Bolívar, 05°47'N 076°22'W, 960 m, 22 April 1983, *T.B. Croat 56347a* (JAUM); 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 steep trail up hogback ridge beginning at west end of bridge. 05°20'30"N 076°13'45"W, 240 - 350 m, 23 February 1990, *T.B. Croat 70942* (AAU, CAS, F, MEXU. MO, SEL); Road between Medellín and Quibdó; at Km 159. 05°44'33"N 076°29'24"W, 480 m, 13 April 1983, *T.B. Croat 55931* (CHOCO, MO); Along road between Quibdó and Medellín, 25 mi E of Quibdó. 05°51'51"N 076°27'04"W, 200 m, 18 December 1980, *T.B. Croat & Álvaro Cogollo P. 52295* (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 & John F. Gaskin 80795* (MO); Along Highway 60 between Quibdó and Bolívar (Antioquia), 12.5 km E of Tutunendo. 05°45'N 076°30'W, 240 m, 16 August 1997, *T.B. Croat & John F. Gaskin 80930* (MO); Nuquí. Quebrada, Chaqui, 05°40'N 077°16'W, 200 m, febrero 1994 - marzo 1994, *Gloria A. Galeano, J. Grueso, O. Hurtado & Perea 4538* (MO); Corregimiento de Arusí, Estación Biológica El Amargal. 05°34'N 077°31'W, January 1999 - April 1999, *J. Jácome 371* (COL, MO); *J. Jácome 248* (COL, MO); 50 m, July 1998 - September 1998, *Marcela Mora 40* (MO); 05°34'14"N 077°30'10"W, 30 m, 17 June 2000, *T.B. Croat & Marcela Mora 83647 (=Mora 269), 83715 (=Mora 333), 83745 (=Mora 362), 83671 (=Mora 289), 83676 (=Mora 294), 83678 (=Mora 296), 83687 (=Mora 305), 83691 (=Mora 309), 83675 (=Mora 293)* (COL, MO); Quibdó. corregimiento de Guayabal, Río Hugón, 14 October 1985, *L. García 76* (CHOCO); San José del Palmar. Cerro del Torrá, vertiente del Río Negro, ca a 1 hora abajo del Helipuerto; bosque primario. Vereda de Río Negro. 1800 m, 14 August 1988, *Jorge E. Ramos & et al. 1202* (MO); **Cundinamarca:** Municipio La Vega; Hacienda La Primavera. Margen del río Perucho. 21 February 1974, *I. de Arevalo 79* (COL); **Nariño:** Road from El Espino to Tumaco; 30 km W of Ricaurte, 10 km W of Ataquier; El Mirador, Finca Santa Lucia; inforest N of Río Nambí, 01°17'N 078°07'W, 950 m, 09 December 1988, *B.E. Hammel & A. Naraváez 17195* (MO); Along road between Junín and Barbacoas, 18.1 km NE of Junín. 01°21'N 078°06'W, 940 m, 27 February 1992, *T.B. Croat 72440* (MO); Along road between Junín and Barbacoas, 18.1 km NE of Junín. 01°21'N 078°06'W, 940 m, 27 February 1992, *T.B. Croat 72441* (CUVC, HUA, MO, SEL); Along trail which leads from main Pasto-Tumaco Road to the Río Nambí, departing main road at Escuela Mixta El Mirador, 7 km W of Altaquer. 01°18'N 078°04'W, 1100 m, 26 February 1992, *T.B. Croat 72400* (IBE, MO, TEX, Z); 23.6 km N of Junín on

road to Barbacoas. 01°23'50"N 078°04'21"W, 588 m, 02 September 2013, *T.B. Croat 105168* (MO); Barbacoas. Corregimiento de El Diviso, camino al Caraño, 01°22'N 078°09'W, 580 - 590 m, 23 August 1995, *Gonzalez, M. S. 1032* (PSO); Ricaurte. Resguardo Indígena Nulpe Medio. Camino a la quebrada La Conga. 01°06'N 078°13'W, 750 m, 08 January 1996, *M. Socorro González E. 1597* (QCA); Reserva Natural La Planada: 7 km above Chucunés (on road between Túquerres and Ricaurte); along trail to Pialapí, 150-200 m past entrance to La Planada Field Station. 01°10'17"N 077°59'08"W, 1925 m, 10 March 1990, *T.B. Croat 73175* (MO, QCNE); Along road between Altaquer and Tumaco, Altaquer, Río Ñambi, 6 km W of Altaquer. 01°18'N 078°04'W, 1100 - 1130 m, 20 March 1990, *T.B. Croat 71642* (MO); Along road between Altaquer and Tumaco, between Altaquer and Junín, 7 km W of Altaquer, Río Ñambi. 01°18'N 078°04'W, 1100 m, 21 March 1990, *T.B. Croat 71675* (K, MO); Along road between Altaquer and Tumaco, Altaquer, Río Ñambi, 6 km W of Altaquer. 01°18'N 078°04'W, 1100 - 1130 m, 20 March 1990, *T.B. Croat 71631* (AAU, BF, CAS, MEXU, MO, SEL); **Valle del Cauca:** Reserva Natural de Yotoco, Cordillera occidental, vertiente oriental, Km 18 de la carretera Buga Madroñal., 03°45'N 076°23'W, 1200 - 1900 m, 7 June 1995, *Dorothy Bay 317* (MO); Dense forest along highway, 10-15 kilometers east of Buenaventura; near sea level. 12 April 1939, *Ellsworth P. Killip 34941* (US); Río Calima (región del Chocó), La Trojita. 5 - 50 m, 19 February 1944 - 10 March 1944, *José Cuatrecasas 16551* (F); Bajo Calima; Concesión Pulpapel/Buenaventura. 03°55'N 077°00'W, 100 m, 23 April 1987, *Miryam Monsalve B. 1453* (MO); Along old road (gravel) between Cali and Buenaventura, near village of Sabaletas. 100 m, 28 August 1976, *T.B. Croat 38566* (MO); Along road around the edge of Lago Calima (situated along highway between Buga and Loboquerero on road to Buenaventura) on steep forested rocky slopes N of lake. 3 54'N, 76 33'W. elev. 1430 m. 03°54'N 076°33'W, 1430 m, 13 May 1983, *T.B. Croat 56743* (COL, HUA, JAUM, MO); Bajo Calima, within Lumber Con- cession of Cartón de Colombia, between Buenaventura & Río Calima; Vicinity of Camp Portado Pulpapel, 11 km North of main Calí-Buenaventura Highway; 17-year-old successional forest; Elevation about 50 m; 03°56'30"N 077°01'00"W, 50 m, 4 July 1986, *T.B. Croat 62775* (MO); Bajo Calima Region, along road from Buenaventura to Río Calima, at km 12.5 Regrowth forest about 4 m tall. 03°56'N 077°01'W, 160 m, 4 February 1990, *T.B. Croat 70150* (B, COL, CUVC, MO, NY); Along road from Jamondí to western Andes, vicinity of San Antonio. GPS coordinates. 03°12'44"N 076°39'25"W, 1450 - 1580 m, 16 July 1997, *T.B. Croat & John F. Gaskin 79911* (CUVC, HUA, MO); Vicinity of Queremal, along Río Cava (south of Queremal-Buenaventura Highway, near Queremal, at Km 55), ca. 2 km S of road. 03°32'21"N 076°45'25"W, 1100 m, 26 July 1997, *T.B. Croat & J. F. Gaskin 80387* (CUVC, MO); Vicinity of Queremal, Vereda La Victoria, just S of Queremal. GPS coordinates. 03°31'06"N 076°42'57"W, 1450 - 1480 m, 27 July 1997, *T.B. Croat & J. F. Gaskin 80614* (CUVC, MO); ..Along road to Dapa from main Cali-Buenaventura Highway. GPS coordinates. 03°32'10"N 076°36'37"W, 1945 m, 23 July 1997, *T.B. Croat & J. F. Gaskin 80197* (CAUP, COL, 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. GPS coordinates. 03°32'23"N 076°45'26"W, 1250 m, 26 July 1997, *T.B. Croat & J. F. Gaskin 80358* (COL, CUVC, MO); 1.7 km SSW of Queremal, 25 km beyond turnoff of main Cali-Buenaventura Hwy, via Borrero Ayerbe, 3.1 km. W of Queremal. 03°31'12"N 076°44'16"W, 1432 m, 03 October 2012, *T.B. Croat, G. Ferry & D. Scherberich 104004* (MO); Buenaventura. Bajo Calima Region; Municipio Buenaventura along road between Buenaventura and Málaga, at km 40; virgin forest near road (currently being felled). 04°04'N

077°09'W, 100 m, 5 February 1990, *T.B. Croat 70179* (G, GH, MO); between Buenaventura and Río Calima, Cartón de Colombia Forest Concession Area, 11 km NW of Cali-Buenaventura Highway, 18 year old regrowth forest plot behind Pulpapel headquarters. 03°56'30»N 077°01'00»W, 50 - 80 m, 16 July 1988, *T.B. Croat 69299* (MO); Bajo Calima Region; along road between Buenaventura and Málaga, Km 51.7 from main Cali-Buenaventura Hwy. 04°03'N 077°05'W, 16 July 1993, *T.B. Croat & D. Bay 75783* (HUA, MO); Bajo Calima; Within forestry concession of Bajo Calima, between Buenaventura & Río Calima; 17-year-old successional forest behind headquarters of Camp Portada Pulpapel, 11 km N of main Cali-Buenaventura Highway. 03°56'30»N 077°01'00»W, 50 m, 9 July 1986, *T.B. Croat & Miryam Monsalve B. 61398* (COL, HUA, MO); ECUADOR. Carretera Santo Domingo de los Colorados-Quinindé, km 171-188, hasta el Río Cócola. 100 m, 17 February 1950, *M. Acosta-Solis 16209* (F); **Bolívar**: Clementina Farms, Cerro Samama, 5.7 km S and W of main Pueblo-Viejo-Caluma Road, 5.2 km W from bridge over Río Pita, (turnoff is 6.3 km E from Potosí). 01°38'51»S 079°19'52»W, 371 - 600 m, 14 August 2004, *T.B. Croat, et al. 93328* (GB,MO); **Carchi**: Río Blanco drainage above Chical, tributary of Río San Juan, mostly mature forest, ca. 12 km W of Maldonado. 00°55'37»N 078°11'02»W, 1300 - 1500 m, 25 September 1979, *A.H. Gentry & Eugene Schupp 26524* Perhumid forest on wet plateau above San Marcos de los Coaiqueres, on trail towards Gualpi Bajo. 01°06'N 078°17'W, 1000 m, 7 February 1985, *B. Øllgaard et al. 57469* (AAU, MO); From Prima Vera hike about six hours up Río Gualchan drainage to shelter built by Nilo Ortiz at 1950 m., 00°49'58»N 078°10'01»W, 1930 - 2200 m, 07 June 1993 - 08 June 1993, *J. C. Bradford et al. 38* (MO, QCNE); Chical. 00°56'N 078°11'W, 1200 - 1250 m, 13 August 1983, *Sue A. Thompson et al. 1064* (CM, MO); Along road from El Chical to El Carmen via unfinished road, departing main El Chical-Peñas Blancas Road, 0.6 km W of Río Chical Bridge, just W of El Chical, 3.8 km S of main road. 00°59'01»N 078°11'37»W, 1300 m, 9 August 2004, *T.B. Croat & G. Ferry 93147* (MO); Along road from Lita to Baboso, along Río Baboso, near bridge. 00°53'00»N 078°27'00»W, 672 m, 09 October 2012, *T.B. Croat et al. 104090* (MO); Carchi; trail along plain above Tobar-Donoso and to Río Gualpe; 1°10'N, 78°18-31»W, elev. 800-1300 feet. 01°10'N 078°24'W, 244 - 397 m, 19 February 1984, *W. Scott Hoover 1244* (MO); Gualpi Chico, vicinity of Awá encampment headed across trail up from encampment east. 00°58'N 078°16'W, 1300 - 1400 m, 18 Jan. 1988, *W. Scott Hoover et al. 2937* (MO); Tulcán. Reserva Etnica Awá. Parroquia El Chical. Centro Gualpi Medio. Río Canumbí. Bosque muy húmedo Premontano. Bosque primario, topografía muy irregular; suelo negro franco-arcilloso. 01°02'N 078°15'W, 1150 m, 19-28 February 1993, *A. Grijalva, C. Aulestia & J. Taicúz 587* (MO, QCNE); Parroqui Maldonado, ecotr El Plata, Bosque Protector Golondrinas, finca el Diviso, propiedad del Sr. Germán Figuerca. 00°50'21»N 078°05'47»W, 2076 - 2100 m, 15 May 2011, *C. E. Cerón et al. 69604* (MO, QAP); Reserva Etnica Awá. Comunidad San Marcos, 25 km al NW de El Chical, parroquia Maldonado. Bosque pluvial Premontano. 01°06'N 078°17'W, 1500 m, 16-30 November 1990, *Daniel Rubio et al. 1093* (MO, QCNE); Parroquia Chical, Sector Gualpi medio, Reserva Indígena Awá, Sendero a San Marcos al norte de la casa comunal. Bosque muy húmedo Premontano. Bosque primario. 01°02'N 078°16'W, 1020 m, 23 May 1992 - 27 May 1992, *G.A. Tipaz et al. 1132* (MO, QCNE.); **Cotopaxi**: 2 km N of Pucuyacu near bridge over Río San Francisco, 15 km N of bridge over Río Guasaganda at Guasaganda; 23 km N of Palmar (village NE of La Maná on Quevedo-Latacunga road, 13 km NE of La Maná). 00°41'00»S 079°06'30»W, 690 m, 11 October 1983, *T.B. Croat 57081* (AAU, MO); Along road between Quevedo & El Corazón; 63.4 km SE of Quevedo; 6 km NW of El Corazón;

primary forest on steep slopes near waterfall above Río Angamarca. 01°07'S 079°07'W, 1030 m, 4 April 1983, *T.B. Croat 55764* (MO); **El Oro**: Road between Santa Rosa and Balsas, 9 km NW of Balsas, 11 km SE of Saracay. Vegetation: bosque tropical by stream on steep slope. 03°42'S 079°49'W, 700 m, 2 December 1996, *G. P. Lewis & P. Lozano 2909* (MO, QCNE); **Esmeraldas**: Playa de Oro. Colecciones en Caja de Chacra. 00°52'N 078°47'W, 180 m, 18 March 1997, *C. E. Cerón & D.J. Corozo 34043* (QAP); Playa de Oro. 1 km. desde el Río Santiago y del Pueblo. 00°52'N 078°47'W, 180 m, 14 March 1997, *C. E. Cerón & D.J. Corozo 33870* (QAP); Playa de Oro. 1 Km. desde el Río Santiago y del Pueblo. 00°52'N 078°47'W, 180 m, 14 Marzo 1997, *C.E. Cerón & D.J. Corozo 33974* (QAP); Lita-San Lorenzo Road, 17.3 Km E of Río Tululbí, 31.2 Km E of Gasolinera San Lorenzo. 01°06'49"N 078°39'38"W, 204 m, 7 October 1999, *T.B. Croat 83120* (MO); Along road from main Lita-San Lorenzo Hwy. to Carondelet and Río Bogota, 0.4 Km E of main Lita-San Lorenzo Hwy. 01°07'39"N 078°44'01"W, 113 m, 16 July 2000, *T.B. Croat 84095* (MO); Lita-San Lorenzo Road, 13.0 Km W of Río Lita Bridge (new road) near Lita. Forested hills on steep slopes. 00°54'06"N 078°32'27"W, 814 m, 11 October 1999, *T.B. Croat 83229* (MO, USM); Lita-San Lorenzo Road, 37.2 Km W of Río Lita, 2.9 Km E of El Durango. 01°01'29"N 078°36'42"W, 320 m, 15 October 1999, *T.B. Croat 83336* (MO,USM); Lita-San Lorenzo Road, 26.9 Km W of Río Lita, 13.2 Km E of El Durango; disturbed virgin forest. 00°58'06"N 078°33'45"W, 735 m, 17 October 1999, *T.B. Croat 83388* (MO, USM); Lita-San Lorenzo Road, 24.7 Km W of Río Lita, 5.5 Km W of Alto Tambo. 00°57'04"N 078°33'29"W, 685 m, 17 October 1999, *T.B. Croat 83432* (MO, USM); Lita-San Lorenzo Road, 23.6 Km W of Río Lita (near Lita on new road), 4.4 Km W of Alto Tambo. 00°56'32"N 078°33'22"W, 720 m, 17 October 1999, *T.B. Croat 83453* (MO,USM); Lita-San Lorenzo Road, 23.6 Km W of Río Lita (near Lita on new road), 4.4 Km W of Alto Tambo. 00°56'32"N 078°33'22"W, 720 m, 17 October 1999, *T.B. Croat 83454,83455* (MO,USM); Lita-San Lorenzo Road, 23.1 Km W of Río Lita, 3.7 Km W of Alto Tambo, 00°56'19"N 078°31'16"W, 750 m, 19 October 1999, *T.B. Croat 83467* (MO, USM); Lita-San Lorenzo Road, 26.9 Km W of Río Lita, 13.2 Km E of El Durango. 00°58'06"N 078°33'45"W, 735 m, 15 October 1999, *T.B. Croat 83369,83370* (MO, USM); Along Río Bogota, Awá community Río Bogota, 3 Km SW of main Lita-San Lorenzo Hwy. 11.5 Km NW of Alto Tambo, 30.5 Km W of Río Lita near Lita. 00°58'57"N 078°35'58"W, 16 September 2002, *T.B. Croat 87561* (MO); Along road between San Lorenzo and Mataje, 1.9 Km S of Mataje, 16.4 Km N of main San Lorenzo-Lita Hwy. 01°02'52"N 078°43'01"W, 45 m, 14 July 2000, *T.B. Croat 83983,83984* (MO); Vicinity of Alto Tambo on road between Lita and San Lorenzo, 11.5 Km NW of Lita Awá Reserve, along trail to Río Bogota, 0.5 Km SW of main highway. 00°59'03"N 078°36'W, 800 m, 16 September 2002, *T.B. Croat 87535* (MO); Comunidad Awá Río Bogota, 11.5 Km W of Alto Tambo, 30.5 Km W of Río Lita, 3 Km by trail to Río Bogota on S side of Lita-San Lorenzo Road. 00°58'57"N 078°35'58"W, 380 m, 15 September 2002, *T.B. Croat & D. P. Torres Ravelo 87486* (MO); Comunidad Awá Río Bogota, 11.5 Km W of Alto Tambo, 30.5 Km W of Río Lita, 3 Km by trail to Río Bogota on S side of Lita-San Lorenzo Road. 00°58'57"N 078°35'58"W, 380 m, 15 September 2002, *T.B. Croat & D. P. Torres Ravelo 87495* (MO); Comunidad Awá Río Bogota, 11.5 Km W of Alto Tambo, 30.5 Km W of Río Lita, 3 Km by trail to Río Bogota on S side of Lita-San Lorenzo Road. 00°58'57"N 078°35'58"W, 380 m, 15 September 2002, *T.B. Croat & D. P. Torres Ravelo 87516* (MO); Comunidad Awá Río Bogota, 11.5 Km W of Alto Tambo, 30.5 Km W of Río Lita, 3 Km by trail to Río Bogota on S side of Lita-San Lorenzo Road. 00°58'57"N 078°35'58"W, 380 m, 15 September 2002, *T.B. Croat & D. P. Torres Ravelo 87528* (MO);

Along road to Río Tulubí from main San Lorenzo-Lita hwy. 33.0 Km E of Gasolinera San Lorenzo at edge of San Lorenzo, along Río San José, 1.1 Km N of main hwy. 01°04'44"N 078°38'59"W, 59 m, 12 July 2000, *T.B. Croat & et al. 83936* (MO); Along highway from Esmeraldas to San Lorenzo; 32.9 Km E of main San Lorenzo-Lita Road; 10.6 Km E of Río Santiago bridge. 01°02'47"N 078°58'13"W, 44 m, 10 July 2000, *T.B. Croat & et al. 83820* (MO); Lita-San Lorenzo Road, 55.8 Km W of Río Lita. 01°07'28"N 078°43'18"W, 150 m, 6 October 1999, *T.B. Croat & et al. 83058* (AAU,GB, MO, Q, S); Lita-San Lorenzo Road, 3.2 Km E of Río Tululbí, 16.7 E of Gasolinera San Lorenzo, in swampy area. 01°09'30"N 078°45'W, 140 m, 7 October 1999, *T.B. Croat & et al. 83093* (MO); Along road between Lita and Alto Tambo ca. 2 km W of Alto Tambo. 00°55'16"N 078°32'42"W, 754 m, 14 August 2013, *T.B. Croat et al. 104730* (MO); Along road between Lita and San Lorenzo, vicinity of Alto Tambo, 17.8 km NW of Lita, vicinity of abandoned white house, 2.3 km E of RR track in Alto Tambo. 00°33'54"N 078°32'36"W, 841 m, 21 February 2005, *T.B. Croat et al. 95177* (MO); Along road between Lita and San Lorenzo, vicinity of Alto Tambo, 6.6 km NW of Alto Tambo. 00°57'34"N 078°33'36"W, 684 m, 21 February 2005, *T.B. Croat et al. 95247,95248* (MO); Along road from San Lorenzo to Mataje, departing main Lita-San Lorenzo highway, 7.5 Km N of Gasolinera San Lorenzo, 0.4 Km W of main Lita-San Lorenzo highway. 01°14'30"N 078°45'50"W, 60 m, 11 July 2000, *T.B. Croat et al. 83865* (MO); Lita-San Lorenzo Road, vicinity of Alto Tambo, 17.1 Km W of Río Lita Bridge near Lita (new road). 00°54'06"N 078°32'27"W, 822 m, 10 October 1999, *T.B. Croat, et al. 83204* (MO,USM); Lita-San Lorenzo Road, 37.2 Km W of Río Lita, 2.9 Km E of El Durango. 01°01'32"N 078°36'23"W, 449 m, 15 October 1999, *T.B. Croat, et al. 83347* (MO,USM); Lita-San Lorenzo Road, vicinity of Alto Tambo, 17.1 Km W of Río Lita Bridge near Lita (new road). 00°54'06"N 078°32'27"W, 822 m, 10 October 1999, *T.B. Croat et al. 83182* (AAU, GB, MO, Q, QAP, S, USM); Lita-San Lorenzo Road, 19.1 Km E of Río Tululbí, 5.2 Km W of El Durango; 0.6 Km down gravel road going N to Río Tululbí and crossing Río San José, vicinity of Río San Jose; disturbed virgin forest. 01°04'47"N 078°38'55"W, 73 m, 13 October 1999, *T.B. Croat, et al. 83292* (MO, USM); Lita-San Lorenzo Road, vicinity of Alto Tambo, 19.4 Km W of Río Lita. 00°54'N 078°32'W, 829 m, 5 October 1999, *T.B. Croat et al. 83000* (MO); Lita-San Lorenzo Road, 3.7 km W of Río Lita Bridge (below Lita), on steep creek banks. 00°52'51"N 078°28'30"W, 647 m, 30 June 1998, *T.B. Croat et al.82154* (MO, QCNE); Lita-San Lorenzo Road, 14.2 km W of Río Lita Bridge (below Lita). 00°52'11"N 078°27'16"W, 425 m, 4 July 1998, *T.B. Croat et al. 82342* (AAU, GB, MO); Lita-San Lorenzo Road, 1.2 km W of El Durango, 21.1 km W of Alto Tambo. 00°52'11"N 078°27'06"W, 300 m, 8 July 1998, *T.B.Croat et al. 82437* (MO); Lita-San Lorenzo Road, 1.2 km W of El Durango, 21.1 km W of Alto Tambo. 00°52'11"N 078°27'06"W, 300 m, 8 July 1998, *T.B.Croat et al. 82474* (MO); Lita-San Lorenzo Road, Río Piguambi, 6.4 km W of Río Lita Bridge (below Lita). 00°52'04"N 078°29'03"W, 685 m, 30 June 1998, *T.B.Croat et al. 82176* (MO, QCNE); Lita-San Lorenzo Road, 1.2 km W of El Durango, 21.1 km W of Alto Tambo. 00°52'11"N 078°27'06"W, 300 m, 8 July 1998, *T.B.Croat et al. 82496* (MO, QCNE.); Lita-San Lorenzo Road, 14.2 km W of Río Lita Bridge (below Lita), vicinity of Alto Tambo, near sign for Ecological Reserve, 6.6 km W of Río Chuchubí. 00°52'11"N 078°27'16"W, 425 m, 10 July 1998, *T.B. Croat et al. 82646* (MO); Further along trail to Río Mataje (beginning at point where collecting ended previous day. Awá encampment from Río Palaví encampment. Small clearing along trail. 01°07'N 078°37'W, 200 - 230 m, 11 February 1988, *W. Scott Hoover et al. 3951* (MO); Quinindé. 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 January 1997 - 10 January 1997, *John L. Clark et al. 3712* (MO, QCNE); Bilsa Biological Station. 00°21'00"N 079°42'00"W, 450 - 650 m, October 2006, *Nils Köster & A. Schnell 2094* (BONN, MO, QCA, QCNE); Bilsa Biological Station. 00°21'00"N 079°42'00"W, 450 - 650 m, January 2007, *Nils Köster & A. Schnell 2373* (MO, QCA); San Lorenzo. Reserva Etnica Awá. Parroquia Alto Tambo. Centro de la Unión. Cañón del Río Mira. Bosque Pluvial Tropical. Bosque primario. 00°52'N 078°26'W, 250 m, 22 March 1993, *Carlos Aulestia & Milton Aulestia 1238* (MO, QCNE); Reserva Etnica Awá. Parroquia Alto Tambo. Centro de la Unión. Cañón del Río Mira. Bosque Pluvial Tropical. Bosque primario. 00°52'N 078°26'W, 250 m, 22 March 1993, *Carlos Aulestia & Milton Aulestia 1379* (MO, QCNE); Parroquia Ricaurte. Centro Pambilar. Bosque Pluvial Tropical. Bosque primario. 01°08'N 078°36'W, 500 m, 21 January 1993, *Carlos Aulestia & Milton Aulestia 934* (MO, QCNE); 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 72367* (MO); Along road between Lita and San Lorenzo, 16.6 km W of Lita, 0.5 km W of Anchayaca (campamento de construccions), 00°55'N 078°28'W, 700 m, 20 February 1992, *T.B. Croat 72287* (MO); **Imbabura:** In valley of Río Mira on border with Carchi Province, between Ibarra and Lita, 2.5 km east of Lita; steep forested slopes. 00°52'26"N 078°21'00"W, 750 - 775 m, 8 September 1976, *T.B. Croat 38982A* (MO); **Los Ríos:** Río Palenque Biological Station. Km 56 rd. Quevedo-Sto. Domingo. 00°35'00"S 079°22'00"W, 150 - 220 m, 5 March 1977 - 14 March 1977, *Calaway H. Dodson 6716* (SEL); Río Palenque Biological Station. Km 56 Quevedo-Santo Domingo. 00°35'00"S 079°22'00"W, 150 - 220 m, 25 October 1974, *C. H. Dodson & A.H. Gentry 5655* (SEL, US.A.H. Gentry); Centro Científico Río Palenque, along trails west of laboratory and in vicinity of laboratory clearing. 210 - 250 m, 31 August 1976, *T.B. Croat 38672* (MO); Río Palenque Biological Station, ca. Km 48 Santa Domingo-Quevedo Highway. 00°35'S 079°25'W, 250 m, 13 October 1980, *T.B. Croat 50656* (MO); Río Palenque Science Center, along road 25 from Santo Domingo de los Colorados to Quevedo; just S of Patricia Pilar on E side of Hwy, along road to hotel. 00°35'15"S 079°21'56"W, 150 m, 22 March 2006, *T.B. Croat et al. 96228, 96229* (MO); **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 72* (MO, QCNE); **Pichincha:** Centinela; Montañas de Ila; 13 km E of Patricia Pilar; ca. 54 km S of Santo Domingo, in small remnant patch of forest on ridge top and steep slope just East of pass and ca. 1/2 km N of road. 00°38'S 079°16'W, 600 m, 01 December 1986, *B.E. Hammel & Jill Trainer 15840* (MO); Rancho Brahman, about 10 km NW of Santo Domingo de los Colorados, tropical rain forest, 400 m, January 1967, *Benkt Sparre 14061* (S); 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 de la reserva. 00°05'N 079°02'W, 650 - 700 m, 6 April 1984, *Jaime L. Jaramillo 6533* (QCA); 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 9429* (QCNE); 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 9429* (MO); Bosque Integral Ontonga. 00°25'00"S 079°01'00"W, 2000 m,

November 2005, *Nils Köster & K. Friedrich* 963 (MO, QCA, QCNE); Along old road from Quito to Santa Domingo de los Colorados via Chiriboga, at Km 86.7, 30 km S of Chiriboga, 8 km N of junction of new highway to Santo Domingo, Premontane wet forest. 00°22'S 078°52'W, 1310 m, 12 October 1980, *T.B. Croat* 50644 (MO); Km 113, Nanegalito-Pto-Quito Road, then north on road to Endesa Reserve. 00°04'52"N 079°01'44"W, 602 m, 22 July 1998, *T.B. Croat* 82806 (GB, MO, S); 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* 73149 (MO); Along road between Pacto and Nuevo Azuay (near border of Imbabura Province); 2.3 km North of Paraiso, (Nuevo Azuay is 17.5 km North of Paraiso); 15.3 km North of Pacto, Disturbed primary forest near road. 00°11'N 078°45'W, 1320 m, 21 July 1986, *T.B. Croat* 61638 (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, 3.4 km from main road, in pinetum, regrowth of native plants on pine trees. 00°03'N 079°07'W, 710 m, 19 March 1992, *T.B. Croat* 73184 (MO, QCNE); Tinalandia (property of Hotel Tinalandai) 9.6 km E of Santo Domingo de los Colorados, S of hwy. to Aloag & Quito, above Río Toachi. 00°16'N 079°07'W, 700 m, 3 April 1983, *T.B. Croat* 55694 (B, MO, QCA); 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* 73172 (MO, QCNE); Tinalandia (property of Hotel Tinalandai) 9.6 km E of Santo Domingo de los Colorados, S of hwy. to Aloag & Quito, above Río Toachi. 00°16'N 079°07'W, 700 m, 3 April 1983, *T.B. Croat* 55726 (MO); ENDESA Forest Reserve; 6 Km N of main Nanegalito-Puerto Quito Hwy. (Departing at Km 113, 5 Km W of San Vincente Andoas), 00°07'01"N 079°01'41"W, 649 m, 8 July 2000, *T.B. Croat & et al.* 83800, 83801 (MO); Reserva Endesa, 9 km N of Km. 113 on Quito- Pto. Quito Highway. 00°05'N 079°02'W, 750 m, 15 July 1986, *T.B. Croat & Jimena Rodríguez* 61480 (MO); Reserva Endesa, about 8 km North of Km. 113 on Quito-Pto. Quito Highway, vicinity of Río Cabayales. 00°05'N 079°02'W, 700 m, 16 July 1986, *T.B. Croat & Jimena Rodríguez* 61526 (MO); Reserva Guaycuyacu, along Río Guaycuyacu between Cielo Verde cable crossing over Río Guaycuyacu and village of Santa Rosa near mouth of Río Guaycuyacu at Río Guayabama. 00°13'N 078°55'W, 500 m, 11 February 2005, *T.B. Croat et al.* 94528 (MO); Reserva Guaycuyacu, near border with Imbabura Province, along Río Guaycuyacu and Road from Cielo Verde to Santa Rosa at junction of Río Guaycuyacu and Río Guayabamba. 00°13'N 078°56'W, 500 m, 13 March 2006, *T.B. Croat et al.* 95871 (MO); Quito. Carretera Quito-Puerto Quito, km 113, 10 km al Norte de la carretera principal, bosque virgen y alrededores de la reserva. 00°05'N 079°02'W, 650 - 800 m, May 1984, *Jimena Rodríguez* 239 (CR, MO, NY, QCA); Reserva Mashpi, along road leading into reserve, departing main Pacto-San Miguel de los Bancos Road, 13.8 km N of central plaza in Pacto, then 7-8 km into reserve. 00°09'53"N 078°52'46"W, 910 - 1000 m, 08 December 2008, *T.B. Croat* 101036 (MO); Santo Domingo de Los Colorados. Hac. Zaracay, tropical rain forest. 00°16'00"S 079°14'00"W, 500 m, 29 March 1967, *Benkt Sparre* 15157 (S); Rancho Brahman, about 10 km NW the town, on road to Esmeraldas, tropical rain forest. 400 m, 31 March 1967, *Benkt Sparre* 15238 (S); Bosque humedo tropical. 00°00'09"S 079°22'53"W, 140 m, Abril 1999, *Gladys Benavides* 465, 00°09'34"S 078°28'43"W, 250 m, 18 Marzo 1999, *G. Benavides & V. Calazacón* 438 (Q); 171-188 to Río Cócolo, 100 m, *M. Acosta-Solis* 162 (F); Vicinity of El Centinela, 0.2 km past Escuela Mixta El Centinela, along trail to left of road,

exactly 13 km E from main Santo Domingo-Quevedo Highway in Patricia Pilar. 00°32'S 079°11'W, 1000 m, 14 March 1992, *T.B. Croat 73047* (MO); La Centinela, 0.2 km past Escuela Mixta La Centinela, 13 km E from main highway, 00°32'S 079°11'W, 1000 m, 14 March 1992, *T.B. Croat 73051* (MO); Vicinity of La Centinela, 0.2 km past Escuela Mixta La Centinela, along trail to left of road, exactly 13 km E from main Santo Domingo-Quevedo Highway in Patricia Pilar. 00°32'S 079°11'W, 1000 m, 14 March 1992, *T.B. Croat 73049* (MO); La Centinela, 0.2 km past Escuela Mixta La Centinela, 13 km E from main highway, 00°32'S 079°11'W, 1000 m, 14 March 1992, *T.B. Croat 73051* (QCNE); Vicinity of La Centinela, 0.2 km past Escuela Mixta La Centinela, along trail to left of road, exactly 13 km E from main Santo Domingo-Quevedo Highway in Patricia Pilar. 00°32'S 079°11'W, 1000 m, 14 March 1992, *T.B. Croat 73049* (QCNE); Along road between Santo Domingo and Aloag, along bypass S of Santo Domingo which passes from Santo Domingo-Quevedo Road (ca. 4 km S of Centro) to Santo Domingo-Aloag road; small stream ca. 3 km from junction with Santo Domingo-Aloag Road. 00°16'S 079°09'W, 10 April 1992, *T.B. Croat 73851* (QCNE); Centro Científico Río Palenque. 00°35'S 079°21'W, 220 m, 15 March 1992, *T.B. Croat 73062* (MO); Along road between Santo Domingo and Aloag, along bypass S of Santo Domingo which passes from Santo Domingo-Quevedo Road (ca. 4 km S of Centro) to Santo Domingo-Aloag road; small stream ca. 3 km from junction with Santo Domingo-Aloag Road. 00°16'S 079°09'W, 10 April 1992, *T.B. Croat 73851* (MO). PANAMA. **Coclé:** La Pintada. Palmarazo Río San Juan. Parque Nacional G. D. Omar Torrijos H. Area de Calle Larguita (Palmarazo). 08°43'04"N 080°40'47"W, 462 m, 18 July 2013, *Álex Espinosa et al. 6140* (MO); **Colón:** Donoso. Coclé del Norte, area del helipad T02A, caminando hacia la ruta Oeste. 08°53'34"N 080°40'55"W, 138 m, 19 julio 2012, *Álex Espinosa 6014* (MO); Coclé del Norte, area del helipad T02A, caminando hacia la ruta Oeste. 08°53'34"N 080°40'55"W, 138 m, 19 julio 2012, *Álex Espinosa 6014* (PMA); Teck Cominco Petaquilla mining concession. 08°53'17"N 080°45'09"W, 160 m, 30 June 2008, *G. McPherson 20754* (MO); Area de Concesión Minera Panamá. Pipeline Road. 02 abril 2013, *O.O. Ortiz & López, R. 2745* (MO); Area de Concesión Minera Panamá. Pipeline Road. 02 abril 2013, *O.O. Ortiz & López, R. 2745* (PMA); **Veraguas:** Santa Fé. Parque Nacional Santa Fé. 08°41'44"N 080°53'00"W, 290 m, 08 febrero 2014, *Arturo Morris et al. 2086* (MO); Santa Fe. Area del Río Piedra, trocha bordeando la ribera del río, 08°44'06"N 080°46'19"W, 364 m, 16 diciembre 2013, *Laurencio Martínez et al 1558* (MO); Santa Fe. 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 June 1987, *T.B. Croat 66971* (MO).

Rhodopatha morii Croat, **sp. nov.** — Type: PANAMA: Colón: Vicinity of Río Indio on road from Portobello to Nombre de Dios, 09°33'N 79°33'W, 22 March 1976, *T.B. Croat 33586* (holotype, MO-2381542-43).

Diagnosis: The species is characterized by its light tan-brown deeply longitudinally fissured light tan-brown with deep longitudinally fissured internodes, petioles sulcate above the sheath and sheathed throughout most of its length, its thin, brown sheath, sometimes persisting somewhat intact and ultimately deciduous, a sharply sulcate geniculum, linear-lanceolate acute to somewhat acuminate blades, acute at base, drying dark brown to gray-brown and smooth on upper surface, dark reddish brown and semiglossy below, 25–30 pairs of primary lateral

veins, these 1–2 cm apart at the middle of the blade, the pinkish to salmon-colored spathe and stipitate, gradually tapered spadix.

Appressed-climbing epiphyte from near the ground to 10 m; stems branched or unbranched; **internodes** short or to 1.5 cm long, 8–15 mm diam. drying light tan-brown with deep longitudinal fissures, the upper nodes short with the leaf bases obscuring the stem all together; **petioles** 13–38 cm long, 3–6 mm diam, solid dark-green, sulcate above the sheath, sheathed throughout most of its length, completely to the geniculum or to within 1 cm below the geniculum; sheath thin, brown, sometimes persisting somewhat intact, ultimately deciduous; geniculum sharply sulcate; **blades** linear-lanceolate, 30–58 cm long, 2.8–11.0 cm wide, 5.8–10.0 times longer than wide, acute to somewhat acuminate at apex, acute at base, slightly bicolorous, semiglossy and dark green above, slightly paler and semiglossy below, drying dark brown to gray-brown and smooth on upper surface, dark reddish brown and semiglossy below; midrib sunken and concolorous above, prominently raised below, thicker than broad, usually drying concolorous on both surfaces; **primary lateral veins** 25–30 pairs, departing midrib at 35–55°, only weakly curved to the margin, 1–2 cm apart at the middle of the blade, weakly sunken above, drying almost flat, convex and almost concolorous below; minor lateral veins and cross veins visible beneath; minor veins usually about 3 between each pair of primary lateral veins. INFLORESCENCE erect; peduncle 10–13 cm long, drying 4 mm diam.; **spathe** to 21 cm long, caudate acuminate at apex, drying dark brown; **spadix** pinkish to salmon-colored, 15–16 cm long, 10–11 mm diam midway, stipitate to 2 cm, gradually tapered to a bluntly rounded apex, drying dark brown; flowers mostly quadrangular, 1.6–1.8 mm diam. sometimes irregularly and acutely to bluntly 5- or 6-sided, drying brown and matte; anthers 1.0 mm long, 0.8 mm wide, rounded at apex and protruding slightly above the pistils. INFRUCTESCENCE unknown. **Figures 43–46.**

Distribution — *Rhodospatha morii* is endemic in Panama in Panama and Colón Provinces in *Tropical wet forest* life zones at sea level to 400 m.

Etymology — The species is named in honor of American botanist Scott Mori (1941–2020) who, along with Jackie Kallunki, collected the first specimen in September 1974. Scott had a Ph.D. from the University of Wisconsin in Madison and spent most of his career at the New York Botanical Garden, working largely with the family Lecythidaceae.

Comments — *Rhodospatha morii* is most easily confused with some of the narrower-leaved forms of *R. knappiae*, particularly *Hampshire & Whitefoord 170*, but that taxon differs in having blades matte or even subvelvety above (rather than semiglossy) and in having primary lateral veins mostly less than 1 cm apart at the middle of the blades and in having a moderately prominent interprimary vein between each of the primaries.

Rhodospatha morii is also similar to *R. burgeri* but that species has proportionately shorter blades (3.2–5.1 times longer than broad) which dry moderately more greenish, glossier and smoother on the lower surface (versus matte, granular and with more prominently raised tertiary veins for *R. morii*).

Paratypes: PANAMA. **Panamá:** Chepo, El Llano/Cartí road, 4 miles from main gate near El Llano, 09°15'01"N 78°55'45"W, 27 Mar. 1974, *T.B. Croat 33726* (MO); El Llano-Cartí



Figure 43: *Rhodospatha morii*. T.B. Croat 33586, TYPE (Sheet 1)



Figure 44: *Rhodospatha morii*. T.B. Croat 33586, TYPE (Sheet 2)



Figure 45: *Rhodospatha morii*. T.B. Croat 33726



Figure 46: *Rhodospatha morii*. S.A. Mori & J.A. Kallunki 1833

Road; 9.6 km from Pan American Highway, 09°16'05"N 78°55'42"W, 410 m, 12 September 1974, *Scott A. Mori & Jacquelyn A. Kallunki 1833* (MO).

Rhodospatha moritziana Schott, Oesterr. Bot. Wochenbl. 7: 109–110. 1857. — *Anepsias moritzianus* (Schott) Schott, Gen. Aroid.: t. 73. 1858. — *Monstera moritziana* (Schott) Steyerl., Fieldiana Bot. 28: 819. 1957. — [*Rhodospatha moritziana* (Schott) Croat. Fl. Barro Colorado Isl.: 219. 1978, isonym]. — [*Rhodospatha moriziana* (Schott) Bunting, Rev. Fac. Agron. (Maracay) 10: 256. 1980, isonym]. — Type: VENEZUELA. Colonia Tovar, 1855 (W, lost). Schott Icones 267 (W, neotype, designated here).

? *Rhodospatha picta* G. Nicholson, Ill. Dict. Gard. 3: 467. 1886. Type: not found.

Terrestrial; 1.2–3.0 m tall; stems creeping across the surface of the ground, including the upright portion 1.5–5.0 m long; sap mucilaginous, transparent; **internodes** short, 3–7 cm diam. near apex, semiglossy, dark green, tapered below and much narrower when entering soil, supported by prop roots at the lower part of the stem, drying yellow-brown, closely longitudinally ribbed with sometimes close transverse fissures; LEAVES closely spaced, spreading-ascending in various directions or almost distichous; **petioles** dark green, minutely speckled with light green, sharply V-sulcate to narrowly and sharply sulcate adaxially, 30–103 cm long, ca. 1 cm diam. below the geniculum, sheathed 2/3 to fully throughout their length; sheath erect, one side higher, to 2.3 cm wide at the base, often overlapping to close the sheath, early-drying and deciduous or with dark brown fragments of tissue, sometimes fibrous; geniculum thickened, 2.0–4.5 cm long, oval in cross section, obscurely sulcate, rarely sharply sulcate; **blades** erect on petiole or slightly reclining, moderately coriaceous, conspicuously bicolorous, oblong-elliptic, often somewhat inequilateral, tapering equally toward both ends, short-acuminate at apex, cuneate to obtuse, or rounded and usually briefly attenuated at base, rarely subcordate, 45–91 cm long, 20–49 cm wide, 0.6–1.9 times longer than the petioles, glabrous or minutely papillate, dark green and glossy above, drying green to gray-green or yellowish brown, silvery green or milky green and matte to weakly glossy below, drying grayish green above, medium brown or medium green below, densely covered with minute reddish brown dots; midrib light green to cream, concave to V-sulcate above, thicker than broad below; **primary lateral veins** 24–34 per side, somewhat to deeply impressed above, convex below, 10–25 mm apart, often prominently down-turned just before merging with the midrib; interprimary veins 1 or 2 pairs between each pair of primary lateral veins, darker than surface; minor veins 1–3 between the interprimary vein and the primary lateral veins, often drying puckered; cross veins moderately conspicuous, sometimes diagonal, especially toward the margins. INFLORESCENCE from one or more of the upper leaf axils; peduncles 27–42 (59) cm long; **spathe** naviculiform, greenish outside, white within preanthesis, becoming white to cream, pale yellow or pinkish, 15–35 cm long, to 3.5 cm diam when furled, cuspidate at apex (cusp to 2.5 cm long), decurrent at base, to 12 cm diam. when open, 5–6 cm deep, promptly deciduous, the margins revolute, containing trichoclereids; **spadix** pink to pink-orange, greenish orange, light orange-yellow, brownish orange, pale orange, salmon-pink, salmon, salmon-red, or pinkish purple, rarely white, 3–7 cm shorter than the spathe, 16–21 cm long, to 1.9 cm diam., stipitate 1–1.5 (2.5) cm on the back side, becoming covered with a sticky substance promptly after anthesis; flowers 13–18 visible per spiral; pistils ca. 3 mm long, 1.0–2.4 mm diam., quadrangular or irregularly 5- or 6-sided, the corners rounded to angular, the sides convex to concave, stigma

matte, drying with a frost-like covering; stigma linear to elliptic, 0.8–1.2 mm long, 0.2–0.6 mm wide; ovary 1-locular but with a partial division into 2 locules; anthers pointed, 1 mm long, 0.8 mm wide. INFRUCTESCENCE brownish green, finally reddish, 19–32 cm long, to 3 cm diam. at maturity; berries prismatic, truncate, mesocarp bright yellow at apex, white below; seeds elbow-shaped, subcircular in outline, 0.5–1 mm diam., brownish to white, the outer margins dotted with purple. **Figures 47–55.**

Distribution — *Rhodospatha moritziana* ranges from Costa Rica to Panama, Colombia, and Ecuador along the Pacific Coast, and to northern Venezuela, from sea level to 1300 m in *Tropical moist forest* and *Tropical wet forest* life zones. In Costa Rica and Panama, the species is restricted to the Caribbean slope but in South America it ranges along the Pacific slope to as far south as Cotopaxi in Ecuador as well as along the Central Cordillera of Colombia in Antioquia, and both slopes of the Eastern Cordillera in Colombia and Venezuela. In Venezuela, the species ranges east along the Cordillera de la Costa (as far east as Aragua, and Miranda). Populations in the Cordillera de la Costa have blades which dry darker, typically dark brown or dark olive-green on the upper surface whereas populations along the Cordillera de los Andes in Venezuela differ in having the blades more gray-green above and typically somewhat less reddish on the lower surface. These collections also typically have spadices more stipitate than those of the Cordillera de la Costa.

Comments — The species is characterized by its terrestrial habit and large size with stems creeping across the surface of the ground; its petioles dark green, minutely speckled with light green and with a deciduous sheath; its oblong-elliptic blades drying reddish brown to yellow green or yellow brown, densely covered with minute reddish brown dots; and its large inflorescences with the spadix of various shades of pink, orange, red or purple.

Specimens determined provisionally as *Rhodospatha "filamentosa"* deposited in the Kew Herbarium and based on a specimen cultivated in the Botanical Garden in Penang, Malaysia are also *R. moritziana*.

Additional specimens seen: COLOMBIA. **Antioquia:** Primary forest along Quebrada Negra, tributary to Punchiná reservoir, Río Guatapé (Río Magdalena valley). 06°15'N 075°05'W, 770 - 820 m, 6 July 1986, *M.H. Grayum et al. 7625* (MO); Antioquia: Mpio. de Tarazá, correg. El Doce. 201 km NE de Medellín. En camino a Barroblanco. Bosque húmedo tropical. 300 m, 18 August 1986, *Ricardo Callejas & et al. 2440* (MO); Antioquia: Mpio. de Tarazá, correg. El Doce. 201 km NE de Medellín. En camino a Barroblanco. Bosque húmedo tropical. 300 m, 18 August 1986, *Ricardo Callejas & et al. 2440* (HUA); Along road between San Luis and Puerto Triunfo, ESE of Medellín, SE of Granada, S of San Carlos, ca. 3 km SE of San Luis. Premontane moist forest. 05°57'N 074°57'W, 800 m, 13 December 1980, *T.B. Croat 52037* (JAUM, MO), *52036* (CM, JUAM, 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 56560* (JAUM, MO, NY); *W. John Kress & et al. 7625* (MO); Tropical Wet/Very Wet Forest Transition Zone Vic. Planta Providencia, 26 kms S & 23 kms W (Air) of Zaragoza. In valley of Río Anorí between Dos Bocas & Anorí, hill behind 2EB biostation. 07°13'N 075°03'W, 400 - 700 m, 26 March 1977, *White 298* (COL, HUA, WIS); Cáceres. Cabecera municipal El Doce. Bajo Cauca, zona entre las quebradas Puri y Corrales. Quebrada



Figure 47: *Rhodospatha moritziana*. Habit, T.B. Croat 72968



Figure 48: *Rhodospatha moritziana*. Habit, cultivated at Sitio Burle-Marx Burle, *R. Burle-Marx 173*

“Pité”. Occasional. 200 - 400 m, 10 June 1977, *Ricardo Callejas 277* (HUA); San Carlos. Corregimiento El Jordán, Vereda Juanes 780-820 mts. altura, Represa Punchina, Quebrada La Villa, 780 - 820 m, 10 March 1988, *Linda K. Albert de Escobar & et al. 8260* (HUA); San Luis. Valley of Río Claro, 27 km E of Entrada for San Luis, 53 km E of Río Calderas. 05°53'30»N 074°51'20»W, 500 m, 21 April 2007, *T.B. Croat & Felipe Cardona 97907* (MO); Zaragoza. Correg. de Providencia, mountain slope above hydroelectric plant. 600 m, 10 February 1971, *Djaja D. Soejarto & J.D. Villa 2751* (COL, MO); **Caldas:** Mun. de Norcasia, Proyecto Hidroeléctrico La Miel, zona del embalse. 400 - 600 m, 13 July 1999 - 31 July 1999, *William G. Vargas 6331* (HUA); **Cauca:** Along road from Popayan to Juntas through Parque National Munchique, 21 km beyond summit, Pacific slope of Western Cordillera. GPS coordinates. 02°30'48»N 077°02'33»W, 900 m, 19 July 1997, *T.B. Croat & John F. Gaskin 80080* (CAUP,MO); **Chocó:** Bolivar-Quibdó hwy. On rocks by river, alt. 480 m; Km 159. 05.40»N, 76.30»W. 05°40»N 076°30»W, 480 m, 13 April 1983, *Adrian Juncosa 907* (MO); Hwy. Bolivar/Quibdó. Around km 155, by Río Atrato. 05°40»N 076°22»W, 500 m, 11 March 1984, *Adrian Juncosa 2414* (JUAM,MO,NY); *Aguilar 2* Mun. de Carmen de Atrato, 3 km abajo de El Siete. 05°48'00»N 076°17'00»W, 1000 m, 7 July 2000, *F. Cardona 1016* (HUA); Serrania de Baudo, along road between Las Animas and Pato on Río Pato, ca. 1 km above Pato. Steep road banks. 05°32»N 077°48»W, 150 m, 18 April 1983, *T.B. Croat 56109* (CHOCO, JAUM, MO); Quebrada Antón from Santa Cecilia (Risaralda) to Isthmina, 15.2 km W of Santa Cecilia, 17.3 km E of Tabor, 28.1 km E of Playa de Oro. 05°20'41»N 076°14'42»W, 280 - 350 m, 12 August 1997, *T.B. Croat & John F. Gaskin 80758* Bahia Solano. Parque Nacional Natural Utría, quebrada Papayal, 06°21»N 076°26»W, 340 m, 8 Septiembre 1990, *F. García Cossio & Enzo Aguallimpia 2178* (MO); Parque Nacional Natural Utría, quebrada Papayal. Colecciones



Figure 49: *Rhodospatha moritziana*. Inflorescence near anthesis, cultivated at Munich Botanical Garden. Photo J. Bogner.



Figure 50: *Rhodospatha moritziana*. Inflorescence and leaves, T.B. Croat 71773

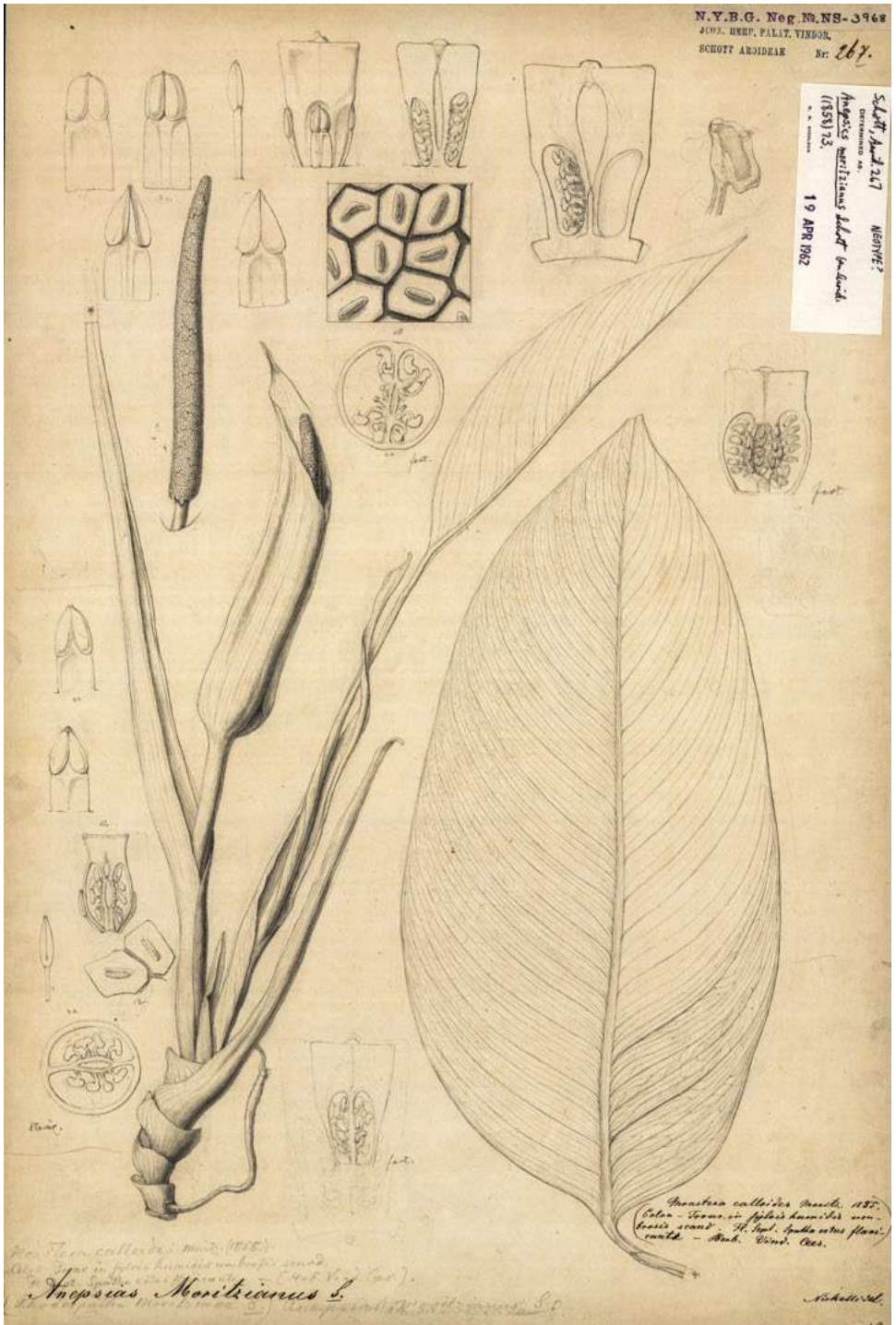


Figure 51: *Rhodospatha moritziana*. Schott Icones 267, Reproduced with permission from W to the captions, Reproduced with permission from W to the captions



Figure 52: *Rhodospatha moritziana*. M. Nee 7123 (Sheet 2)

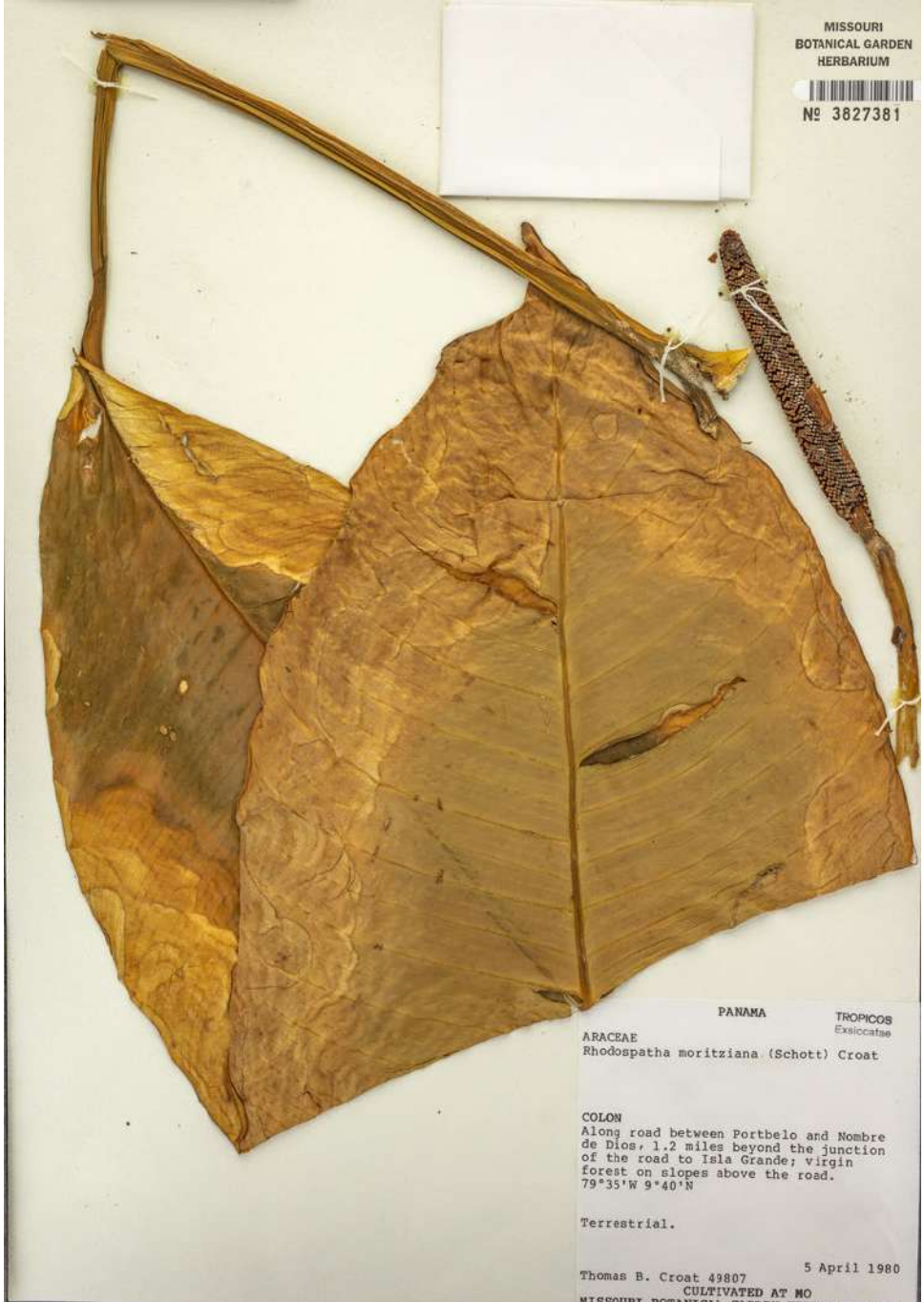


Figure 53: *Rhodospatha moritziana*. T.B. Croat 49807



Figure 54: *Rhodospatha moritziana*. T.B. Croat 12603



Figure 55: *Rhodospatha moritziana*. T.B. Croat 12297

realizadas en adelante de la investigación florula neotropical del Parque Natural Ensenada de Utría. 06°21'N 076°26'W, 340 m, 8 Septiembre 1990, *F. García Cossio & Enzo Agualimpia* 2073 (MO); Near Bahía Solano, along Quebrada S of airport less than 1 km up stream; disturbed primary forest. 05°13'30"N 077°22'00"W, 50 m, 14 March 1984, *T.B. Croat* 57437 (CHOCO, MO); Nuquí. Corregimiento Termales, entre Jobi y Arusi. Bosque cerca a las cabañas Pijibá. Costa Pacifica colombiana, estribaciones de la serranía del Baudó, Cabo Corrientes. Bosque primario. 05°37'24"N 077°25'03"W, 5 - 50 m, 31 January 1995, *Julio C. Betancur B. & et al.* 6036 (HUA, MO); Corregimiento de Arusi, Estación Biológica El Amargal. 05°34'N 077°30'W, 30 m, July 1998 - September 1998, *Marcela Mora* 1 (MO); Corregimiento de Arusi, Estación Biológica El Amargal. 05°34'N 077°30'W, 50 m, March 1995 - 17 April 1995, *Suarez* 652 (MO); 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* 83664, 83669 (COL, MO); 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 & Marcela Mora* 83664 (=Mora 282) (COL); **Nariño:** Tumaco. La Guayacana, Tumaco. Nariño. 27 June 1951, *R. Romero Castañeda* 2936 (COL, F); Near Rí Albí, 01°22'N 078°28'W, 200 - 250 m, 10 November 1995, *RAMIREZ* 8731 (QCA); **Norte de Santander:** Cordillera Oriental; región del Sarare: Hoya del río Cubugón entre El Caraño y El Indio. 600 - 470 m, 12 November 1941, *José Cuatrecasas* 13051 (US); **Santander:** Vicinity of Puerto Berrio, between Carare and Magdalena Rivers. Magdalena Valley (Camp Carare VI). 100 - 700 m, 24 July 1935, *O. Haught* 1853 (US); **Valle del Cauca:** Cordillera Occidental, vertiente occidental, carretera Morrison, km. 45-50 de Buenaventura. Hoya del río Dagua. 11 August 1955, *Jesús M. Idrobo* 1755 (COL); Along new highway between Cali and Buenaventura; Between Loboguerrero and Cisneros; Along Quebrada la Guinea at 1.2 km east of Cisneros, near the west end of tunnel #5; 26.8 km east of Bajo Calima turnoff; 30.4 km east of Puente El Piñal; in Buenaventura. 03°47'N 076°46'W, 220 - 260 m, 5 July 1986, *T.B. Croat* 62830 (F,G,HUA,MO,US); Along old road between Cali and Buenaventura at Km marker 60 in Valley of Río Dagua, ca 50 km east of Buenaventura. 290 m, 28 August 1976, *T.B. Croat* 38577 (MO); Along road from Queremal to Buenaventura, 15.3 km W of junction to Queremal. Along Río Ningaño. GPS coordinates. 03°32'00"N 076°45'00"W, 730 m, 12 July 1997, *T.B. Croat & John F. Gaskin* 79725 (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 & John F. Gaskin* 80522 (CUVC, MO). COSTA RICA. **Limón:** Cordillera de Talamanca Along Río Madre de Dios. 10°03'00"N 083°25'48"W, 240 - 300 m, 2 September 1988, *M.H. Grayum, Gerardo Herrera Ch. & Rafael Robles* 8664 (MO); Cordillera de Talamanca Along Quebrada Cañabral, from Río Barbilla to ca. 1.5 km upstream. 10°02'00"N 083°24'30"W, 100 - 200 m, 08 September 1988, *M.H. Grayum, Gerardo Herrera Ch. & Rafael Robles* 8869 (CR, MO); Cordillera de Talamanca, ridge separating Quebrada Cañabral from Río Barbilla, and slope leading down to the latter. 10°02'N 083°26'W, 200 - 400 m, 04 September 1988, *M.H. Grayum, Gerardo Herrera Ch. & Rafael Robles* 8747 (CR, K, M, MBM, MO, SEL.); Talamanca. Amubri. Margen derecho del Río Lari. Lomas aleñañas a Cachabri. 09°29'24"N 082°59'24"W, 100 - 200 m, 28 June 1989, *Gerardo Herrera Ch.* 3040 (CR, MO); ECUADOR. *A.P. Yanez* 1557 (QCNE); **Esmeraldas:** Río San Miguel. River side. 28 March 1959 - 6 April 1959, *Gunnar Wilhelm Harling* 4593 (S); Río Grande. Virgin forest. 70 m, 28 March 1959 - 6 April 1959, *Gunnar Wilhelm Harling* 4618 (S); Pueblo San Miguel. Rain forest in ravine on clay. 00°45'N 078°54'W, 200 m, 31 August 1980, *L.B. Holm-Nielsen, Jaime L. Jaramillo, Flavio Coello & Eduardo Asanza C.* 25420 (AAU); Pueblo San Miguel. Rain

forest in ravine on clay. 00°45'N 078°54'W, 200 m, 31 August 1980, *L.B. Holm-Nielsen et al.* 25383 (AAU); Environs of Lita, on the Ibarra-San Lorenzo R.R. Wet submontane forest. 00°50'00"N 078°28'00"W, 550 - 650 m, 10 June 1978, *Michael T. Madison et al.* 5134 (SEL); GRAVEL ROAD 8: 6 km beyond bridge over Río Esmeraldas (near San Mateo, road to Esmeraldas airport), ca 6.6 km beyond Univ. Techn. Luis Vargas Torres-Est. Exp. Mutile); Río Mutile; primary forest. 00°52'N 079°33'W, 80 m, 1 April 1983, *T.B. Croat* 55627 (MO); Lita-San Lorenzo Road, 55.8 Km W of Río Lita. 01°07'28"N 078°43'18"W, 150 m, 6 October 1999, *T.B. Croat* 83061 (MO); Along road from San Lorenzo to Mataje, departing main Lita-San Lorenzo highway, 7.5 Km N of Gasolinera San Lorenzo, 0.4 Km W of main Lita-San Lorenzo highway. 01°14'30"N 078°45'50"W, 60 m, 11 July 2000, *T.B. Croat* 83867 (MO); Along road between Santo Domingo de los Colorados to Esmeraldas, 90 km NW of Santo Domingo, 8.8 km NW of Quininde, 85 km SE of Esmeraldas; disturbed forest along road. 00°26'N 079°03'W, 270 m, 31 March 1983, *T.B. Croat* 55545 (CM,MO,QCA); Along road to Río Tulubí from main San Lorenzo-Lita hwy. 33.0 Km E of Gasolinera San Lorenzo at edge of San Lorenzo, along Río San José, 1.1 Km N of main hwy. 01°04'44"N 078°38'59"W, 59 m, 12 July 2000, *T.B. Croat & et al.* 83884 (AAU, G, MO, S); Reserva Cotacachi-Cayapas, La Aguita. Bosque muy húmedo tropical. 00°48'N 078°44'W, 150 m, 26 June 1998, *Xavier Cornejo S. & Carmen Bonifaz B.* 6386 (GUAY, MO); Atacames. SW of Esmeraldas, along road S of Atacames via la unión and Boca de Tasones and Las Vegas, vicinity of Santa Teresa, Finca Julio, along Río Mono, along western edge of Montañas de Mache. 00°52'00"N 079°51'00"W, 16 February 2015, *T.B. Croat et al.* 106138 (ECUAMZ, MO); Quinindé. Bilsa Biological Station. 00°21'00"N 079°42'00"W, 450 - 650 m, October 2006, *Nils Köster & A. Schnell* 1973 (MO); **Los Ríos:** Río Palenque Biological Station. Km 56 Quevedo-Santo Domingo. 00°35'00"S 079°22'00"W, 150 - 220 m, 26 October 1974, *Calaway H. Dodson* 5662 (SEL); Along road (mostly graveled) E of Santo Domingo-Quevedo road (beginning 10.5 km N of Patricia Pilar) at Caseria Palmar de Bimbe; 79 12'30"W, 0 35'S; elev. 550-575 m. 00°35'00"S 079°12'30"W, 550 - 575 m, 9 October 1983, *T.B. Croat* 57013 (B, MEXU, MO); **Pichincha:** 2 km SE of Santo Domingo de Los Colorados 15 hectare patch of mature forest in Cooperativa Santa Marta # 2 along Río Verde. 530 m, 05 February 1979, *C.H. Dodson, A.H. Gentry & James A. Duke* 7610 (SEL); Río Blanco (immediately below the confluence with Río Toachi). Virgin forest. 300 m, 16 March 1959 - 18 March 1959, *G. W. Harling* 4521 (S); 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. 00°05'N 079°02'W, 650 - 700 m, 25 March 1985, *J. L. Jaramillo* 7625 (QCA); Vicinity of Santo Domingo de Los Colorados; vicinity of Peripa SW of Santo Domingo; virgin forest. 00°09'34"S 078°28'43"W, 250 m, 25 June 1998, *T.B. Croat & M. Nuñez* 82088 (KRAM, MO, QCNE); Reserva Guaycuyacu, along Río Guaycuyacu between Cielo Verde cable crossing over Río Guaycuyacu and village of Santa Rosa near mouth of Río Guaycuyacu at Río Guayabama. 00°13'N 078°55'W, 500 m, 11 February 2005, *T.B. Croat, C. Davidson & S.R. Christoph* 94462 (MO); Bosque Protectora "La Perla", km 41 de la carretera Santo Domingo-Quinindé. 00°00'49"S 079°22'21"W - 00°02'08"S 079°22'32"W, 220 m, 25 May 1990, *V. Zak* 5363 (MO, QCA, QCNE); Quito. Reserva Forestal ENDESA, Río Silanche: "Corporación Forestal J.M. Durini", km 113 de la carretera Quito-Pto. Quito, faldas occidentales, a 10 km N de la carretera principal, bosque virgen y alrededores. 00°05'N 079°02'W, 650 - 800 m, May 1984, *RODRÍGUEZ* 239A (MO, QCA); Santo Domingo de Los Colorados. 00°00'09"S 079°22'53"W, 140 m, Abril 1999, *Gladys Benavides* 479 (QCNE); Along road between main

Santo Domingo-Esmeraldas Highway and Valle Hermoso, 25 km NW of Santo Domingo, 1.9 km N of highway, in vicinity of the bridge over the Río Blanco just S of Valle Hermosa; along steep banks of Río Blanco and in adjacent disturbed areas above river banks. 00°05'S 079°15'W, 410 m, 13 March 1992, *T.B. Croat 72968* (MO, QCNE); GERMANY. Origin unknown, *J. Bogner 462* (M); PANAMA. **Canal Area:** Between Frijoles and Monte Lirio, 09°10'21"N 079°47'53"W - 09°14'33"N 079°51'02"W, 30 m, 18 October 1922, *Ellsworth P. Killip 12153* (MO); Barro Colorado Island, Gatun Lake, 09°09'N 079°51'W, 0 - 120 m, 18 November 1925 - 24 November 1925, *P.C. Standley 41103* (US); Barro Colorado Island, Gatun Lake, 09°09'N 079°51'W, 10 - 100 m, 17 January 1924, *Paul C. Standley 31415* (US); Barro Colorado Island, Gatun Lake, 09°09'N 079°51'W, 10 - 100 m, 17 January 1924, *Paul C. Standley 31468* (US); Barro Colorado Island, Gatun Lake, 09°09'N 079°51'W, 10 - 100 m, 17 January 1924, *Paul C. Standley 31462* (MO); Barro Colorado Island; creek near dock, 09°09'49"N 079°50'11"W, 0 - 5 m, 13 November 1970, *T.B. Croat 12603* (MO); Barro Colorado Island. Donato Trail, 09°09'32"N 079°50'08"W, 10 - 70 m, 12 September 1968, *T.B. Croat 6017* (MO); Barro Colorado Island, 09°09'17"N 079°50'53"W, 10 - 100 m, 9 April 1968, *T.B. Croat 4570* (MO); Barro Colorado Island, laboratory clearing. Canal Zone. 09°09'45"N 079°50'30"W, 20 m, 21 September 1970, *T.B. Croat 12297* (MO); Barro Colorado Island. Shannon Trail, 09°09'25"N 079°50'30"W, 10 - 100 m, 15 July 1970, *T.B. Croat 11275* (MO); Barro Colorado Island. Forest north of Lab clearing, 09°09'45"N 079°50'30"W, 20 m, 14 May 1970, *T.B. Croat 10193* (MO). Colón: On slope on N side of Río Guanache, 0.5-1 km upstream from Puerto Pílon-Portobelo road, 6 km S of Portobelo, 09°30'N 079°40'W - 09°30'N - 079°41'W, 25 September 1973, *Nee 7123* (MO, NY). Along road between Portobelo and Nombre de Dios, 1.2 mi. beyond the junction of the road to Isla Grande. 09°34'N 079°34'W, 5 April 1980, *T.B. Croat 49807* (MO). VENEZUELA. *Anonymous s.n.* (MO-BC1205681/A:2484703); Cerro Naiguatá, Río Grande, 9 km al E de Los Tanques de La Electricidad de Caracas, 900 m, 24 August 1976, *Bruno J. Manara s.n.* (VEN); Rancho Grande, *H. Walter 92* (B); In forest, Tovar. *H.G.A. Engler 100* (K,MO); January 1944, *J. A. Steyermark 55128* (VEN); *J.A. Steyermark 98281* (VEN); 12 February 1943, *J.A. Steyermark 55042* (VEN); Selva siempreverde a lo largo del Río Guayabito, en El Guayabito Playón, 15 kms. al norte de Marín, 150 - 250 m, 28 November 1971, *J.A. Steyermark & G.S. Bunting 105286* (VEN); Selva siempreverde a lo largo del Río Guayabito, en El Guayabito Playón, 15 kms. al norte de Marín, 150 - 250 m, 28 November 1971, *J.A. Steyermark G.S. Bunting 105286* (MO); *T.B. Croat 71773* (MO). **Amazonas:** *J.A. Steyermark & G.S. Bunting 86750* (VEN). Apure: Reserva Forestal San Camilo: selva siempreverde a lo largo de la Quebrada Botina, 2 km SE of San Camilo (El Nula), 250 m, 28 March 1968, *J.A. Steyermark et al. 0101511* (VEN); Reserva Forestal San Camilo, selva siempreverde a lo largo de la Quebrada Botina, 2 km SE of San Camilo (El Nula), 250 m, 28 March 1968, *J.A. Steyermark et al. 101511* (MO, MY, NY). **Aragua:** Cerca de "El Loro", a 7 km de San Casimiro, subiendo por la localidad llamada El Casupal. Serranía de Golfo Triste. Bosque húmedo primario a lo largo de la fila de la montaña, 10°00'N 066°58'W, 960 m, 10 Marzo 1999, *Ana Narváez & et al. 374* (MO); Parque Nacional Henri Pittier, in quebrada just beyond driveway to Rancho Grande, 14 August 1967, *G.S. Bunting 2239* (MY, VEN); Along road between Maracay and Ocumare de la Costa: Henri Pittier National Park, 3 km N of summit. Virgin forest. 10°20'N 067°34'W, 970 m, 17 March 1985, *T. B. Croat 60579* (CM, MO, MY, RSA); Parque Nacional de Henri Pittier: paraíso trail to pico perquito: in primary cloud forest, 1200 - 1300 m, 8 February 1973, *T.B. Croat 21411* (MO, VEN); Barinas; Carretera Mérida-Sto. Domingo-Barinas, entere La Soledad-Barinitas, 2 km below La Soledad, 18 km above Barinitas, al lado

dela carretera en la orilla de una quebrada, 20 Septiembre 1971, *G.S. Bunting 4573* (MO, MY); Carretera Barinas/Merida. 6 km above La Soledad; 2 April 1969 *George S. Bunting & et al. 3368* (MY, NY). **Distrito Capital:** Cultivated at home of Dr. Julian Steyermark, Caracas, 15 August 1982, *T.B. Croat 55074* (VEN), 55080 (CAS, CM, MO); Topo Tacamahaco (Tamanaco), quebrada Río Grande, 9 km E de los Tanques de la Electricidad de Caracas, sur de Camurí Grande, vertiente norte de la Cordillera de La Costa, bosque nublado, 900 - 1000 m, 16 July 1973, *G.N. Morillo 3321* (VEN). Mérida: 1200 m, *Leandro Aristeguieta 41486* (VEN); ca. 12 km below (N) of Azulita, along Highway 4, 08°45'N 071°25'W, 760 m, 8 August 1982, *T.B. Croat 54867* (MO, B). Miranda: Distrito Páez; drainage of the Rín Guapo, Cerro Riberón between Ríno Guapo and Río Chiquito, 44.5 km directly (in a straight line) SE of Caucagua, 10°05'N 066°01'W, 200 - 400 m, 01-02 June 1977, *Gerrit Davidse & Ángel C. González 13526* (MO, VEN). **Táchira:** Diamante-Matamulas, 8 km above Diamante, 23 km above Rubio, 1900 m, 8 April 1971, *G.S. Bunting 4395* (MY, NY, US); Distr. Uribante: Empresa Las Cuevas near La Fundación. Undisturbed evergreen forest, 07°50'N 071°47'W, 900 m, 7 July 1983, *H. van der Werff & Á.C. González 5069* (B, MO, VEN); Quebrada con cascada, 16 km SW of La Fundación, 07°43'40"N 071°58'W, 920 m, 29 September 1981, *J.A. Steyermark & B.J. Manara 125475* (MO, VEN); Primary wet forest, sandy soil, vicinity of Las Minas, N of La Laguna, 16 km SE of Santa Ana, 07°36'N 072°13'W, 1150 - 1250 m, 28 July 1979, *J.A. Steyermark & R.L. Liesner 118874* (MO, VEN); Forested, steep sandstone slopes of Cerro de Cuite, along Quebrada La Colorada, 4-6 km S of Campoamento Colorada, 07°29'30"N 072°05'30"W, 450 - 630 m, 9 November 1979, *J.A. Steyermark et al. 119756* (MO, VEN); 18 km SW of La Fundación. Along stream with primary vegetation, 07°41'N 071°58'W, 950 m, 14 March 1981, *R.L. Liesner & Á.C. González 10560* (K, MO, NY, VEN); La Buenana, 6-12 km W of Quebrada Colorado, ca. 35 km SSE of San Cristóbal; primary forest, 07°28'N 072°09'W, 600 - 1000 m, 19 March 1981, *R.L. Liesner & Á.C. González 10821* (MO, VEN); 10 (airline) km ESE of La Fundación, 23 km by road, around Repres Dorada, 0-3 km below dam. Primary evergreen forest with patches of secondary vegetation, 07°47'N 071°46'W - 07°47'N 071°47'W, 450 - 650 m, 29 April 1981, *R.L. Liesner & M. Guariglia 11582* (CM, K, MO, NY, VEN); Along highway between San Cristobal and La Fundación, 19.6 km NE of highway #5 (San Cristobal- Barinas); along rocky quebrada, 07°44'N 071°59'W, 810 m, 23 March 1985, *T.B. Croat 60694* (MO). **Zulia:** Dto. Mara: cuenca del río Guasare, alrededores del Destacamento Guasare No. 1 (La Yolanda), en las laderas del cerro ca. 5 km al SSE del Destacamento, entre el caño Indio y la fila arriba de su orilla izquierda, en bosque húmedo original, 10°52'10"N 072°29'30"W, 350 - 500 m, 16 November 1982, *G.S. Bunting et al. 12375* (MO); Sierra de Perija: bosque húmedo a lo largo de la quebrada del Río Omira-kuna (Tumuriasa), cerca de la frontera Colombo-Venezolana suroeste de Pishikakao e Iria, 1440 - 1460 m, 22-28 March 1972, *J.A. Steyermark et al. 105544* (B, G, MER, MO, US)

Rhodospatha osaensis Croat, Grayum & M.Cedeño, *Aroideana* 46(3): 81. 2023. — Type: COSTA RICA. Puntarenas: disturbed area between Las Cruces Botanical Garden and Río Jaba, ca 4 km SE of San Vito de Coto Brus; 08°47'30"N 82°58'00", 1150 m, 27 May 1986, *M.H. Grayum, B. Hammel & G. de Nevers 7574* (holotype, MO-3486444; isotypes CR, K, US).

Epiphytic, loosely climbing to 2.5–5.0 m; fertile stems sometimes looping upward; **internodes** short or up to 3 cm long, 1.0–2.5 cm diam, matte to semiglossy dark green to gray-green

or light green, becoming light brown to grayish brown or tan with fine transverse fissures, drying with longitudinal fissures and often minutely warty, sometimes acutely 2-ribbed on one side. LEAVES distichous; **petioles** fully sheathed, 5.5–20.0 cm long; sheaths erect or partly involute, with etched veins, rounded to truncate and inequilateral at apex; **blades** oblong, markedly inequilateral, 13–41 cm long, 2.7–8.5 cm wide, 4.8 times longer than wide, subcoriaceous, gradually acuminate to caudate-acuminate at apex, acute to narrowly rounded at base, glossy and dark green and drying gray-green or sometimes brown above, semiglossy and yellowish green below, drying yellowish green to yellow brown below (juvenile leaves silvery below); midrib sunken above, convex and slightly paler below; **primary lateral veins** 8–16 per side, departing midrib at 55–70°, weakly curved to the margin, sunken above, slightly convex and darker or concolorous below; interprimary veins often present and obscure below; minor veins not raised, usually about 3 between each pair of primaries. INFLORESCENCE erect; peduncle 4–19 cm long, terete, pale green; spathe erect, cucullate, 6.5–12.5 cm long, 6.5–8.0 cm wide, about ½ as deep as broad (when forcibly flattened broader than long), greenish white outside, pure white within, drying brown to blackened, rounded and cuspidate at apex, rounded at base, the margins broadly revolute; **spadix** 5.5–15.0 cm long, 0.7–1.2 cm diam. cream-colored at anthesis, becoming blue-green post-anthesis stipitate to 5 mm; flowers 9–10 per spiral; pistils pruinose at apex, drying with a frost-like covering, 6–10 mm diam., trapezoidal to irregularly and sharply 6-sided, sometimes the sides perpendicular to the spiral sigmoid; lowermost flowers slightly larger and more irregular. INFRUCTESCENCE to 1.7 cm diam; seeds tan, more or less rounded, with a prominent notch in one side, 1.0–1.2 mm long, 0.8–1.0 mm diam. **Figures 56–63.**

Distribution — *Rhodospatha osaensis* is endemic to southwestern Costa Rica and adjacent Panama on the Pacific slope between sea level and 1200 m, occurring in *Tropical wet forest*.

Comments — The species is characterized by its small yellowish-drying leaf blades with prominently ascending primary lateral veins and by its post-anthesis bluish green spadix.

The species is separated from *Rhodospatha forgetii* by having proportionately longer leaf blades (4.8 times longer than wide) which dry light greenish brown above. In contrast, the blades of *R. forgetii* are only 3–3.4 times longer than wide and dry light grayish green above. In Miike Grayum's treatment of the Manual de Plantas de Costa Rica the species was treated as *Rhodospatha* sp. D (Grayum, 2003).

Additional Specimens Seen: COSTA RICA. near San Vito and the Las Cruces Forest San Vito, Costa Rica, 30 January 2003, *Margaret M. Mayfield 143-240-3199* (MO); Near San Vito and the Las Cruces Forest., 08°47'02"N 082°58'29"W, 31 July 2001, *Margaret M. Mayfield 143-1930-2112* (MO); Osa Peninsula, Fila Esquinos, Mogos, 08°45'00"N 083°18'00"W, 20 April 1993, *Ricardo Soto 24* (CR); **Puntarenas:** Reserva Forestal Golfo Dulce. Rancho Quemado, Río Riyitói., 08°40'12"N 083°33'00"W, 200 m, 31 March 1991, *B.E. Hammel 18184* (CR,MO); Parque Nacional Corcovado Los Patos Forest, 08°27'00"N 083°33'00"W, 500 m, 2 July 1988, *Christopher Kernan & Pamela Phillips 649* (CR,MO); Along Río Jaba S of San Vito de Coto Brus. 08°47'N 082°58'W, 1150 m, 01 July 1984, *M.H. Grayum et al. 3389* (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 5601* (MO); Along trail between Las Cruces Botanical Garden and Río Jaba, ca. 3.5 km SE



Figure 56: *Rhodospatha osaensis*. Adult plant with one inflorescence in female anthesis and one infructescence in development. *M. Cedeño* 791 (USJ). Photo M. Cedeño



Figure 57: *Rhodospatha osaensis*. Spathe cucullate and cream externally in female anthesis (left), and infructescence with a light green stylar cap during development (right), *M. Cedeño* 791 (USJ). Photo M. Cedeño.



Figure 58: *Rhodospatha osaensis*. Adult plant growing with pendulous stem. Photo M. Cedeño.



Figure 59: *Rhodospatha osaensis*. Adult plant growing about 4 m from the ground with narrow leaf. Photo M. Cedeño



Figure 60: *Rhodospatha osaensis*. M.H. Grayum 5601

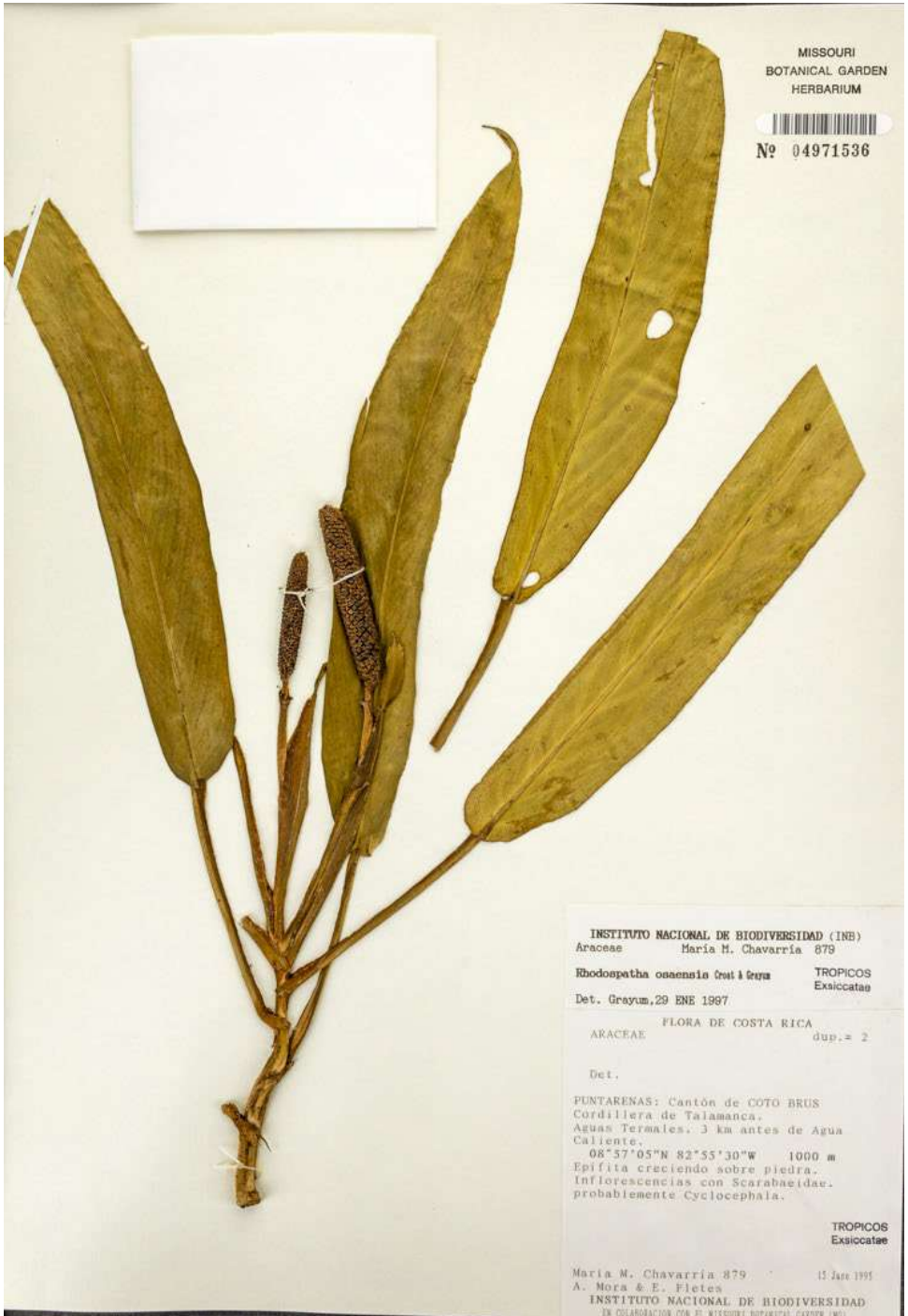


Figure 61: *Rhodospatha osaensis*. M.M. Cheverria 879



Figure 62: *Rhodospatha osaensis*. M.H. Grayum, B. Hammel & G. de Nevers 7574 (Sheet 2)

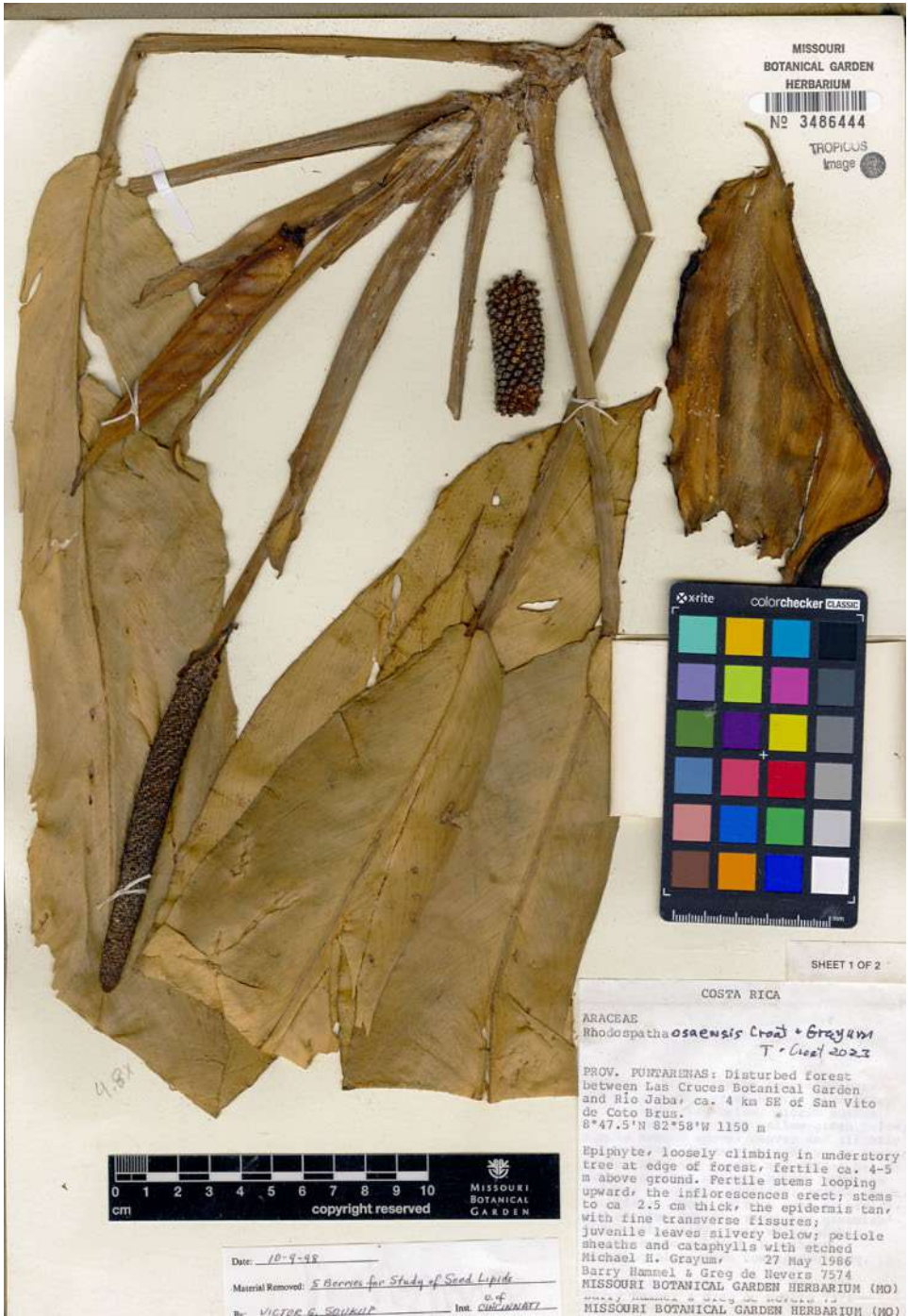


Figure 63: *Rhodospatha osaensis*. M.H. Grayum, B. Hammel & G. de Nevers 7574 (Sheet 1)

of San Vito de Coto Brus. 08°47'30"N 082°58'00"W, 1160 - 1200 m, 12 September 1985, *M.H. Grayum, Gerardo Herrera Ch. & José Berrocal 5984* (MO); Esquinas Forest. 08°43'48"N 083°16'48"W, 60 m, 27 March 1951, *Paul H. Allen 6034A* (EAP); Reserva Forestal Golfo Dulce Aguabuena. Sector oeste. 08°42'00"N 083°31'12"W, 50 - 150 m, 20 November 1991, *Reinaldo Aguilar 663* (MO); Hills above Palmar Norte, 08°57'36"N 083°26'24"W, 100 - 200 m, 20 May 1976, *T.B. Croat 35116* (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 67623* (MO); Along road from Pan-American Hwy. at Piedras Blancas to Rincón (on Osa Peninsula), 3.7 mi W of Panamerican Hwy. 08°46'N 083°18'W, 90-105 m, 16 September 1987, *T.B. Croat 67653* (MO); Along road between Palmar Norte and Panamerican Border, 3 km N of turn-off to Rincón. 08°48'39"N 083°16'18"W, 110 m, 10 September 1996, *T.B. Croat & D. P. Hannon 79194* (CR, MO, WU); 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 59876* (MO); Along road between Rincón de Osa and Rancho Quemado, ca. 10 km W of main Rincón-Pto. Jimenez Road. 08°41'00"N 083°32'30"W, 150 - 260 m, 03 March 1985, *T.B. Croat & M.H. Grayum 59786* (CR,MO); Along short cut-road to Golfito from Villa Briceño on Interamerican Hwy. W side of Fila Gamba, ca. 6 km from Golfito airport. 08°41'30"N 083°12'00"W, 100 m, 06 March 1985, *T.B. Croat & M.H. Grayum 59907* (MO); San Vito de Java, Las Cruces Tropical Botanical Garden. In forest below gardens, scandent in tree. 08°48'36"N 082°58'12"W, 4000 f, 28 May 1978, *W. J. Kress 78-968* (DUKE, F); Coto Brus. Along road to stream through forest on grounds of Finca Las Cruces, 08°47'24"N 082°57'00"W, 4500 f, 29 May 1973, *James L. Luteyn 3862* (DUKE, MO); Cordillera de Talamanca, Aguas Termales, 3 km antes de Agua Caliente. 08°57'00"N 082°55'12"W, 1000 m, 15 June 1995, *María Marta Chavarría 879* (CR, MO); Golfito. Golfo Dulce. 09°18'00"N 083°52'48"W, 0 m, 17 February 1933, *A.M. Brenes 552* (F); Estacion Aguas. Finca La Leiva de Delfin Vindas. 08°32'23"N 083°25'08"W, 200 - 300 m, 18 February 1998, *Manuel Lobo 205*(CR, MO); Playa Blanca, Golfo Dulce. Coto. 08°37'48"N 083°25'48"W, 0 m, 17 February 1933, *Manuel Valerio 552* (CR); R.N. Fauna Silv. Golfito, along crest of Fila Gamba, to ca. 0.7 km N of Golfito/Villa Briceño road. 08°40'12"N 083°12'00"W, 160 - 260 m, 26 January 1992, *M.H. Grayum 10060* (CR,MO); Conte, Burica, 08°26'01"N 082°57'10"W, 2 July 1980, *Rafael Á. Ocampo S. 2682* (CR); R.N.V.S. Cópamo. Península de Osa. Puerto Jiménez, Miramar. 08°27'36"N 083°19'48"W, 100 m, 6 May 1995, *Reinaldo Aguilar 4114* (CR, K, MO); Osa. Between Golfo Dulce and Río Térraba, 08°46'48"N 083°24'36"W, 30 m, December 1947, *Alexander F. Skutch 5327* (US); Between Golfo Dulce and Río Térraba, 08°46'48"N 083°24'36"W, 30 m, December 1947, *Alexander F. Skutch 5380* (US); Rincón de Osa, road between Rincón and Playa Blanca, 09°18'00"N 083°52'48"W, 0 - 10 m, 25 July 1974, *J. F. Utley & K. Burt-Utley 1244* (F); Corcovado National Park. Primary forest and edge of forest near new airfield under construction at Pavo. 08°30'00"N 083°36'36"W, 5 m, 7 July 1977, *R.L. Liesner 3025* (MO); **San José:** Refugio de Vida Silvestre Boracayán, Fila Costeña, San José-Puntarenas Province border, ca. 10 km E of Dominical. Just N of Fila Alivio in upper Río Barucito basin, a southern tributary of Río Barú. 09°14'N 083°46'W, 700 m, 29 May 2003, *B.K. Holst 8729* (MO); Pérez Zeledón. Along road between San Isidro del General and Dominical, 9 miles southwest of Río Pacuare, disturbed remnants of primary forest, 09°17'42"N 083°47'17"W, 680 m, 23 May 1976, *T.B. Croat 35350* (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 35257* (MO); About 1 mile beyond divide between San Isidro del General and coastal town of Dominical. 09°16'12"N 083°51'36"W, 900 m, 22 May 1976, *T.B. Croat 35317* (CR, MO); Puriscal. Zona Protectora La Cangreja, along Quebrada Grande and on adjacent ridges, ca. 2 km north of Mastatal de Puriscal, 09°42'00"N 084°22'30"W, 340 m, 22 July 1988, *M.H. Grayum et al. 8617* (MO); Turrubares. Z. P. Cerro de Turrubares. Cuenca del Tárcoles. San Pablo de Turrubares. 09°50'19"N 084°30'21"W, 100 - 200 m, 08 December 2004, *Daniel Santamaría 302* (CR, MO); Reserva Biológica Carara, Valle del Tárcoles, Cuenca del Río Grande de Tárcoles, Puesto Carara, along Río Carara, between guardpost and Río del Sur. [Original Label Coordinates 9°47'00"N 84°32'00"W]. 09°46'48"N 084°31'48"W, 130 - 170 m, 2 April 1993, *M.H. Grayum 10431* (CR, MO); P. Turrubares; Cuenca del Río Grande de Tárcoles; SW spur of Cerro Turrubares, ridge bet. N and S forks of Río Carara. 09°47'00"N 084°29'00"W, 850 - 1100 m, 06 April 1993, *M.H. Grayum, B.E. Hammel & Rodolfo Zúñiga 10556* (CR, MO).

Rhodospatha ovatifolia Croat, Grayum & M.Cedeño, *Aroideana* 46(3): 96. 2023. — Type: COSTA RICA. Cartago: along Camino de Hule, SE of Platanillo (Tsipiri), 09°49'12"N 83°24'00"W, 1200–1400 m, *T.B. Croat 36755* (holotype, MO-2390113; isotype, CR).

Terrestrial; to 1.2 m tall; stems 0.5–1.5 m long with prominent prop roots; **internodes** 1-3(7) cm long, 1.0–4.5 cm diam, gray to medium green, glossy, smooth and unmarked, drying grayish and minutely longitudinally fissured, sometimes weakly and closely transverse fissured; **petioles** 35–56 cm long, averaging 1.2 times longer than the blades, ranging 1.0–1.5 times longer than the blades; sheathed 2/3-3/4 of their length, drying brown and closely ridged, especially adaxially, the free portion thicker than broad between, narrowly C-shaped, bluntly to sharply sulcate; sheaths ending imperceptibly at the apex, the margins, persistent or in part deciduous and partly persistent, sometimes with the margin fibrous; geniculum 1–3 cm long, sharply sulcate; **blades** ovate, less frequently elliptic, slightly inequilateral, usually markedly unequal at the base with one side meeting at a more acute angle, 29–45 cm long, 18–30 cm wide, 1.4–1.8 times longer than wide, thinly coriaceous, moderately to weakly bicolorous, semiglossy to weakly glossy and dark green above, slightly paler and weakly glossy below, drying dark brown to blackened above, grayish brown or rarely dark brown or yellowish brown below; midrib sunken and slightly paler above, slightly paler and thicker than broad below, drying bluntly acute; **primary lateral veins** 35–50 per side, departing midrib at a right angle or to about 30°, moderately curved to the margin, prominently sunken and weakly quilted above, prominently raised and sometimes acute below, 4–10 mm apart, sometimes turned down abruptly just before the midrib; interprimary veins occasionally present; minor veins 1-3 between each pair of primary lateral veins. INFLORESCENCE moderately long-pedunculate; peduncles 10–31 cm long, ca. 5 mm diam.; **spathe** cream, 11–14 cm long, acute at apex, promptly deciduous, the scar prominent; **spadix** 8-13 cm long, 10-13 mm diam, green to gray, prominently stipitate, the stipe 2.5–3 cm long; flowers 12–16 per spiral, trapezoidal to quadrangular, acutely to bluntly 5- or 6-sided, the sides straight to concave; surface of pistil dotted with frost-like particles of grayish white wax, 1.6–2.7 mm diam.; stigma raised, oblong, 1.1–1.3 mm long, 0.3–0.4 mm wide, blackened; anthers 0.8 mm long, 0.6 mm wide, the thecae prominently divaricate. INFRUCTESCENCE to 15 cm long, 3 cm diam.; seeds subrounded, somewhat flattened, tan, glossy, 1.0–1.1 mm diam. **Figures 64–73.**

Distribution — *Rhodospatha ovatifolia* ranges from Costa Rica on the Caribbean slope (Cartago, San José & Limón) to western Panama (Bocas del Toro and Chiriquí) at (100)500–1200 m in *Tropical wet forest*, *Premontane wet forest*, *Lower montane wet forest* life zones and in a transition zone between *Tropical wet forest* and *Premontane wet forest*.

Comments — The species is characterized by its terrestrial habit, slender, stilt-rooted stems, ovate, densely veined, weakly glossy blades with conspicuously sunken primary lateral veins and by its inflorescence with an acute spathe and prominently stipitate weakly glaucous spadix.

Rhodospatha ovatifolia is most easily confused with *R. guanchensis* Croat, a species from low elevation (20–50 m elevation) in Panama (Colón Province). That species differs by having blades 1.8–2.6 times longer than wide and drying usually green to gray green rather than blades that are 1.0–1.8 times longer than wide and drying dark brown to blackened on upper surface as with *R. ovatifolia*.

The species is also similar to *R. densinervia* Engl. & K.Krause, a South American species that occurs at much higher elevations and has more oblong-elliptic blades.

Paratypes: COSTA RICA. **Cartago:** Forested slope above Río Reventazón, along trail leading to river from CATIE main building, Turrialba, 09°53'24"N 83°38'24"W, 500 m, 1 May 1985, *M.H. Grayum & G. E. Schatz 5240* (CR, MO); Along Quebrada Platanillo near confluence of Quebrada Sipiri, Platanillo de Chirripó, 09°48'36"N 83°24'00"W, 1135 m, 2 March 1990, *M.H. Grayum & Donald R. Hodel 9725* (MO); 12 km south of Turrialba by air, 4 km southeast of Pejibaye along Río Gato, disturbed primary forest along river, 09°48'00"N 83°42'00"W, 700 m, 16 April 1983, *R.L. Liesner 14420* (CR, MO); Along Highway 32 from Turrialba to Limón, ca. 9 miles northeast of Turrialba, along ravine and stream, 09°55'12"N 83°36'00"W, 800 m, 13 August 1977, *T.B. Croat 43371* (MO); M. N. Guayabo. Sendero a la derecha de la entrada principal, 09°58'18"N 83°41'17"W, 1091 m, 17 May 2006, *Luis Diego Vargas 1317* (CR); Tayutic, Jicotea, 09°47'05"N 83°32'40"W, 1200 m, 16 June, 1995, *Gerardo Herrera Ch. & A. Cedeño 7942* (MO). **Limón:** Parque Internac. La Amistad. Quebrada Chaho, subiendo por la Fila, Croriña, 09°58'48"N 83°34'12"W, 700 m, 23 July, 1989, *Abelardo Chacón 266* (MO); Cuenca del Estrella. Sobre la quebrada Barera junto a la estación de la R.B. Hitoy Cerere, 09°40'31"N 83°01'30"W, 100 m, 25 June 2000, *Luis Acosta 1890* (MO); Hitoy Cerere Reserve and vicinity in Valle La Estrella S of Finca Concepción, in secondary woods near station, Los Jabillos, 09°42'00"N 83°01'48"W, 140 m, 2 August 1985, *B.E. Hammel & M.H. Grayum 14348* (CR, MO); Reserva Indígena Talamanca Sukut, desembocadura del Río Sukut en el Río Urén, camino al sureste, hacia Purisqui, 09°23'24"N 82°57'36"W, 650 m, 7 July 1989, *B.E. Hammel et al. 17384* (MO). **San José:** Braulio Carrillo Park, along road from near the entrance down to the Río Sucio and in the vicinity of Estación Carrillo, 10°08'24"N 83°57'00"W, 400–1500 m, 12 June 2009, *B.E. Hammel & J. Trainer 14271* (MO); Vicinity of Bajo La Hondura, along road between Paracito and the Río Claro, 10°03'36"N 83°58'48"W, 110–1400 m, 14 January 1978, *T.B. Croat 44517* (MO); Braulio Carrillo National Park, 12 km beyond the San Isidro-San Josecito entrance to turnpike, 10°05'58"N 83°58'55"W, 1180 m, 1 September 1996, *T.B. Croat 78815* (CR, MO). PANAMA. **Bocas del Toro:** Caribbean slopes of Cerro Fábrega at foot of 'Falso Fábrega' in Palo Seco Reserve, second northernmost tributary (on map) of Culubre river, Pavón Camp, 980 m, 19 March 2013, *Alex K. Monro &*



Figure 64: *Rhodospatha ovatifolia*. Habit of flowering plant, *M. Cedeño & J. Hughes 2395* (US)

Steve Cafferty 4749 (BM); On route from Gualaca to Chiriquí Grande along the oil pipeline just north of the continental divide; in forest W of pipeline rd at end of drivable road, 08°49'N 82°13'W, 850 m, 8 March 1986, *B.E. Hammel et al. 14701* (MO); Along highway, between Fortuna and Chiriquí Grande, 2.2 mi N of Continental Divide, 6.3 mi N of bridge over Fortuna Lake, 08°46'06"N 82°12'30"W, 820 m, 12 March 1985, *T.B. Croat & M.H. Grayum 60396* (MO); Along road between Gualaca and Chiriquí Grande, 6.6 mi N of middle of bridge over Fortuna Lake, steep slope in forest above highway, 08°47'18"N 82°11'54"W, 780 m, 24 June 1987, *T.B. Croat 66729* (MO). **Chiriquí:** 33.0 kms from Gualaca on road to Chiriquí Grande, 08°44'46"N 82°14'44"W, 1080 m, 17 February 1986, *W. Scott Hoover, 1335* (MO); Gualaca-Chiriquí Grande, 1.6 mi. N of Continental Divide, 08°48'N 82°13'W, 850 m, 29 March 1993, *T.B. Croat 74926* (K, MO).

Rhodospatha pellucida Croat & Grayum, *Novon* 9(4): 500. 1999. — Type: PANAMA. Chiriquí: Chiriquí Grande-Fortuna, 7.7 mi W of Chiriquí Grande, 1.5 mi W of Punta Peña, 80 m, 8°50'N 82°10'W, 19 March 1985, *T.B. Croat & M.H. Grayum 60106* (holotype, MO 3123550; isotypes, B, K, PMA, US).

Appressed-climbing epiphyte; stems to 2.0–2.5 m high, the flowering branches somewhat divergent; **internodes** shorter than broad, 1–2 cm diam. near apex (drying frequently less than 1 cm diam and often flattened, glossy, medium to dark green, tapered below, drying brown, matte, densely and finely granular. LEAVES clustered somewhat toward the apex, spreading



Figure 65: *Rhodospatha ovatifolia*. Juvenile plant growing on rocks, M. Cedeño & J. Hughes 2395 (USJ). Photo M. Cedeño



Figure 66: *Rhodospatha ovatifolia*. Entire flowering plant on ground, A.K. Monro & S. Cafferty 4749. Photo A. Monro



Figure 67: *Rhodospatha ovatifolia*. Leaf adaxial surface, T.B. Croat 74926



Figure 68: *Rhodospatha ovatifolia*. base of blade abaxial surface, T.B. Croat 78815



Figure 69: *Rhodospatha ovatifolia*. Inflorescence cut open at near anthesis, M. Cedeño & J. Hughes 2395 (USJ). Photo M. Cedeño



Figure 70: *Rhodospatha ovatifolia*. Inflorescence in male anthesis with the spathe cream externally and internally and the spadix cream, with a lot of damage by beetles. *M. Cedeño & J. Hughes 2395 (USJ)*. Photo M. Cedeño



Figure 71: *Rhodospatha ovatifolia*. T.B. Croat 74926.



Figure 72: *Rhodospatha ovatifolia*. T.B. Croat 36755, TYPE



Figure 73: *Rhodospatha ovatifolia*. B.E. Hammel & J. Trainer 14271

or ascending and almost distichous; **petioles** medium green, 8.5–23.0 cm long, ca. 5 mm diam. below the geniculum, sheathed fully throughout their length, drying matte, yellowish brown; sheath erect, persisting intact with the margin sometimes drying darker brown; geniculum somewhat shrunken, C-shaped, V-sulcate adaxially, 1.0–1.5 cm long; **blades** reflexed on petiole for upper leaves, directed in line with the petioles on the lower leaves, moderately coriaceous, conspicuously bicolorous, oblong-elliptic, inequilateral, tapering more or less equally toward both ends, slightly inequilateral and gradually acuminate to obtuse and abruptly acuminate at apex, acute to attenuated at base, broadest at the middle or just above the middle, 21–41 cm long, 7.2–14.5 cm wide, 2.5–4.5 times longer than wide, 1.6–3.4 times longer than petioles, dark green and glossy above, drying gray-green to olive-green or yellowish brown, matte to weakly glossy, yellow-green to silvery-green and paler below, drying yellow-brown to yellow-green below; midrib paler than surface, obtusely V-sulcate above, thicker than broad and more or less concolorous with surface below; **primary lateral veins** 21–33 per side, departing midrib at 30–47°, moderately arcuate to the margin, sometimes prominently down-turned just before merging with the midrib, closely spaced, somewhat to deeply impressed above, darker than surface below and convex, but drying only weakly raised to flat, 5–17 mm apart; interprimary veins 1 alternating between adjacent primary lateral veins, much less conspicuous than the primary lateral veins; both the primary lateral and interprimary and sometimes the minor veins margined with thick black lines on drying, and also with a sparse arrangement of pale raphide cells aligned with the dark black lines (those of the interprimary and minor veins usually intermittent and appearing as rows of pellucid dots and streaks on living plants and appearing above as weak dark green bumps); minor veins 1–3 between alternate primary and interprimary usually very weak, branched toward the margin; cross veins usually inconspicuous, often branched, mostly extending throughout the surface; surface minutely dark granular, often sparsely covered with pale raphide cells. **INFLORESCENCE** 1 or 2, from the upper leaf axils; peduncles arching, (5)12–28 cm long, 6–8 mm diam, usually longer than petioles (up to 13 cm longer) sometimes equaling petioles, rarely somewhat shorter than petioles, drying light brown; **spathe** coriaceous, acuminate at apex and up to 1.4 cm diam when furled, sub-globular when open, 8–15 cm long, to ca 5 cm wide, 5–13 cm diam when opened flat, the veins impressed, white to greenish white, matte outside, glossy and white inside, dark brown on drying, often promptly deciduous, sometimes persistent; **spadix** cylindroid, weakly tapered toward both ends, white to cream at anthesis, soon becoming gray or green or grayish green after anthesis, 6.3–18.5 cm long, drying 6–15 mm diam, sometimes shorter than the spathe but usually 1–3 cm longer than the spathe, stipitate 4–9 mm on the back side, held at ca 35° to the peduncle; flowers 4-sided, 2.0–2.8 mm in both directions, 12–13 flowers visible in the principal spiral, 8–9 visible in the alternate spiral; pistils mostly 4-sided, sometimes irregularly 5- or 6-sided, 1.4–2.0 mm wide, the style truncate, gray, matte & minutely granular, sometimes smooth, brown; stigma broadly elliptic, slit-like, 0.9–1.1 mm long, 0.5–0.8 mm long, depressed medially, drying black with a pale ring-like base; stamens included; filaments densely embedded with short, pale raphide cells; anthers 1.2 mm long, 0.7 mm wide, the thecae oblong, not divaricate; pollen white. **INFRACTESCENCE** to 15 cm long, to 2 cm diam; seeds reniform, light brown, glossy, 0.8–1 mm long, the outer margin deeply and sharply sulcate. **Figures 74–78.**

Distribution — *Rhodospatha pellucida* is found on the Atlantic slopes of Nicaragua, Costa Rica and Panama at 10–1300 m in *Premontane moist forest* and wetter parts of *Tropical moist forest*.

Comments — The species is characterized by its relatively small size with stems less than 2 cm diam and blades less than 11 cm wide, which dry yellowish brown to yellowish green and have the primary lateral veins as well as many interprimary veins and minor veins bordered with continuous or intermittent dark black lines (appearing as irregular rows of pellucid-punctate markings on the lower surface and as minute bumps on the upper surface on fresh leaves.) Also characteristic is the dark reddish or brownish-granular lower blade surface on magnification.

Rhodospatha pellucida has for long been confused with *Rhodospatha madisonii* Delannay & Croat (ined., Delannay & Croat, in prep.) from Colombia and Ecuador. It differs from *R. pellucida* by its blades having prominent minor veins and cross-veins (instead of those being weak for *R. pellucida*), and by its lower blade surface densely covered with large irregular dark spots on magnification, which are not seen in the case of *R. pellucida*. Also, the two species have divergent geographic distributions, with *R. madisonii* ranging from Colombia to northern Ecuador on the Pacific slopes of the Cordillera Central, while the true *R. pellucida* is found only on the Atlantic slopes of Central America from Nicaragua to Panama.

Additional specimens seen: COSTA RICA. **Alajuela:** Ciudad Quesada to Los Chiles, 9 km north of Ciudad Quesada, along Río Peje, 300 m, 10°21'36"N, 84°27'36"W, 1 June 1986, *Hammel et al.* 15306 (CR, MO); San Carlos, 3 km south of Boca de Arenal along Río San Carlos on Hacienda Boca Arenal, 100 m, 10°30'00"N, 84°30'00"W, 03 June 1986, *Hammel & Nevers* 15325 (MO); 22 km NE of Quesada by air, 4 km W of Muelle San Carlos, 10°27'36"N, 84°30'00"W, 9 April 1983, *Liesner* 14139 (MO); 22 km NE of Quesada by air, 4 km W of Muelle San Carlos, 10°27'36"N, 84°30'00"W, 9 April 1983, *Liesner* 14157 (MO); 2 km N of Santa Rosa, 15 km N of Boca Arenal on Quesada-Muelle San Carlos-Los Chiles road, 100 m, 10°37'48"N, 84°30'36"W, 28 April 1983, *Liesner et al.* 15033 (CR, MO); 15 km WNW of Quesada by air, 1 km W of Jabillos, 150–200 m, 10°22'48"N, 84°33'00"W, 29 April 1983, *Liesner et al.* 15149 (MO); Bijagua, Canas-Upala, 13.8 km north of Bijagua, 100–150 m, 10°49'12"N, 085°01'48"W, 26 June 1976, *Croat* 36426 (MO); 3.5 km west of Fortuna, 2.5 km NW of New Volcan Arenal along its sloping base, 1500 m, 10°27'36"N, 84°42'00"W, *Taylor & Taylor* 11609 (MO); **Guanacaste:** Hills along south side of Lake Arenal, from Río Chiquito to Río Caño Negro, 550–850 m, 10°27'00"N, 84°49'48"W, 09 May 1986, *Hamme et al.* 15155 (MO). **Heredia:** N of road to Puerto Viejo at Chilamate, 10°27'00"N, 84°03'36"W, 22 May 1982, *B. Hammel*, 12416 (DUKE); La Selva Biological Station, 50 m, 10°26'00"N, 84°01'00"W, 30 August 1996, *T.B. Croat* 78734 (INB, MO); Finca La Selva, at confluence of Río Sarapiquí and Río Puerto Viejo, Atlantic slope, 50–80 m, 10°25'48"N, 84°00'36"W, 22 September 1986, *Grayum* 7668 (MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 100 m, 10°25'53"N, 84°00'13"W, 17 August 1979, *M.H. Grayum* 2420 (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 100 m, 10°25'12"N, 84°00'36"W, 25 May 1982, *Hammel* 12502 (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 100 m, 10°19'12"N, 84°04'12"W, 6 June 1982, *B. Hammel et al.* 12726 (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 100 m, 10°25'53"N, 84°00'13"W, 12 August 1980, *B. Hammel* 9517 (DUKE, MO); La Selva Biological Station, 100 m, 10°25'53"N, 84°00'13"W, 5 June 1980, *B. Hammel* 8948 (DUKE); Finca La Selva, 10°25'12"N, 84°01'12"W, 18 June 1984, *Kress* 84-1623 (SEL); Finca La Selva,



Figure 74: *Rhodospatha pellucida*. Habit of cultivated plant at MO, T.B. Croat 75156



Figure 75: *Rhodospatha pellucida*. Habit of fruiting plant, T.B. Croat 74946



Figure 76: *Rhodospatha pellucida*. T.B. Croat & M.H. Grayum 60106, TYPE (Sheet 1)



Figure 77: *Rhodospatha pellucida*. T.B. Croat & M.H. Grayum 60106, TYPE (Sheet 2)



Figure 78: *Rhodospatha pellucida*. B.E. Hammel & J. Trainer 13148

the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 100 m, 10°25'53"N, 84°00'13"W, 13 July 1982, *B. Hammel & J. Trainer 13148* (DUKE, MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 100 m, 10°25'53"N, 84°00'13"W, 16 June 1980, *M.H. Grayum 2896* (DUKE, MO, F); Original forest near the Río Puerto Viejo, about 2 km upstream from the confluence with Río Sarapiquí, formerly "Finca La Selva" of L.R. Holdridge, 100 m, 10°27'00"N, 84°00'00"W, 14-17 June 1968, *W. Burger & B. Stolze 5836* (CR, F, US); Near Puerto Viejo along road near the Río Sucio, 20 m, 10°27'36"N, 83°59'24"W, 27 May 1976, *T.B. Croat 35713* (F, MO); **Limón:** Cordillera de Talamanca, along Río Barbilla, from jct. with Río Dantas to ca. 1 km downstream, 100-110 m, 10°00'36"N, 83°24'36"W, 10 September 1988, *M.H. Grayum et al. 8966* (MO); Hills between headwaters of Quebrada Mata de Limón and upper branches of Quebrada Tigre, and lowland forest of Quebrada Tigre drainage, Finca Anai, (Sixaola region), 25-30 m, 09°33'36"N, 82°39'36"W, 18 November 1984, *M.H. Grayum et al. 4450* (CR, MO); Mata de Limón-Finca Anai, Sixaola region, 15 m, 09°33'00"N, 82°37'48"W, 3 May 1985, *M.H. Grayum & G. Schatz 5260* (CR, MO); Ref. Nac. Barra del Colorado (Refugio Nacional de Vida Silvestre), fields and pastures between Río Chirripocito and Río Sardina ("Sardinal" Chirripó Atlántico quadrangle), 12 m, 10°37'48"N, 83°45'00"W, 22 April 1990, *M.H. Grayum & O. Montiel 9845* (CR, MO); Cerro Coronel, E of Laguna Danto, 20-170 m, 10°41'N, 83°38'W, tall evergreen forest on gentle to moderately steep slopes, 20-170 m, 10°40'48"N, 83°37'48"W, 15-20 September 1986, *Stevens 24558* (MO); Hacienda Tapezco-Hacienda La Suerte, 29 air km W of Tortuguero, 40 m, 10°30'00"N, 83°46'48"W, 18 August 1979, *C. Davidson & Donahue 8499* (LAM); 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, 40 m, 10°30'00"N, 83°46'48"W, 24 August 1979, *C. Davidson & Donahue 8759* (LAM); 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, 40 m, 10°30'00"N, 83°46'48"W, 30 August 1979, *C. Davidson & Donahue 8979* (LAM, MO, RSA); Islas Buena Vista, on hills 2 air km SSE of Islas Buena Vista in the Río Colorado, 14 air km SW of Barra del Colorado, *premontane wet forest* on low hills, 10-20 m, 10°40'N, 83°40'W, 13-14 September 1986, *G. Davidse & Herrera 31091* (MO); Río Frio-Limón, vicinity of Río Blanco W of Guapiles, along banks of Quebrada Danta, 3 mi S of main highway along old rail-road bed, 360 m, 10°12'N, 83°49'W, 2 October 1987, *T.B. Croat 68424* (MO); Pococi, P.N. Braulio Carrillo, Cuenca del Sarapiquí, Quebrada González, Sendero Las Palmas, 500 m, 10°09'48"N, 83°56'20"W, 6 November 1997, *Rodríguez & Vargas 2690* (MO); P.N. Braulio Carrillo, Cuenca del Sarapiquí, Estación Quebrada González, a lo largo del Sendero Las Palmas, 500 m, 10°09'50"N, 83°56'20"W, 20 January 1998, *Rodríguez et al. 2858* (MO); Bosque residual, Linda Vista, carretera entre Turrialba y Siquirres, 650 m, 10°00'28"N, 83°34'35"W, 24 June 1981, *Gomez-Laurito 6819*

(CR). NICARAGUA. **Río San Juan:** Reserva Indio-Maíz, Municipio de San Juan del Norte, Río Indio, Cerro Canta Gallo, 150–200 m, 11°04'N, 83°51'W, 17 September 1998, *Rueda et al.* 8696 (MO); La Lupe, ca. 25 km ENE of Boca de Sabalo, primary forest lightly logged with silvicultural treatment, clay soils, hilly, 80–120 m, 11°08'N, 84°21'W, 28 June 1997 - 2 July 1997, *Salick & Stijfhoorn* 8269-b (MO). PANAMA. **Bocas del Toro:** in forest on hill above RR station at Milla 7.5, 09°21'30"N, 82°27'00"W, 27 July 1971, *T.B. Croat & D. Porter* 16402 (MO); Above Chiriquí Grande on side road 10 miles from continental divide, on trail off pipeline trace, 300 m, 8°55'N, 82°10'W, 28 May 1988, *G. McPherson* 12566 (MO, PMA); Almirante, Milla 7.5, ridge SW of RR, 50 m, 17 November 1971, *H. Kennedy* 1267 (DUKE, MO); Gualaca-Chiriquí Grande, 1.4 mi S of Punta Peña. 200 m, 08°53'24"N, 82°10'54"W, 29 March 1993, *Croat* 74946 (K, MO); **Chiriquí:** Fortuna Dam area, S of reservoir, on trail to E of road leading to Quebrada Ortega, 1200 m, 8°41'N, 82°14'W, 24 May 1984, *S. Churchill* 5282 (MO); **Coclé:** Above El Potroso sawmill at Continental Divide, *premontane rain forest*, 1200–1300 m, 08°40'36"N, 080°36'36"W, 25 October 1980, *Sytsma* 1877 (MO); Above El Cope, along road to Caribbean side, Atlantic slope, 720–800 m, 8°38'N, 80°35'W, 31 August 1988, *McPherson* 12860 (MO); **Colón:** Río Piedras, Sabanitas-Portobelo, along Río Guanache, 5 km above bridge on Colón-Portobelo road, 250 m, 09°22'30"N, 79°41'30"W, 6 April 1993, *Croat* 75156 (K, MO); **San Blas:** Carti, El Llano-Cartí road, km 26.5, 200 m, 09°22'N, 078°58'W, 17 June 1986, *de Nevers et al.* 7846 (MO, CAS).

Rhodospatha vandaniilssoniae Croat & Grayum, **sp. nov.** — Type: COSTA RICA. San José: Vasquez de Coronado, Cordillera Central, Río Zurquí, 10°03'00"N 84°00'36"W, 1500–1600 m, 18 January 1986, *M.H. Grayum & P.J. Sleeper* 6137 (CR, MO, NY).

Diagnosis: The species is distinguished by its habitat in high elevation cloud forests, by its nearly full-sheathed petioles, intact persistent petiole sheath, more or less elliptic, glossy, dark brown-drying, weakly acuminate leaf blades with up to 20 primary lateral veins per side.

Appressed-climbing epiphyte 2.5 m in understory; **internodes** short 2.5–3.5 cm long, to 2.5 cm diam. glossy & gray-green, drying dark brown, matte, **petioles** 25.5–40.5 cm long, sheathed to geniculum, drying dark brown; sheath to 36 cm long, 7–8 mm high, the margin remaining intact, weakly free-ending at apex; geniculum sharply C-shaped, deeply concave above, 3.2–3.7 cm long, the margins sharply and narrowly alate; **blades** narrowly elliptic to oblanceolate-elliptic, 32.1–51.0 cm long, 15.5–19.1 cm wide, (1.9)2.1–2.9 times longer than wide, 1.1–1.4 times longer than petioles, broadly acute and weakly short-acuminate at apex, acute at base, subcoriaceous, dark green and glossy above, semiglossy and moderately paler below, drying scarcely discolourous, dark grayish brown and semiglossy on both surfaces; major veins sunken and concolorous above; midrib obtusely raised and slightly darker above, narrowly raised, drying bluntly acute and concolorous below; **primary lateral veins** 16–20 per

side, minor veins visible below, interprimary veins 1 or 2 between each pair of primaries and with 1 or 2 additional minor veins between the primary and interprimary veins; cross-veins not visible. INFLORESCENCE not seen. **Figure 79.**

Distribution — *Rhodospatha vandaniilssoniae* ranges from Costa Rica to western Panama at 1500–1700 m on the Caribbean slope in *Tropical wet forest* life zones.

Etymology — The species is named in honor of the late Vanda Tereza Nilsson Laurito, the who collected the only fertile example (now lost) of it. Vanda was born in Brazil (Limeira, São Paulo State) Sept. 24, 1955, immigrated to Costa Rica and became a naturalized Costa Rican citizen. She died Aug. 5, 2020.

Comments — This species was collected in fertile condition by Costa Rican botanist Vanda Nilsson in the Tapantí region in Cartago Province, but the collection was never deposited in any herbarium and is considered lost (*vide* M.H. Grayum).

The species could be confused with *Rhodospatha antonensis* but that Panamanian species is found growing at lower elevations (700–1200 m) with blades that dry medium brown above and yellowish brown below. In contrast *R. vananiilssoniae* grows in high elevation cloud forests at 1500–1700 m with the blades drying dark brown on both surfaces:

Paratype: Panama. Chiriquí: Along trail between N. fork of Río Palo Alto and Cerro Pate de Macho, ca. 6 km NE of Boquete, 08°48'00"N 82°23'30"W, 1600-1700 m, 6 February 1986, *Michael Grayum, Barry Hammel & Bonnie Bochan 6399* (holotype: MO-1361545).

Rhodospatha wendlandii Schott, J. Bot. 2: 52. 1864. — Type : Cultivated plant of F. Wendland at Schönbrunn Palace, Vienna (W, presumed lost). — Schott Icones 2993 & 2994 (W, neotype, designated here).

Rhodospatha nervosa Lundell, Contr. Univ. Mich. Herb. 6:3. 1941. — Type: BELIZE. Stann Creek District: Middlesex, 25 May 1939, *Gentle 2797* (holotype, MICH).

Rhodospatha roseospadix Matuda, Anales Inst. Biol. Univ. Nac. México 25: 176. 1954. — Type: MEXICO. Chiapas: Turqui, vic. Finca California, 15°21'00"N 092°37'48"W, 8 September 1947, *E. Matuda 17782* (holotype, MEXU; isotypes, CM, DS, NY)

Appressed-climbing epiphyte, fertile 2–4 m above soil; caudex usually unbranched, 1–2(7) m long; **internodes** to 4 cm diam., tightly appressed to support. JUVENILE PLANTS terrestrial, creeping, rooting at the nodes, the blades ovate to elliptic, acuminate, rounded to acute at base, gray-green, mostly 4–10 cm long; plants eventually climbing trees. ADULT LEAVES closely spaced near the apex, well-spaced below; **petioles** 25–83 cm long, drying matte, usually closely and acutely ribbed abaxially, sheathed throughout most of their length (the margins usually drying lighter brown, usually weathering away, usually somewhat to markedly fibrous), ultimately deciduous; the free portion of the petiole sulcate; geniculum prominently swollen,



Figure 79: *Rhodospatha vandaniillsoniae*. M.H. Grayumjhb & P. Sleeper 6137 TYPE

2.0–4.5 cm long, shrinking and turning black on drying; **blades** subcoriaceous, narrowly elliptic, oblong oblanceolate to narrowly ovate, asymmetrically cuspidate-acuminate at apex, usually rounded to truncate, rarely acute or subcordate, at the base, 35–72 cm long, 13–36 cm wide, (0.9)2.5–3.1 times longer than wide, usually semiglossy on both surfaces, sometimes matte on one or both surfaces, dark green above, slightly to moderately paler beneath, drying usually dark brown to gray brown or rarely gray-green above, dark brown to reddish brown or rarely grayish green to greenish gray below; midrib bluntly acute above, narrowly convex or much thicker than broad beneath; **primary lateral veins** 22–60 per side, widely spaced (1.5–2.0 cm), departing midrib at ca 60–70°, sunken above, raised beneath, usually drying paler than the surface; interprimary veins 0–2 per pair of primary lateral veins; minor veins usually 3–5 per pairs of primary lateral veins, obscure above, visible beneath. INFLORESCENCES arising from the upper axils; peduncles 12–29 cm long; **spathe** subcoriaceous, 20–44 cm long, 9–18 cm wide when fully expanded, white to creamy white or somewhat pinkish or pinkish purple, acuminate at apex; **spadix** pale green, white to pink, light red, or faintly purplish, rarely becoming bluish green, cylindroid and weakly tapered to the blunt apex, stipitate 5–30 mm, mostly about 1 cm, slightly shorter than the spathe, to 1.5 cm diam; stamens ca 3 mm long; anthers narrowly inverted V-shaped, 0.8–1 mm long; pollen yellowish; ovary 3–4 mm long, obovoid, prismatic and truncate at apex; ovules elbow-shaped, sticking together in a gelatinous mass. INFRUCTESCENCE erect, and often curled or nodding, faintly purplish or pinkish at or finally yellow-orange to yellow at maturity; seeds round, flattened, ca 1 mm diam. **Figures 80–93.**

Distribution — *Rhodospatha wendlandii* ranges from Mexico (Veracruz) to Panama and Colombia (Chocó, Antioquia) from sea level to 1600 m, mostly to about 550 m in *Tropical moist forest*, *Premontane wet forest* and *Tropical wet forest life zones*.

Comments — Although leaf blades are typically somewhat rounded at the base, some collections, including the type of *Rhodospatha roseospadix* Matuda, are acute at the base. Noteworthy is a collection from the Lancetilla Valley in Honduras (*Standley 53109*) which differs in drying grayish on the upper surface and reddish brown on the lower surface. There is also an associated juvenile plant with the collection which more closely resembles *R. moritziana* than *R. wendlandii*. However, Standley describes the species as an epiphyte. It is possible that the plants at Lancetilla represent another species.

Another noteworthy collection is one from Mexico in Tabasco at Cerro las Campanas (*Conrad et al 2893*). This collection differs from other material from that part of Mexico in being more acute at the base and in drying grayish on the upper surface and yellowish green on the lower surface.

Noteworthy collections from Panama include a series from Central Panama in Veraguas, Coclé and western Panama provinces. These differ in having blades which typically dry more grayish than normal and in having the sheath less fibrous. By contrast, the more typical material from lower elevations have prominently fibrous petiole sheaths and blades which dry more typically brown to dark brown.



Figure 80: *Rhodospatha wendlandii*. Habit, Mexico, San Andres Tuxtla



Figure 81: *Rhodospatha wendlandii*. Habit, T.B. Croat 76559



Figure 82: *Rhodospatha wendlandii*. Abaxial leaf surface with inflorescence, T.B. Croat 79255



Figure 83: *Rhodospatha wendlandii*. Adaxial leaf surface, T.B. Croat 75162



Figure 84: *Rhodospatha wendlandii*. free-ending growth, flagellate branching. Panama, Barro Colorado Island



Figure 85: *Rhodospatha wendlandii*. Fresh pollen extruded from stamens, T.B. Croat & D.P. Hannon 63157



Figure 86: *Rhodospatha wendlandii*. Inflorescence post-anthesis, O. Ortiz 721. Photo O. Ortiz.

Additional Specimens Seen: COSTA RICA. **Limón.** Montañas de Colorado, 08°32'27"N 082°54'17"W, 23 March 1989, *Alice Benzecry CR.CB.CL.113* (NY); Corcouado Nac. Park, 08°33'00"N 083°34'48"W, 10 m, *Stefan Merz 453* (CR); Coto Brus. P.I. La Amistad. Cordillera de Talamanca. Sector El Tajo. 09°01'12"N 082°57'36"W, 1300 m, 11 March 1991, *Gerardo Mora 273* (CR, MO); .Above coffee fincas along Río Coto Brus, near Cotón, 23 km north of La Unión (on Panama) border, 08°58'N 083°05'W, 09 August 1974, *T.B. Croat 26687* (MO); **Puntarenas:** Canton OSA: along road between Rincón and Boscosa, 2 km W of bridge over Río Rincón, 08°41'20"N 083°29'50"W, 50 m, 11 September 1996, *Croat 79255* (CM, CR, MO, NY). **San José:** Tarrazu. San Marcos de Tarrazu between Cerro Toro and Cerro Hormiguero along the road between Basuero de Tarrazu and Esquipulas, vicinity of Cerro Hormiguero. 09°33'30"N 084°03'15"W, 1100 - 1200 m, 05 September 1996, *T.B. Croat 78933* (CM, CR, IBE, K, M, MO); Turubares. Reserva Biológica Carara, Valle del Tárcoles, Cuenca del Río Grande de Tárcoles, Puesto Carara, along Río Carara, between



Figure 87: *Rhodospatha wendlandii*. Habit with stem, leaves and inflorescence, *Schott Icones* 2993, Reproduced with permission from W to the captions



Figure 88: *Rhodospatha wendlandii*. Inflorescences with insets of flowers, pistils, stamens, Schott *Icones* 2994, Reproduced with permission from W to the captions



Figure 89: *Rhodospatha wendlandii*. Type of *R. roseospadix*, E. Matuda 17782, holotype, MEXU-859787, sheet 1



Figure 90: *Rhodospatha wendlandii*. Type of *R. roseospadix*, F. Matuda 17782, holotype, MEXU-6316, sheet 2



Figure 91: *Rhodospatha wendlandii*. T.B. Croat 26687



Figure 92: *Rhodospatha wendlandii*. T.B. Croat & D. P. Hannon 63275



Figure 93: *Rhodospatha wendlandii*. B.E. Hammel 26349

guardpost and Río del Sur. [Original Label Coordinates 9°47'00»N 84°32'00»W]. 09°46'48»N 084°31'48»W, 130 - 170 m, 2 April 1993, *M.H. Grayum 10430* (CR, MO). GUATEMALA. **Alta Verapaz:** Cubilgüitz, 15°40'36»N 090°25'12»W, 350 m, March 1913, *Hans von Türckheim 4016* (US); 7 miles up road to Oxec along road which turns off Highway 7E between Tucurú and El Estor, ca. 6 km NE of Panzós. 15°30'21»N 089°40'23»W, 700 m, 20 July 1977, *T.B. Croat 41620* (MO); Panzós. *C. Cifuentes & et al. CF049* (BIGU); **Izabal:** Along trail beginning from mile 33.23 between Dartmouth and Morales towards Lago Izabal, Montaña del Mico, 15°23'09»N 089°01'24»W, 35 - 150 m, 7 April 1940, *J.A. Steyermark 39079* (FMO); Near Entre Ríos, 15°38'04»N 088°32'19»W, 18 m, 30 April 1939, *P.C. Standley 72765* (F); Montañas del Mico, 3 km W of Santo Tomás de Castilla on road to microwave tower. On limestone, with travertine deposits along stream. 15°41'37»N 088°38'47»W, 240 m, 10 September 1988, *W.D. Stevens. et al. 25618* (MO); Livingston. Creek Jute, Biotopo Chocón Machacas. 15°47'22»N 088°51'58»W, 28 julio 1988, *Pedro Tenorio L. et al. 14983* (MO); Puerto Barrios. En el río Las Escobas, camino entre Puerto Barrios y Punta de Palma. 15°41'20»N 088°38'34»W, 120 m, 10 septiembre 1988, *E.M. Martínez S. et al. 23692* (MO); **Petén:** Forest between Finca Yalpemech along Río San Diego and San Diego on Río Cancuen, 16°01'40»N 090°04'31»W, 50 - 150 m, 25 March 1942, *J.A. Steyermark 45325* (F, GH, NY, US); Dolores. Dolores, Km 83, on Machaquila Road, 16°30'32»N 089°25'40»W, 18 April 1961, *Elias Contreras 2112* (LL). HONDURAS. **Atlántida:** Campamento Quebrada Grande ca. 10 km southwest of La Ceiba. At base of north slope of Pico Bonito, from camp to 1 km east of camp. 15°42'N 086°51'W, 140 m, 08 May 1993, *R.L. Liesner & D. Mejía 26055* (MO); Along trail to dam for municipal water supply of Tela, Lancetilla Botanical Gardens, on road ca. 2 mi WSW of Tela and S of main hwy, 2 October 1987. 15°44'N 087°27'W, 70 - 90 m, 10 February 1987, *T.B. Croat & D.P. Hannon 64644* (MO); La Masica. 11 km W of La Masica. 15°38'18»N 087°10'50»W, 100 m, 12 September 1972, *M.T. Madison 694* (GH); Tela. Lancetilla Valley, near Tela. 15°42'40»N 087°27'28»W, 20 - 600 m, 06 December 1927 - 20 March 1928, *P.C. Standley 53109* (F, US); Lancetilla Valley, near Tela. 15°42'40»N 087°27'28»W, 20 - 600 m, 06 December 1927 - 20 March 1928, *P.C. Standley 55390* (F,US.); .Lancetilla Valley ca. 10 miles southeast of Tela; in forest preserve along Río Lancetilla, on trail to water reservoir. 15°44'N 087°27'W, 10 - 150 m, 03 August 1977, *T.B. Croat 42659* (MO); Vicinity of Lancetilla, 15°44'N 087°27'W, 100 - 150 f, 12 August 1934, *T.G. Yuncker 5006* (MO). **Cortés:** San Pedro Sula. Guamiles semi-húmedos de Montaña El Carmén (=San Antonio del Perú). 15°29'01»N 088°04'26»W, 260 m, 2 December 1950, *Antonio Molina R. 3530* (F); **Olancho:** Along Río Olancho, on road between San Esteban and Bonito Oriental, 14.8 miles NE of San Esteban. 15°25'N 085°47'W, 635 m, 07 February 1987, *T.B. Croat & D. P. Hannon 64398* (MO); MEXICO. **Chiapas:** Lacondona Reserva; Crucero frontera; Corozal. 16°54'36»N 091°04'48»W, 290 m, 11 October 1986, *B.E. Hammel et al. 15672* (MEXU, MO); Escuintla Esperanza, 15°26'24»N 092°31'12»W, 200 m, June 3, 1948, *Eizi Matuda 17938* (DS, MEXU); Cascada Mizola, 19 km south of Palenque. 17°23'24»N 091°59'24»W, 250 m, 2 October 1974, *M.T. Madison 1759* (GH, SEL); Escuintla. Esperanza. In wet shaded forest. 15°26'24»N 092°31'12»W, 160 m, 5 July 1948, *Eizi Matuda 18157* (DSW, MEXU, NY); In wet forest. Salto de Agua, Esquintla. 15°22'12»N 092°37'48»W, 400 m, 4 August 1948, *Eizi Matuda 18399* (F,MEXU); .Ocosingo. A 3 km al N del crucero San Javier. 16°48'28»N 091°06'42»W, 383 m, 2 September 2002, *Gabriel Águilar M. & et al. 2456* (MO); Palenque. Slopes and small streams

along the ridges 6-12 km S of Palenque on the road to Ocosingo. 17°26'44»N 091°58'36»W, 300 m, 23 November 1972, *D.E. Breedlove & R.L. Dressler 29766* (DS); Along gravel road from Palenque to Bonampak, 60 miles SE of Palenque. 17°00'03»N 091°19'11»W, 400 m, 05 July 1977, *T.B. Croat 40187* (MO); Tapachula. 4 miles N of Tapachula, along road to Nueva Alemán. 14°58'44»N 092°14'38»W, 250 m, 20 August 1977, *T.B. Croat 43792* (MO).

Oaxaca: Uxpanapa Region, along gravel road between Esmeralda (17 km E of Sarabia) and Río Manca (tributary of Río Verde), 11.5-13.5 mi S of Esmeralda. Roadside vegetation with primary forest elements. Veg. type: "selva alta perennifolia", 17°03'36»N 094°45'W, 90-110 m, 19 January 1987, *T.B. Croat & D.P. Hannon 63275* (MEXU, MO); **Tabasco:** Tacotalpa. Cerro del Madrigal, Km 7 (4.2 mi) de la estación Tacotalpa hacia Tapijulapa. 17°30'00»N 092°48'36»W, 90 m, 17 June 1983, *Clark P. Cowan & et al. 3938* (MO); Tacotalpa. 17°34'12»N 092°49'25»W, 20 - 25 m, 24 July 1980, *Clark P. Cowan & M.A. Magaña A. 3128* (CSAT); Teapa. 50° slope of Cerro las Campanas 3 km E of Teapa, ca. 50 km S of Villahermosa. 17°32'24»N 092°55'48»W, 50 - 100 m, 12 August 1974, *Jim Conrad et al. 2893* (MO); 3 km E of Teapa, along road to Jalapa. 17°32'24»N 092°55'48»W, 40 m, 04 July 1977, *T.B. Croat 40127* (CAS, F, MEXU, MO); Vicinity of Teapa, along road between Teapa and Tacotalpa, 3.1 m; E of Teapa, ca. 0.25 miles S of Highway. Along stream and limestone cliffs. 17°33'N 092°58'W, 150 m, 19 February 1987, *T.B. Croat & D.P. Hannon 65369* (ENCB, MEXU, MO); **Veracruz:** Estación de Biología Tropical Los Tuxtlas, wet forest. Transect 10. 18°34'48»N 095°03'36»W, 170 - 200 m, 1 June 1981, *A.H. Gentry & E.J. Lott 32563* (MO); Los Tuxtlas, 18°34'48»N 095°03'36»W, 02 March 1987, *Guillermo Ibarra Manríquez & Santiago Sinaca C. 1254* (MEXU); Playa Escondida 28 km NE of Catemaco. 18°34'12»N 095°03'36»W, 50 m, 25 September 1974, *M.T. Madison 1726* (GH, SEL); Catemaco. Estación de Biología Tropical 'Los Tuxtlas', Lote 72, cerca del Ejido Lazaroro Cardenas. 18°34'N 095°05'W, 240 m, 14 Agosto 2006, *Thorsten Krömer & A. Peña 2799* (MO); Coatzacoalcos. 6 miles E of Coatzacoalcos along Highway 180. 18°04'48»N 094°21'36»W, 10 m, 03 July 1977, *T.B. Croat 40065* (MO); San Andrés Tuxtla. Lote 71, "El Pedregal", 18°34'N 095°04'W - 18°36'N 095°09'W, 600 m, 03 July 1986, *Santiago Sinaca C. 818* (CHAPA); Estación de Biología Tropical Los Tuxtlas, N of San Andrés Tuxtla between Sontecomapan and Montepio. Along broad trail and new border road through virgin forest. Veg. type: "selva alta perennifolia", 18°34'48»N 095°03'36»W, 150-200 m, 17 January 1987, *T.B. Croat & D.P. Hannon 63157* (ENCB, MO); Alrededores de la Estación de Biología Tropical "Los Tuxtlas", carr. Catemaco-Montepio. Selva alta perennifolia. 18°35'N 095°04'W, 120 m, 11 May 2005, *Thorsten Krömer 2176* (MO); Col. Agrícola Militar Montepio "Rancho Huber". Selva alta perennifolia. 18°36'N 095°05'W, 60 m, 26 June 2005, *Thorsten Krömer & Amparo Acebey 2305* (MO); NICARAGUA. **Atlántico Sur:** Comarca Waslala, 6.5 km al SE de Waslala, 13°16'N 085°24'W, 520-560 m, 14 septiembre 1982, *P. P. Moreno 17291* (MO); Caño Costa Riquita, ca. 1.8 km SW of Colonia Naciones Unidas, above (S of) road between Colonia Nuevo León and Colonia Naciones Unidas. 11°43'N 084°18'W, 150 - 180 m, 06 November 1977 - 07 November 1977, *W. D. Stevens 5032* (MO); **Río San Juan:** Municipio El Castillo, Comunidad Las Maravillas, El Puentón, 3 km al oeste de la comunidad, 11°07'15»N 084°21'04»W, 100 m, 8 Abril 2005, *C. Guadamuz 3625* (HULE, MO); Near Caño Chontaleño, 20 km NE of El Castillo. 11°08'N 084°12'W, 200 m, 18 April 1978 - 21 April 1978, *David A. Neill & Paul C. Vincelli 3624* (MO); El Castillo; lowland disturbed forest on sandy clay soils, 11°01'N 084°24'W, 35 - 50 m, 2 Sep. 1990, *Jan Salick 7844* (MO); La Lupe, ca. 25 km ENE of Boca de Sabalo; primary forest lightly logged with silvicultural treatment, clay soils, hilly, 11°08'N 084°21'W, 80 - 120 m, 28

June 1997, *Jan Salick & Eirik Stijfhoorn 8176* (MO); La Lupe, ca. 25 km ENE of Boca de Sabalo; primary forest lightly logged with silvicultural treatment, clay soils, hilly, 11°08'N 084°21'W, 80 - 120 m, 28 June 1997, *Jan Salick & Eirik Stijfhoorn 8213* (MO); La Lupe, ca. 25 km ENE of Boca de Sabalo; primary forest lightly logged with silvicultural treatment, clay soils, hilly, 11°08'N 084°21'W, 80 - 120 m, 28 June 1997, *Jan Salick & Eirik Stijfhoorn 8283* (MO). PANAMA. January 1858, *Moritz F. Wagner s.n.*; Distrito de Chepo. Llano-Carti. Carretera hacia Nusagandi, km. 2. Reserva privada Burbayar. Sendero rojo, 09°18'46"N 78°59'34"W, 405 m, 16 December 2012, *Orlando Ortiz 1061* (MO, PMA). **Bocas del Toro:** m, *A.K. Monro et al. 6383* (PMA); Bocas del Toro. Alto Uri, Rancho Santin, PILA, Punto #4. Aprox a 300 mtrs de R. Santin. 9:11:22.5/82:66:43.1, 29 July 2008, *Daniel Santamaría 7595* (MO); Faldas del "Cerro Falso Fabrega" PILA, Puntop#9. 09°09'42"N 82°40'20"W, 1020 m, 03 August 2008, *Daniel Santamaría et al. 7663* (MO, PMA); Vicinity of Fortuna Dam. Along pipeline road leaving road to Chiriquí Grande at continental divide, 2.8 road-miles from divide., 08°46'42"N 82°11'34"W, 850 - 950 m, 25 June 1986, *G. McPherson 9673* (MO); Alto Uri, Rancho Santin, PILA. Punto #4. Approx a 300mtrs de R. Santin, 09°11'22"N 82°06'43"W, 29 July 2008, *Daniel Solano et al. 7570* (MO, PMA); Changuinola. PILA. Estacion Santin, 09°07'08"N 82°39'51"W, 01 August 2008, *Daniel Solano et al. 5634* (MO, PMA); Bosque Protector Palo seco. Sendero El Verrugoso, entrando por la finca del Sr. Desiderio Meneses., 08°46'54"N 82°10'40"W, 822 m, 7 February 2013, *Jorge E. Aranda B. 4426* (MO, PMA); Cerro Frío, headwaters of Río Tskui. Point 20., 09°15'26"N 82°30'29"W, 1100 m, 24 October 2008, *Laurencio Martínez, Alex K. Monro & Daniel Santamaría 376* (MO, PMA). **Canal Area:** Gatun Lake. Raymond Shannon Trail. Barro Colorado Island, 09°09'25"N 79°50'30"W, 10 - 100 m, 16 March 1934, *J.R. Smith Netting 25* (CM, MO); Barro Colorado Island., 09°09'N 79°51'W, 10 - 100 m, *O.E. Shattuck 104* (F); *P. C. Standley 40959, 41143* (US); *T.B. Croat 6291, 6302, 6407, 6851, 7720, 8226, 10176, 10904, 11837, 12502* (MO); Pipeline Rd. 6.5 miles NW of gate, 09°10'15"N 79°45'14"W, 100 m, 6 Dec 1970, *T.B. Croat 12761* (MO, SCZ); **Chiriquí:** Along Río Colorado., 08°50'N 82°43'W, 1200 - 1400 m, 17 March 1983, *Clem W. Hamilton & Henry Stockwell 3450* (MO); Santa Clara. Finca Hartmann., 4 April 1997, *D.W. Roubik & Liduvina Quiroz 716* (CR); Camino hacia Soledad, SO del campamento de Fortuna (sitio de presa), hasta región de finca Pitti., 08°43'N 82°17'W, 1100 m, 8 June 1976, *M.D. Correa A., N. Escobar A. & R. Mendoza 2077* (PMA); "Ojo de Agua", property of Ratidon Hartmann, vicinity of Santa Clara (between Volcán and Río Sereno); E of Volcán., 08°51'N 82°45'W, 1520 m, 16 June 1987, *T.B. Croat 66247* (CR, HNMN, MEXU, MO); On NW side of Cerro Pando., 08°49'36"N 82°42'12"W, 1400 m, 21 July 1971, *T.B. Croat 15910* (MO); Fortuna Dam Area, Fortuna-Chiriquí Grande, 1.8 mi NW of center of dam., 08°45'N 82°18'W, 1080 m, 27 June 1994, *T.B. Croat & G.H. Zhu 76504* (MO); Fortuna Dam Area: Trail to Meteorological Station of Río Hornito, beginning 0.5 km S of Centro de Científicos., 08°45'N 82°18'W, 23 June 1994, *T.B. Croat & G.H. Zhu 76300* (AAU, B, CM, G, IBE, KRAM, M, RSA, SAR, SEL, VDB, W, Z); Gualaca. Reserva Forestal Fortuna. Sendero Samudio., 08°44'04"N 82°14'57"W, 1205 m, 06 November 2013, *Orlando Ortiz, Juvenal Batista & F. Miranda 1775, 1795* (MO, PMA). **Coclé:** La Mesa region N of Cerro Gaital vicinity of (El Valle)., 08°37'N 80°07'W, 2400 ft, 02 July 1978, *B.E. Hammel 3890* (MO); NE slopes of Cerro Caracoral, N rim of El Valle., 08°37'18"N 80°06'30"W - 08°37'42"N 80°07'00"W, 2700 - 3200 ft, 13 March 1981, *K.J. Sytsma 3786* (MO); Parque Nacional Omar Torrijos. Cano Sucio. Area del Tife. Bosque humedo.,

08°43'18"N 80°37'56"W, 247 m, 20 July 2013, *O.O. Ortiz 1425* (MO, PMA); Vicinity of El Valle de Antón; at La Mesa, 0.2 mi from jct. of Finca Macarenitas and Finca Adela at Finca Gabriella, along water lines to reservoir., 08°38'N 80°09'W, 7 July 1994, *T.B. Croat & G.H. Zhu 76743* (MO); Vicinity el Valle de Antón, at forested flat area near Finca Macarenita at La Mesa., 08°36'N 80°07'W, 800 m, 6 July 1994, *T.B. Croat & G.H. Zhu 76675* (MO); La Pintada. Palmarazo, Río San Juan, Parque Nacional Omar Torrijos. Area de Calle Larguita, bosque primario., 08°42'58"N 80°40'21"W, 17 julio 2013, *Álex Espinosa 6134A* (HUA, MO, PMA); Vicinity El Copé, Alto Calvario, ca. 6 mi N of El Copé, 08°39'45"N 80°35'26"W, 770 m, 12 July 1994, *T.B. Croat & G.H. Zhu 76762* (MO). **Colón:** Distrito de Donoso. Area de Concesion Minera Panama. Coastal Road. Km16. Coordenadas en UTM: 0537499 985005., 108 m, 10 June 2013, *Orlando Ortiz t al. 1344* (MO, PMA); 9-12 mi E of Transisthmian Highway on Santa Rita ridge. [Coordinates on original label: 9°20'N, 79°45'W], 09°22'00"N 79°39'30"W - 09°23'30"N 79°41'30"W, 500 - 550 m, 17 - 18 April 1988, *Sue A. Thompson 4842* (CM, 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 79°41'30"W, 380 m, 13 April 1976, *T.B. Croat 34339* (MO); Along road between Portobelo and Nombre de Dios, 1.2 mi. beyond the junction of the road to Isla Grande. [Coordinates on original label: 9°36'N, 79°35'W], 09°34'N 79°34'W, 05 April 1980, *T.B. Croat 49793* (MO, SEL); Vicinity of Río Indio, east of Portobello, 09°33'30"N 79°32'30"W, 0-300 f, 22 March 1976, *T.B. Croat 33676* (MO); Along Río Guanche, 5 km above bridge on Colón-Portobelo road, 09°22'30"N 79°41'30"W, 250 m, 6 April 1993, *T.B. Croat 75162* (CM, K, M, MO); Along Río Iguanita near bridge along Portobelo Road. [Coordinates on original label: 9°28'N, 79°42'W], 09°29'50"N 79°41'31"W, 50 m, 05 April 1980, *T.B. Croat 49780* (MO); Donoso. MPSA Concession. Forest around Petaquilla Tower. Collected with: J. De Gracia, J. Martínez, H. Quiel, & M. Merello, 08°48'53"N 80°39'59"W, 23 May 2012, *B.E. Hammell 26349* (MO); Area de Concesion Minera Panama. coastal Road. Coordenadas en UTM: 537528 984923., 102 m, 22 May 2013, *Orlando Ortiz et al. 1327* (MO, PMA); Portobelo. 6 miles S of Portobelo, 09°30'N 79°41'W, 17 July 1970, *T.B. Croat 11406* (F, MO, NY). **Darién:** Parque Nacional del Darién, along S branch of Río Pucuro; forest and ridge S of river and up river from old village of Tacarcuna; ca. 18 km E of Pucuro., 08°05'N 77°16'W, 600 - 800 m, 25 October 1987, *B.E. Hammell et al. 16499* (MO); Cerro Sapó; ca. 5 km south of Garachiné; along ridge at north approach to cerro., 7°59'N 78°25'W, 600 - 800 m, 23 March 1986, *B.E. Hammell et al. 14860* (MO); South of El Real, region called Alturas de Nique, near Cana mine. Near camp, along trail to Río Seteganti., 7°45'N 77°40'W, 500 m, 23 August 1987, *Gordon McPherson 11557* (MO); Parallel to Río Tucutí on ridge upstream ca. 2 hrs (piragua) above Tucutí., 7°54'N 77°56'W, 160 m, 25 July 1962, *James A. Duke 5270* (MO); Vicinity of airstrip at Cana gold mine., 7°45'N 77°41'W, 480 m, 29 July 1976, *T.B. Croat 38053* (MO); Vicinity Cerro Pirre, along trail from base camp to Rancho Frío on slopes of Cerro Pirre., 7°58'N 77°43'W, 200 - 450 m, 27 July 1994, *T.B. Croat & G.H. Zhu 77128* (CAS, CM, MO, PMA); Pinogana. Along headwaters of Río Tuquesa, ca. 2 km air distance from the Continental Divide, in vicinity of upper gold mining camp of Tyler Kittredge., 08°33'30"N 77°29'00"W, 600 m, 25 August 1974, *T.B. Croat 27155* (MO). **Panamá:** Isla de Barro Colorado. Sendero Snider Molino, transecto #3., 03 February 2000, *Blanca Araúz & Rafael Aizprúa B1720* (MO); Distrito de Campana. Parque Nacional Altos de Campana. Sendero hacia la Cruz., 24 May

2014, *Orlando Ortiz et al. 2391* (MO, PMA); Kunayala (formerly San Blas) Nusigandi, along El Llano-Cartí 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 78°59'W, 450 m, 03 April 1993, *T.B. Croat 75145* (CM, MO); El Llano-Cartí Road, 7 mi from Pan-American Highway, near El Llano., 09°19'N 78°59'W, 460 m, 3 April 1993, *T.B. Croat 75106* (CUVC, MO); Along road to Cartí Suitupo from El Llano; 13.2 km North of Pan American Highway., 09°16'N 78°57'W, 370 m, 11 February 1986, *W. Scott Hoover 1314* (CM, MO); Capira. Cerro Campana in forest along trail from 2700 ft. to top (ca. 3200 ft.), 08°41'26"N 79°55'15"W, 2700 - 3200 f, 2 July 1978, *B.E. Hammell 3770* (MO); Middle slopes of Cerro Campana, ca. 1 mile from Interamerican Highway, 08°43'09"N 79°53'25"W, 150 m, 15 June 1976, *T.B. Croat 35955* (MO); Chepo. 16-18 km from Interamerican Highway on the El Llano-Cartí Road, 09°17'50"N 78°56'03"W, 400 m, 28 March 1974, *E. L. Tyson & M.H. Nee 7350* (GH, MO); 16-18 km from Interamerican Highway on the El Llano-Cartí Road, 09°17'50"N 78°56'03"W, 400 m, 28 March 1974, *Edwin L. Tyson & Michael H. Nee 7347* (MO); El Llano-Cartí Road, 5-6 miles N of Interamerican Highway at El Llano, 09°15'30"N 78°55'50"W, 350 - 375 m, 7 May 1976, *T.B. Croat 34785* (MO); Along trail between Río Majé and Quebrada Brava, 09°06'21"N 78°45'36"W, 60 m, 4 May 1976, *T.B. Croat 34655* (MO); Panamá. Trail behind Peluca meteorological station., 09°22'56"N 79°32'38"W, 200 m, 25 March 1973, *Helen Kennedy & Robert L. Dressler 2965* (MO); Campo Tres, beyond Cerro Jefe, 09°18'03"N 79°15'57"W, 700 m, 21 August 1974, *T.B. Croat 27079* (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 79°20'25"W, 600 m, 12 June 1976, *T.B. Croat 35937* (MO). **San Blas:** Near Nusigandi on El Llano-Cartí road. Forest along Sendero Nusigandi, west of road. [Coordinates on original label: 9°15'N 79°00'W], 09°20'N 78°59'W, 300 - 350 m, 26 March 1987, *Gordon McPherson 10746* (MO); Río Cangandi at confluence of Quebrada Titamibe. [Coordinates on original label: 9°24'N, 79°7'W], 09°24'30"N 79°07'00"W, 60 m, 8 February 1986, *Greg C. de Nevers & Heraclio Herrera 7032* (MO); El Llano-Cartí Road, 14 mi N of Panamerican Highway., 09°21'N 78°57'W, 300 m, 12 July 1988, *T.B. Croat 69248* (MO); (Comarca de Kunayala): Nusigandí, El Llano-Cartí Road, 10.1 mi N of Interamerican Hwy., then ca. 0.5 mi N, Paseo Mariska near road., 09°20'N 78°59'W, 300 m, 20 July 1994, *T.B. Croat & G.H. Zhu 77022* (MO); (Comarca de Kunayala): Nusigandí, El Llano-Cartí Road, 9 mi N of main highway; Nergan Igar (Nergan Trail), 09°20'N 79°59'W, 350 m, 2 July 1994, *T.B. Croat & G.H. Zhu 76559* (MO). **Veraguas:** Santa Fe. Río Guayabalito. Areas boscosas en las proximidades del río. Cercano al límite con la provincia de Colon (Río Belen), 08°47'40"N 80°45'46"W, 109 m, 19 March 2014, *Alvin Zapata et al. 3553* (MO, PMA); Above Santa Fe beyond Escuela Agrícola Interamericana, 1.8 miles beyond fork in road on Pacific slope; above rocky ravine on side of Cerro Tute., 08°30'49"N 81°02'11"W, 700 - 1000 m, 05 April 1976, *T.B. Croat 34201* (MO); Valley of Río Dos Bocas on road between Alto Piedra (above Santa Fé) and Calovebora, along road., 08°33'03"N 81°10'17"W, 350 - 400 m, 29 August 1974, *T.B. Croat 27438* (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 81°07'20"W, 800 - 1030 m, 15 July 1994, *T.B. Croat & G.H. Zhu 76889* (MO).

ACKNOWLEDGEMENTS

The authors extend special thanks to Patricia Swope Croat who edited the paper and helped in assembling the final images as well as to Carla Kostelac who downloaded herbarium images from Tropicos, scanned type specimens and accumulated countless color images using Picasa. The first author also acknowledges the National Science Foundation Grant BSR 89-05890, Taxonomic Revision of *Rhodospatha* (Araceae). \$179,802 during 1990 to 1993 for support for field work and other support which enabled this revision as well as a full revision of the genus to follow. We thank Mario-Dominik Riedl (W) for kindly supplying and permission to use the Schott images in Figures 51, 87 & 88.

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Table 1: Geographical range of Central American *Rhodospatha*

<i>Rhodospatha</i>	Mex.	Guat.	Bel.	El Sal.	Hond.	Nic.	C.R.	Pan.	S. Amer.
<i>R. antonensis</i> Croat & O.Ortiz								1	
<i>R. antonioana</i> Croat								1	
<i>R. burgeri</i> Croat							1	1	
<i>R. dressleri</i> Croat								1	
<i>R. forgetii</i> N.E.Brown							1	1	
<i>R. guanchensis</i> Croat								1	
<i>R. heraclioana</i> Croat								1	
<i>R. knappii</i> Croat							1	1	
<i>R. monsalvae</i> Croat & D.C.Bay								1	1
<i>R. morii</i> Croat								1	
<i>R. moritziana</i> Schott							1	1	1
<i>R. osaensis</i> Croat, Grayum & M.Cedeño							1	?	
<i>R. ovatifolia</i> Croat, Grayum & M.Cedeño							1	1	
<i>R. pellucida</i> Croat & Grayum						1	1	1	
<i>R. vandaniissoniae</i> Croat & Grayum							1	1	
<i>R. wendlandii</i> Schott	1	1	1		1	1	1	1	1
Total <i>Rhodospatha</i>	1	1	1	0	1	2	9	14	3

Table 2: Endemism of Central American *Rhodospatha*

<i>Rhodospatha</i>	Mex.	Guat.	Bel.	El Sal.	Hond.	Nic.	C.R.	Pan.
<i>R. antonensis</i> Croat & O.Ortiz								1
<i>R. antonioana</i> Croat								1
<i>R. burgeri</i> Croat								
<i>R. dressleri</i> Croat								1
<i>R. forgetii</i> N.E.Brown							1	
<i>R. guanchensis</i> Croat								1
<i>R. heraclioana</i> Croat								1
<i>R. knappii</i> Croat								
<i>R. monsalvae</i> Croat & D.C.Bay								
<i>R. morii</i> Croat								1
<i>R. moritziana</i> Schott								
<i>R. osaensis</i> Croat, Grayum & M.Cedeño							1	
<i>R. ovatifolia</i> Croat, Grayum & M.Cedeño								
<i>R. pellucida</i> Croat & Grayum								
<i>R. vandaniilssoniae</i> Croat & Grayum								
<i>R. wendlandii</i> Schott								
Total <i>Rhodospatha</i>	0	0	0	0	0	0	2	6