



FLAAR
MESOAMÉRICA

CAULIFLOROUS #1

TREE FLOWERING

DIRECTLY FROM THE TRUNK

Bellucia pentamera

Where The Pirates Hide
Caribbean Botanical Experience
Livingston, Izabal

NICHOLAS **HELLMUTH**

CAULIFLOROUS #1

TREE FLOWERING

DIRECTLY FROM THE TRUNK

Bellucia pentamera



DECEMBER 2020



CREDITS

The helpful individuals listed below are part of the FLAAR Mesoamerica research and field work team. The office research team is additional individuals in the main office in Guatemala City.

Author

Nicholas Hellmuth

Compilation of Basic Data from Earlier Botanists

Nicholas Hellmuth
Diana Sandoval

Bibliography Team

Nicholas Hellmuth
Vivian Hurtado

Editors

Vivian Díaz

Photographers

Nicholas Hellmuth

Manager of Design and Layout

Andrea Sánchez Díaz

Layout of Spanish Edition

Andrea Sánchez Díaz

Layout of this English Edition

Carlos Marroquín



Cauliflory:

Flowering directly from trunk and/or tree limb.

APPRECIATION

Assistance for local Access, Municipio de Livingston

Daniel Esaú Pinto Peña, Alcalde of Livingston (Izabal, Guatemala).

Iniciation of the Project of Cooperation

Edwin Mármol Quiñonez, Coordinación de Cooperación de Livingston (Izabal, Guatemala)

Lancheros from Muelle Municipal to Field Trip Base Camp

Omar Suchite
Keneth William De La Cruz

Lanchero and Guide, Vuelve Mujer

George Renau

Local Assistants, Vuelve Mujer

Amilcar Caal Cac



PHOTO FROM FRONT COVER

Bellucia pentamera Naudin.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston, Izabal.

Camera: Sony Alpha A7R IV. Lens: sONY FE 50mm Macro. Settings: 1/400 sec; f/8; ISO 1,000.

PHOTO FROM TITLE PAGE

Bellucia pentamera.

Photo by: Víctor Castillo, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston, Izabal, Guatemala.

Camera: Canon 1D X Mark II. Lens: Canon 50mm f/2.5 Macro 1:1. Settings: 1/1,000 sec; f/2.5; ISO 400.

CONTENTS

Introduction to *Bellucia pentamera* _____

My Personal Experience with *Bellucia pentamera* _____

Location of this discovery _____

Full Botanical Name _____

Here are synonyms for *Bellucia pentamera* _____

Local names for *Bellucia pentamera* _____

Local names for *Bellucia grossularioides* _____

World Range for *Bellucia pentamera* _____

Bellucia in Standley and co-authors Chicago botanical monographs _____

Bellucia in Standley and Record 1936, Belize _____

Bellucia pentamera trees in Belize _____

Bellucia in Standley Trees and Shrubs of Mexico _____

More recent list of species of *Bellucia* trees in Mexico _____

Close relative(s) of *Bellucia pentamera* _____

Synonyms of *Bellucia grossularioides*, this close relative _____

Where has either *Bellucia pentamera* and/or *Bellucia grossularioides* been found in the Municipio of Livingston? _____

- Is *Bellucia* listed for Biotopo Protegido Chocón Machacas, CECON/USAC? _____
- Is *Bellucia* listed for Tapon Creek Nature Reserve (including Taponcito Creek), FUNDAECO? _____
- Is *Bellucia* listed for Buena Vista Tapon Creek Nature Reserve? _____
- Is *Bellucia* listed for Cerro San Gil (south side of Rio Dulce)? _____

- Is *Bellucia* listed for Ecoalbergue Lagunita Creek
- (Área de Usos Múltiples Río Sarstún) _____
- Is *Bellucia* listed for El Refugio de Vida Silvestre Punta de Manabique? _____
- Is *Bellucia* listed for Sarstoon-Temash National Park (northern side of Río Sarstún)? _____

In what Ecosystem(s) can you find native *Bellucia* trees? _____

Can *Bellucia pentamera* be considered a cauliflorous plant? _____

Do *Bellucia pentamera* trees also grow in home gardens? _____

Uses of *Bellucia pentamera* _____

Is there potential medicinal usage of *Bellucia pentamera* by local people? _____

Are any parts of *Bellucia pentamera* eaten by mammals? _____

What are the primary pollinators of *Bellucia pentamera* flowers? _____

Suggested Further Research _____

Concluding Discussion and Summary on *Bellucia pentamera* trees _____

References Cited and Suggested Reading on *Bellucia pentamera* _____

Helpful web sites for any and all plants _____

Web sites specifically on *Bellucia pentamera* trees _____



Starting in January 2021, we will have two different series of FLAAR reports on plants of Guatemala.

One series will be focused on the area where we found and photographed the species, with basic list of suggested reading. The purpose of this 1st edition is to help provide our photographs and information on where botanists, students, and interested members of the public can find and visit this plant themselves.

Once our team has time (and funding) we will then do a 2nd edition with comparative comments about the same tree or vine in other areas of Guatemala and adjacent parts of Mesoamerica, especially: Chiapas, Tabasco, Campeche, Yucatan, Quintana Roo, and Belize.



Bellucia pentamera detail of the immature fruit, the remaining base for the petals after they dried.
Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston.
Camera: Sony Alpha A7R IV. Lens: Lens. Sony FE 50mm Macro. Settings: 1/400 sec; f/8; ISO 1,000.

INTRODUCTION TO ***BELLUCIA PENTAMERA***

The two different colors of flowers on one same tree were quite a surprise. The gorgeous size and shape of these flowers was gorgeous and photogenic. And the fruits are edible. So, lots of reasons for me to want to learn more about this tree and share what I have learned with the world.

After considerable research I learn there are two species, so we will need to accomplish more research to learn which is the one we saw in December 2020, on a hill overlooking the town of Livingston, Izabal, Guatemala.

Both species produce edible food. But no species of *Bellucia* is in Lundell's 1937 book on Vegetation of Peten. So, no surprise that no book on foods of the Maya list this plant.

But some ethnobotanists have indeed added this fruit to list of edible foods available to the Maya of Guatemala. *Bellucia*, but only *Bellucia grossularioides*, has been in my list of edible foods of the Maya for over a decade (Hellmuth 2013). But in that past decade I was not yet aware that the other species, *B. pentamera*, was also edible.

However, it turns out that *Bellucia grossularioides* has been listed by the Neotropical Flora database for Tikal. So, it's time to add this tree fruit to the list of plants available to eat for the Classic Maya by Lundell (1938), to the list fruit trees of Dennis Puleston (1968), etc.

MY PERSONAL EXPERIENCE **WITH *BELLUCIA PENTAMERA***

I have never in my 50+ years in Mesoamerica seen this tree before the field trip focused on exploring ecosystems within hiking distance of the town of Livingston, Izabal, Guatemala. I have never heard anyone mention this tree or its flowers (other than being listed if you spend hours, days, weeks doing library research). Also, this tree was not in either of our first two editions of *Cauliflorous Trees of Guatemala*. Ironically, we had another species of *Bellucia* in the list of trees we were looking for since 2012!

But *Bellucia* was already in my list of fruit trees with edible fruits. Just that a decade ago I was only visiting the waterways of Livingston; I was not hiking into the hills.



Bellucia pentamera flower in an early developing stage.

Photo by: Victor Castillo, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston, Camera: Canon 1D X Mark II. Lens: Canon 50mm f/2.5 Macro 1:1. Settings: 1/1,000 sec; f/2.5; ISO 400.

LOCATION OF THIS DISCOVERY

To stand in front of this tree yourself, make an appointment with George Reanu or his team at the pirate's hilltop nature reserve. Then just hop into a *tuc-tuc* and they will leave you at the end of the road (at the edge of the town of Livingston). Then just a short hike up the hill. We recommend you have a local guide with you (and obviously register your presence with George or his associates who manage this land).



Contact to access Finca Where the Pirates Hide is via George Reanu.

[@where_the_pirates_hide](#) is the username for his INSTAGRAM

Bellucia pentamera above view.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston. Camera: Sony Alpha A7R IV. Lens: Sony FE 50mm Macro. Settings: 1/400 sec; f/8; ISO 1,000.

MAP FROM NEXT PAGE:

Here is the location of the hill where the team from Pirate's area led our team of FLAAR Mesoamerica where we were pleasantly surprised to find two trees still with some flowers on it.

Map of the town of Livingston, the capital of the Municipio de Livingston, Departamento de Izabal, Guatemala, Central America.



678000

680000

682000

684000

686000

688000

Bahía de Amatique

Aldea Plan Grande Tatín, Livingston

1756000

1754000

1752000

1750000

1748000

1756000

1744000

1742000



Izabal



- 1. Reserva Protectora de Manantiales Cerro San Gil
- 2. Biotopo Protegido Chocón Machacas
- 3. Área sin protección
- 4. Parque Nacional Río Dulce
- 5. Área de Usos Múltiples Río Sarstún
- Acceso terrestre
- - - Acceso de tierra

Información de referencia:

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



At the bottom of the landscape you will be able to observe the sea that is in front of the urban area of Livingston.
Photo by: Haniel López, FLAAR Mesoamerica, Nov. 19, 2020, Livingston, Izabal, Guatemala.
Camera: DJI Mavic 2 Pro. Settings: 1/400 sec; f/6.3; ISO 100.

FULL BOTANICAL NAME

Victor Mendoza of the plant identification team at FLAAR Mesoamerica has suggested that this tree is *Bellucia pentamera*. The full botanical name, *Bellucia pentamera* Naudin, is the accepted name, family Melastomataceae. We also need to double-check whether this tree is a very similar species, *Bellucia grossularioides*. So I introduce the nomenclature of both species.



Bellucia pentamera flowers can be of two different color; this is the brown phase.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston.
Camera: iPhone 12 Pro Max

HERE ARE SYNONYMS FOR *BELLUCIA PENTAMERA*

<i>Axinanthera bellucia</i> H.Karst.	<i>Axinanthera bellucia</i> H.Karst.
<i>Bellucia axinanthera</i> Triana	---
<i>Bellucia aricuaizensium</i> Pittier	<i>Bellucia aricuaizensium</i> Pittier
<i>Bellucia axinanthera</i> Triana	<i>Bellucia axinanthera</i> Triana
<i>Bellucia costaricensis</i> Cogn. ex T.Durand & Pittier	---
---	<i>Bellucia costaricensis</i> Cogn.
<i>Bellucia weberbaueri</i> Cogn.	<i>Bellucia weberbaueri</i> Cogn.
www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.	www.theplantlist.org/tpl1.1/record/tro-20300363

Standley and Williams suggest that *Bellucia superba* Naudin is a synonym of *Bellucia grossularioides* (1963: 420).

Synonyms for *Bellucia grossularioides*:

- *Bellucia brasiliensis* Naudin
- *Bellucia circumscissa* Spruce ex Cogn.
- *Bellucia hostmannii* Naudin
- *Bellucia macrophylla* (D. Don) Triana
- *Bellucia multiflora* H. Karst.
- *Bellucia quinquenervia* (Aubl.) H. Karst.
- *Bellucia superba* Naudin
- *Blakea macrophylla* D. Don
- *Blakea quinquenervia* Aubl.
- *Melastoma grossularioides* L.
- *Webera quinquenervia* (Aubl.) C.C. Gmel.

LOCAL NAMES FOR **BELLUCIA PENTAMERA**

Manzana de Montana (the common name given on most websites). Elfriede Pöll (1982) uses the name *Bellucia costaricensis* and gives the local common name manzanito.

- Guayabo de mico, coronillo

www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:323200-2#synonyms

LOCAL NAMES FOR **BELLUCIA GROSSULARIOIDES**

Arbol de manzana. Guatemala, Costa Rica (Chizmar 2009: 235).

WORLD RANGE FOR **BELLUCIA PENTAMERA**

Belize, Bolivia, Brazil North, Brazil Northeast, Brazil West-Central, Colombia, Costa Rica, Ecuador, Guatemala, Guyana, Honduras, Mexico Gulf, Mexico Southeast, Mexico Southwest, Nicaragua, Panamá, Peru, Venezuela.

www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:323200-2#image-gallery

So *Bellucia pentamera* has been documented for Mesoamerica everywhere from Gulf coastal Mexico through Guatemala, Belize, Honduras, Nicaragua, and Costa Rica. But not listed by Kew gardens for El Salvador (possibly since that is on the Pacific side of Mesoamerica and this plant is more on the Caribbean side?).



Bellucia pentamera family Melastomataceae.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston.

Camera: iPhone 12 Pro Max

BELLUCIA IN STANDLEY AND CO-AUTHORS CHICAGO BOTANICAL MONOGRAPHS

Bellucia pentamera is included in their 1963 monograph of half a century ago but under the common antiquated name: *Bellucia costaricensis*.

Bellucia costaricensis Cogn. Bull. Soc. Bot. Belg. 30, pt. 1: 264.

1891. Manzana de montana.

Wet mixed forest, sometimes in open pine forest, or in pastures, 300 meters or less; Izabal. Mexico to Panama. Colombia.

A tree of 6-8 meters, the crown rounded, the branchlets tetragonous, brownish-puberulent or glabrate; leaves coriaceous, on stout petioles 2-3 cm. long, ovateelliptic or broadly elliptic, mostly 20-30 cm. long and 12-18 cm. broad, rounded or obtuse at the apex and abruptly short-acute, broadly cuneate at the base, 5-plinerved or 5-nerved, deep green above, glabrous or brownish-puberulent, paler beneath, in age glabrate; flowers mostly in fascicles of 2-4, on stout pedicels 1.5 cm. long, 5-6-parted; calyx 2-2.5 cm. broad, the lobes broadly triangular, acute, slightly shorter than the hypanthium; petals 13-15 mm. long, white or pinkish white, incurved-erect; anthers dull yellow.

The large juicy fruits of this and other species are edible. Called "Maya" in British Honduras.

(Standley and Williams 1963: 419).



Notice that no mention is made of the flowers changing color totally; that white is only the fresh recently opened phase. No mention that the plant is cauliflorous. This suggests the authors did not often (if ever) see the real actual tree in front of them).

But as in most botanical books, *Bellucia grossularioides* is very much present, and in its name that is accented still today.

Bellucia grossularioides (L.) Triana, Trans. Linn. Soc. Bot. 28: 141. 1871. *Melastoma grossularioides* L. Sp. Pl. 390. 1753.

Wet mixed forest, 400 meters or less; Izabal; Alta Verapaz. Mexico; British Honduras; Panama; northern South America to Ecuador.

Tree of 5-10 meters with a rounded crown, the younger branches tetragonous, glabrous; leaves on stout petioles 2-4 cm. long, coriaceous, ovate to elliptic or oblong-obovate, 20-30 cm. long, 10-20 cm. broad, acute or often rounded and abruptly acute, rounded to cuneate at the base, 5-plinerved or almost 5-nerved, glabrous or obscurely puberulent; flowers mostly solitary, rarely 2, on stout pedicels 2 cm. long; calyx 1.5-2 cm. broad; calyx lobes 2-5, irregular in shape, acute to rounded, 5-8 mm. long; petals 1.5-2 cm. long, white. Called "black moir" and "Maya" in British Honduras. The flowers are said to be fragrant. Here probably belongs material that has been reported from Alta Verapaz as *B. superba* Naudin.

(Standley and Williams 1963: 419).

Bellucia superba Naudin is indeed a synonym of *Bellucia grossularioides* (L.) Triana.



Bellucia pentamera Naudin is a valid name.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston.
Camera: iPhone 12 Pro Max

BELLUCIA IN STANDLEY AND RECORD 1936, BELIZE

Bellucia pentamera is included in their 1963 monograph of half a century ago but under the common antiquated name: *Bellucia costaricensis*.

Bellucia costaricensis Cogn. Occasional in forest; southward to Costa Rica. A tree 10 meters high, the trunk 12 cm. in diameter; leaves very large, broadly elliptic, thick, entire, 5-plinerved, shorta-cuminate, acutish or obtuse at the base, glabrous above, pubescent beneath; flowers large, white, in lateral clusters, fragrant; fruit a large berry. Wood creamy yellow, moderately hard, fine-textured, not durable; not utilized.

(Standley and Record 1936: 288)

Bellucia costaricensis is a synonym for accepted name *Bellucia pentamera*.

BELLUCIA PENTAMERA TREES IN BELIZE

Balick, Nee and Atha 2000 list two species and list both as edible.

- *Bellucia grossularioides* (L.) Triana — Loc Use: MED, PRD, FOOD. — Nv: black moir, maya, sir-in. — Habit: Tree.
- *Bellucia pentamera* Naudin — Syn: *Bellucia costaricensis* Cogn. — Loc Use: FOOD, CNST. — Nv: maya. — Habit: Tree.

Bellucia pentamera is in Sarstoon Temash National park, which is across the Rio Sarstun from Izabal. (Meerman et al. 2003 Sheet 6).

BELLUCIA IN STANDLEY TREES AND SHRUBS OF MEXICO

Bellucia macrophylla (D. Don) Triana, Trans. Linn. Soc. Bot. 28: 142. 1871.

Blakea macrophylla D. Don, Mem. Wern. Soc. 4: 326. 1823.

Belinda superba Naud. Ann. Sci. Nat. III. 16 : 104. 1851.

Reported from Tabasco; type from Mexico. Guatemala.

Tree; leaves petiolate, ovate or broadly elliptic, 20 to 30 cm. long, abruptly acute, 5-nerved, coriaceous, when young densely tomentulose beneath but soon glabrous, entire; flowers axillary, solitary or fasciculate, long-pedicellate, 8-parted; calyx about 2 cm. broad, the limb divided into several lobes; petals oblong, 2 cm. long; fruit baccate.

A related species, *B. costaricensis* Cogn., is known in Costa Rica as "coronillo".

(Standley and Williams 1963: 419).



Bellucia pentamera close detail.

Photo by: Victor Castillo, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston,
Camera: Canon 1D X Mark II. Lens: Canon 50mm f/2.5 Macro 1:1. Settings: 1/1,000 sec; f/2.5; ISO 400.

MORE RECENT LIST OF SPECIES OF **BELLUCIA TREES IN MEXICO**

<i>Bellucia pentamera</i> trees in Mexico	<i>Bellucia grossularioides</i> trees in Mexico
CHIS	CHIS
OAX	OAX
TAB	TAB
VER	VER

(Villaseñor 2016: 616)



Notable that neither species has yet been noted in Campeche or Quintana Roo, but both species are in Belize and Izabal. So, neither species is in any plant list for Calakmul.



Bellucia pentamera in its early stages of flowering.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston.

Camera: Sony Alpha A7R IV. Lens: Sony FE 50mm Macro. Settings: 1/400 sec; f/8; ISO 1,000.



CLOSE RELATIVE(S) OF ***BELLUCIA PENTAMERA***

Bellucia grossularioides
(L.) Triana (Chízmar 2009: 235-236).

SYNONYMS OF *BELLUCIA GROSSULARIOIDES*, THIS **CLOSE RELATIVE**

- *Bellucia brasiliensis* Naudin.
- *Bellucia circumscissa* Spruce ex Cogn.
- *Bellucia hostmannii* Naudin.
- *Bellucia macrophylla* (D. Don) Triana.
- *Bellucia multiflora* H. Karst.
- *Bellucia quinquenervia* (Aubl.) H. Karst.
- *Bellucia superba* Naudin.
- *Blakea macrophylla* D. Don.
- *Blakea quinquenervia* Aubl.
- *Melastoma grossularioides* L.
- *Webera quinquenervia* (Aubl.) C.C. Gmel.

www.theplantlist.org/tpl1.1/record/tro-20302605

Bellucia pentamera details.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston. Camera: Sony Alpha A7R IV. Lens: Sony FE 50mm Macro. Settings: 1/400 sec; f/8; ISO 1,000.

WHERE HAS EITHER *BELLUCIA PENTAMERA* AND /OR *BELLUCIA GROSSULARIOIDES* BEEN FOUND IN THE MUNICIPIO OF LIVINGSTON?

- Is *Bellucia* listed for Biotopo Protegido Chocón Machacas, CECON/USAC?
No Mentioned.
- Is *Bellucia* listed for Tapon Creek Nature Reserve (including Taponcito Creek), FUNDAECO?
No Mentioned.
- Is *Bellucia* listed for Buena Vista Tapon Creek Nature Reserve?
No Mentioned.
- Is *Bellucia* listed for Cerro San Gil (south side of Rio Dulce)?
The list of 380 plants of Cerro San Gil does not include any species of *Bellucia*. That does not mean this tree does not exist here, it means it has not been found by anyone here.
- Is *Bellucia* listed for Ecoalbergue Lagunita Creek (Área de Usos Múltiples Río Sarstún)
Not Mentioned.
- Is *Bellucia* listed for El Refugio de Vida Silvestre Punta de Manabique?
The Melastomaceae family occupies 5.3% of the subtropical flooded forest, it is the second most abundant, after the Fabaceae family (FUNDARY 2007 Sheet 22). The species *Bellucia costaricensis* Cong. *Bellucia grossularoides* (L.) are listed in Annex 4 "List of Flora and Fauna Species" of the 2002-2006 master plan (FUNDARY 2002 Sheet 116).
- Is *Bellucia* listed for Sarstoon-Temash National Park (northern side of Río Sarstún)?
Bellucia pentamera is in Sarstoon Temash National park, which is across the Río Sarstun from Izabal. (Meerman et al. 2003 Sheet 6).



Bellucia pentamera is a plant that flowers directly from the trunk.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston.
Camera: Sony Alpha A7R IV. Lens: Sony FE 50mm Macro. Settings: 1/400 sec; f/8; ISO 1,000.

IN WHAT ECOSYSTEM(S) CAN YOU FIND **NATIVE *BELLUCIA* TREES?**

The one tree we found was on the top of a hill overlooking the town of Livingston, Izabal, Guatemala. Most of this area is karst (limestone). The other *Bellucia* tree we found several years ago was in the flatlands about 100 or 200 meters from Rio Dulce's south side.

CAN *BELLUCIA PENTAMERA* BE CONSIDERED A CAULIFLOROUS PLANT?

So far not one single solitary botanical description lists *Bellucia pentamera* as cauliflorous. It was raining the day we were in front of this tree, but the way it flowered from the branches sort of reminded me of *Crescentia* and *Theobroma* cauliflory branches. But so far *Bellucia pentamera* is not flowering from the main trunk.

But... if you Goggle: *Bellucia pentamera*, cauliflory. You instantly get back website after website, report after report that says "cauliflorous inflorescence" or "cauliflorous fruiting habit." So even though I have never taken any college or university course on botany, when I am in front of a tree; or in the case of this low tree, literally "inside" next to the trunk with branches all around at eye level, even though I don't know or understand most botanical jargon, I can recognize a cauliflorous aspect.

In fact, we are finding more cauliflorous trees in the Municipio de Livingston than in any other part of Mesoamerica that I have visited:

- *Bellucia pentamera* (only two trees so far, but more to come).
- *Grias cauliflora* ("thousands" along shore of most rivers and lagoons).
- *Vasconcellea cauliflora* (present but we have not yet found it).
- *Zygia gigantifoliola* (awesome structure, size, and color).

Plus, I have notes on an additional 16 cauliflory trees that could be (should be) findable in Izabal.

DO *BELLUCIA* TREES ALSO GROW IN HOME GARDENS?

I would definitely like to have both species of *Bellucia* in my ethnobotanical research garden.

USES OF **BELLUCIA PENTAMERA**

Balick, Nee and Atha 2000 list food and construction as two uses. They list food as use for both species.

IS THERE POTENTIAL MEDICINAL USAGE OF **BELLUCIA PENTAMERA BY LOCAL PEOPLE?**

Further research needs to be accomplished since if one species of *Bellucia* is medicinal surely the other is also.

ARE ANY PARTS OF *BELLUCIA PENTAMERA* **EATEN BY MAMMALS?**

Los frutos son consumidos por muchas especies de mamíferos tanto en el árbol cómo en el suelo.

(Erwin Xo, Guardarrecursos, Parque Nacional Laguna Lachúa, Cobán, Alta Verapaz, Guatemala, cited by Chizmar 2009: 236).

WHAT ARE THE PRIMARY POLLINATORS OF **BELLUCIA PENTAMERA FLOWERS?**

The flowers are produced continuously all year, and are visited by a wide variety of female bees, the principal pollinators being *Xylocopa*, *Centris*, *Ptilotopus*, *Epicharis*, *Eulaema*, *Bombus*, and *Oxaea* (Renner 1986).



Bellucia pentamera with its petals wide open.

Photo by: Victor Castillo, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston.
Camera: Canon 1D X Mark II. Lens: Canon 50mm f/2.5 Macro 1:1. Settings: 1/1,000 sec; f/2.5; ISO 400.

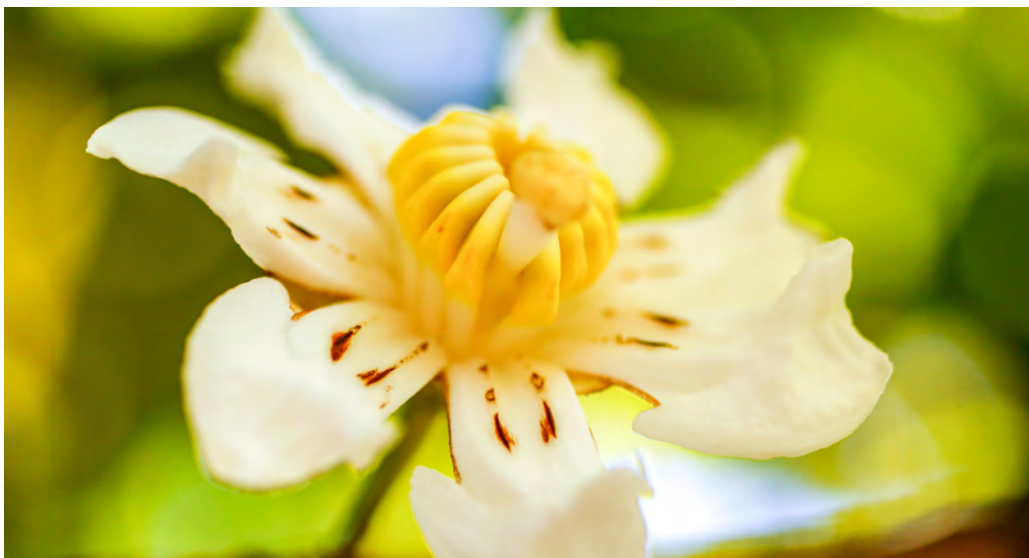
SUGGESTED FURTHER RESEARCH

Since I now know there are two species of *Bellucia* trees in Belize and two species in Izabal, we need to find the second species. Lots more research needed to make tabulated list of *Bellucia pentamera* and *Bellucia grossularioides* in all areas of Guatemala.



Bellucia pentamera detail.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston.
Camera: Sony Alpha A7R IV. Lens: Sony FE 50mm Macro. Settings: 1/400 sec; f/8; ISO 1,000.



Bellucia pentamera Naudin is a valid name.

Photo by: Victor Castillo, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston, Izabal, Guatemala.

Camera: Canon 1DX Mark II. Lens: Canon 50mm f/2.5 Macro 1:1. Settings: 1/1,000 sec; f/2.5; ISO 400.

CONCLUDING DISCUSSION AND SUMMARY **ON *BELLUCIA PENTAMERA* TREES**

One of the world's elite Neotropical plant database portal shows four locations in or near Izabal, but NONE are near Livingston. Two are near Puerto Barrios or Puerto Santo Tomas.

- Guatemala, Izabal, Puerto Barrios approx 20 km from town, on the road to Machacas.
- Guatemala, Izabal, St. Thomas (should be written as Puerto Santo Tomas).
- Guatemala, Izabal, 4.8 km north of the junction of CA-9 on road to Mariscos. Steep northwest-facing slope above small stream, in moist tropical forest.
- Guatemala, Alta Verapaz, Panzos, Finca Mercedes, Telemán. Selva alta perennifolia. Suelo rojo arcilloso.
- Guatemala, Alta Verapaz, Panzos, A 2 km al S de Jolomylix, Telemán, Panzós. Sierra de las Minas. Bosque mesófilo con elementos de selva alta

<https://serv.biokic.asu.edu/neotrop/plantae/collections/map/index.php>

Plant species after plant species, we are learning that not many botanists hiked around the Municipio de Livingston in the past century. They intelligently stayed on the roads or along Rio Dulce. We highly recommend that botanists, ethnobotanists, ecologists and students come to friendly hospitable Municipio de Livingston to accomplish additional research. Go "off the road" on land. Explore Cerro San Gil (more than just the tourist trails). And for wetlands, go upstream on all the tributaries of Rio Dulce and El Golfete. You will find plants all over the Municipio de Livingston that have never been collected from the areas that you are exploring. You can even find a lot literally on the edge of the town, in the land of George Renau. Just be ready to climb a hill. But at age 75 (my age last December), if I can climb all these hills surely you can get there also.

George Renau can provide access and guides. Just notify him in advance.

The website(s) of the top botanical gardens around the world are of scholarly and helpful quality. Peer-reviewed journal articles by botanists are essential. But it is notable that coverage of most plants is mostly based on fieldwork in South America (or in Costa

Rica or the research areas of Panama). Publications by Mexican scholars on botany and ethnobotany of Veracruz, Chiapas and other areas are also notable. Our goal of FLAAR (USA) and FLAAR Mesoamerica (Guatemala) is "to put Guatemala on the world map of botanical and ethnobotanical and ecological research.

While driving to a remote mountain home for having Christmas 2019 dinner, Senaida Ba showed me a native tree in these misty moisty mountains which had flowers of three or more individually distinct flowers. I estimate some were young and fresh; others were mature; other colors were fading.

The different colored flowers in the same tree in that tree in the cloud forests comparable with flowers of *Bellucia pentamera* trees. In fact Victor Mendoza, plant identifier manager here at FLAAR Mesoamerica, suggests that the tree George brought us to is *Bellucia pentamera* precisely because it has pure white flowers and tasty looking light cacao colored flowers (however don't eat the flowers).



Bellucia pentamera is a plant that flowers directly from the trunk.

Photo by: Victor Castillo, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston, Camera: Canon 1D X Mark II. Lens: Canon 50mm f/2.5 Macro 1:1. Settings: 1/1,000 sec; f/2.5; ISO 400.

If you Google: “*Bellucia*, Maya forest garden” you get SIX references to Maya forest gardens with the plant name *Bellucia* crossed out: *Bellucia*. Then you get two references to our 20+ years of research throughout Guatemala on edible plants (www.maya-ethnobotany.org and various editions of our ethnobotanical report).

The fruits of *Bellucia costaricensis*, synonym for accepted name *Bellucia pentamera* are listed as edible by several ethnobotanists:

MANZANITO - *Bellucia costaricensis* Cogn. – Melastomaceae. (Fig. No. 17)

Descripción: Arbol con copa redonda de 6 a 8 metros de altura. Posee ramas tiernas cuadrangulares; hojas coriáceas ovalo-elípticas, de hasta 30 cm. de largo y 18 de ancho, con cinco nervios saliendo de la base- Flores fasciculadas blancas o blanco-rosadas. Los frutos son bayas globosas.

Uso: Los frutos grandes, de aproximadamente 3 a 4 cm. de diámetro, muy jugosos son comestibles.

(Pöhl 1982: 14).

We hope to encourage studies of Maya forest gardens to find this fruit tree; and to see how often it is in Maya kitchen gardens. If absent, let’s encourage local Mayan and Garifuna people to plant it around their homes. It’s gorgeous, and the fruit is edible.



Bellucia pentamera is able to grow many flowers at the same time.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston.
Camera: Sony Alpha A7R IV. Lens: Sony FE 50mm Macro. Settings: 1/400 sec; f/8; ISO 1,000.



Bellucia pentamera in its brown stage.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston.

Camera: iPhone 12 Pro Max

REFERENCES CITED AND SUGGESTED READING ON *BELLUCIA PENTAMERA*

Note: since the present edition is a work-in-progress this bibliography also is a work-in-progress.

ABRIL-Saltos, Ricardo V., RUÍZ-Vásquez, Tomás E., ALONSO-Lazo, Jatnel and Janeth K. AGUINDA-Vargas

2016 Plantas utilizadas en alimentación humana por agricultores mestizos y Kichwas en los cantones Santa Clara, Mera y Pastaza, Provincia de Pastaza, Ecuador. *Cultivos Tropicales*, vol. 37, no. 1, pp. 7-13.

ATRAN, Scott, LOIS, Mimena and Edilberto UCAN Ek'

2004 Plants of the Peten Itza' Maya. *Museum of Anthropology, Memoirs, Number 38*, University of Michigan. 248 pages.

Very helpful and nice collaboration with local Itza' Maya people. But would help in the future to have a single index that has all Latin, Spanish, and English plant names so that you can find plants more easily. Suzanne Cook's Lacandon ethnobotany index is significantly easier to use.

Not available as a download.

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.

BALICK, Michael J. and Rosita ARVIGO

2015 Messages from the Gods: A Guide to the Useful Plants of Belize. The New York Botanical Garden, Oxford University Press.

CANO, E., VELOZ, A., CANO, A. and F. J. RUIZ

2015 Distribution of Central American Melastomataceae: biogeographical analysis of the Caribbean islands. *Acta Botánica Gallica*. Vol. 156, No. 4. Pages 527-557.

Available online:

www.tandfonline.com/doi/pdf/10.1080/12538078.2009.10516176

CHIZMAR-Fernández, Carla

2009 Plantas comestibles de Centroamérica. Santo Domingo de Heredia, Costa Rica: Instituto Nacional de Biodiversidad, INBio. 160 pages.

Easy download on the Internet.

CONAP, FUNDAECO, TNC

2006 Plan Maestro de la Reserva Protectora de Manantiales Cerro San Gil, 2008-2012. Consejo Nacional de Áreas Protegidas – CONAP, Fundación para el Ecodesarrollo y la Conservación – FUNDAECO, The Nature Conservancy – TNC. 199 numbered pages plus other pages: total 213 in the pdf format.

Downloadable.

CONDIT, R., PÉREZ, R. and N. DAGUERRE

2010 Trees of Panama and Costa Rica. Princeton University Press. 496 pages.

Sold online: www.amazon.com/Trees-Panama-Costa-Princeton-Guides/dp/0691147108

Note: information of *B. costaricensis* on pages 96 and 97.

DUKE, J. A.

2008 Duke's handbook of medicinal plants of Latin America. CRC Press. 832 pages.

Sold online: www.amazon.com/Dukes-Handbook-Medicinal-Plants-America/dp/1420043161

Note: information of *B. costaricensis* available on page 94.

FUNDARY (Fundación Mario Dary Rivera, GT)

2002 Plan Maestro del Refugio de Vida Silvestre Punta de Manabique 2002-2006, Izabal, Guatemala, C.A. Guatemala, The Nature Conservancy / PROARCA-Costas. 139 p.

FUNDARY (Fundación Mario Dary Rivera, GT)

2007 Plan Maestro del Refugio de Vida Silvestre Punta de Manabique 2007-2011, Izabal, Guatemala, C.A. Guatemala, The Nature Conservancy / PROARCA-Costas. 158 p.

GOODWIN, Z. A., LÓPEZ, G. N., STUART, N., BRIDGEWATER, G. M., HANSTON, E. M., CAMERON, I. D., MICHELAKIS, D., RATTER, J. A., FURLEY, P. A., KAY, E., WHITEFOORD, C., SOLOMON, J. LLOYD, A. J. and D. J. HARRIS

2013 A checklist of the vascular plants of the lowland savannas of Belize, Central America. *Phytotaxa* 101 (1): 1–119.

Downloadable: www.eeo.ed.ac.uk/sea-belize/outputs/Papers/goodwin.pdf

GRIJALVA, A.

2006 Flora útil etnobotánica de Nicaragua. Ministerio del Ambiente y los Recursos Naturales. 352 pages.

Available online: www.fao.org/fileadmin/user_upload/training_material/docs/Flora%20Util%20en%20Nicaragua.pdf

Note: information about *B. costaricensis* on page 128.

HELLMUTH, Nicholas

2013 Maya Ethnobotany, Complete Inventory: fruits, nuts, root crops, grains, construction materials, utilitarian uses, sacred plants, sacred flowers, Guatemala, Mexico, Belize, Honduras. 12th edition, FLAAR Reports, January 2013. 107 pages.

Lists only *Bellucia grossularioides*, citing Chizmar 2009: 235-236).

HERBARIO UNIVERSIDAD DE ANTIOQUIA

2017 Guía ilustrada Flora cañón de río Porce – Antioquia. 268 pages.

Available online:

https://issuu.com/herbariohua/docs/guia_ilustrada_canon_de_rio_porce_a/125

Note: Information on page 125.

LESUR, Luis

2011 Árboles de México. Editorial Trillas. 368 pages.

Bellucia trees are almost never in books on “Trees of ...”

LUNDELL, Cyrus L.

1937 The Vegetation of Peten. Carnegie Institution of Washington, Publ. 478. Washington. 244 pages.

LUNDELL, Cyrus L.

1938 Plants Probably Utilized by the Old Empire Maya of Peten and Adjacent Lowlands. Papers of the Michigan Academy of Sciences, Arts and Letters 24, Part I:37-59.

Available online:

www.botanicalsciences.com.mx/index.php/botanicalSciences/article/download/1660/1309/

MEERMAN, J. C., HERRERA, P. and A. HOWE

2003 Rapid Ecological Assessment Sarstoon Temash National Park Toledo District, Belize Volume II: Appendices (Species lists and raw data).

OCHOA-Gaona, Susana, RUÍZ González, Hugo, ÁLVAREZ Montejo, Demetrio, CHAN Coba, Gabriel and Bernardus H. J. DE JONG

2018 Árboles de Calakmul. ECCOSUR, Chiapas. 245 pages.

It is amazing that there is no such book for Parque Nacional Tikal, nor El Mirador. Even though it includes only half the estimated number of “trees,” it has more tree species than Schulze and Whitacre for Tikal (they estimated about 200 but list only about 156 (their lists of species and list by plant family are not identical).

The entire book is a totally free download, however you can't copy and paste so is difficult to add to your discussion.

In the future would be helpful to have a photographer with high-resolution equipment available and a book producer that can put these photos at a resolution that allows you to see the details. The photos of the overall tree have almost no visible detail. Nonetheless, the authors all have botanical experience and this book is a good start. A second edition would be helpful. Also would help to have more than one page per photo.

Available online:

http://aleph.ecosur.mx:8991/exlibris/aleph/a22_1/apache_media/74R92GMRSJSEPF-DEE5NJY4SJ2I8AK.pdf

ORDÓÑEZ, María de Jesús

2014 Las flores comestibles. Instituto nacional de investigación sobre medios bióticos.

Download:

www.academia.edu/12405169/LAS_FLORES_COMESTIBLES_MAR%C3%8DA_DE_JES%C3%9AS_ORD%C3%93%C3%91EZ

PARDO Tejada, Enrique

1979 Flores Comestibles. comunicado n° 36 sobre recursos hióticos potenciales del país.

PARKER, Tracey

2008 Trees of Guatemala. The Tree Press. 1033 pages.

Even though copy-and-paste, it helps to have 99% of the trees of Guatemala in one single volume. Although more than half the book is copy-and-paste from Flora of Guatemala, since the Parker book is year 2008, it has additional information for some trees.

PEÑA-Chocarro, María and Sandra KNAPP

2011 Árboles del mundo maya. Natural History Museum Publications. 263 pages.

Helpful book; contributing authors are experienced botanists. They cover 220 species of trees, more than virtually all other "Books on Trees of the Maya." Even include tasiste (which is missing from all other books on "Trees of the Maya" except for the recent book on Árboles de Calakmul.

But if all this effort is going into a book, would help if there were more photos, larger photos, and not so much blank space at the bottom of each page. Plus would help if the text could include personal first hand experience with these trees out in the Mundo Maya. But even as is, it is a helpful book.

If you are doing field work you need this, plus Árboles de Calakmul, plus Árboles tropicales de México. Parker's book you need back in your office, since out in the field it's not much help due to lack of photographs. Back in your office the books by Regina Aguirre de Riojas are also helpful.

PENNINGTON, Terence D. and José SARUKHAN

2005 Árboles tropicales de México. Manual para la identificación de las principales especies. 3rd edition. UNAM, Fondo de Cultura Económica. 523 pages.

This book is a serious botanical monograph. 1968 was the first edition (I still have this), 1998 was second edition. The 3rd edition is a "must have" book. Each tree has an excellent line drawing of leaves and often flowers and fruits (though to understand flowers you need them in photographs, in full color). Each tree has a map showing where found in Mexico (such maps are lacking in most books on Trees of Guatemala or plants of Belize). But trying to fit a description of a tree on one single page means that a lot of potential information on flowering time is not present. And, this is definitely not a book on ethnobotany: for that you need Suzanne Cook.

PÖLL, Elfriede

1982 Plantas silvestres comestibles en Guatemala. Revista Científica No.1, Facultad de Ciencias Químicas y Farmacia, Universidad de San Carlos de Guatemala.

PULESTON, Dennis

1973 Ancient Maya Settlement Patterns and Environment at Tikal, Guatemala. PhD dissertation, Anthropology, University of Pennsylvania.

Free download: www.puleston.org/writings-dissertation.html
But no pagination, and no copy-and-paste facility.

PULESTON, Dennis

1968 Brosimum Alicastrum as a Subsistence Alternative for the Classic Maya of the Central Southern Lowlands. MA Thesis, University of Pennsylvania. 141 pages.

RENNER, S.

1986 Reproductive biology of Bellucia (Melostomataceae). Acta Amazónica. No. 17. Pages 197-208.

Available online: www.puleston.org/writings-dissertation.html

ROJAS-Torres, Alexander

2014 Inventario de Flora: Identificación y clasificación tazonómica de especies forestales y arbustivas del lote continuo al Cead del Municipio de Acacias, de propiedad de la Universidad Nacional Abierta y Distancia.

Downloadable online:
<https://repository.unad.edu.co/bitstream/handle/10596/2662/7843809.pdf?sequence=1&isAllowed=y>

Note: Information on page 40.

SCHULZE, Mark D. and David F. WHITACRE

1999 A Classification and Ordination of the Tree Community of Tikal National Park, Peten, Guatemala. Bulletin of the Florida Museum of Natural History. Vol. 41, No. 3, pp. 169-297.

Even though 20 years ago, it's the best list of trees of Tikal that I have found. There is a web site with plants of Tikal but they are not separated into trees, vines, shrubs, etc., so harder to use. The new monograph on Arboles de Calakmul is better than anything available so far on Tikal (and the nice albeit short book by Felipe Lanza of decades back on trees of Tikal is neither available as a scanned PDF nor as a book on Amazon or ebay).

Download on the Internet.

STANDLEY, Paul C. and Samuel J. RECORD

1936 The Forests and Flora of British Honduras. Field Museum of Natural History. Publication 350, Botanical Series Volume XII. 432 pages plus photographs.

STANDLEY, Paul C.

1924 Trees and Shrubs of Mexico. Contributions from the United States National Herbarium, Volume 23, Part 4. Smithsonian Institution.

In this one monograph the species are not listed in alphabetical order, so it's a mental adventure finding the species you are looking for.

All monographs by Standley and co-authors can be easily found and downloaded. I would recommend finding the .pdf versions as they are easier to store, easier to copy, and easier to share with students and colleagues.

STANDLEY, Paul C. and Louis O. WILLIAMS

1963 Flora of Guatemala. Fieldiana: Botany, Volume 24, Part VII, Number 4, Chicago Natural History Museum.

SUCHINI Farfan, Aura Elena et al.

2000 Endemismo florístico en la reserva de la biosfera Sierra de las Minas. USAC

Unfortunately, the PDF is locked, so no way to show the information without having to hand type each letter, each word, each list.

Free download: <http://glifos.concyt.gob.gt/digital/fodecyt/fodecyt%201999.69.pdf>

VARGAS, O.

2001 Síndromes de dispersión, polinización y sistemas sexuales de los árboles nativos de la estación biológica La Selva y áreas circundantes. 1ª edición. Costa Rica.

Available online:

http://sura.ots.ac.cr/florula4/docs/lista_arboles_sindromes_OVR05.pdf

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/imagetdatabase/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.

WEB SITES SPECIFICALLY ON ***BELLUCIA PENTAMERA* TREES**

<http://arbolesdelchaco.blogspot.com/2017/02/croton22.html>

General information.

www.backyardnature.net

Jim Conrad's helpful web site, as usual, photos better than most other web pages.

www.cicy.mx/

Species list.

www.inriodulce.com

A helpful web site for visitors for Rio Dulce. Species names have changed; best to feature the accepted name and list the synonyms.

<https://naturalezatropical.com/>

Information and cultivation

<http://www.theplantlist.org>

Shows which are Accepted and which are Synonyms.

<https://melas-centroamerica.com/bellucia-pentamera/>

Photos show leaves, buds, blossoms, fruits (outside and cut in half).

The photos are from the comfort of Costa Rica (logical since the website organizer is an experienced botanist from Costa Rica). Our goal is to add photographs of plants from Guatemala.

<https://melas-centroamerica.com/>

This is the home page for the helpful web site on plant family Melastomataceae by botanist Dr. Ricardo Kriebel.

www.osinfor.gob.pe/wp-content/uploads/2016/06/Fichas-de-identificaci%C3%B3n-de-especies-forestales-maderables-de-la-zona-de-Tingo-Maria-2014.pdf

Photos on page 126.

www.theplantlist.org/tpl/record/tro-20300363

Synonyms.

<http://tropical.theferns.info/viewtropical.php?id=Bellucia+pentamera>

Good basic information all with citations.

<http://tropical.theferns.info/image.php?id=Bellucia+pentamera>

Helpful photos. One photo shows “thousands” of flower buds or fruits on a single tree (location not provided in caption). Each ecosystem will have trees being able to produce lots of flowers or not as many flowers-per-tree. Whether in deep soil or on top of karst (limestone) will also affect number of flowers-per-tree. Age of the tree will also affect whether has lots of flowers or fewer flowers.

Best photographs of this plant:

<http://tropical.theferns.info/image.php?id=Bellucia+pentamera>

Information and map location

https://toptropicals.com/catalog/uid/Bellucia_pentamera.htm

Photos.

www.gbif.org/species/3866517

Photos and map location.

www.tropicos.org/name/20302744?projectid=3

Information and map location.

SUGGESTED WEB PAGES WITH PHOTOS AND INFORMATION ON *BELLUCIA PENTAMERA*

www.asianplant.net/Melastomataceae/Bellucia_pentamera.htm

Synonyms and general information

<https://colombia.inaturalist.org/taxa/278111-Bellucia-pentamera>

Useful photos and location map

<https://melas-centroamerica.com/bellucia-pentamera/>

Useful photos

https://toptropicals.com/catalog/uid/Bellucia_pentamera.htm

Very nice photos

PHOTO FROM PAGE 33

Bellucia pentamera is a plant that flowers directly from the trunk.

Photo by: Victor Castillo, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston.
Camera: Canon 1D X Mark II. Lens: Canon 50mm f/2.5 Macro 1:1. Settings: 1/1,000 sec; f/2.5; ISO 400.

LIVINGSTON: THE CARIBBEAN BIODIVERSITY WONDERLAND OF GUATEMALA

Izabal, one of the regional departments of Guatemala that offers a variety of recreational activities, is home to numerous nature parks and diverse natural landscapes. There are white sandy beaches a short boat trip away, with tall jungle-covered mountains in the background, and the Mesoamerican Reef System in the Caribbean Sea on the horizon in front of you. Mangrove swamps, seagrass, islands, cenotes, caves, karst geology canyons and streams of crystal clear water abound along the Rio Dulce and Lake Izabal coast or inland. All this together makes Livingston one of the destinations for tourists wanting to do bird-watching, explore caves, and get healthy exercise hiking through trails in the rainforest. In addition to the incredible flora and fauna that the municipality offers, three different cultures coexist in the ecosystem (Mayan Q'eqchi', Garifuna and Ladinos).

In order to conserve the biodiversity found in the municipality and that continues to be of benefit to the ecosystem, it is necessary to have an updated record of the species that inhabit it and thus be able to detect changes in the species population. Thanks to the efforts of different institutions focused on environmental improvement projects at various sites in Livingston (FUNDAECO working in Río Sarstun, CONAP covering Río Dulce, CECON-USAC in Chocón-Machacas, and ARNPG with more than ten private reserves, among many others) are records of species of flora, fauna and ecosystems of this municipality of Izabal.

Using this information in the most efficient way and using the potential of digital technology, the database for the municipality can be supplemented with photographic records of flora, fauna, and ecosystems. The FLAAR Mesoamerica team, in cooperation with the municipal authorities, have begun to produce this educational material using the photographic records generated during the cooperation project to account for the flora, fauna and ecosystems that can be seen in Livingston. This will be accomplished in order to provide information to schools, families and institutions already working to protect the environment.

We hope to attract the attention of professors, botanical garden clubs, orchid and bromeliad societies, students, tourists, experts, explorers, photographers and nature lovers who want to get closer, to marvel at the species of flowering plants, mushrooms and lichen that FLAAR Mesoamerica finds during each field trip each month.



620000

650000

680000

710000

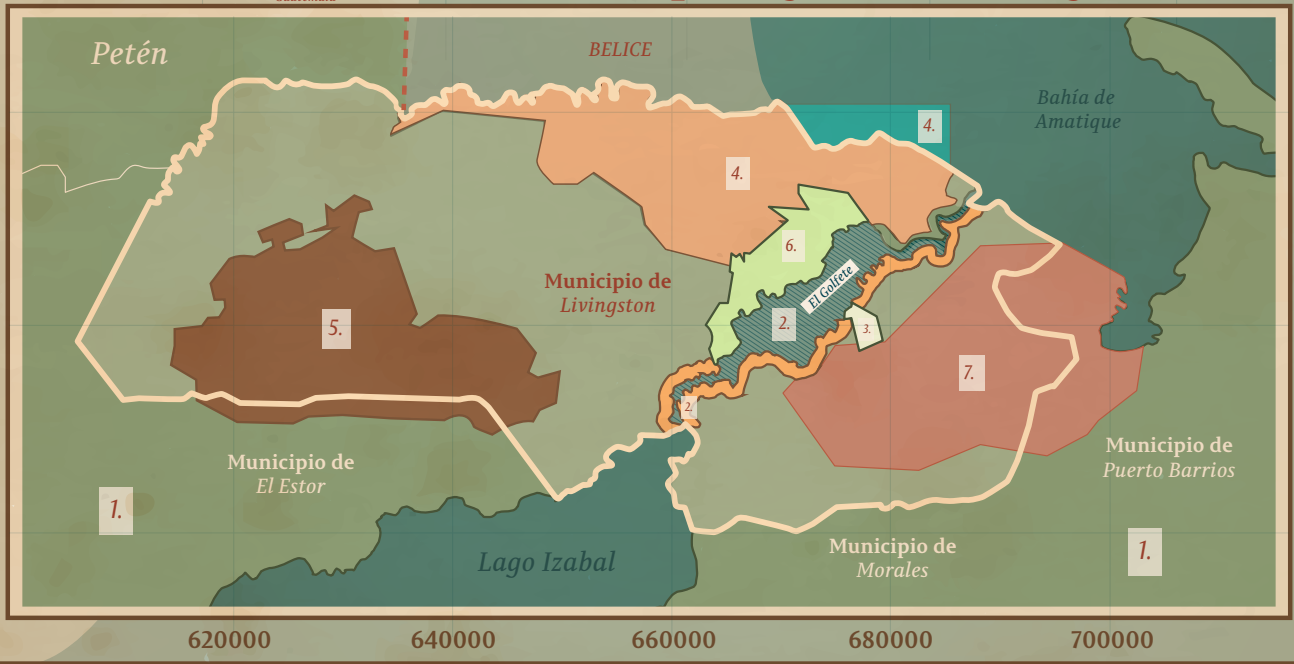
740000



1780000
1760000
1740000
1720000
1700000
1680000



Áreas naturales protegidas de Livingston



1760000
1740000
1720000

Izabal

- 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



ACKNOWLEDGEMENTS TO FLAAR MESOAMÉRICA

Flor de María Setina is the office manager, overseeing all the diverse projects around the world (including FLAAR-REPORTS research on advanced wide-format digital inkjet printers, a worldwide project for over 20 years). We also utilize the inkjet prints to produce educational banners to donate to schools.

Vivian Díaz environmental engineer, is project manager for flora, fauna projects (field work and resulting reports at a level helpful for botanists, zoologists and ecologists, and for university students). Also coordinates activities at MayanToons, division where educational material for kids is prepared.

Victor Mendoza identifies plants, mushrooms, lichen, insects, and arachnids. When his university schedule allows, he also likes to participate in field trips on flora and fauna research.

Vivian Hurtado prepares the bibliography for each subject and downloads pertinent research material for our e-library on flora and fauna. All of us use both these downloads plus our in-house library on flora and fauna of Mesoamerica (Mexico through Guatemala into Costa Rica).

Andrea de la Paz is a designer who helps prepare the master-plan for aspects of our publications. She is our editorial art director

Senaida Ba is photography assistant for many years. She knows the Canon, Nikon and is learning the two new Sony mirrorless cameras. She prepares, packs, sets-up, and helps the photographers before, during, and after each day's field trip.

Jaqueline Gonzalez is a designer who puts together the text and photographs to create the actual report (we have several designers at work since we have multiple reports to produce).

Roxana Leal is Social Media Manager for flora and fauna research and publications, and MayanToons educational book projects

Maria Alejandra Gutierrez is an experienced photographer, especially with the Canon EOS 1D X Mark II camera and 5x macro lens for photographing tiny insects, tiny flowers, and tiny mushrooms. Work during and after a field trip also includes sorting, naming, and processing. And then preparing reports in PDF format.

David Arrivillaga is an experienced photographer and is able to handle both Nikon and the newest Sony digital cameras. Work during and after a field trip also includes sorting, naming, and processing. And then preparing reports in PDF format.

Juan Carlos Hernandez takes the material that we write and places it into the pertinent modern Internet software to produce our web pages (total network is read by over half a million people around the world).

Paulo Nuñez is a webmaster, overlooking the multitude of web sites. Internet SEO changes every year, so we work together to evolve the format of our web sites.

Valeria Aviles is an illustrator for MayanToons, the division in charge of educational materials for schools, especially the Q'eqchi' Mayan schools in Alta Verapaz, Q'eqchi' and Petén Itzá Maya in Petén, and the Q'eqchi' Mayan and Garifuna schools in the municipality of Livingston, Izabal.

Josefina Sequen is illustrator for MayanToons and also helps prepare illustrations for Social Media posts and for animated videos.

Rosa Sequen is also an illustrator for MayanToons and also helps prepare illustrations for Social Media posts and for animated videos.

Laura Morales is preparing animated videos in MayanToons style since animated videos are the best way to help school children how to protect the fragile ecosystems and endangered species

Heidy Alejandra Galindo Setina joined our design team in August 2020. She likes photography, drawing, painting, and design.

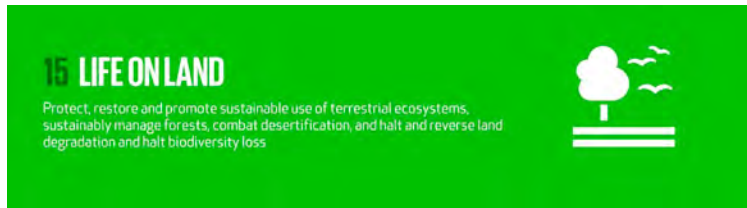
Maria José Rabanales she is part of the team for editing photographic reports and educational material of Flora and Fauna since September 2020. She works together with others of the team to prepare the finished pdf editions of the material of the Yaxha, Nakum and Naranjo Project.

Alejandra Valenzuela, biology student is now part of Flora y Fauna's photographic report and educational material editing team since September 2020.

Cristina Ríos designer student who join the editorial team on December 2020. She will combine the text, pictures and maps into the FLAAR Mesoamerica editorial criteria.

Alexander Gudiel: designer who join the editorial design team on December 2020. He will combine the text, pictures and maps into the FLAAR Mesoamerica editorial criteria.

Carlos Marroquín is a USAC graphic design student who volunteered to do his professional practice with the Editorial Design team. We are very grateful to people like him who join our team and bring his knowledge and work.



The current Alcalde of Livingston, Mr. Daniel Pinto, together with his team, have set the goal of achieving the municipality development in the years 2020-2024 based on the goals and indicators proposed by the 2030 Agenda for Sustainable Development (by United Nations). From this agenda, FLAAR Mesoamerica will collaborate to achieve Sustainable Development Goal (SDG) number 15 "Life on Land".

Throughout this cooperation project, different materials have been prepared, like this Photo Essay, that helps to collect information on species, different ecosystems: terrestrial, wetlands and fresh water biodiversity. This information would also be useful as part of a strategy to protect threatened species and prevent their extinction. The municipality's goals include to promote the sustainable use, conservation and research of the species of flora and fauna of the terrestrial, wetlands and aquatic shore and coastal ecosystems of the Guatemalan Caribbean. Learn more about this project and the SDG indicators at: <https://flaar-mesoamerica.org/rain-forests-rivers-lakes-bays-ocean-caves-canyons-livingston-the-caribbean-biodiversity-wonderland-of-guatemala/>

SERIES OF MUNICIPIO OF LIVINGSTON



Any school, college, university, botanical garden, zoological garden, botanical or zoological association (or club) may post this report on their web sites, (at no cost) as long as they link back to one of our web sites:

- www.maya-ethnobotany.org
- www.maya-ethnozology.org
- www.maya-archaeology.org
- www.digital-photography.org
- www.FLAAR-Mesoamerica.org

This report may be cited with this information:

Hellmuth, N (2021) Tree Flowering Directly from the Trunk, *Bellucia pentamera*, Where The Pirates Hide Caribbean Botanical Experience, Livingston, Izabal. Guatemala: FLAAR Mesoamerica.

BACKCOVER PHOTOGRAPH

Bellucia pentamera.

Photo by: Victor Castillo, FLAAR Mesoamerica, Dec. 19, 2020. Finca Paradise Where the Pirates Hide, Livingston, Izabal, Guatemala.

Camera: Canon 1D X Mark II. Lens: Canon 50mm f/2.5 Macro 1:1.

Settings: 1/1,000 sec; f/2.5; ISO 400.

FLAAR Mesoamerica is the creator of the design and authorship of the document. When sharing information or designs on social networks, you must tag the page of FLAAR Mesoamérica, its authors and photographers. In the case of written documents, use the corresponding quote.

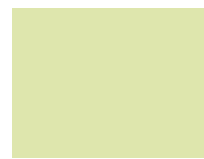
FLAAR (in USA) and FLAAR Mesoamerica (in Guatemala) are both non-profit research and educational institutes, so there is no fee. And you do not need to write and ask permission; but we do appreciate when you include a link back to one of our sites. Any school, college, university, botanical garden, etc. can post this PDF on their school or university or institute website for their students to download at no cost. And you do not need to write and ask permission; but we do appreciate it when you include a link back to one of our web sites.

Any website in or related to the Municipio of Livingston, is also welcome to post this PDF on their web site (no fee). This permission includes travel agencies, hotels, guide services, etc. And you do not need to write and ask permission; but we do appreciate it when you include a link back to one of our web sites. CECON-USAC, CONAP, FUNDAECO, Plantemos, AIESEC, are welcome to publish our reports, at no cost.

All national parks, nature reserves, and comparable are welcome to have and use our reports at no cost. USAC, UVG, URL, Universidad Rural, INTECAP and other Guatemalan universities, and high schools, and schools, are welcome to post our reports, at no cost.

© Copyright 2021 FLAAR Mesoamerica.

OTHER PUBLICATIONS OF
THE FAUNA OF GUATEMALA

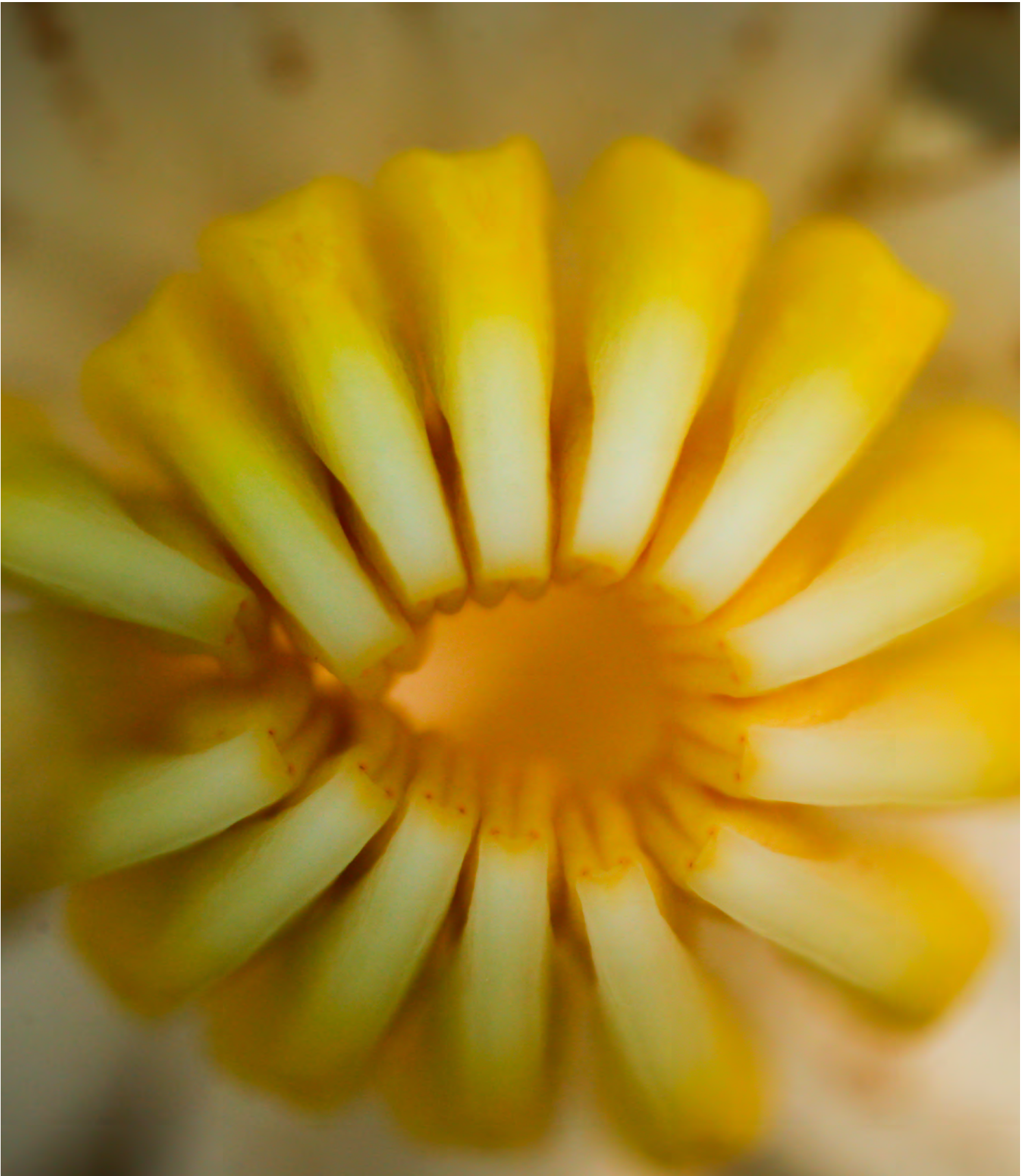


OTHER PUBLICATIONS OF
THE FLORA OF GUATEMALA



OTHER PUBLICATIONS FROM NATIONAL PARK
YAXHA, NAKUM AND NARANJO, GUATEMALA





FLAAR
MESOAMÉRICA