PITAL ECOSYSTEMS OF PNYNN Biodiverse Ecosystems of Edible & Useable Aechmea magdalenae

Part 1: Pital Aguada El Pucte

NICHOLAS HELLMUTH FLAAR (USA) AND FLAAR MESOAMÉRICA (GUATEMALA)

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Part 1: Pital Aguada El Pucte



Parque Nacional Yaxha, Nakum and Naranjo (PNYNN) Reserva de la Biosfera Maya (RBM) Peten, Guatemala



NICHOLAS HELLMUTH FLAAR (USA) AND FLAAR MESOAMÉRICA (GUATEMALA)

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Guides and equipment porters from La Maquina and nearby during november, 2021

Ricardo de Jesus Herrera Marroquin, guide and helped carry digital camera equipment

Equipment porters from La Maquina and nearby during november, 2021

Dennis Dennilson Diaz Duarte Enrique Rodas

6WD Pickup truck driver and guide Sebastial de la Hoz

4WD Pickup truck drivers

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Sergio Balam

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We appreciate a donation during November 2021 and a subsequent donation in early June 2022 to help cover the costs of FLAAR research projects specifically to assist and support the current FLAAR project of flora and fauna in the Reserva de la Biosfera Maya (RBM). This continuing donation is also assisting the FLAAR (USA) and FLAAR Mesoamerica (Guatemala) research project searching for wild edible plants in the wetlands of the Municipio de Livingston area of the departamento of Izabal, Guatemala.

These donations are 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 in the Yaxha area in the 1970's while the site was being mapped by FLAAR.

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), Parque Nacional Laguna de Tigre (PNLT) and the wetlands of Municipio San Jose are three parts of the over 5 million acres of the RBM.





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FRONT COVER PHOTOGRAPHY Aechmea magdalenae.

Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, Aug. 24, 2018. Camera: Sony RX10 IV. Settings: 1/125 sec; f/4; ISO 800.

COVER PHOTOGRAPHY

Aechmea magdalenae. Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, Aug. 24, 2018. Camera: Nikon D5. Settings: 1/200 sec; f/6,3; ISO 4,000.

FLAAR was formed in 1969 to map Yaxha (and nearby Topoxte Island and Nakum) and we worked with the president of Guatemala and the head of FYDEP to initiate protection of this area as a national park. Recently we were asked to return for flora, fauna, and biosphere field work from August 2018 to July 2019. This project was successful and as a result we were asked by CONAP to return for five years, 2021-2025 of coordination and cooperation with them, both in the Yaxha, Nakum and Naranjo national park plus all the rest of the Reserva de la Biosfera Maya.

The aerial photographs of IGN, Instituto Geográfico Nacional de Guatemala, are the best aerial photographs that we have found so far. If you are a professor or student studying ecosystems of Guatemala these photographs are essential.





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Yaxha to Nakum Road.

Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, Sep. 4, 2018. Camera: Nikon D5. Settings: 1/250 sec; f/13; ISO 6,400.

Introduction to Aechmea magdalenae of Guatemala

This is a FLAAR Report on the ecosystem aspect of a pital, a seasonally dry aguada that has lots of giant terrestrial bromeliads around the higher ground. So the pital area is only flooded in a really wet week of a very wet year. The aguadas are bone dry most of the year.

My Personal Experience with a Pital Ecosystem

The first time I remember being introduced to a pital ecosystem was when PNYNN park ranger Teco (Moises Daniel Perez Diaz) showed us the two pital areas alongside the road from Yaxha to Nakum during our first flora, fauna and ecosystem project here (August 2018-July 2019).



Yaxha to Nakum Road.

Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, Jan. 21, 2019. Camera: iPhone Xs. .



Yaxha to Nakum Road. There are lots of long-leaf terrestrial bromeliads in PNYNN. A good place to see and experience them is by hiking into the bajo forests along the road from Yaxha to Nakum. Be sure to have a local registered guide with you. This bromeliad has much longer leaves than Aechmea magdalenae.

Photograph by: Juan Pablo Fumagalli. FLAAR Mesoamerica, Jan. 21, 2019. Camera: Google Pixel 3XL.

Full Botanical Name

Aechmea magdalenae (André) André ex Baker is the accepted name.

Family name is Bromeliaceae.

Here are synonyms for Aechmea magdalenae

Aechmea magdalenae var. quadricolor M.B.Foster Ananas magdalenae (André) Standl. Bromelia magdalenae (André) C.H.Wright Chevaliera magdalenae André Chevaliera magdalenae var. quadricolor (M.B.Foster) L.B.Sm. & W.J.Kress

www.theplantlist.org/tpl/record/kew-218083



Aechmea magdalenae.

Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, Aug. 24, 2019. Camera: Nikon D5. Settings: 1/200 sec; f/6,3; ISO 4,000.

Local names for Aechmea magdalenae

Silkgrass; Pita floja (Alta Verapaz, Central America, fide Standley); Pita (Peten), fide Bartlett); Pinuela (Peten, fide Standley); Man (Quecchi). (Standley and Steyermark 1958: 384).

Habit for Aechmea magdalenae

Herb, terrestrial (Balick, Nee and Atha 2000: 174).

Is *Aechmea magdalenae* a vine? Or a bush? Or a Tree?

This plant is a giant terrestrial bromeliad, with shark curved spines up and down both sides of the rigid leaves.



Aechmea magdalenae. Photograph by: Moisés Díaz. FLAAR Mesoamerica, Oct. 15, 2018. Camera: Huawei P10.

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

Nearby trees probably need to be able to survive the rising water of the aguada at the height of the rainy season. Obviously it would help for a future PhD dissertation research on *Aechmea magdalenae* to make a map of each pital and show the name of every species surrounding the aguada. Often the aguada area transitions into a bajo forest but I would not be surprised if there are karst area forests near other pital areas.

Also will need to study the pital areas elsewhere in Guatemala, such as Huehuetenango. And in surrounding Chiapas, Tabasco, Campeche, Quintana Roo and Belize. But the present FLAAR Report is to introduce the basic ecosystem for Parque Nacional Yaxha, Nakum and Naranjo (PNYNN, RBM, Peten, Guatemala): seasonally dry/seasonally inundated aguada, mass of pital around part or most of the aguada; forest transition into surrounding forest.



Aechmea magdalenae.

Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, May. 22, 2022. Camera: iPhone 13 ProMax.

Where has *Aechmea magdalenae* been found in the Peten?

https://serv.biokic.asu.edu/neotrop/plantae/collections/harvestparams.php

Are Aechmea magdalenae plants registered for Parque Nacional Tikal?

Catalog #: 1793155

Taxon: Aechmea magdalenae (André) André ex Baker **Family:** Bromeliaceae **Determiner:** L.B. Smith,

Collector: C.L. Lundell

Number: 15451

Date: 1959-02-10

Locality: Guatemala, Petén, Tikal National Park, Tikal, Aguada Naranjal on [along] Arroyo [Corriental] 17.23 -89.61

https://serv.biokic.asu.edu/neotrop/ plantae/collections/individual/index. php?occid=941102&clid=0

Since there are seasonal aguadas at Tikal and nearby, it is no surprise that Aechmea magdalenae has been found there, and in each case clearly defined as being dense:

- La Presa Reservoir (Puleston 2015: 31 and 88)
- Aguada Seca (Puleston 2015: 41 and 89)
- Third area (Puleston 2015: 94).

I estimate that more locations can be found there in the extensive Parque Nacional Tikal. Same for Parque Nacional Yaxha Nakum Naranjo: when the pita plants are blooming and fruiting again (July, August, September) we will find and photograph their presence and location.



Photograph by: Moisés Díaz. FLAAR Mesoamerica, Oct. 15, 2018. Camera: Huawei P10.

Aechmea magdalenae in Belize

The Neogropical Flora data base of herbaria around the world (that are on-line) has zilch for Belize.

Balick, Nee and Atha (2000) list

Aechmea magdalenae (André) André ex Baker —Use: FOOD, ORN, PRD. —Reg Use: ORN, PRD, FOOD. — Nv: silk grass. — Habit: Herb, terrestrial.

(Balick, Nee and Atha 2000: 174)



Aechmea magdalenae.

Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, Sep. 18, 2018. Camera: Nikon D810. Settings: 1/60 sec; f/10; ISO 800.

Botanical Description of *Aechmea magdalenae* by Standley and Steyermark (1958)

Aechmea magdalenae (André) André ex Baker, Handb. Bromel. 65. 1889. *Chevalliera Magdalenae* André; Enum. Bromel. 3. 13 Dec. 1888; Rev. Hortic. 60: 563. 16 Dec. 1888. *Bromelia Magdalenae* C. H. Wright, Kew Bull. 1923: 267. 1923. *Ananas magdalenae* Standl. ex Standl. & Cald. Lista Prelim. PI. S. Salvador 45. 1925. Silkgrass; Pita floja (Alta Verapaz, Central America, fide Standley) ; Pita (Peten, fide Bartlett); Pinuela (Peten, fide Standley); Man (Quecchi). Figure 65.

Terrestrial in forests and thickets, usually below 500 meters; Peten (Tikal). Mexico to Ecuador, the species described from the Rio Magdalena in Colombia.

Plant 10-15 dm. high; leaves coarse, up to 2 meters long, blades linear, 5-10 cm. wide, often bright red (Standley), laxly serrate with curved teeth 5 mm. long; scape stout, its bracts foliaceous, the upper ones massed below the inflorescence and reflexed; inflorescence of a few sessile globose spikes in a dense mass or rarely simple; floral bracts recurving, acuminate, 65 mm. long, densely serrate, thick, coriaceous; flowers sessile, 5 cm. long; sepals triangular, unequal, 35-38 mm. long; petals 4 cm. long; ovary elliptic, complanate.

According to Standley this species is common in the North Coast (Izabal) and lowlands of Baja Verapaz, apparently also in lowlands of northern Huehuetenango. Large amounts of the fiber are said to be separated in northern Huehuetenango. It is cultivated occasion- ally for ornament or as a curiosity in Guatemala City and probably elsewhere. The leaves are wetted in water, and fiber is usually ex- tracted by pounding them on stones in running water. It is a very fine and tough fiber, much used for hammocks, bags and string.

(Standley and Steyermark 1958: 384).



Photograph by: Elena Siekavizza. FLAAR Mesoamerica, Mar. 29, 2019. Camera: Google Pixel 3XL.



Photograph by: Elena Siekavizza. FLAAR Mesoamerica, Mar. 29, 2019. Camera: Google Pixel 3XL.

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

In the Maya Lowlands. This plant was readily available to the Classic Maya thousands of years ago.

In which States of Mexico is Aechmea magdalenae listed by Villaseñor?

The Neogropical Flora data base of herbaria around the world (that are on-line) has not one single solitary specimen collected for for Mexico (it's not easy to get to a pital; it is not easy to work your way through the entangled vegetation; it is not easy to get close to these spiny bromeliads; it is not easy to have a thick leaf pressed in paper; and to get the flowers, just look at where the flowers are situated! (on top of a giant spiny hand-grenade-sized, pineapple-sized fruit).

Villaseñor lists Aechmea magdalenae only for Chiapas and Quintana Roo (Maya Lowlands) plus Oaxaca and Verapaz. So none in the wetter area of Tabasco not drier area of Campeche (which is adjacent to northern Peten) (2016: 675).

Close relative(s) of *Aechmea magdalenae*; how many other species of *Aechmea* are in Peten?

Aechmea bracteata is a large epiphytic bromeliad found in many parts of PNYNN and elsewhere. Aechmea tillandsioides

Balick, Nee and Atha (2000: 174) have helpful information on all Aechmea species of Belize:

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

Aechmea bromeliifolia (Rudge) Baker — Habit: Herb, epiphytic.

Aechmea lueddemanniana (K. Koch) Brongn. ex Mez —Nv: gallibasco, wild pine. Aechmea magdalenae (André) André ex Baker —Use: FOOD, ORN, PRD. —Reg Use: ORN, PRD, FOOD. — Nv: silk grass. — Habit: Herb, terrestrial.

Aechmea mexicana Baker —Habit: Herb, epiphytic. — Note: Possibly misapplied to A. lueddemanniana.

Aechmea tillandsioides (Mart. ex Schult. & Schult. f.) Baker —Loc Use: PRD. — Nv: ik'l. — Habit: Herb, epiphytic.

Aechmea magdalenae in Izabal of Guatemala

According to Standley this species is common in the North Coast (Izabal) and lowlands of Baja Verapaz, apparently also in lowlands of northern Huehuetenango. Large amounts of the fiber are said to be separated in northern Huehuetenango. It is cultivated occasion- ally for ornament or as a curiosity in Guatemala City and probably elsewhere. The leaves are wetted in water, and fiber is usually ex- tracted by pounding them on stones in running water. It is a very fine and tough fiber, much used for hammocks, bags and string.

(Standley and Steyermark 1958: 384).



Aechmea magdalenae.

Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, Aug. 24, 2018. Camera: Nikon D810. Settings: 1/8 sec; f/11; ISO 1,250.

The Seasonally Dry, Seasonally Inundated Aguadas that are surrounded by *Aechmea* magdalenae



The post in the center is so park rangers can estimate how deep the water is during the rainy season. 2018 was a dry year because here in September (4, 2018) there is only a bit of mud in the center. The area is mostly without plants because the water floods them out every several years. The Acacia bush to the right can withstand the seasonal water.

Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, Sep. 4, 2018. Camera: Nikon D5. Settings: 1/250 sec; f/13; ISO 800.

The Bushes and Forest surrounding a Pital; Pital La Sardina



The open area of the aguada is the bright area in the far background.

The pita plants are behind the tree with the vines. The pita leaves are mostly curling over; are not two meters long (they are a bit more than a meter). The entangled forest and entangled lianas is in the front.

Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, Sep. 4, 2018. Camera: Nikon D5. Settings: 1/250 sec; f/13; ISO 6,400.



Here you can notice that getting anywhere near a pital area is a challenge; your clothes get torn, your hands get bleedy. No wonder there are no plant collections of *Aechmea magdalenae* of PNYNN in herbaria.

Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, Sep. 4, 2018. Camera: Nikon D5. Settings: 1/250 sec; f/13; ISO 2,500.

Thickets of Aechmea magdalenae bromeliads



Finally you can get close enough to photograph the actual pita bromeliads.

Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, Sep. 4, 2018. Camera: Nikon D5. Settings: 1/250 sec; f/13; ISO 2,500.

Concluding Discussion and Summary on Pital Aguada Ecosystems with *Aechmea magdalenae*

Herbaria in Neotropical Flora portal have such few specimens of Aechmea magdalenae that this documents what I have noticed in recent years: intelligent botanists and professors tend to undertake their botanical and ecological field work in areas close to a comfortable hotel or at least a base camp with comfortable living accomodations. We are not always different: we overnight in tents at the Nakum administration area of IDAEH+CONAP where a kitchen, shower, and support is available. We bring our tents to sleep in but there are tables and stools for eating breakfast and dinner.

To visit the more distant pital areas will take additional planning. So far we have learned from park ranger Teco about the following:

- 1. Pucte
- 2. Sardina
- 3. Rio Holmul, north of Naranjo-Sa'al, then west along river
- 4. El Tigre, not far from mirador of El Tigre
- **5.** El Pital, noreste de La Pochiteca

A focus of our 5-year project (2021-2025) of coordination and cooperation with CONAP for the entire Reserva de la Biosfera Maya of Peten is to find, photograph, document, and publish ecosystems (and species of flora and fauna). I am especially interested in wetlands, including seasonally inundated wetlands. So the pital areas surrounding seasonally dry/ seasonally filled aguadas is part of my "to do" list. We have visited and photographed these pital areas before but I wanted good aerial photos so our new drone pilot came with two different models of DJI drones. We register the drone usage with the park administration before arrival and we have GPS MAPS with Garmin equipment showing every place we have been each day.

The spiny terrestrial bromeliad, *Aechmea magdalenae*, can be easily found in two pital habitats near the mud road between Yaxha and Nakum.

When conservation entities are reforesting areas destroyed for cattle, it would help to plant *Aechmea magdalenae* around the aguada (in areas reached by water only at the height of the wet season).

The soft yummy liquid and pulp around the seeds are edible. The fiber from the leaves is one of the highest regarded strings in Mesoamerica.

To find the path to reach these two pital areas it helps to have assistance by Teco (Moises Daniel Perez Diaz) and other knowledgeable guides and park rangers. The pital to the west is about 100 meters; the pitel to the east is a bit less. The fruits and flowers are very photogenic (only one fruit in mid-May, so other months are better).

Best place to stay is Ecolodge El Sombrero, just before the entrance to Parque Nacional Yaxha, Nakum and Naranjo. Be sure you have a licensed local guide who knows which trail goes to each pital area (from the main road of Yaxha to Nakum). It's only about 4 minutes to the Pucte pital and 6 or so minutes to the Sardina pital.



Aechmea magdalenae.

Photograph by: Nicholas Hellmuth. FLAAR Mesoamerica, Sep. 18, 2018. Camera: Nikon D810. Settings: 1/250 sec; f/10; ISO 2,000.

Appendix A List of folders of Aechmea magdalenae, Pita floja by Elena Siekavizza

- 1 Yaxha-to-Nakum-Aechmea-magdalenae-pita-area-Nicholas-view-GOOGLE-Pixel-3XL-Jan-21-2019-Juan-Pablo
- 2 Yaxha-Aechmea-magdalenae-bromeliad-pitafloja-HuaweiP10-Oct-15-2018-Teco
- 3 Yaxha-to-Nakum-Poza-La-Sardina-pinuela-Aechmea-magdalenae-Sep-4-2018-NH
- 4 Nakum-Aechmea-magdalenae-pitafloja-bromeliad-Google-Pixel-3XL-Mar-29-2019-Elena
- 5 Yaxha-to-Nakum-Nicholas-Aechmea-magdalenae-pita-ecosystem-area-Google-Pixel-3XL-Jan-21-2019-Juan-Pablo
- 6 Yaxha-to-Nakum-Poza-La-Sardina-area-bromeliads-Aechmea-magdalenae-Pitafloja-piñuela-Sep-4-2018-NH
- 7 Yaxha-Aechmea-magdalenae-bromeliad-pitafloja-Oct-15-2018-Teco
- 8 Yaxha-to-Nakum-road-Aechmea-magdalenae-pita-pital-pano-GOOGLE-Pixel-3XL-Jan-20-2019-Juan-Pablo-or-NH
- 9 Yaxha-to-Nakum-road-Aechmea-magdalenae-pita-Jan-20-2019-MAG
- 10 Yaxha-to-Nakum-road-Aechmea-magdalenae-pita-bromeliad-Google-Pixel-3XL-Jan-21-2019-Juan-Pablo
- 11 El-Tigre-campamento-Aechmea-magdalenea-pital-fruit-and-pano-iPhone-Xs-Jan-23-2019-NH
- 12 Yaxha-to-Nakum-Poza-Pucte-Aechmea-magdaleneae-pinuela-bromeliad-247-310pm-Sep-4-2018-NH
- 13 Yaxha-to-Nakum-road-pital-closest-to-Nakum-Aechmea-magdalenea-fruit-and-pano-iPhone-Xs-Jan-21-2019-NH
- 14 Yaxha-to-Nakum-past-arroyo-La-Sardina-Aechmea-magdaleneae-bromeliad-Aug-24-2018-NH

By date:

Aug. 24, 2018	Yaxha-to-Nakum-past-arroyo-La-Sardina-Aechmea-magdaleneae-bromeliad-Aug-24- 2018-NH
Sep. 4, 2018	Yaxha-to-Nakum-Poza-Pucte-Aechmea-magdaleneae-pinuela-bromeliad-247- 310pm-Sep-4-2018-NH
	Yaxha-to-Nakum-Poza-La-Sardina-area-bromeliads-Aechmea-magdalenae-Pitafloja- piñuela-Sep-4-2018-NH
	Yaxha-to-Nakum-Poza-La-Sardina-pinuela-Aechmea-magdalenae-Sep-4-2018-NH
Oct. 15, 2018	Yaxha-Aechmea-magdalenae-bromeliad-pitafloja-HuaweiP10-Oct-15-2018-Teco
Oct. 25, 2018	Yaxha-Aechmea-magdalenae-bromeliad-pitafloja-Oct-15-2018-Teco
Jan. 20, 2019	Yaxha-to-Nakum-road-Aechmea-magdalenae-pita-Jan-20-2019-MAG
	Yaxha-to-Nakum-road-Aechmea-magdalenae-pita-pital-pano-GOOGLE-Pixel-3XL- Jan-20-2019-Juan-Pablo-or-NH
Jan. 21, 2019	Yaxha-to-Nakum-road-pital-closest-to-Nakum-Aechmea-magdalenea-fruit-and-pano- iPhone-Xs-Jan-21-2019-NH
	Yaxha-to-Nakum-road-Aechmea-magdalenae-pita-bromeliad-Google-Pixel-3XL-Jan- 21-2019-Juan-Pablo
	Yaxha-to-Nakum-Nicholas-Aechmea-magdalenae-pita-ecosystem-area-Google-Pixel- 3XL-Jan-21-2019-Juan-Pablo
	Yaxha-to-Nakum-Aechmea-magdalenae-pita-area-Nicholas-view-GOOGLE-Pixel- 3XL-Jan-21-2019-Juan-Pablo
Jan. 23, 2019	El-Tigre-campamento-Aechmea-magdalenea-pital-fruit-and-pano-iPhone-Xs-Jan-23- 2019-NH
Mar. 29, 2019	Nakum-Aechmea-magdalenae-pitafloja-bromeliad-Google-Pixel-3XL-Mar-29-2019- Elena



Photograph by: María Alejandra Gutiérrez. FLAAR Mesoamerica, Jan. 29, 2019. Camera: Canon 1D X Mark II. Settings: 1/20 sec; f/14; ISO 2,000.



Photograph by: María Alejandra Gutiérrez. FLAAR Mesoamerica, Jan. 29, 2019. Camera: Canon 1D X Mark II. Settings: 1/20 sec; f/14; ISO 2,000.

Appendix B Portal de Biodiversidad de Guatemala

Often the same collector would send samples from same location to more than one herbaria; in this case we list just one of the locations where the plant was collected. If no coordinates are given, and the same area is listed elsewhere with coordinates, we don't list the undocumented specimen.

It is notable that most collections in Tikal are specifically noted to be "edge of aguada."

MOBOT

Aechmea magdalenae (André) André ex Baker 1793155 Cyrus L. Lundell – Lundell 15451, 1959-02-10 Guatemala, Petén, Tikal National Park, Tikal, Aguada Naranjal on [along] Arroyo [Corriental], 17.225 -89.61305

United States National Herbarium- Smithsonian

Aechmea magdalenae (André) André ex Baker US 1493221H. H. Bartlett 126401931-04-12 Guatemala, El Peten, Department of Peten. Edge of aguada, Tikal.

Aechmea magdalenae (André) André ex Baker US 1084681O. F. Cook & R. D. Martin 2211922-04-09 Guatemala, El Peten, Bet. Yaxmuxan & Yaxha. Tikal district., 100 - 500m

Aechmea magdalenae (André) André ex Baker US 1084645O. F. Cook & R. D. Martin 1791922-04-03 Guatemala, El Peten, La Pita. Tikal district., 100 - 500m. Detalles completos del registro

Aechmea magdalenae (André) André ex Baker US 1635188C. L. Lundell 28271933-04-17 Guatemala, El Peten, The District of Peten. Occupied Clearing, La Libertad.

Aechmea magdalenae (André) André ex Baker US 692175O. F. Cook & C. Doyle 161906-04-18 Guatemala, Alta Verapaz, Vicinity of Finca Sepacuite.

Aechmea magdalenae (André) André ex Baker US 692176O. F. Cook & C. Doyle 961906-04-25 Guatemala, Alta Verapaz, Vicinity of Cahabon.

https://biodiversidad.gt/portal/collections/list.php?usethes=1&taxa=15194



Photograph by: Elena Siekavizza. FLAAR Mesoamerica, Mar. 29, 2019. Camera: Google Pixel 3XL.

References Cited and Suggested Reading on *Aechmea magdalenae*

Most helpful monographs on this plant:

There is no monograph on *Aechmea magdalenae* that we have yet found. These trees certainly deserve more attention in Guatemala and adjacent countries.

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. 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.

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.

BESTELMEYER, Brandon T. and Leeanne E. ALONSO (editors)

2000 A Biological Assessment of Laguna del Tigre National Park, Petén, Guatemala. RAP Bulletin of Biological Assessment 16, Conservation International, Washington, DC. 221 pages.

ESTRADA Loreto, Feliciana

2010 Indicadores ecológicos de la zona riparia del Río San Pedro, Tabasco, México. MS Thesis, El Colegio de la Frontera Sur. 131 pages.

Helpful download:

https://ecosur.repositorioinstitucional.mx/jspui/bitstream/1017/1656/1/10000050585_documento.pdf

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.

Helpful download:

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

LUNDELL, Cyrus L.

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

We scanned the entire book so have it as a super-helpful in-house PDF.

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.

PULESTON, Dennis E.

2015 Settlement and Subsistence in Tikal. The assembled work of Dennis E. Puleston (Field research 1961-1972). Paris Monographs in America Archaeology 43. BAR International Series 2757.

Downloadable:

www.researchgate.net/profile/Olga_Stavrakis3/publication/301202845_Settlement_and_Subsistence_at_Tikal_ The_Assembled_Work_of_Dennis_E_Puleston_Field_research_1961-1972/links/570c3de008ae8883a1ffe8f6/ Settlement-and-Subsistence-at-Tikal-The-Assembled-Work-of-Dennis-E-Puleston-Field-research-1961-1972.pdf

SCHULZE, Mark D. and David F. WHITACRE

1999 A Classification and Ordination of the Tree Community of Tikal National Park, Peten, Guatemala. *Bulletin Florida Museum of Natural History* 41(3): 169-297.

STANDLEY, Paul C. and Samuel J. RECORD

1936 The Forests and Flora of British Honduras. Field Museum of Natural History, Botany Series 12. 432 pages.

QUATTROCCHI, Umberto

2016 CRC World dictionary of medicinal and poisonous plants: common names, scientific names, eponyms, synonyms, and etymology. Vol. 5. 3960 pages.

VÁSQUEZ Mejía, Héctor Mizael

2002 Evaluacion Tecnica, Economica y Social de Pita Floja (*Aechmea magdalenae*) en la Zona de Amortiguamiento del Parque Nacional Sierra del Lacandon, La Libertad, Petén, Guatemala.

Helpful Powerpoint that shows where farmed in Parque Nacional Sierra del Lacandon.

We include lots of other helpful reports by Vásquez Mejía in our year 2019 FLAAR Report on *Aechmea magdalenae* of PNYNN.

VILLASEÑOR, José Luis

2016 Checklist of the native vascular plants of Mexico. Catálogo de las plantas vasculares nativas de México. Revista Mexicana de Biodiversidad 87 (2016) 559–902.

http://revista.ib.unam.mx/index.php/bio/article/view/1638/1296

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

https://plantidtools.fieldmuseum.org/pt/rrc/5582

SEARCH page, but only for collection of the Field Museum herbarium, Chicago.

https://fieldguides.fieldmuseum.org/guides?category=37

These field guides are very helpful. Put in the Country (Guatemala) and you get eight photo albums.

http://enciclovida.mx

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

www.kew.org/science/tropamerica/imagedatabase/index.html

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

www.ThePlantList.org

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

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

Web pages specifically on Aechmea magdalenae

http://tropical.theferns.info/viewtropical.php?id=Aechmea+magdalenae

Helpful because it cites information in an academic manner. Has several photos

Videos on Aechmea magdalenae

90% of returns when you Google "Aechmea magdalenae" video are comercial junk (or on bromeliads in general with just a few seconds on pita). Surely more videos must exist but for now we show one:

https://twitter.com/frutascolombia/status/1350076454026031109?lang=en

Shows how to pull out the fruity seed areas (this is what you can eat, the pulp around each seed).

Permissons

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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Any web site 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 when you include a link back to one of our web sites.

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, Aug. 24, 2018.



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 Díaz is coordinator of Flora & Fauna and MayanToons projects. She's an environmental engineer and for more than six years she has helped with organizing and coordinating each team for the Yaxha and RBM research projects, from 2018 to 2022.

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 At first, she helped us by preparing bibliographies on different subjects. Now, her job consists of coordinating our fieldtrips for the RBM project of 2022 and helps us manage other Flora & Fauna activities.

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

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 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 lconography.

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

Roxana Leal is a 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 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.

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.

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.

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 is an environmental engineering student. 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.

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

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.

Other publications of the fauna of Guatemala



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