FLAAR
MESOAMÉRICA

FLOR DE MAYO

TULIPÁN DE MONTAÑA

Erblichia odorata, a tree of the Passifloraceae family

Municipio de Livingston, Izabal, Guatemala

VICTOR **MENDOZA**
& DIANA **SANDOVAL**

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Photo by: Victor Mendoza, FLAAR Mesoamerica, Apr. 2021. Aldea El Rosario, Livingston, Izabal. Camera: Sony Alpha A7R IV. Lens: Sony FE 200-600mm G OSS. Settings: 1/1,600 sec; f/11; ISO 2,000.

PHOTO FROM TITLE PAGE
Photo by: Victor Mendoza, FLAAR Mesoamerica, Apr.8, 2022. Aldea El Rosario, Livingston, Izabal. Camera: Google Pixel 6 Pro.

LIVINGSTON
Plantas

CONTENTS

CONTENTS

INTRODUCTION TO *ERBLICHIA ODORATA* **OF GUATEMALA**

Passifloraceae is a family of plants that inhabit tropical, subtropical, and temperate zones belonging to the order Malpighiales. They are mainly vines, sometimes herbaceous, followed by shrubs and trees.

This family is divided into 3 subfamilies: Passifloroideae, Malesherbioideae and Turneroideae. The Turneroideae subfamily of the Passifloraceae family includes 10 genera and about 220 species in America, Africa and Madagascar. The Turneroideae can be recognized by the following diagnostic combination of characters: Leaves simple and alternate, often with crenate or serrate margins. Extra-floral nectaries (frequent). Actinomorphic, bisexual, yellow, rarely salmon, pink or red flowers in non-peninsular species, with persistent bracteoles (floral profiles) (absent in Piriqueta). Pentamerous calyx, corolla and stamens (that is, with 5 parts each). Ovary tricarpellate, unilocular. Fruit of a loculicidal capsule and arlated seeds (Grande, Duno, Cetzal, Tapia, & Fernandez. 2015)

***Erblichia odorata* is a species of tree in the family Passifloraceae subfamily Turneroideae. It was possible to find, photograph and document this plant in the municipality of Livingston, through 2 trips made to the 'Area de usos Múltiples Río Sarstún.**

The FLAAR Mesoamérica team was interested in researching this plant, since the Passifloraceae family is mainly conformed by vines. So, getting to know that this tree belongs to this family was a huge surprise. The main purpose of this document is not the photograph aspect, but to share our experience, how to identify this plant, determine in which areas it has been previously documented and, most importantly, highlight the change of family according to its phylogenetics.

Photo by: Roxana Leal, FLAAR Mesoamerica, Apr.8, 2022. Aldea El Rosario, Livingston, Izabal.

Camera: Google Pixel 6 Pro.

PERSONAL EXPERIENCE WITH ***ERBLICHIA ODORATA***

by Victor Mendoza

In March 2021, a visit was made to Aldea Buena Vista, within the Tapón Creek area. We entered to document this area, specifically in the swampo that belongs to Finca Santa Ana, in this place where I was able to observe the orange flower of Erblichia odorata for the first time. I immediately asked to one of the forest rangers: what flower is this? The forest ranger told me that it was a flower that is commonly called "Flor de Mayo". Investigating the plant, it was possible to determine its species and its phenology from April to June, months in which its common name coincides since May is the time when the plant is flowering. To identify it, I used the book "Guía de plantas acuáticas y ribereñas de la Cuenca del usumacinta" by several authors mentioned in the bibliographies of this document.

In April 2022, a shorter expedition was carried out to the municipality, visiting the area of Aldea Buena Vista, where we once again found this wonderful plant. This time we were able to observe and photograph it more closely because we had a ladder. When we returned to the Guatemala City, I immediately began to read more about this species, and I realized that in some literature it is mentioned that it belongs to the Turneraceae family; however, in a visit we made to the UVAL (herbarium of the Universidad del Valle de Guatemala), we realized that the plant belongs to the Passifloraceae family, in the book that I consulted in 2021, it also mentions that the plant belongs to the Passifloraceae family, so I dedicated myself to search more information and confirm the change of family.

FULL BOTANICAL NAME ***ERBLICHIA ODORATA***

Erblichia odorata Seem.

Learn more about *Erblichia odorata* Seem

HERE ARE SYNONYMS FOR *ERBLICHIA ODORATA*

Erblichia odorata var. mollis (Standl. & Steyerm.) LOWilliams
Erblichia odorata var. odorata
Erblichia standleyi Steyerm.
Erblichia xylocarpa (Sprague & L.Riley) Standl. y Steyerm.
Erblichia xylocarpa var. Mollis Standl. y Steyerm.
Piriqueta odorata (Semejanza) Urb.
Piriqueta xylocarpa Sprague & L.Riley

Learn more about *Erblichia odorata* Seem

LOCAL NAMES FOR *ERBLICHIA ODORATA*

Flor de mayo
Tulipán de montaña

Mayan names for *Erblichia odorata*
sik'in (Maya-K'iché, Chiapas)
(Ochoa 1996: 76)

HABIT

Tree

Photo by: Victor Mendoza, FLAAR Mesoamerica, Apr.8, 2022. Aldea El Rosario, Livingston, Izabal.

Camera: Google Pixel 6 Pro.

IN WHAT ECOSYSTEM(S) CAN YOU FIND NATIVE ***ERBLICHIA ODORATA***?

It is considered an endemic species of Mesoamerica. It is distributed in Mexico in the states of Veracruz, Oaxaca, Chiapas; Guatemala rain forests, Belize, El Salvador, Honduras, Costa Rica and Panama.

CLOSE RELATIVE(S) OF ***ERBLICHIA ODORATA***

The *Erblichia odorata* species is the only one in its genus in Mesoamerica, the species of *Erblichia genus* are found mostly in Madagascar, so they do not interact with *Erblichia odorata*.

Photo by: Victor Mendoza, FLAAR Mesoamerica, Apr.8, 2022. Aldea El Rosario, Livingston, Izabal.

Camera: Google Pixel 6 Pro.

BOTANICAL DESCRIPTION OF THE *ERBLICHIA ODORATA* **BY STANDLEY & WILLIAMS 1961**

ERBLICHIA Seemann Reference: Standley & Steyermark, Notes on the American species of *Erblichia*, Field Mus. Bot. 22: 351-357. 1940. Large trees; leaves alternate, petiolate, serrate; stipules minute; flowers large, yellow or orange-yellow, the peduncles articulate below the middle, 2-bracteolate, the bractlets subfoliaceous, serrate; sepals lanceolate, colored; petals hypogynous, obovate-spatulate, unguiculate, the claw bearing a fimbriate appendage at its apex; stamens 5, hypogynous, the anthers linear-oblong; ovary oblong, the styles 3, the stigmas dilated and subclavate; capsule oblong, pubescent or glabrous, 3-valvate, many-seeded; seeds ovate-oblong, straight.

Erblichia was united to Piriqueta by Urban, and in this he was followed by Gilg in his account of the family in Naturliche Pflanzenfamilien. There seems to be adequate reason to maintain the genus. The wood in this genus is pale brownish, of medium density but hard and tough; the texture is fine, the grain straight to irregular. So far as we know, no use is made of it. We have not seen the African species that have been associated with *Erblichia* and do not know what their status may be.

Erblichia odorata Seem. Bot. Voy. Herald 130, t. 27. 1854 (type from Panama); Piriqueta xylocarpa Sprague & Riley, Kew Bull. 1923: 373. 1923 (type from British Honduras); E. xylocarpa Standl. & Steyerm. Field Mus. Bot. 22: 353. 1940; E. Standleyi Steyerm. Field Mus. Bot. 22: 353. 1940 (type from Honduras). Condp; cortez; candillaria. Occasional in wet forest to about 900 m.; Alta Verapaz; Pete"n; Izabal. Mexico, Central America (except Nicaragua), and Panama. A tall tree to 40 m., but usually much less, with a trunk 50 cm. in diameter; leaves short-petiolate, lance-oblong or elliptic-oblong, mostly 7-14 cm. long, acute or acuminate at each end, appressed-serrate or crenate, glabrous and lustrous above, glabrous beneath or nearly so, often with appressed hairs along the costa above; sepals lanceolate or linear-lanceolate, 5-5.6 cm. long, long-acuminate or caudate, usually yellow-green with salmon or pale orange margins, somewhat appressed-pilosulous outside; petals yellow, bright orange or orange-salmon, cuneate-oblong, cuspidate or caudate, 6-8 cm. long, 3.5-4.5 cm. broad; anthers 4-6 mm. long; ovary glabrous to densely velutinous with short ascending stiff

yellowbrown hairs. Called "flor de fuego" in El Salvador; "butterfly tree" in British Honduras. When in flower it is an outstanding tree, covered with brilliant flowers, and often towering high above the surrounding trees. It blooms usually in March and April. *Erblichia odorata* var. mollis (Standl. & Steyerm.) L. Wms. Fieldiana: Bot. 29: 368. 1961. E. xylocarpa var. mollis Standl. & Steyerm. Field Mus. Bot. 22: 355. 1940. Candellaria de montana; polo de mora. Moist highland forests, 1,200-1,500 meters; Solola; Suchitepequez; Quezaltenango; San Marcos. Mexico. Figure 13. A tall tree differing from the typical variety principally in the velutinous pubescence of the under surface of the leaves.

(Standley and Williams 196:110)

DICHOTOMOUS KEY BY STANDLEY & WILLIAMS 1961 *ERBLICHIA ODORATA*

Leaves glabrous or essentially so below..... **E. odorata**.
Leaves velutinous below ..... **E. odorata var. mollis**.
(Standley and Williams 196:110)

DESCRIPTION WHERE FLAAR FOUND AND **DOCUMENTED *ERBLICHA ODORATA***

In the expeditions carried out in the municipality of Livingston, it was possible to find, photograph and document *Erblichia odorata* in the village of Buena Vista, Tapón Creek, Finca Santa Ana in April 2021, then it was documented again in the village of El Rosario in the month April 2022.

PLACE	DATE	COORDINATES
Finca Santa Ana, Buena Vista Livingston	25 de abril de 2021	15.861, -88.852
Aldea El Rosario, Livingston	7 de abril de 2022	15.852, -88.864

Photo by: Victor Mendoza, FLAAR Mesoamerica, Apr.8, 2022. Aldea El Rosario, Livingston, Izabal.

Camera: Google Pixel 6 Pro.

WHERE HAS THIS BEEN FOUND *ERBLICHIA ODORATA* IN THE MUNICIPIO OF LIVINGSTON?

- Is *Erblichia odorata* listed for Biotopo Protegido Chocón Machacas, CECON/USAC?
  Not mentioned.

- Is *Erblichia odorata* listed for Tapon Creek Nature Reserve (including Taponcito Creek), FUNDAECO?
  Not mentioned.

- Is *Erblichia odorata* listed for Buena Vista Nature Reserve?
  Not mentioned.

- Is *Erblichia odorata* listed for Cerro San Gil (south side of Rio Dulce)?
  Not mentioned.

- Is *Erblichia odorata* listed for Ecoalbergue Lagunita Creek (Área de Usos Múltiples Río Sarstún)
  Not mentioned.

- Is *Erblichia odorata* listed for Sarstoon-Temash National Park (northern side of Río Sarstún)?
  Yes, *Erblichia odorata* is mentioned as part of the Turneraceae family (Meerman, Herrera and Howe 2003: 9).

- Is *Erblichia odorata* listed for Refugio de Vida Silvestre Punta de Manabique?
  Not mentioned.

- Is *Erblichia odorata* listed for Bocas de Polochic?
  Not mentioned.

ARE *ERBLICHIA ODORATA* TREES REGISTERED FOR PARQUE NACIONAL TIKAL?

Missouri Botanical Garden (MO:Tropicos)
 # de Catálogo: 1424675
ID de Ocurrencia: urn:catalog:MO:Tropicos:1424675
Taxón: Erblichia odorata Seem.
Familia: Passifloraceae
Determinador: Arbo (1978)
Colector: Rolando Tún Ortíz
Número: Ortíz 766
Fecha: 1970-03-17
Fecha Literal: 1970-3-17
Localidad: Guatemala, Petén, Parque Nacional, Tikal. En orillando el camino para Puerto Mendez, lado norte, Km 163/164 de Santa Elena. En foresta alta
Derechos de Uso: CC BY (Attribution)
ID del Registro: 10517fd8-baca-499b-94cb-717efda1114a

Learn more about *Erblichia odorata* Seem

ARE *ERBLICHIA ODORATA* TREES REGISTERED FOR RESERVA DE LA BIOSFERA MAYA?

Yes, it is mentioned in the flora list of the project Dinámica de la regeneración natural de un bosque tropical como fundamento para el desarrollo de estrategias de restauración ecológica en la Reserva de Biosfera Maya (García, López and Ramírez 2015: 77).

Photo by: Roxana Leal, FLAAR Mesoamerica, Apr.8, 2022. Aldea El Rosario, Livingston, Izabal.

Camera: Google Pixel 6 Pro.

DID CYRUS LUNDELL FIND *ERBLICHIA ODORATA* TREES IN PETEN?

In the book of the Vegetation of Peten (1937), Lundell records that this species probably lives on the banks of the La Pasión river. (Lundell 1937: 200)
Lundell took a sample in Petén, On Poptun-San Luis Road, Km 102. In pipeland, the specimen is in the Missouri Botanical Garden Lundell took a sample in La Cumbre, Dep. Peten, the specimen is in the Registries of Plants in Mexican Collections (CONABIO: Plants)

Learn more about *Erblichia odorata* Seem

IS *ERBLICHIA ODORATA* FROM THE HIGHLANDS OR FROM THE LOWLANDS (OR BOTH)?

Both, it's found at elevations of 50-1200 masl (Grijalva and Quezada 2014: 51).

Erblichia odorata in Belize
Erblichia odorata Seem. var. odorata — Syn: Piriqueta xylocarpa Sprague & Riley — Ref: FG 7: 110. 1961; Arbo, 1979: 464. — Nv: butterfly tree, conop. — Habit: Tree. — Voucher: Baldermos 4; Gentle 6460; Schipp S-718. (Balick, Nee and Atha 2000: 15)

Photo by: Roxana Leal, FLAAR Mesoamerica, Apr.8, 2022. Aldea El Rosario, Livingston, Izabal.

Camera: Google Pixel 6 Pro.

ERBLICHIA ODORATA IN MEXICO

Erblichia odorata Seem. CHIS, NAY, OAX, PUE, QROO, SIN, TAB, TAMS, VER (Villaseñor 2016: 830)

USES OF *ERBLICHIA ODORATA*

Some *Turnera* species and *Erblichia odorata* are cultivated as ornamentals. The latter has also been used for fine timber.

Learn more about *Erblichia odorata* Seem

IS THERE POTENTIAL MEDICINAL USAGE BY LOCAL PEOPLE?

No medicinal use was found for this species.

ARE ANY PARTS OF *ERBLICHIA ODORATA* TREES EATEN BY ANIMALS?

The larvae of butterflies of the species *Eueides vulgiformis* (Nymphalidae) have been found feeding the leaves of *Erblichia odorata*.

Learn more about *Erblichia odorata* Seem

WHAT ARE THE PRIMARY POLLINATORS OF ERBLICHIA ODORATA FLOWERS?

Regarding the pollination of Passiflora, three groups of pollinators are known. Some are pollinated by moths (those with white flowers), others are pollinated by birds, for example hummingbirds (those with red flowers) and the third group are those pollinated by bees. Pollination in the genus *Turnera* is usually done by bees, wasps, butterflies and various flies. Some species have extrafloral nectaries and are highly visited by ants. (FaCENA n.d.: 81)

Photo by: Roxana Leal, FLAAR Mesoamerica, Apr.8, 2022. Aldea El Rosario, Livingston, Izabal.

Camera: Google Pixel 6 Pro.

CONCLUDING DISCUSSION AND SUMMARY ON *ERBLICHIA ODORATA*

- The *Erblichia odorata* species is a fascinating plant that shows itself to be of unique characteristics that attract the attention of the curious.
- Its beautiful flowers of showy colors are attractive for ornamental use and its wood is of good quality. Even though its ethnobotanical uses are few, as an object of study it is quite interesting.
- *Erblichia odorata* is the only one of its genus in the American continent and its phylogenetically closest relatives are native to Africa and Australia.
- Although the *Erblichia genus* currently belongs to the Passifloraceae family, in many texts it can still be found as part of the Turneraceae family that currently ceased to be a family to become a Turneroideae subfamily, this error may still exist in many common information web pages.
- In El Salvador, the Flor de Mayo can also be called "tree of butterflies" because it harbors species of the Nymphalidae family that feed on the leaves of this plant.

Photo by: Roxana Leal, FLAAR Mesoamerica, Apr.8, 2022. Aldea El Rosario, Livingston, Izabal.

Camera: Google Pixel 6 Pro.

CITED REFERENCES ON *ERBLICHIA ODORATA*

Most helpful mention of this plant (because this book lists the most uses):

Balick, Nee and Atha 2000: 15

BALICK, Michael J., NEE, Michael H. and **Daniel E. ATHA**

2000 Checklist of the Vascular Plants of Belize: With Common Names and Uses. Memoirs of the New York Botanical Garden Vol. 85. 246 pages.

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GARCÍA-Vettorazzi, M., LÓPEZ-López, J. and **M. RAMÍREZ-Posadas**

2015 Proyecto "Dinámica de la regeneración natural de un bosque tropical como fundamento para el desarrollo de estrategias de restauración ecológica en la Reserva de Biosfera Maya, Informe Final. Dirección General de Investigación (DIGI)/ Universidad de San Carlos (USAC), Guatemala. 113 pages,

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https://digi.usac.edu.gt/bvirtual/informes/cultura/INF-2014-15.pdf

GRANDE, J., DUNO, R., CETZAL, W., TAPIA, J., and **G. FERNÁNDEZ**

2015 La subfamilia Turneroideae (Passifloraceae) en la Península de Yucatán Mexicana.

Available online:.
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FACULTAD DE CIENCIAS EXACTAS Y NATURALES Y AGRIMENSURA

n.d. Guía de Consultas Diversidad Vegetal: Eudicotiledoneas Escenciales-Clado Rosides-Eurosides I-Malpighiales: Passifloraceae + Turneraceae. Universidad Nacional de Nordeste. Pages 80-84.

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2014 Un gran recurso: las plantas ornamentales en Nicaragua: una guía sobre los árboles y arbustos ornamentales exóticos. 1a ed. Managua. 256 pages.
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TRUYENS, S. ARBO, M. and **J. S. SHORE**
2005 Phylogenetic relationships, chromosome and breeding system evolution in Turnera (Turneraceae): inferences from its sequence data". Am. J. Bot. 92: 1749-1758.

WEB SITES SPECIFICALLY ON ERBLICHIA ODORATA

Botanical and ecological information of the species
https://www.thecompositaehut.com/www_tch/webcurso_spv/familias_pv/passiflorace-ae_turneroideae.html

Botanical and ecological information of the species
https://panamabiota.org/stri/taxa/index.php?tid=64676

Portal de Biodiversidad de Guatemala
https://biodiversidad.gt/portal/collections/list.php?usethes=1&taxa=7910

Taxonomic Information
http://www.worldfloraonline.org/search?query=erblichia

Botanical and ecological information of the species
https://es.wikipedia.org/wiki/Erblichia

HELPFUL WEB SITES FOR ANY AND ALL PLANTS

There are several web sites that are helpful even though not of a university or botanical garden or government institute.

However most popular web sites are copy-and-paste (a polite way of saying that their authors do not work out in the field, or even in a botanical garden). Many of these web sites are click bait (they make money when you buy stuff in the advertisements that are all along the sides and in wide banners also. So we prefer to focus on web sites that have reliable information.

https://serv.biokic.asu.edu/neotrop/plantae/
Neotropical Flora data base. To start your search click on this page:
https://serv.biokic.asu.edu/neotrop/plantae/collections/harvestparams.php

http://legacy.tropicos.org/NameSearch.aspx?projectid=3
This is the main SEARCH page.

https://plantidtools.fieldmuseum.org/pt/rrc/5582
SEARCH page, but only for collection of the Field Museum herbarium, Chicago.

https://fieldguides.fieldmuseum.org/guides?category=37
These field guides are very helpful. Put in the Country (Guatemala) and you get eight photo albums.

http://enciclovida.mx
CONABIO. The video they show on their home page shows a wide range of flowers pollinators, a snake and animals. The videos of the insects are great.

www.kew.org/science/tropamerica/imagedatabase/index.html
Kew gardens in the UK is one of several botanical gardens that I have visited (also New York Botanical Gardens and Missouri Botanical Gardens (MOBOT), in St Louis. Also the botanical garden in Singapore and El Jardín Botánico, the open forest botanical garden in Guatemala City).

www.ThePlantList.org
This is the most reliable botanical web site to find synonyms. In the recent year, only one plant had more synonyms on another botanical web site.
APPENDIX A

APPENDIX A

WHERE TO FIND, BY LOOKING IN HERBARIA

Field Museum of Natural History - seed plants

Catalog #: US 1922562
Occurrence ID: http://n2t.net/ark:/65665/3180bc77d-c2f8-465b-962b-e9fcbea6e519
Taxon: Erblichia odorata Seem.
Family: Turneraceae
Collector: J.A. Steyermark
Number: 45648
Date: 1942-04-01 - 1942-04-02
Literal Date: 1942-4-1
Location: Guatemala, Alta Verapaz, Dept. Alta Verapaz: Cerro Chinajá, between Finca Yalpemech and Chinajá, above source of Río San Diego.
Elevation: 150-700 meters (492-2296ft)

Missouri Botanical Garden

Catalog #: 3460321
Occurrence ID: urn:catalog:MO:Tropicos:3460321
Taxon: Erblichia odorata mollis (Standl. & Steyerm.) L.O. williams
Family: Passifloraceae
Determiner: A. Cóbar (2006)
Collector: Pierre Ventur
Number: Ventur 103
Date: 1976-04-04
Literal Date: 1976-4-4
Location: Guatemala, Petén, San Luis, San Luis. Ix K'onop
16.19861 -89.44055
Rights of Use: CC BY (Attribution)
Registry ID: 8c97b85b-9669-45a2-acd5-d2ab45540197

New York Botanical Garden Steere Herbarium - Plants

Catalog #: 75946
Occurrence ID: c22f19c7-6830-4a98-9821-e62d5b53b837
Taxon: Erblichia xylocarpa var. Mollis Standl. and Steyerm.
Family: Passifloraceae
Determiner: E.K. Schofield
Type Status: isotype
Collector: J.A. Steyermark
Number: 33448
Date: 1940-01-01 - 1940-01-02
Literal Date: 01 Jan 1940-02 Jan 1940
Location: Guatemala, Quetzaltenango, Along the Quebrada San Gerónimo, Finca Pirineos, low south-facing slopes of Volcán Santa María, between Santa María de Jesús and Calahuaché.
Elevation: 1300-2000 meters Literal Elevation: 4265.1-6561.7 feet

Registros de Plantas en Colecciones Mexicanas

Catalog #: 928159
OccurrenceID: urn:catalog:IBUNAM:MEXU:928159:291b1382ffcb3845f745ab-602703f8e2
Taxon: Erblichia odorata Seem.
Family: Turneraceae
Determiner: C. Todzia
Collector: Elias Contreras
Date: 1967-03-13
Literal Date: 1967-03-13T00:00:00
Location: Guatemala, Petén, La Tortuga [Location ID: 463837]
Habitat: In high jungle, in corozal
Single Count: 1
Preparations: Herbalized
Rights of Use: CC BY-NC (Attribution-Noncommercial)
Rights Holder: CONABIO
Registry ID: deb49163-7538-411c-93c7-95146125178d

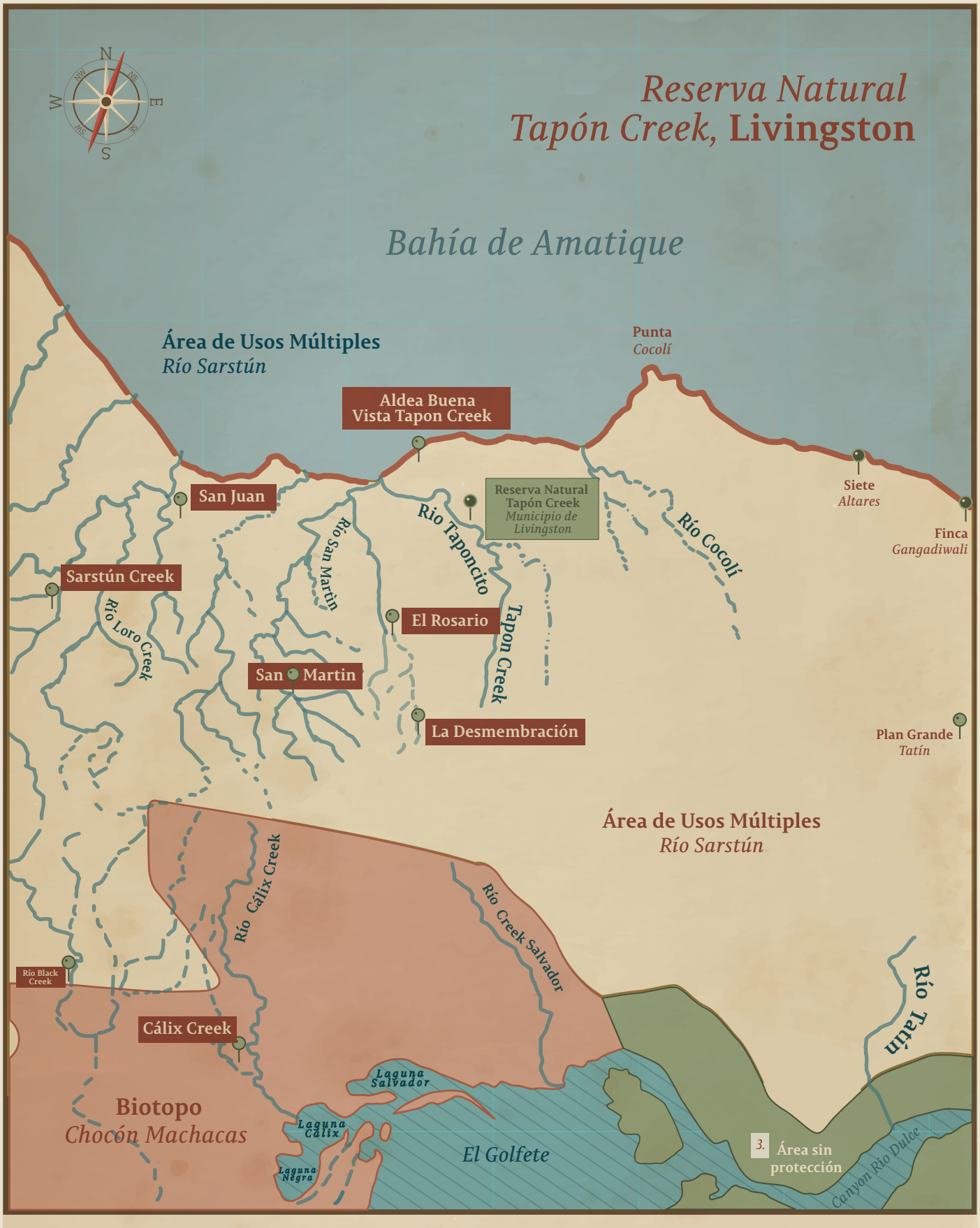
United States National Herbarium- Smithsonian

Catalog #: US 1949656
Occurrence ID: http://n2t.net/ark:/65665/30bf398e8-0233-4a47-81ae-ca3a6d1f7765
Taxon: Erblichia odorata Seem.
Family: Turneraceae
Collector: J.A. Steyermark
Number: 44996
Date: 1942-03-12
Literal Date: 1942-3-12
Location: Guatemala, Alta Verapaz, Dept. Alta Verapaz: Montaña Yxocubvain, 2½ miles west of Cubilgüitz.
Elevation: 300-500 meters (984-1640ft)

See more: https://biodiversidad.gt/portal/collections/list.php?usethes=1&taxa=7910


Livingston,
Izabal
Mar Caribe
BELICE
Petén
Sarstoon River
Río Sarstún
Modesto Mendez
Bahía de Amatique
Municipio de Livingston
Livingston
Municipio de Livingston
El Golfete
Municipio de Puerto Barrios
Puente de Río Dulce
Puerto Barrios
Municipio de Livingston
CA13
CA9
Municipio de El Estor
Lago Izabal
Municipio de Morales
Áreas naturales protegidas de Izabal
1. Bocas del Polochic (El Estor)
2. Punta de Manabique (Puerto Barrios)
3. Sarstoon Temash National Park (Belice)
Municipio de Los Amates
HONDURAS
Zacapa
Hacia Ciudad de Guatemala
Áreas naturales protegidas de Livingston
Petén
BELICE
Bahía de Amatique
Municipio de Livingston
El Golfete
Municipio de El Estor
Lago Izabal
Municipio de Morales
Municipio de Puerto Barrios
1. Área sin protección
2. Parque Nacional Río Dulce
3. El Higuerito
4. Área de Usos Múltiples Río Sarstún
5. Sierra de Santa Cruz
6. Biotopo Protegido Chocón Machacas
7. Reserva Protectora de Manantiales Cerro San Gil
FLAAR MESOAMÉRICA

Reserva Natural Tapón Creek, **Livingston**



Izabal

FLAAR MESOAMÉRICA

Información de referencia:

- Limites departamentales de Guatemala. (IGN))
- Instituto Geográfico Nacional (IGN) (Hojas 2463 IV y 2463 III)
- Google Map data 2020. Shapes: Sistema Guatemalteco de Áreas Protegidas 2017.
- Cuerpos de agua. Ministerio de Agricultura Ganadería y Alimentación (MAGA
- Dirección de Análisis Geoespacial del (CONAP), Marzo/2017.

Elaborado por: Andrea de la Paz; Amanda Estrada Rodas. FLAAR Mesoamerica 2020

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2. Biotopo Protegido Chocón Machacas
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4. Área de Usos Múltiples Río Sarstún
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ACKNOWLEDGEMENTS TO FLAAR MESOAMÉRICA

Flor de María Setina is in charge of the financial administration of the institution and supports the supervision of daily activities.

Vivian Hurtado is the current project manager of the FLAAR divisions: Flora & Fauna and MayanToons. She is also an environmental engineer and a passionate researcher.

Victor Mendoza environmental engineer in charge of the photographic database and its taxonomic identification. He also helps with the coordination of research activities.

Sergio Jerez agronomy engineering student involved in the identification of plants and support in research topics.

Belén Chacón biology student who organizes, tabulates and updates our ethnobotanical list.

Diana Sandoval agricultural engineer who compiles scientific information that is added to our flora and fauna reports.

Roberto Aguiar history student collects information and bibliographic references to feed our electronic library of flora and fauna and support research for reports and websites.

Samuel Herrera is in charge of processing maps of our field trips and helping with the identification and investigation of species.

Pedro Pablo Marroquín is part of the editing team, review and add information to our photographic reports

Alejandra Valenzuela is a biology student and part of the photographic reports editing team. She also supports the realization and analysis of web statistics.

Byron Pacay is our assistant during field trips to handle GPS data. He also assists in the main office with different tasks

Norma Cho is a helpful photography assistant during field trips. She also assists in the main office with different tasks

Hanny López is a communication student. She manages all our social networks and digital community.

Isabel Rodriguez Paiz is in charge of fundraising and partnership development.

Edwin Solares is a photographer and videographer during our expeditions. Later, he edits this content to be used in our different materials.

Haniel López is a drone pilot and photographer during our expeditions.

Pedro Pablo Ranero with a degree in communication is responsible for editing videos of flora and fauna to create content on our sites.

Andrea Sánchez graphic designer who helps prepare the graphic line of our publications. She is our editorial art director.

Jaqueline González graphic designer who combines text layout and photo editing to create our reports.
Heidy Galindo graphic designer who combines text layout and photo editing to create our reports.

Cristina Ríos graphic designer who combines text layout and photo editing to create our reports.

David Arrivillaga is an experienced photographer and graphic designer. Sometimes he is a photographer during our expeditions, but he also designs our flora and fauna reports.

María Alejandra Gutiérrez is an experienced photographer who is now in charge of the preparation of photographic catalogs. She was also coordinator of the field trips for the research project in Livingston, Izabal.

Paulo Núñez is an engineer and our webmaster. He is the person in charge of the maintenance and programming of the entire network of FLAAR websites.

Juan Carlos Hernández is a graphic designer and part of the web team. Receive the material we produce to place on our sites.

María José García is a graphic designer and part of the web team. Receive the material we produce to place on our sites.

Andrés Fernández is a graphic designer and in charge of keeping our websites updated and more efficient for the user.

Karla Cho helps with general research and design assistant in the office.

Luis Molina is a professional illustrator specialized in line drawings of Maya vases, bowls, and plates.

Valeria Áviles is a graphic designer and illustrator. She is in charge of coordinating the activities of MayanToons, as well as making illustrations for the different materials that we prepare.

Laura Morales is a digital content engineer, She is in charge of directing the animation area of our MayanToons project.

Paula García is part of our MayanToons animation team. Her job is to bring our favorite characters to life.

Niza Franco is part of our MayanToons animation team. Her job is to bring our favorite characters to life.

Isabel Trejo is a graphic designer and illustrator for MayanToons and for social media posts.

Andrea Bracamonte is a graphic designer and illustrator for MayanToons and for social media posts.

Josefina Sequén is an illustrator for MayanToons.

Rosa Sequén is an illustrator for MayanToons.

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