



Primeros descubrimientos de mangles de América: Siglos XVII, XVIII



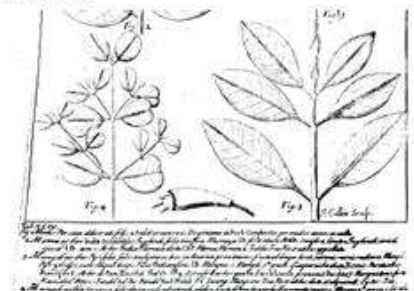
Willem Piso y George Marcgrave. 1648. *Historia Naturalis Brasiliae*



Leonard Plukenet, 1696. *Almagestum Botanicum*

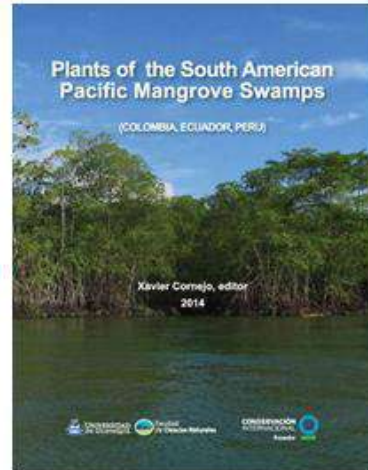
MANGLE arbor Pyrifolia foliis & uliginosis locis in America proveniens, fructu oblongo terreo, summis ramis radiceola, *Physog. Tab. 204. fig. 3.* Mangles Pyrifolia cum filiquo bogis, *Ficci Indica affinis, J.B. T. c. Mangos, & Mangles 1^a species Guayanae dicta, Pisoni, 204.* *Paritovici Kuchfordi des Antilles.* Arbor de Rain, *Lophos Ind. Orient. Part. 4.* Ficus Indica, *in Oblectis Americana, Ralamb. in Hist. lib. 4. cap. 4. Sect. 2.* Oblectis arbor quae in America Latina provenit, *Pursh. Naves. Tom. 1. Foré Kandel, Kay-Kandel, vel For-Kandel, H. Malak. Part. 6.* **Champ-Changor Crê,** Nostratibus dicta; & aliquid **Ché Dphté-Crê.** Hanc similes si non eadem sunt *Forésiana Lopez. de Cuba, lib. 7. cap. 3.* Mango appetit, & radicem crocicam in se infusa atollere, inquit *Provinciâ Malacis ubi prodit.* **Mangé alla Coaria,** folio densifolulo fotocotando glabra, fructu formâ Caryophylli aromatici maiore, *Physog. Tab. 204. fig. 4.* Mangue 2^a species, *1. Caribbea Brasiliensis Pison. 204.* Foré Kandel (*Inde*) *H. Malak. Part. 6.* **Chéte-Changoré** *Bartolomeus dicta.*

Leonard Plukenet, 1720. *Opera omnia botanica, in sex tomos divisa.*



Novedades taxonómicas e innovaciones desde los manglares de la costa del Pacífico producidas en años recientes

- Descubrimiento de *Hattena rhizophorae* en flores de manglares rojos (2006)
- Nueva variedad de mangle blanco: *Laguncularia racemosa* var. *glabriflora* (2007)
- Nuevas especies de orquídeas en los manglares de Ecuador (2010, 2011)
- Nuevo híbrido y lectotipificación: *Rhizophora x hamisonii* (2013)
- Subdivisión fitogeográfica de los manglares (2014)
- Establecimiento de la categoría de manglares facultativos (2014)
- Nuevo género y especie de manglares y salitrales: *Mangleticornia ecuadorensis* (2017)
- Uso de manglares rojos en fitoremediación: Islas flotantes Estero Palanqueado (2017)
- Nueva especie de mangle: *Pellíciera benthamii* (2020)



Manglares de la costa del Pacífico: Epicentro de descubrimientos e innovaciones en años recientes



Rhizophora mangle L. (1753)



Rhizophora racemosa G. Mey (1818)



HYBRIDIZATION AND INTROGRESSION IN NEW WORLD RED MANGROVES, *RHIZOPHORA* (RHIZOPHORACEAE)¹

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- Purpose of the study:** Hybridization is common in both animals and plants and can lead to a diverse array of outcomes ranging from the generation of new ecotypes or species to the breakdown of morphological differences. Here, we explore the extent of hybridization in the three currently recognized New World *Rhizophora* species—*R. mangle*, *R. racemosa*, and the putative hybrid species *R. harrisonii*.
- Methods:** We sampled variation across the three recognized *Rhizophora* species using two noncoding chloroplast (cpDNA), two flanking microsatellite regions (FMRs), and six microsatellite loci.
- Key results:** Gene genealogies of cpDNA and FMRs showed a strong phylogeographic break across the Central American Isthmus, but little relationship to recognized species boundaries. Instead, individuals collected in the same ocean basin and classified as *R. mangle* and *R. racemosa* by morphological characteristics were more closely related to each other than with similar-looking individuals collected in the other ocean basin. Nonetheless, there were low, yet significant differences in microsatellite loci among in-situ populations of *R. mangle* and *R. racemosa* in both ocean basins, suggesting that two taxonomic groups coexist. However, we found no genetic evidence that *R. harrisonii* was a hybrid species. Rather, *R. harrisonii* appears to represent a morphotype produced by ongoing hybridization and backcrossing between *R. mangle* and *R. racemosa*.
- Conclusions:** Our data support ancient and persistent introgressive hybridization among new world *Rhizophora* and argue for a full revision of the systematic relationships of the group based on more than morphological, ecological, and genetic analysis.

Key words: Central American Isthmus, evolutionary history, hybridization, introgression, *Rhizophora harrisonii*, *Rhizophora mangle*, *Rhizophora racemosa*, Rhizophoraceae.

Hybridization is common in both animals and plants, and its role in evolution is becoming more widely appreciated (Mallet, 2005). The evolutionary consequences of these processes are diverse and include increased genetic diversity, the generation of new ecotypes or species, and breakdown or reinforcement of isolation barriers (Rieseberg and Wendel, 1993; Erwin and Amend, 1997, 2004, 2008; Fritz et al., 2006). In addition, the introgression of genes across species provides a pathway for the exchange of

Rhizophora L. is an old and widespread diplot genus that has been present in the neotropics since the Early Eocene (50 Ma). Ten million years later, during the Middle Eocene, its distribution expanded around the world (Rice-Gray, 1997; Graham, 1998; Ellison et al., 1999; Duke et al., 2002; Tyagi, 2002). During this period, the neotropics underwent significant geological changes including the independent development of the Greater and Lesser Antilles Islands in the Caribbean (burial-

LECTOTYPIFICATION AND A NEW STATUS FOR *RHIZOPHORA X HARRISONII* (RHIZOPHORACEAE), A NATURAL HYBRID BETWEEN *R. MANGLE* AND *R. RACEMOSA*

XAVIER CORNEJO¹

Abstract. Based on molecular data, the rank of *Rhizophora harrisonii*, a well-known red mangrove from the Neotropics and West Africa, is formally presented here as a natural hybrid produced by ongoing hybridization and introgression between *R. mangle* and *R. racemosa*.

Resumen. Con base en datos moleculares, el rango de *Rhizophora harrisonii*, un taxón bien conocido como mangro de las Indias Occidentales y el oeste de África, es presentado aquí como un híbrido natural que es producto de la hibridación continua e introgresión entre *R. mangle* y *R. racemosa*.

Keywords: Hybrid, Neotropics, red mangrove, *Rhizophora X harrisonii*, Rhizophoraceae, West Africa

Rhizophora harrisonii Luchman (Rhizophoraceae) is a well-known red mangrove tree or shrub distributed along both coast of Tropical America and in West Africa (Brecher, 1969, 1977; Cerón-Souza et al., 2010). Nonetheless, its taxonomic rank has been questioned (Tomlinson, 1986; Cornejo and Bonifaz, 2006). As previously suggested (Brecher, 1969, 1977), recent molecular studies using two noncoding chloroplasts (cpDNAs), two flanking microsatellite regions (FMRs), and six microsatellite loci (Cerón-Souza et al., 2010) supported that *R. harrisonii* is not a separate species of hybrid origin. Rather *R. harrisonii* individuals represent ecophenotypes produced by ongoing hybridization and introgression between the often sympatric *Rhizophora mangle* L. and *R. racemosa* G. Mey. As large stands of the proposed natural hybrid, *R. X harrisonii*, are often found in the Neotropics, a name that follows modern nomenclatorial rules is needed to properly name red mangroves.

The hybrid name of *Rhizophora X harrisonii* was previously published by Tomlinson (1986: 334), who stated that it "is a hybrid between *R. mangle* and *R. racemosa*." However, following Art. 41.1 and 41.5 of the then current International Code of Botanical Nomenclature (McNeill et al., 2012), the natural hybrid was not properly proposed. Hence, the hybrid status for *R. harrisonii* is formally proposed. *Rhizophora X harrisonii* Luchman (pro sp. nov.) *Bauxiopsis Rhizophora harrisonii* Luchman, Bull. Misc. Inf. Kew 1918(1): 8, fig. A, 1918. TYPE: BRITISH GUIANA, Stabroek near Georgetown, Feb. 1917 (D), A. Luchman s.n. (lectotype, designated here, K-485219 [!]) (holotype, K-485220 [!], K-485218 [!]). Synonymy: *Rhizophora harrisonii* Salween, Nat. Appl. Sci. Bull. Philipp. 5(3): 211, fig. 2, 1916. TYPE: PANAMA, Panama, along the Pacific coast, Bello Yane, 10 Sept. 1929 (B), F. M. Salween 1007 (A, 35199; isotype, J-9919).

LECTOTYPE CITED

BRECHER, F. J. 1969. The Atlantic species of *Rhizophora*. *Acta Botanica Neerlandica* 16: 434–441.
 BRECHER, F. J. 1977. America's Pacific species of *Rhizophora*. *Acta Botanica Neerlandica* 20: 225–230.
 CERÓN-SOUSA, J. E., RIVERA-OCAMPO, E., MEDINA, E., A. JIMÉNEZ, W. O. McMILLAN, & BERMINGHAM, 2010. Hybridization and introgression in New World red mangroves, *Rhizophora* (Rhizophoraceae). *Amer. Bot. Soc.* 97(6): 889–902.
 CORNEJO, X. and C. BONIFAZ, 2006. *Rhizophora racemosa* G. Mey. (Rhizophoraceae) en Ecuador y

A NEW *HATTENA* DOMROW (ACARI: AMEROSIIDAE) FROM ECUADORIAN MANGROVES AND A NEW GENERIC RECORD FOR SOUTH AMERICA

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ABSTRACT. Mites of the genus *Hattena* Domrow primarily inhabit flowers and found phoretic on flower-visiting animals. *Hattena rhizophorae* n. sp. (Amerosiidae) from flowers is described and illustrated herein. It is a new generic record for the American continent. Deutonymphs and adult stages of both sexes of *H. rhizophorae* were found in the flowers of red mangrove trees (*Rhizophora mangle* L., Rhizophoraceae) in Rio Chone estuary located in the province of Manabí, on the Pacific coast of Ecuador. A key to the species of *Hattena* and remarks on its characters are provided.

Key words. Acari, Amerosiidae, new species, *Rhizophora* flowers, Ecuador.

INTRODUCTION

Domrow (1963) erected the genus *Hattena* based on *H. ornata* Domrow collected from a bird in Indonesia. Halliday (1997) provided diagnosis for this genus and a key for 4 species found in Australia including 2 new species. *Hattena* was previously known from 5 species found in southeastern Asia and Australia collected in association with flowers and flower-visiting animals (Halliday, 1997). In this paper, we describe and illustrate a sixth member of the genus, an allopatric species found in mangrove flowers in the Pacific coast of Ecuador, and provide a key to the known species of *Hattena*.


specimens) is deposited in the Australian National Insect Collection, Canberra (ANIC); British Museum (Natural History), London, UK (BMNH); Museo de Zoología de la Pontificia Universidad Católica de Quito, Ecuador (QCAZ); National Museum of Natural History, Leiden, The Netherlands (RMNH); and US National Museum, Washington, DC, USA (USNM).

DESCRIPTION

Hattena Domrow

Hattena Domrow, 1963: 202–203.

Hattena rhizophorae Faraji & Cornejo en las Bahamas



5547150

Pavel Klimov, Bee Mite ID, USDAAPHIS PPQ, Bugwood Inc.
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Image Number: 5547150

mite (*Hattena rhizophorae*) Faraji and Cornejo, 2008

Photographer: Pavel Klimov
Descriptor: Adult(s)
Gender: Female
Image view: Dorsal / Abaxial / Back
Description: BAHAMAS: San Salvador Is. 24°02'N, 74°31'W, 26 Dec 1994, BMOC 95-0109-001, ex *Rhizophora mangle*, collected by B. Rathcke

Image type: Micrograph
Image Source: Bee Mite ID from ITP
Host: red mangrove (*Rhizophora mangle* L.)
Project: Bee Mite ID

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Pavel Klimov, Bee Mite ID, USDAAPHIS PPQ, Bugwood.org

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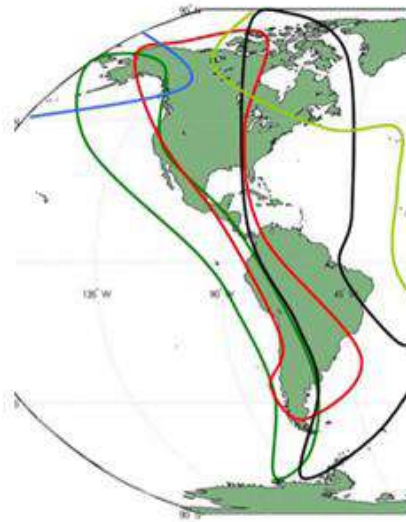
Specimen Information

Image Location

Commodity/Setting

Taxonomy & Annotation

Curation Information



The migration routes of migrant birds in all the world.

Avicennia germinans (L.) L. (1764)



Laguncularia racemosa var. *racemosa* (L.) C.F. Gaernt. (1807)



L. racemosa var. *glabriflora* (Presl) Stace (2007)





Source: <http://www.mangrove4j.org/pelliciera-rhizophorae-4j-mangrove.html>

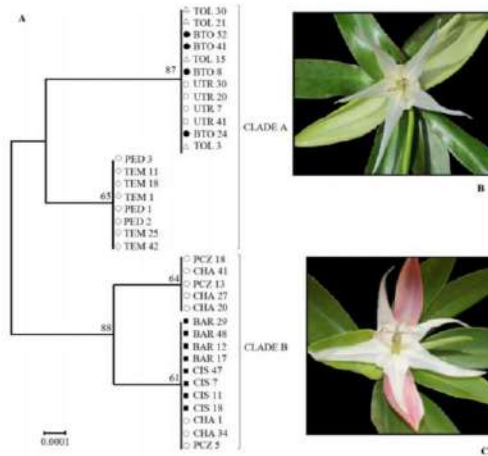


Figure 3. A. Unrooted neighbour-joining tree with 1000 bootstraps based on plastid DNA. Populations included in tree: Colombian Pacific Coast: UTR (white squares), Colombian Caribbean coast: CIS, BAR (black squares), Panamanian Pacific Coast: CHA, PCZ, PED (white circle), Panamanian Caribbean coast: BTO (black circle), Costa Rican Pacific Coast: TEM (white diamonds), Ecuadorian coast: TOL (white triangles). The scale bar indicates genetic distance. B, Flower variant A. C, Flower variant B.

Pelliciera rhizophorae (izq.) vs. *P. benthamii* (der.)

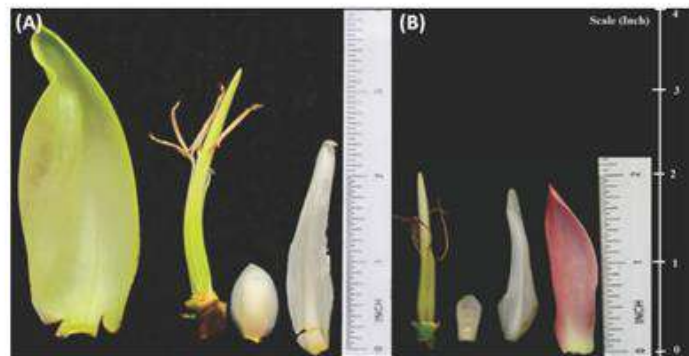
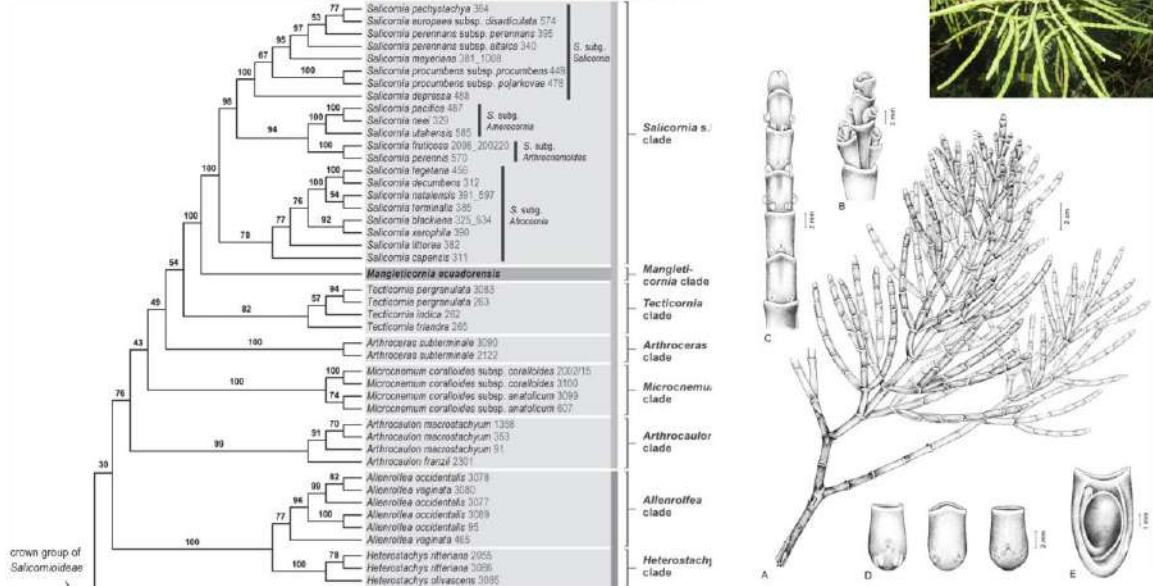


Figure 4. Floral structures in two variants of *Pelliciera rhizophorae*. A, Variant A (from left to right: bract, pistil and stamens, sepal, petal). B, Variant B (from left to right: pistil and stamens, sepal, petal, bract).

Mangleticornia ecuadorensis Ball, Kadereit & Comejo (2017)

Nuevo género y especie



Conocarpus erectus L. (1753)



Cultivado en el Parque Samanes de Guayaquil

Mangles Facultativos: Una nueva categoría

Table 6. Categorization of mangrove types for species on the Pacific coast of South America.

Family	Scientific name	Mangrove type
Rhizophoraceae	<i>Rhizophora mangle</i>	major
Rhizophoraceae	<i>Rhizophora racemosa</i>	major
Rhizophoraceae	<i>Rhizophora x harrisonii</i>	major
Acanthaceae	<i>Avicennia germinans</i>	major
Combretaceae	<i>Laguncularia racemosa</i>	major
Tetrameristaceae	<i>Pelluciera rhizophorae</i>	minor
Bignoniaceae	<i>Tabebuia palustris</i>	minor
Fabaceae	<i>Mora oleifera</i>	facultative
Fabaceae	<i>Pterocarpus officinalis</i>	facultative
Combretaceae	<i>Conocarpus erectus</i>	facultative
Malvaceae	<i>Talipariti titaceum</i> var. <i>pernambucense</i>	facultative
Bignoniaceae	<i>Amphitecna latifolia</i>	facultative
Annonaceae	<i>Annona glabra</i>	facultative

Table 7. Other floristic elements restricted and semi-restricted to the mangroves on the Pacific coast of South America.

Family	Scientific name	Distribution
Bignoniaceae	<i>Phryganocydia phellosperma</i>	Restricted
Malpighiaceae	<i>Tetrapterys subaptera</i>	Restricted
Malvaceae	<i>Pavonia rhizophorae</i>	Restricted
Malvaceae	<i>Pavonia kearneyi</i>	Restricted
Acrostichaceae	<i>Acrostichum aureum</i>	Semi-restricted
Asteraceae	<i>Tuberosylis axillaris</i>	Semi-restricted
Asteraceae	<i>Tuberosylis rhizophorae</i>	Semi-restricted
Chrysobalanaceae	<i>Hirtella carbonaria</i>	Semi-restricted
Fabaceae	<i>Muelleria choocoensis</i>	Semi-restricted
Lythraceae	<i>Crenea patentinervis</i>	Semi-restricted
Malpighiaceae	<i>Hiraea brachyptera</i>	Semi-restricted
Orchidaceae	<i>Platystele cornejoi</i>	Semi-restricted?
Orchidaceae	<i>Scaphyglottis</i> sp. nov.	Semi-restricted?
Orchidaceae	<i>Sobralia rhizophorae</i>	Semi-restricted?

Fitogeografía de los manglares en la costa del Pacífico de América del sur

MANGLARES DEL CHOCÓ*

Distribución: Suroccidente de Costa Rica (Península de Osa) hasta noroccidente de Ecuador (estuario de Cojimies)

Zonas de vida: Bosques pluviales, muy húmedos y húmedos

Diversidad: 91 % (=202 spp.) de las especies registradas

Manglar del Chocó-Ecuatorial**

Especies diagnósticas:

Árboles: *Pelliciera rhizophorae*, *Tabebuia palustris*, *Mora oleifera*, *Pterocarpus officinalis*, *Amphitecna latifolia*, *Hirtella carbonaria* y *Muelleria choocoensis*

Arbustos: *Crenea patentinervis*, *Pavonia kearneyi*, y *P. rhizophorae*

Lianas: *Bignonia phellosperma*, *Tetractris subaptera* e *Hiraea brachyptera*

Epífitas: *Platystele cornejoi*, *Scaphyglottis* sp. nov. y *Sobralia rhizophorae*

MANGLARES DEL PACÍFICO-ECUATORIAL*

Distribución: Pedernales hasta los Manglares San Pedro de Vica en Piura (5°34'S) y en las islas Galápagos.

Zonas de vida: Bosques secos, muy secos, matorrales espinosos hasta desiertos.

Diversidad: 20.3 % (=45 spp.) de las especies registradas

Manglar del Jama-Zapotillo**

Especies diagnósticas:

Árboles: *Laguncularia racemosa* var. *glabriflora*

Arbustos: *Manglicornia ecuadorensis*

Hierbas: *Sesuvium portulacastrum*, *Batis maritima*

Lianas: *Cryptocarpus pyriformis*

* Cornejo, X. 2014. *Plants of South American Pacific Mangrove Swamps* (Colombia, Ecuador, Peru). Universidad de Gatacajal

** Cornejo, X. En: Ministerio del Ambiente del Ecuador. 2013. *Sistemas de clasificación de los Ecosistemas del Ecuador Continental*. Ministerio del Ambiente del Ecuador. Quito.



SOBRALIA RHIZOPHORAE: A NEW SPECIES OF ORCHIDACEAE FROM THE MANGROVES IN NORTHWESTERN ECUADOR

XAVIER CORNEJO¹ AND CALAWAY H. DODSON²

Abstract. *Sobralia rhizophorae*, from the mangrove of Reserva Ecológica Manglares Cayapas-Manglares (REMAMANG) in northwestern Ecuador, is described and illustrated. The new species is characterized by stems with 3 terminal, cone-like inflorescences bearing white flowers, produced singly in succession, and the showy labellum with five pointed longitudinal lobes, a yellowish-brown spot within, and a heavily undulate margin at the distal third.

Resumen. Se describe y se ilustra *Sobralia rhizophorae*, encontrada en los manglares de la Reserva Ecológica Manglares Cayapas-Manglares (REMAMANG) en el noroeste de Ecuador. Esta nueva especie se caracteriza por poseer una inflorescencia terminal a manera de un cono que produce flores blancas, solitarias en sucesión. Las flores tienen un labio obovado con cinco lóbulos paralelos dispuestos en sentido longitudinal, una mancha café-amarillenta hacia la porción apical y un margen fuertemente ondulado en el tercio distal.

Keywords: Ecuador, mangrove, Orchidaceae, *Sobralia rhizophorae*, South America

Sobralia Ruiz & Pav. (Orchidaceae) is a genus comprising ca. 140 species native to the tropics of Central and South America (Gentry, 1978; Dodson, 2004). A new species is herein proposed; it was discovered while undergoing fieldwork for a flora of mangroves on the Pacific coast of northwestern South America (Cornejo et al. in prep.).

Sobralia rhizophorae Cornejo & Dodson, sp. nov. TYPE: ECUADOR, Esmeraldas, Reserva Ecológica Manglares Cayapas-Manglares (REMAMANG, 08°48'59"W 1°22'06"N, 5 m, 9 Nov 2010 (E), X. Cornejo & M. Cavigli 8278 (Holotype, GUAY [spelled] flowers and unopened shoot); Isotype (QCNE); Figs. 1–2.

Species nova similis Sobraliae pteridifoliae Dodson, a qua distinguitur caulibus longioribus portanthibus foliis majoribus, fertilibus pediculis obovatis-oblongolobatis, lacinibus parallelis quinque-costatis et macula aenea-brunnea in lamina labellii.

Erigulate herbs, suberect to subpendulous, caespitose, often forming clumps. Rhizomes short. Stems cane-like, 1–2 m long. Sheaths adpressed, green and purple on edges, glabrous.

HOLOTYPE: Esmeraldas, 22 Distrito Avenue, Carabugo, Manabí Province 02118, 2020, U.S.A. Email: xcornejo@whi-biobank.miami-camp. Field notes and occurrence in the Reserva Ecológica Manglares Cayapas-Manglares (REMAMANG), and two anonymous references.

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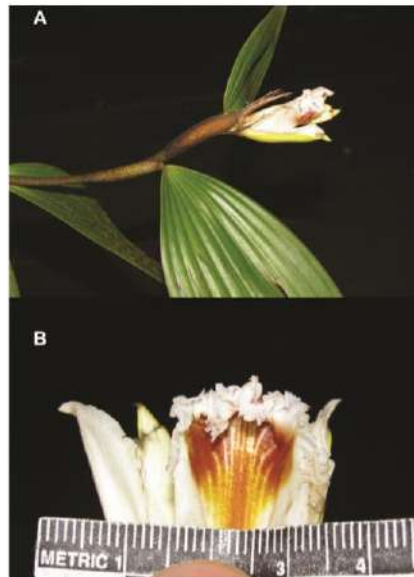
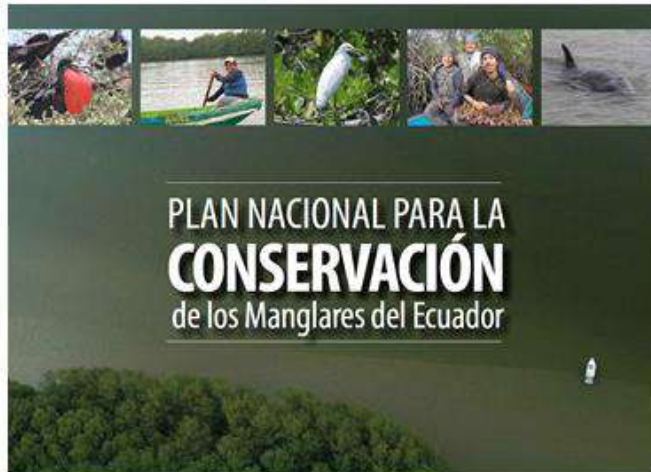


FIGURE 1. *Sobralia rhizophorae* Cornejo & Dodson. A, distal part of stem bearing leaves and a solitary terminal flower. B, anterior view of lip, the column has been removed. Photographs from the holotype (Cornejo & Cavigli 8278, GUAY).



Por R. Carvajal & X. Santillán (2019)



Islas flotantes Estero Palanqueado, Guayaquil

Proyecto MAE/PSI (2017)



Año y medio después (Dic., 2018)