



FLAAR
MESOAMÉRICA

AECHMEA BRACTEATA



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Parque Nacional Tikal (PANAT)
Reserva de la Biósfera Maya (RBM)
Petén, Guatemala

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We appreciate a donation during November 2021 and a follow-up donation in June 2022 to help cover the costs of FLAAR research projects specifically to assist and support the current FLAAR project of exploring remote areas to find and document flora and fauna in the Reserva de la Biosfera Maya (RBM), Petén, Guatemala.

This donation is from a family in Chicago in honor of the decades of botanical field work of botanist Dr John D. Dwyer, who worked in many areas of Mesoamerica, including Petén.

This donation is also in recognition of the urgency and need for conservation of both wildlife and rare plants in the bio-diverse ecosystems of the Reserva de la Biosfera Maya (RBM) of Guatemala. Parque Nacional Yaxha, Nakum and Naranjo (PNYNN) and Parque Nacional Laguna del Tigre are the first two parts of the over 5 million acres of the RBM where we have initiated field work in 2021 and 2022. In July 2022 we initiated field work in cooperation and coordination with the biologists of PANAT at Tikal to study epiphytic plants (orchids, bromeliads, cacti, ferns that grow high up in trees) plus other biology topics of mutual interest and importance to document. Photographs are donated to the park administrators. Contact sheets are being prepared to also donate to CONAP.



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Camera: Sony Alpha A7C. Settings: 1/250 sec; f/3,5; ISO 2,000.

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Introduction to *Aechmea bracteata* of Guatemala

Aechmea bracteata is an epiphyte of the Bromeliaceae family that is distributed from southern Mexico to Venezuela. It develops in the tropics, preferring flooded habitats such as mangroves. In Guatemala it is found mainly in the departments of Petén and Izabal. Like many other bromeliads, *Aechmea bracteata* has a great cultural value in indigenous communities, healing properties of a spiritual nature are attributed to it, and it is part of religious ceremonies. However, the most important utility lies in its fibers that are used in the creation of tools. Bromeliads such as *Aechmea bracteata* are important hosts of a great diversity of fauna, mainly insects, fulfilling this important function within the ecosystems of the treetops.

My Personal Experience with *Aechmea bracteata*

Lots of *Aechmea bracteata* on Topoxte Island and at all the ruins of Yaxha, Nakum, and Naranjo (PNYNN). This bromeliad is easy to find since it grows in forks of trees, often grows on tree trunks, and when tree limbs get blown down in heavy wind storms the *Aechmea bracteata* bromeliads continue to grow on the ground. So we have hundreds of photos of these bright red flowering parts.

Lots of gorgeous *Aechmea bracteata* flowering in an area of the RBM named El Barranco, at 12:10pm, May 9, 2022 (I hope 5-9 is May 9th and not September 5th).



Photograph by: Nicholas Hellmuth. FLAAR Mesoamérica, Jul. 22, 2022. PANAT, Mundo perdido.
Camera: iPhone 13 Pro Max.

Full Botanical Name

Aechmea bracteata (Sw.) Griseb.

Here are synonyms for *Aechmea bracteata*

Aechmea barleei Baker
Aechmea bracteata var. *bracteata*
Aechmea bracteata var. *pacifica* Beutelsp.
Aechmea isabellina Baker
Aechmea laxiflora Benth.
Aechmea macracantha Brongn. ex André
Aechmea regularis Baker
Aechmea schiedeana Schltdl.
Bromelia bracteata Sw.
Hohenbergia bracteata (Sw.) Baker
Hohenbergia bracteata Beer
Hohenbergia laxiflora (Benth.) Baker
Hoplophytum bracteatum (Sw.) K.Koch
Tillandsia spinosa Sessé & Moc.

<http://www.theplantlist.org/tpl1.1/record/kew-217842>

Local names for *Aechmea bracteata*

Water orchid, wild pine
(Balick, Nee and Atha 2000: 174).

Mayan names for *Aechmea bracteata*

Izchu, Chuek (Petén, fide Bartlett); Ixchu, Tinajero (Petén, fide Lundell).

(Standley and Steyermark 1958: 382).

Izchu is more likely spelled X-chu.

Habit for *Aechmea bracteata*

Epiphytic, herb or saxicolous.



Photograph by: Nicholas Hellmuth. FLAAR Mesoamérica, Jul. 22, 2022. PANAT, Mundo perdido.
Camera: iPhone 13 Pro Max.

In what Ecosystem(s) can you find native *Aechmea bracteata*?

Pool-Chale et al. have described the habitats for the Yucatan peninsula:

Aechmea includes herbaceous, rosetophilous, epiphytic or facultative lithophytic plants, with compound inflorescences and hermaphrodite flowers (de Faria et al. 2004). This genus includes approximately 276 species (Luther 2012), of which eight can be found in Mexico (Espejo-Serna et al. 2004) and three in the Yucatan Peninsula (Ramirez-Morillo et al. 2004b): *A. bracteata*, *A. tillandsioides* (Mart. ex Schult. & Schult. f.) Baker and *A. bromeliifolia* (Rudge) Baker. *A. bracteata* occurs from E Mexico to N Colombia and NW Venezuela (Ramirez-Morillo et al. 2004b), and within the genus it is the most widely distributed species in Mexico; it can also be found growing in different types of vegetation. ...

In the Yucatan Peninsula, *A. bracteata* grows in large populations in various ecosystems; it is also associated with bodies of water (e.g. cenotes – sinkholes), forming populations of only a few individuals (Ramirez-Morillo et al. 2004a). However, it is far more common to find this species growing in inundated low forests (Dejean & Olmsted 1997). The presence of basal rhizomes facilitate the formation of small groups of rametes; each ramet produces only one inflorescence during its lifetime (monocarpic).

(Pool et al. 2017: 114).

Need to find similar descriptions for the rest of the Maya Lowlands.



Photograph by: Nicholas Hellmuth. FLAAR Mesoamérica, Jul. 22, 2022. PANAT, Mundo perdido.
Camera: iPhone 13 Pro Max.



Photograph by: Nicholas Hellmuth. FLAAR Mesoamérica, Jul. 22, 2022. PANAT, Mundo perdido.
Camera: iPhone 13 Pro Max.



Photograph by: Nicholas Hellmuth. FLAAR Mesoamérica, Jul. 22, 2022. PANAT, Mundo perdido.
Camera: iPhone 13 Pro Max.

What other Trees or Plants are often found in the same Habitat?

Aechmea bracteata is commonly found in mangroves, so its main hosts are *Laguncularia racemosa*, *Avicennia germinans*, *Rhizophora mangle*, interacting with these species and with others that may be found within mangroves.

(Carmona-Díaz. Et al. 2014: 819)

According to Portal de Biodiversidad de Guatemala, specimens of *A. bracteata* have been collected on oaks and ramón trees.

<https://biodiversidad.gt/portal/collections/list.php?usethes=1&taxa=1813>



***Aechmea bracteata*.**

Photograph by: Nicholas Hellmuth. FLAAR Mesoamérica, Jul. 20, 2022. PANAT, Mundo perdido.
Camera: iPhone 13 Pro Max.



Photograph by: David Arrivillaga. FLAAR Mesoamérica, Oct. 11, 2021. Yaxha Park, Guatemala.
Camera: Sony Alpha A7C. Settings: 1/250 sec; f/3,5; ISO 2,000.

Where has *Aechmea bracteata* been found in the Parque Nacional Tikal (PANAT)?

United States National Herbarium- Smithsonian (US-Botany)

Catalog #: US 2296267

Instance ID: <http://n2t.net/ark:/65665/30eb06525-866f-40b2-bad9-116a09229060>

Taxon: *Aechmea bracteata* var. *bracteata*

Family: Bromeliaceae

Collector: C. L. Lundell

Number: 15413

Date: 1959-01-29 - 1959-02-28

Literal Date: 1959-1-29

Location: Petén, Department of Guatemala: Tikal National Park, Tikal, in El Ramonal covering the ruins.

Single Count: 1

<https://biodiversidad.gt/portal/collections/list.php?usethes=1&taxa=1813>



Photograph by: Nicholas Hellmuth. FLAAR Mesoamérica, Jul. 22, 2022. PANAT, Mundo perdido.
Camera: iPhone 13 Pro Max.

Is *Aechmea bracteata* registered for Parque Nacional Yaxha Nakum y Naranjo (PNYNN)?

Missouri Botanical Garden (MO:Tropics)

Catalog #: 1978447

Instance ID: urn:catalog:MO:Tropicos:1978447

Taxon: *Aechmea bracteata* (Sw.) Griseb.

Family: Bromeliaceae

Determiner: J. Utley

Collector: Thomas B. Croat

Number: Croat 24686

Date: 1973-06-18

Literal Date: 1973-6-18

Location: Guatemala, Petén, Vicinity of Archeological camp on north shore of Lake Yaxha.
17.0636111 -89.3916666

Elevation: 152 meters (499ft)

Single Count: 1

Rights of Use: CC BY (Attribution)

Record Identifier: 04925718-b2ff-45a9-a595-d62fb4c4b542

<https://biodiversidad.gt/portal/collections/list.php?usethes=1&taxa=1813>

The species is present in the General List of Species of the Aquatic and Riparian habitat of the water bodies of the Tikal - Yaxhá, Aquatica and Riparia Maya Region. Made by the University of San Carlos. (PUIRNA 2009: 59)

Did Cyrus Lundell find *Aechmea bracteata* in Petén?

This is the most noticeable large *Aechmea* bromeliad in the entire park. Mentions *Aechmea bromeliaefolia* on pages 40 and 53 (now spelled *Aechmea bromeliifolia*) (Rudge) Baker. Mentions *Aechmea kienastii* on page 53; modern name is now *Aechmea tillandsioides* (Mart. ex Schult. & Schult.f.) Baker.

Mentions *Aechmea magdalenae* on p. 53; also mentions *Aechmea bracteata* on pp. 53, 106, 144, 161, 190, 191 and 196.

(Lundell, C. 1937)

Where else has *Aechmea bracteata* been found in the Petén?

In the Portal de Biodiversidad de Guatemala it is listed primarily in Petén and Izabal for *Aechmea bracteata*. It is not often collected since it occurs all over the place.

<https://biodiversidad.gt/portal/collections/list.php?usethes=1&taxa=1813>

Brief information on *Aechmea bracteata* for Belize by Standley and Record (1936)

This species is mentioned among the species of the genus *Aechmea*, on page 90 of the book, where the species of the Bromeliaceae family documented in Belize are found.

(Standley and Record 1936: 90)

Botanical Description of *Aechmea bracteata* by Standley and Steyermark (1949)

This bromeliad has adapted to grow up in trees and down on solid rocks. It has adapted to grow near sea level (50 meters) and up to 900 meters above sea level. It has adapted to grow in dry areas (much of Mexico) and in humid areas (seasonally wet, seasonally dry) of Petén, Guatemala:

Aechmea bracteata (Sw.) Griseb. Fl. Brit. W. Ind. 592. 1864. *Bromelia bracteata* Sw. Prodr. 56. 1788. *Ae. Schiedeana* Schlecht. Linnaea 18: 437. 1844. *Ae. laxiflora* Benth. Bot. Voy. Sulph. 173. 1846. *Ae. regularis* Baker, Jour. Bot. 17: 229. 1879. *Ae. macracantha* Brongn. ex Andre, 111. Hort. 27: 59. 1880. *Ae. Barleei* Baker, Card. Chron. II. 20: 102. 1883. *Ae. isabellina* Baker, Jour. Bot. 28: 305. 1890 (type from Boca del Polochic, Dept. Izabal, J. D. Smith 1824). Izchu, Chuek (Petén, fide Bartlett); Ixchu, Tinajero (Petén, fide Lundell).

Saxicolous or epiphytic in dense masses, forests, especially in rather arid regions, 50-900 meters; Petén; Alta Verapaz; Izabal. Mexico to Colombia.

Plants 5-17 dm. or more high; leaves 3-13 dm. long, their sheaths elliptic, large; scape erect; scape-bracts lanceolate, entire, bright red; inflorescence laxly paniculate; spikes laxly 4-17-flowered, rhachis slender, flexuous; floral bracts broadly ovate, 5-8 mm. long, entire; flowers sessile; sepals asymmetric, 3-4 mm. long; petals 1 cm. long, yellow; ovary subglobose, enlarged in fruit.

The berries are said to be edible. The hollow ellipsoid leaf- rosettes hold water which is useful to travelers in dry areas. The base is sometimes occupied by ants. In British Honduras the species is called "wild pine," but this name is applied to almost any conspicuous bromeliad.

(Standley and Steyermark 1958: 382).

In which States of Mexico is *Aechmea bracteata* listed by Villaseñor

Aechmea bracteata is found almost everywhere in Mexico (more locations than any other *Aechmea* species):

- ⋮ *Aechmea bracteata* (Sw.) Griseb. CAM, CHIS, COL, DGO, GRO, HGO, JAL, MICH, NAY, OAX, PUE, QRO, QROO, SLP, SIN, TAB, TAMS, VER, YUC

(Villaseñor 2016: 117).

Is *Aechmea bracteata* from the Highlands or from the Lowlands (or both)?

Need to check whether *Aechmea bracteata* grows also in the pine oak forests of the Maya Highlands. But, so far, the Neotropical Plant Portal lists *Aechmea bracteata* only for Petén (Tikal, Yaxha, etc.) and Izabal: all in the Maya Lowlands

World Range for *Aechmea bracteata*

Mexico, Central America, South America (Colombia and Venezuela).

<https://www.cicy.mx>



Photograph by: Nicholas Hellmuth. FLAAR Mesoamérica, Jul. 22, 2022. Hotel Tikal Inn
Camera: iPhone 13 Pro Max.

Close relative(s) of *Aechmea bracteata* in Petén

Aechmea tillandsioides
Aechmea bromeliifolia
Aechmea magdalenae

Aechmea lueddemanniana
Aechmea mexicana
Aechmea tessmannii

Aechmea bracteata in Izabal of Guatemala

This species has been recorded in this area; Flaar-Mesoamerica has included it in its Livingston species catalog.

<https://flaar-mesoamerica.org/wp-content/PDF/Catalogo-de-Hojas-de-Contacto-Proyecto-Documentacion-de-Biodiversidad-Livingston-Oct-Nov-Dec-2021-FLAAR-Mes.pdf>

Aechmea bracteata in Belize

Aechmea bracteata (Sw.) Griseb. — **Loc Use:** FOOD, BEV, ORN. — **Reg Use:** FOOD, PRD. — **Nv:** water orchid, wild pine. — **Habit:** Herb, saxicolous or epiphytic.

(Balick, Nee and Atha 2000: 174).

Epiphytic means up in the tree tops (though they can also be on the side of the vertical trunk) or on a low fork of the trunk.

Saxicolous means growing on rocks (so, since much of the Petén is karst geology, these bromeliads can grow atop rocks). But the Tikal part of the RBM is karst but we will need to find solid rock areas (that we have found at Yaxha such as along the split-open geological fault on the north side of the Savanna East of Nakum, Parque Nacional Yaxha, Nakum and Naranjo (PNYNN)).



Photograph by: Nicholas Hellmuth. FLAAR Mesoamérica, Jul. 20, 2022. PANAT Mundo perdido.
Camera: iPhone 13 Pro Max.

Aechmea bracteata in Chiapas

Yes, Departamento de Botánica, Instituto de Biología 2019)

Collection name

"Herbario Nacional de México (MEXU)"

Responsible for the collection

"Dr. Gerardo A. Salazar Chávez, head of the Herbario Nacional de México"

Collection associated

"Plantas Vasculares"

Responsible for the collection associated

"Dr. Gerardo A. Salazar Chávez, Curador de Plantas Vasculares"

Dependency

"Departamento de Botánica, Instituto de Biología (IBUNAM)"

Institution

"Universidad Nacional Autónoma de México (UNAM)"

Identificador único (URN)

"IBUNAM: MEXU: 435558"

Catalogue number

435558

Register type

Fisical object

Types of preservation

"Herbalized"

Credits

"M. en C. Alberto Reyes García
Responsable of the Sala Bletia"

[https://datosabiertos.unam.mx/
IBUNAM:MEXU:435558](https://datosabiertos.unam.mx/IBUNAM:MEXU:435558)

Aechmea bracteata in Tabasco

Yes, (Cowan 1983)

[http://www.ibiologia.unam.mx/
BIBLIO68/fulltext/lfl1.html](http://www.ibiologia.unam.mx/BIBLIO68/fulltext/lfl1.html)

Aechmea bracteata in Campeche

Yes, E. Góngora 236, CICY, XAL.

<https://www.cicy.mx/>

Aechmea bracteata in Quintana Roo

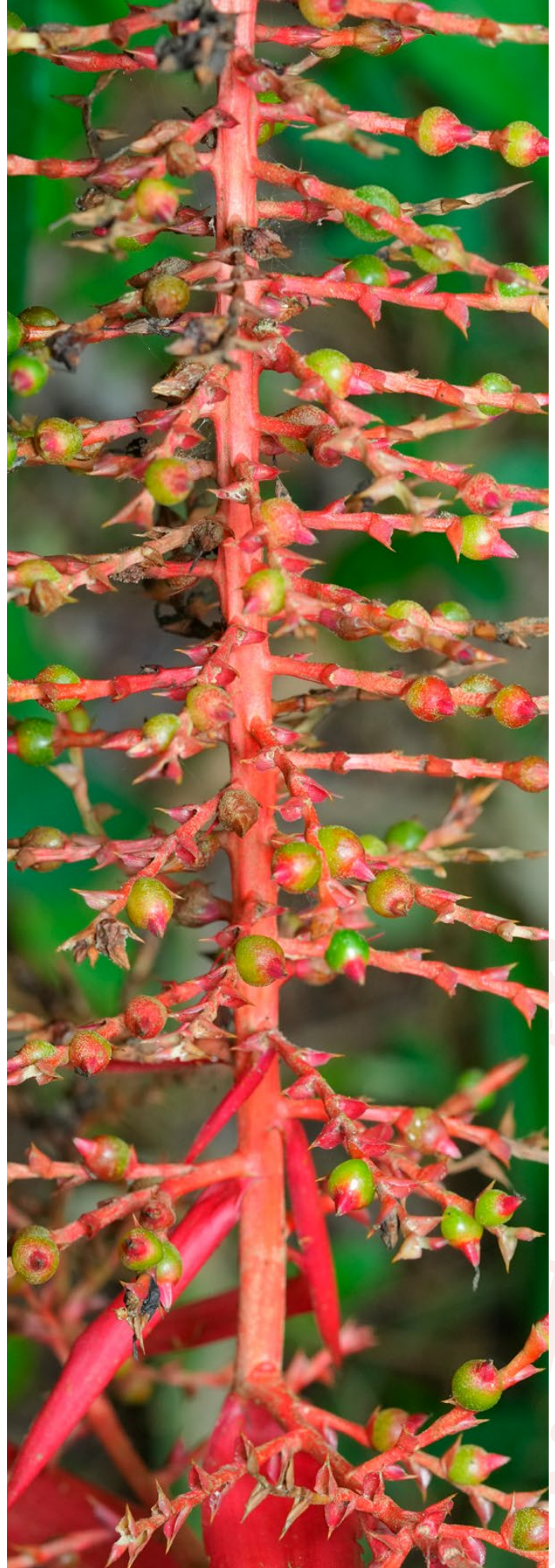
Yes, E. Ucán & J. S. Flores 1006,
CICY, XAL.

<https://www.cicy.mx/>

Does *Aechmea bracteata* also grow in home gardens?

Yes, this is a popular garden plant around
the world.

Photograph by: David Arrivillaga. FLAAR Mesoamérica,
Oct. 11, 2021. Yaxha Park.
Camera: Sony Alpha A7C. Settings: 1/250 sec; f/3,5;
ISO 2,000.



Practical uses of *Aechmea bracteata* for the Lacandon Maya of Chiapas

Many indigenous people of the American continent have made hammocks and baskets from various species, including *A. bracteata* and *Ananas comosus*. In Mexico, the species *Aechmea bracteata*, *A. mexicana*, *A. magdalenae* and *Bromelia pinguin* have been used to obtain the fiber; from the fiber obtained from these species are made sacks, cordage to adorn belts, clothing with leather garments embroidered with it, craft sacks, nets, hammocks, handbags, sandals, baskets and even arrow bows. The fiber known under the name of "ixtle" or "pita fiber" obtained from *Aechmea magdalenae* is recognized for its brightness, fineness, and resistance, comparable to that of silk but with greater vigor.

Given its characteristics, Chinantec, Lacandon and Popoluca indigenous people (Mexico) have used it to make fishing gear (it does not shrink or lose resistance in the water), to weave fishing nets (invisible, resistant, and durable) from fiber dyed with indigo, and has also been used to tie arrowheads, and make shoes or ceremonial objects, such as pheasant feather fans.

(Hornung-Leoni 2011: 204)

Are any parts of *Aechmea bracteata* edible?

This bromeliad is listed by Balick, Nee and Atha as food but surely that comes from another source, so we will search for the original documentation.

The black berries produced by this bromeliad are, in theory, edible (Padilla 1973: 60).

Is there potential medicinal usage of *Aechmea bracteata* by local people?

Properties are attributed to prevent abortions, however not much information has been found to support this data. (Sociedad Mexicana de Cactologia 2004: 106)

In the state of Hidalgo in Mexico, specifically in the Huasteca region, the water accumulated in the rosette of *Aechmea bracteata* and *T. imperialis* is used to bathe “niños quemados” understanding by these the children who were present at the birth of animals or people, which causes them decay and lack of appetite and according to the residents, is eliminated with the bath of the water coming from the rosette. This is more a popular belief than a property of the plant itself. (Hornung-Leoni 2011: 206)



Photograph by: Nicholas Hellmuth. FLAAR Mesoamérica, Jul. 22, 2022. PANAT, Mundo perdido. Camera: iPhone 13 Pro Max.

What are the primary pollinators of *Aechmea bracteata* flowers?

Williams mentions that “The plants are often inhabited by vicious ants.” (1981: 59). I assume he means vicious ants. Definitely worth further research out in the field. Pool et al. also feel the same as I do, that ants may contribute to pollination (Pool et al. 2017: 118). The role of ants with *Aechmea bracteata* bromeliads is explored in detail by biologists Dejean et al. 2018 in Quintana Roo, Mexico:

⋮ We focus on how associated ants can influence the nature of the interactions between a myrmecophytic bromeliad and the aquatic community in its tank, the focal taxon being *Aechmea bracteata* that, contrary to ant-garden epiphytes, does not depend on ants for its germination. Instead, this tank bromeliad shelters ant colonies in a central watertight cavity delimited by an amphora-shaped leaf situated around the base of the inflorescence in the heart of the rosette forming the tanks [22, 23]. Because ants discard their waste and feces into the tanks of their host bromeliads and because each ant species has its own diet [8,14,22], we hypothesized that the species of the associated ants or their absence, by influencing the availability of organic matter, might impact the diversity, abundance, and community composition of aquatic macroinvertebrates in the tanks of *A. bracteata*.

(Dejean et al. 2018: 201).

Pool-Chalé has written two articles on pollinization of *Aechmea bracteata* flowers. He suggests “hummingbirds, bees and wasps, among others...” (Pool et al. 2017: 117).



Photograph by: Nicholas Hellmuth, FLAAR Mesoamérica, Jul. 20, 2022. PANAT, Mundo perdido.
Camera: iPhone 13 Pro Max.

Concluding Discussion and Summary **on *Aechmea bracteata***

This is one of the easiest to notice bromeliads at Tikal National Park and in all areas of Parque Nacional Yaxha, Nakum and Naranjo. *Aechmea bracteata* can also be found in other areas of the Maya Lowlands but in herbaria is documented for central Petén and Izabal (collections are actually very weak, possibly because the plant is so common that not many botanists feel inclined to dedicate the time necessary to press specimens of such a thick inflorescence and long painfully thorny leaves.)

Hundreds (and potentially thousands) of photos are available on the Internet but our advantage is that we document in what part of Petén we are photographing and we try to show enough of the tree so you see where the plant is happily growing.

***Aechmea bracteata* needs further field work?**

Definitely yes, it's necessary to make educational videos. Plus, we need to spend time to accomplish macro photography of the different parts of the plant (for an illustrated glossary) which can then be turned into an infographic poster (to explain the technical botanical jargon).

Would help to document how many are found on hilltop karst areas (in plazas and on pyramids) and how many in flat low forests.

APPENDIX A

Other Bromeliads and Related Plants that we will be doing research on in Parque Nacional Tikal

Aechmea bracteata is the most common species of genus *Aechmea* of family Bromeliaceae. So this is the first species we will publish for PANAT. But we will be searching for all the other species of genus *Aechmea* on future field trips at PANAT.

Aechmea bromeliifolia (Rudge) Baker we found one flowering at Nakum in August 2018.

Aechmea magdalenae (André) André ex Baker is found by hundreds in pital areas. To what degree it is actually eaten by the Maya, needs significant further research. But it is definitely popular in many parts of the Maya areas for high quality fiber.

Aechmea mexicana is another species we will do our best to find in the PANAT park (if they exist here). It is found in Chiapas and Tabasco (Villasenor 2016: 117), both of which border on Petén.

Aechmea tillandsioides is present very high up in the tree tops. But when blown out of the trees by storms, you can see it on the ground. We have photographs of these interesting arrangement of inflorescences from PNYNN that we are preparing to publish as a separate volume. We need to look for *Aechmea tillandsioides* at PANAT.

Androlepis skinneri (K. Koch) Brongn. ex Houillet CHIS, TAB, VER

We will also look for bromeliads of genera Bromelia, Catopsis and Hechtia

Bromelia alsodes H. St. John, Piñuela roja, (Chízar 2009: 130-132). Synonym is *Bromelia slyvestris* Burm.f. In adjacent Mexico is found in CHIS, NAY, OAX, QRO, QROO, SLP, SIN, SON, TAB, TAMS, VER, YUC (Villasenor 2016: 117).

Bromelia hemisphaerica Lam. CHIS, GTO, GRO, MEX, MICH, MOR, OAX, YUC

Bromelia karatas L, Piñuela, "eaten abundantly in Chiapas (Guess and Guess 2001). *Bromelia plumieri* (E. Morren) L.B.Sm. is a synonym of *Bromelia karatas* L.

Bromelia pinguin L., Piñuela, motate (produces rubber-like sap, Rochin 1986).

Catopsis berteroniana (Schult. & Schult. f.) Mez CAM, CHIS, GRO, OAX, QROO, TAB, VER, YUC

Catopsis nutans (Sw.) Griseb. CAM, CHIS, COL, GRO, JAL, MEX, NAY, OAX, PUE, QROO, TAB, TAMS, VER, YUC

Catopsis sessiliflora (Ruiz & Pav.) Mez CAM, CHIS, GRO, HGO, JAL, MEX, MICH, OAX, PUE, TAB, VER

Hechtia schottii Baker CAM, CHIS, PUE, QROO, SLP, VER, YUC

The genus of bromeliads with the most species to be found in Petén appears to be *Tillandsia*. Since Balick, Nee and Atha list 25 species for Belize, I suggest that at least 20 can be found in adjacent (below I list about 19). I select species for Petén based on whether they are found surrounding Petén, namely Chiapas, Tabasco, Campeche and Quintana Roo. Belize has altitudes and habitats not present in Petén, so not all Belize species will be found in Petén.

Tillandsia balbisiana Schult. & Schult. f. CAM, CHIS, COL, GRO, JAL, MEX, MICH, NAY, OAX, QROO, SLP, SIN, TAB, TAMS, VER, YUC. (Page 119).

Tillandsia brachycaulos Schltdl. CAM, CHIS, MEX, MICH, MOR, OAX, PUE, QRO, QROO, SLP, TAB, VER, YUC

Tillandsia caput-medusae E. Morren CAM, CHIS, CHIH, COL, CDMX, DGO, GRO, JAL, MEX, MICH, MOR, NAY, OAX, PUE, QROO, SIN, SON, TAB, VER, ZAC

Tillandsia dasyliiriifolia Baker CAM, CHIS, COL, GRO, HGO, JAL, MEX, MICH, MOR, NAY, OAX, PUE, QROO, SLP, TAB, TAMS, VER, YUC

Tillandsia fasciculata Sw. CAM, CHIS, COL, DGO, GTO, GRO, HGO, JAL, MEX, MICH, MOR, NAY, OAX, PUE, QRO, QROO, SLP, SIN, TAB, TAMS, TLAX, VER, YUC, ZAC (page 120)

Tillandsia festucoides Brongn. ex Mez CAM, CHIS, COL, JAL, OAX, QROO, TAB, TAMS, VER

Tillandsia fuchsii W. Till CAM, CHIS, COL, GRO, JAL, MICH, NAY, OAX, SIN, TAB, VER, YUC

Tillandsia juncea (Ruiz & Pav.) Poir. CAM, CHIS, COL, CDMX, GTO, GRO, HGO, JAL, MEX, MICH, NAY, OAX, PUE, QRO, QROO, SLP, SIN, TAB, TLAX, VER, ZAC

**Tillandsia limbata* Schltdl. CAM, CHIS, CHIH, GRO, HGO, JAL, MEX, MICH, OAX, PUE, QRO, QROO, SLP, TAB, VER

Tillandsia makoyana Baker CAM, CHIS, COL, DGO, GTO, GRO, JAL, MEX, MICH, MOR, NAY, OAX, PUE, QROO, SIN

Tillandsia paucifolia Baker CAM, CHIS, GRO, JAL, OAX, QROO, VER, YUC (page 121)

Tillandsia polystachia (L.) L. AGS, CAM, CHIS, COL, GRO, HGO, JAL, MEX, MICH, NAY, OAX, PUE, QRO, QROO, SLP, SIN, TAB, TAMS, VER, ZAC

Tillandsia pseudobaileyi C.S. Gardner CHIS, COL, GRO, JAL, MICH, NAY, OAX, QROO, VER, YUC

Tillandsia recurvata (L.) L. AGS, BCN, BCS, CAM, CHIS, CHIH, COAH, COL, CDMX, DGO, GTO, GRO, HGO, JAL, MEX, MICH, MOR, NAY, NLE, OAX, PUE, QRO, QROO, SLP, SIN, SON, TAMS, TLAX, VER, YUC, ZAC

Tillandsia schiedeana Steud. AGS, BCN, BCS, CAM, CHIS, COL, DGO, GTO, GRO, HGO, JAL, MEX, MICH, MOR, NAY, OAX, PUE, QRO, QROO, SLP, SIN, TAB, TAMS, VER, YUC, ZAC

Tillandsia streptophylla Scheidw. ex E. Morren CAM, CHIS, COL, GRO, HGO, JAL, MEX, MICH, MOR, NAY, OAX, PUE, QROO, SIN, TAB, VER, YUC

Tillandsia usneoides is very common at PANAT and PNYNN and elsewhere in Peten. Here is where it is obviously common throughout Mexico:

Tillandsia usneoides (L.) L. AGS, BCN, BCS, CAM, CHIS, COAH, COL, CDMX, DGO, GTO, GRO, HGO, JAL, MEX, MICH, MOR, NAY, NLE, OAX, PUE, QRO, QROO, SLP, SIN, TAB, TAMS, TLAX, VER, YUC, ZAC

Tillandsia variabilis Schltdl. CAM, CHIS, COL, JAL, MICH, OAX, PUE, QRO, QROO, SLP, TAB, VER, ZAC*

Glossary prepared by the team at FLAAR Mesoamerica

Aroids: Common name for members of the Araceae family of plants, species of herbaceous monocotyledons.

Bromeliads: Are ornamental plants that belong to the Bromeliaceae family or pineapple plants.

Epiphytes: Grow on tree trunks and tree limbs but are not parasites.

Epiphytic: Plants include aroids, ferns, bromeliads, mosses, and orchids.

Ferns: A type of vascular plant that have roots, stems and leaves but lack flowers and seeds. They produce spores.

Moss: Non-vascular and non-flowering small plants which produce spores and have stems and leaves, but don't have true roots, instead they have multicellular called rhizoids.

Orchids: There are terrestrial orchids (ironically on the Hellmuth farm in the Missouri Ozark Mountain area). The rare vanilla orchid is a vine, which may often have roots in the ground.

Piñuela: is a local generic name for giant terrestrial bromeliads with shark curved thorns and often bright red colors around the center. Teco at Yaxha estimates there are four species; we found *Bromelia karatas* in two locations. Teco showed us the *Bromelia plumieri* (which I seriously doubt is a synonym of *Bromelia karatas*). *Bromelia pinguin* is common in dry areas of Guatemala (Jocoton) and sandy areas (Monterrico, facing the Pacific Ocean). Thus I was very surprised when Teco told us that *Bromelia pinguin* is present in the parque nacional here around Lake Yaxha.

References Cited and Suggested Reading on *Aechmea bracteata*

Most useful document for this report:

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Not available as a download. To help the world learn about the Itza Maya culture and ethnobotany, would be a courtesy of the author and publisher to make as an open searchable PDF as a helpful download.

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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 pages specifically on *Aechmea bracteata*

www.backyardnature.net/yucatan/aechmea.htm

Jim Conrad, from the September 29, 2008 Newsletter written in Sabacché, Yucatán, México an *Aechmea Bromeliad* Fruiting.

<https://botany.cz/en/aechmea-bracteata/>

Good photos and indicated where they were taken.

http://chalk.richmond.edu/flora-kaxil-kiuic/a/aechmea_bracteata.html

http://chalk.richmond.edu/flora-kaxil-kiuic/a/aechmea_bracteata_05s.JPG

WOW photo close-up on the second page; best I have seen so far.

https://www.cicy.mx/sitios/flora%20digital/ficha_virtual.php?especie=171

Listed as ornamental and medicinal; no mention

of anything being edible. What helps is listing the months of flowering (much of the year) and months of fruiting (much of the year) except that these are for the Yucatan Peninsula whose climate is totally different than Petén.

<https://www.monaconatureencyclopedia.com/aechmea-bracteata/?lang=en>

One excellent photograph by Mazzo with studio-quality lighting.

<https://www.naturalista.mx/taxa/210961-Aechmea-bracteata>

nice photos but needs a way to learn where they were taken: in a garden or out in the wild.

Videos on *Aechmea bracteata*

When you search for videos on *Aechmea-bracteata* 99.9% are on gardening for Florida (and I would assume California etc.). One video demanded personal click before it would open so we do not list that whatsoever.

NOTHING from botanists or ecologists (surely must be somewhere; but all their “videos” show printed pages.

<https://www.youtube.com/watch?v=Ez7adySwzQ4>

45 minutes! Field Trip With Patrick Blanc In Belize

Shows primarily the national orchid of Belize. Nice video but finding *Aechmea bracteata* is not realistic.

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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: either

www.maya-ethnobotany.org or www.maya-ethnozoology.org or
www.maya-archaeology.org or www.digital-photography.org or
www.FLAAR-Mesoamerica.org.

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.

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CECON, CONAP, FUNDAECO, INGUAT, ARCAS, IDAEH, Municipio de Livingston, etc. 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.

To publish photographs

Hellmuth's photographs have been published by National Geographic, by Hasselblad Magazine, and used as front covers on books on Mayan topics around the world. His photos of cacao (cocoa) are in books on chocolate of the Maya and Aztec both by Dr Michael Coe (all three of editions) and another book on chocolate by Japanese specialist in Mayan languages and culture, Dr Yasugi. We naturally appreciate a contribution to help cover the costs our office expenses for all the cataloging, processing, and organization of the photos and the field trip data.

For your social media

You can post any of the FLAAR Mesoamerica PDFs about the Municipio of Livingston on your Social Media sites; you can send any of these PDFs to your friends and colleagues and family: no cost, no permission needed.

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.

BACKCOVER PHOTOGRAPH

Photograph by: Nicholas Hellmuth.
FLAAR Mesoamerica, Jul. 20, 2022.
Camera: iPhone 13 Pro Max.

ACKNOWLEDGEMENTS TO FLAAR MESOAMÉRICA

Flor de María Setina is the office manager, overseeing all the diverse projects around the world. We also utilize the inkjet prints to produce educational banners to donate to schools.

Vivian Hurtado is the actual project manager for FLAAR's divisions: Flora & Fauna and MayanToons. She is also environmental engineer and passionate researcher

Victor Mendoza environmental engineer, is in charge of the photographic database of FLAAR Mesoamerica and its taxonomic identification. He also supports as a research assistant.

Sergio Jerez He is involved with plant identification, bibliographic research and map design for the trails explored on each expedition.

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

Senaida Ba has been our photography assistant for several years. Now, she puts together PowerPoint presentations for students and teachers to learn about several subjects like Flora, Fauna and Mayan Iconography.

Jaqueline González designer who puts together the text and photographs to create the actual report.

Roxana Leal major in Communication who manages all our social media and digital community. She's sometimes part of our fieldwork trips, since she has a special interest for adventure and Guatemala's diverse nature.

María Alejandra Gutiérrez is an experienced photographer who now prepares all the Photography Catalogs for the project we're currently working on the RBM. She also contributed to the coordination of several trips we made during our Livingston, Izabal research project.

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

Juan Carlos Hernández takes the material that we write and places it into the pertinent modern Internet software to produce our web pages.

Paulo Núñez 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.

Rosa Sequén 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.

Paula García is part of our MayanToons Animation team. Her job brings our favorite jungle, wetland and savanna characters to life.

María 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.

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.

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

Byron Pacay handles GPS mapping of where we hike or go in the lancha (boat) each field trip day. He also lists where we stop to take photos and what each one of us is photographing and then has that tabulation ready each night.

Edwin Solares environmental engineering. He is a photographer and videographer during our expeditions and later edits this content to be able to use it in the materials we generate.

Belén Chacón her job includes organizing and tabulating data on useful and edible flora, which is listed in FLAAR's bibliography and many other references, in order to keep a complete list of plant species that are useful, along with updated taxonomical information.

Diana Sandoval her work consists of the recompilation of scientific information, which later is transformed into the FLAAR reports that are published on our websites.

María José Toralla she gathers information and bibliographies that are added to our Flora & Fauna electronic library and also make part of the information found in research, reports and websites.

Valeria Áviles 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.

Niza Franco is part of our MayanToons Animation team. Her job brings our favorite jungle, wetland and savanna characters to life.

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

Isabel Rodríguez Paiz is in charge of the fundraising. She is experienced in networking, social media, and organizing meetings to experience what FLAAR does out in the remote rain forest ecosystems

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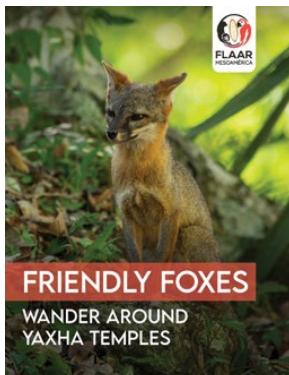
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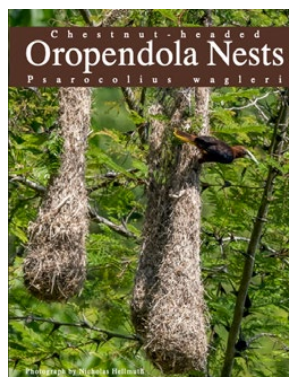
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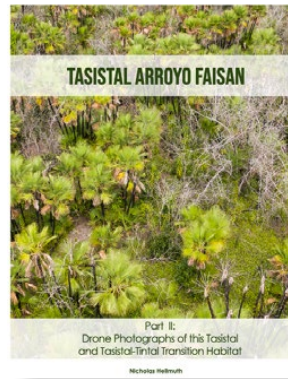
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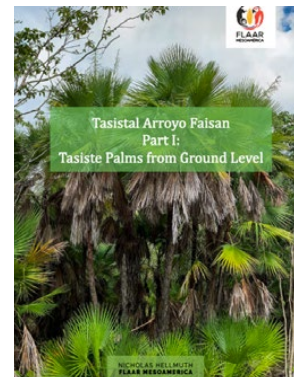
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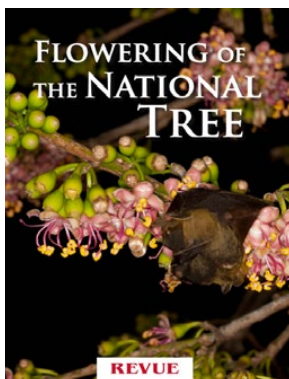
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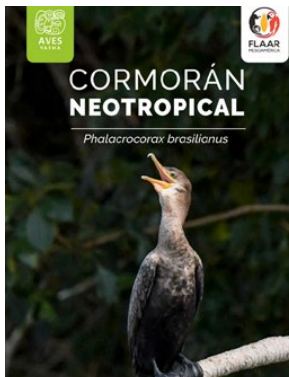
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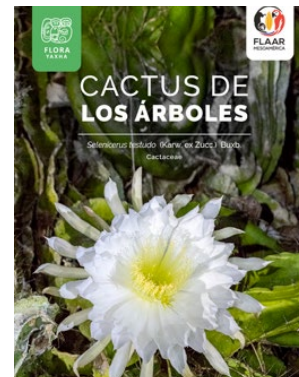
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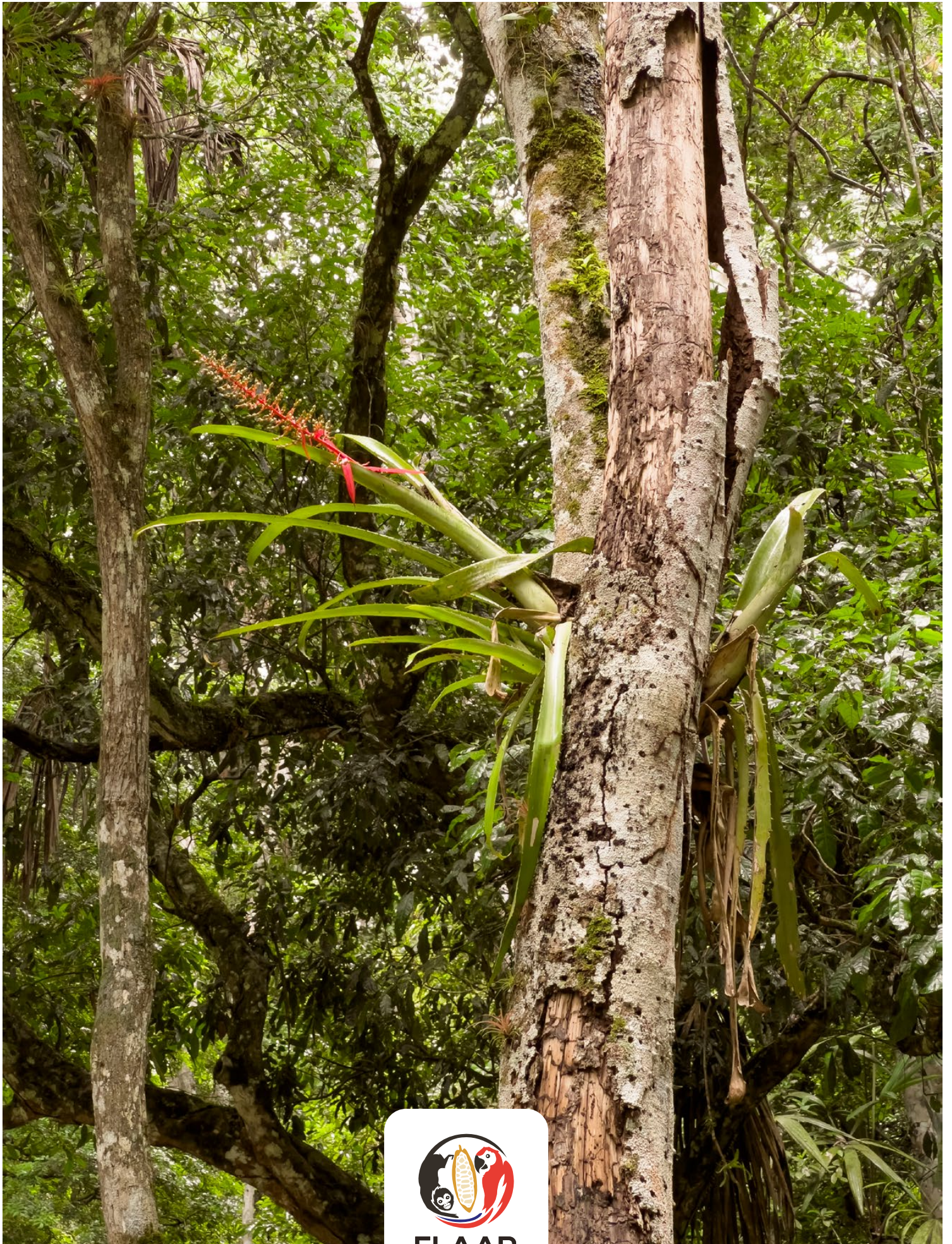
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