



FLAAR
MESOAMÉRICA

WETLANDS #16

PIMIENTO PALM **SAW PALMETTO PALM**

Acoelorrhaphe wrightii

**Swamps and Marshes,
of Livingston, Izabal**

NICHOLAS HELLMUTH

WETLANDS #16

PIMIENTO PALM
SAW PALMETTO PALM

Acoelorrhaphe wrightii

APRIL 2021



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Acoelorrhaphe wrightii.

Photography by: David Arrivillaga, FLAAR Mesoamerica, Jan. 19, 2020, 12:07 p.m. La Tinta, Alta Verapaz, Guatemala.

Camera: Google Pixel 3XL. Lens: Canon EF 300mm IS II USM. Settings: 1/400 sec; f/8; ISO 200.

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Acoelorrhaphe wrightii.

Photography by: David Arrivillaga, FLAAR Mesoamerica, Jan. 19, 2020, 12:07 p.m. La Tinta, Alta Verapaz, Guatemala.

Camera: Nikon D810. Lens: Nikon AF-S Micro NIKKOR 60mm G ED. Settings: 1/100 sec; f/11; ISO 2500.

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Edible Wetlands Plants of Municipio de Livingston, Izabal

Wetland Series 1: from Swamps, Marshes and Seasonally Inundated Flatlands of Izabal



Wetland Series 2: plants that grow along the beach shore of Amatique Bay



Wetland Series 3: plants that grow alongside water: rivers, lagoons, swamps, or ocean





Acoelorrhaphes wrightii. "Saw palmetto palm" is the common name for some English speaking countries.

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 12, 2020, 11:24 a.m. El Golfete Laguna 4 Cayos Livingston
Camera: Canon EOS-1D X Mark II. Lens: Canon EF 100MM Macro USM. Settings: 1/1250 sec; f/7.1; ISO 2,000.

INTRODUCTION

SAW PALMETTO PALM

There are millions of corozo palms in most areas of Peten, Alta Verapaz, Izabal, and Belize. Therefore corozo (cohune palm, *Attalea cohune*) is the species most visitors recognize. If you go to Tikal, Yaxhá, Nakum, or Naranjo (Petén) or to nearby Belize Maya ruins, you also learn about Guano, Botan, and Escoba palm (and about several different kinds of Xate palm). In Alta Verapaz there are pacaya palm everywhere (this edible palm is also wild in forests all around the Neotropical areas of Guatemala and adjacent countries; we have found a few wild pacaya palms in the Municipio de Livingston).

But there are about 35 palm species in the Municipio de Livingston, Departamento of Izabal: the area of Guatemala facing the Caribbean Sea. There are more xate-sized palms here than I realized existed (these unexpected palms are especially common in the nature reserve of Lagunita Creek (near Rio Sarstún nicely maintained by CONAP and FUNDAECO)). So we would like to add more palm species to the palms that ethnobotanists, botanists, ecologists, and archaeologists study. And the palm that we begin with is *Acoelorrhaphe wrightii*. This palm is present in Parque Nacional Yaxha, Nakum y Naranjo but not well documented in other parts of Petén nor Izabal and is scarce in adjacent Alta Verapaz (but is in most lists of plants of seasonally inundated areas in much of Belize).



Acoelorrhaphe wrightii. (Griseb. & H. Wendl.) H. Wndl. ex Becc. is an accepted name for this species.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Mar. 14, 2020, 11:45 a.m. Reserva Natural Tapon Creek, in front of Amatique Bay, Livingston.

Camera: NIKON D810, Lens: 200.0 mm, Speed 1/80; opening f 10; ISO 1,600.

FULL BOTANICAL NAME AND HABIT

Acoelorrhaphe wrightii (Griseb. & H.Wendl.) H.Wendl. ex Becc. is the accepted name.

Habit: palm. Technically (botanically) palms are not “trees” but in most “List of Trees” of any national park or nature preserve palms are in the tree portion of the list. Bartlett spells the genus *Acoelorrhaphe*; the correct spelling that Google wants to see is *Acoelorrhaphe*. Yet both spellings are found in older books. Moya (2019) nicely describes all the spellings, their origins, and the resolution to reach today’s accepted spelling. www.ThePlantList.org of course tells you clearly that the correct botanical name today is *Acoelorrhaphe wrightii* (Griseb. & H.Wendl.) H.Wendl. ex Becc. A dozen other plant names are synonyms.

www.theplantlist.org/tpl1.1/record/kew-2153.



Acoelorrhaphe wrightii. "Saw palmetto palm" is the common name for some English speaking countries.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Mar. 13, 2020, 12:28 p.m. Reserva Natural Tapon Creek, in front of Amatique Bay, Livingston.

Camera: Sony RX10 IV. Lens: Sony FE 200-600mm G OSS. Settings: 1/1250 sec; f/4.0; ISO 800.

LOCAL NAMES FOR ***ACOELORRHAPHE WRIGHTII***

Lots of common local names for most plants of Mesoamerica: depends on where the tree is located. In Florida this *Acoelorrhaphe wrightii* palm is called paurotis palm, Everglades palm, saw cabbage palm, silver-saw palmetto, saw palmetto or comparable names. Silver Saw Palmetto is another name (nothing about the tree looks silver color in Petén or Izabal). But this is a name used in Florida. But these are names primarily in southeastern USA. I prefer to look for the names used in Petén, Izabal, and Belize. In Spanish: "palma de pantano".

<http://sds.yucatan.gob.mx/flora/fichas-+tecnicas/Tasiste.pdf>

Since there are no savannas (yet found) in the area of Izabal where we are working, this name is not pertinent here. But in Belize most of the tasiste palms are indeed in savannas. The Mayan word used in Petén is tasiste. "Te" (usually te' in Yucatan-derived Maya languages or "che" in Q'eqchi' Mayan) means tree. Would be a nice linguistic research project to learn what tasis means.



Acoelorrhaphe wrightii. (Griseb. & H. WEndl.) H. Wndl. ex Becc. Family Arecaceae.

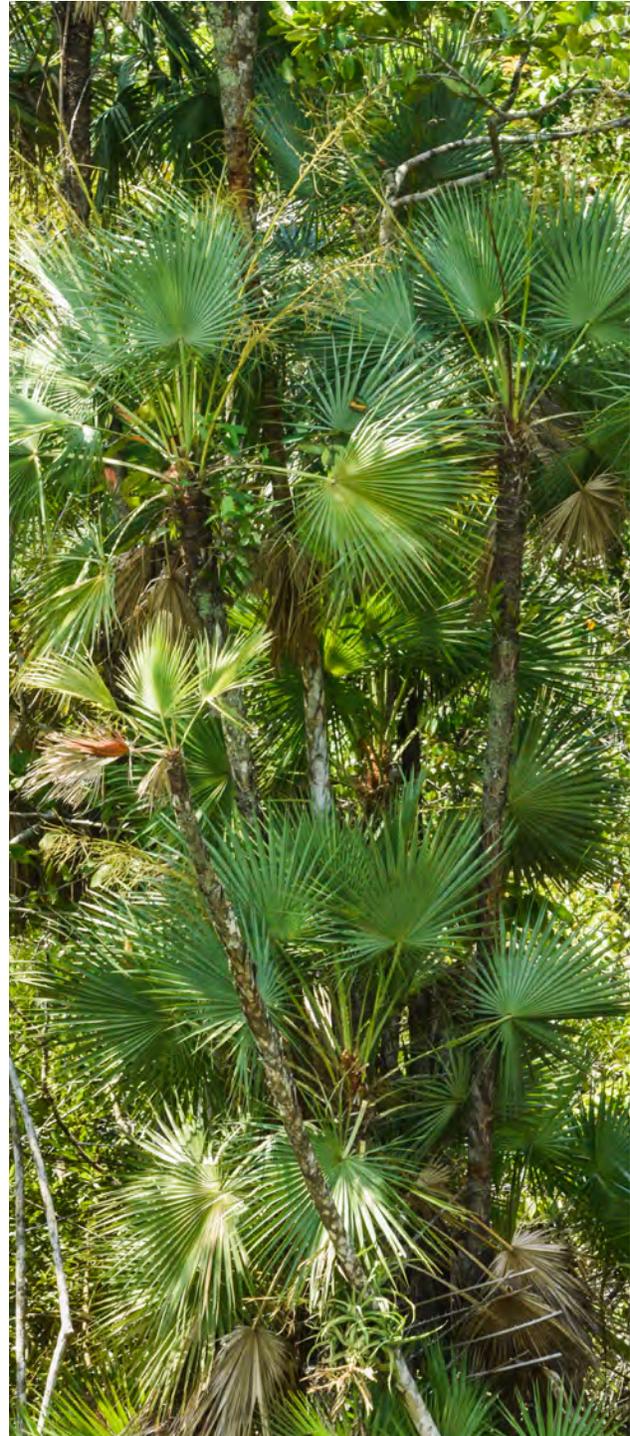
Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, March. 12, 2020, 12:27 p.m. Reserva Natural Tapon Creek, in front of Amatique Bay, Livingston.

Camera: Canon EOS-1D X Mark II. Lens: Canon EF 100MM Macro USM. Settings: 1/1000 sec; f/9; ISO 800.

The most complete list of local common names is in the botanical monograph of Balick, Nee and Atha (2000: 194):

- Chi-it
- Hairy tom (the bark is “hairy”)
- Hairy tom palmetto
- Honduras Pimento
- Palma
- Palmetto
- Papta
- Pimento palm
- Pim-ient
- Pim-int
- Prementa and primenta (surely a total misunderstanding of the local word pimento)
- Taciste
- Tasiste
- Ta-sis-te

In Spanish a tree is sometimes given a male ending (...o) and other times the same tree is given a female ending (...a). So, I am not at all surprised to see both Pimento and Pimiento. And it is common in Guatemala to have an ending that says the plant is small: so pimientillo or pimientilla. It's just local slang in Guatemala. Does not really mean anything is small. The local Q'eqchi' Mayan capitan of the lancha (boat) told us the name was Pimienta or Pimientilla.



Acoelorrhaphe wrightii. (Griseb. & H. Wendl.) H. Wndl. ex Becc. is an accepted name for this species.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Mar. 13, 2020, 11:12 a.m. El Golfete, south side lagunitas Livingston.

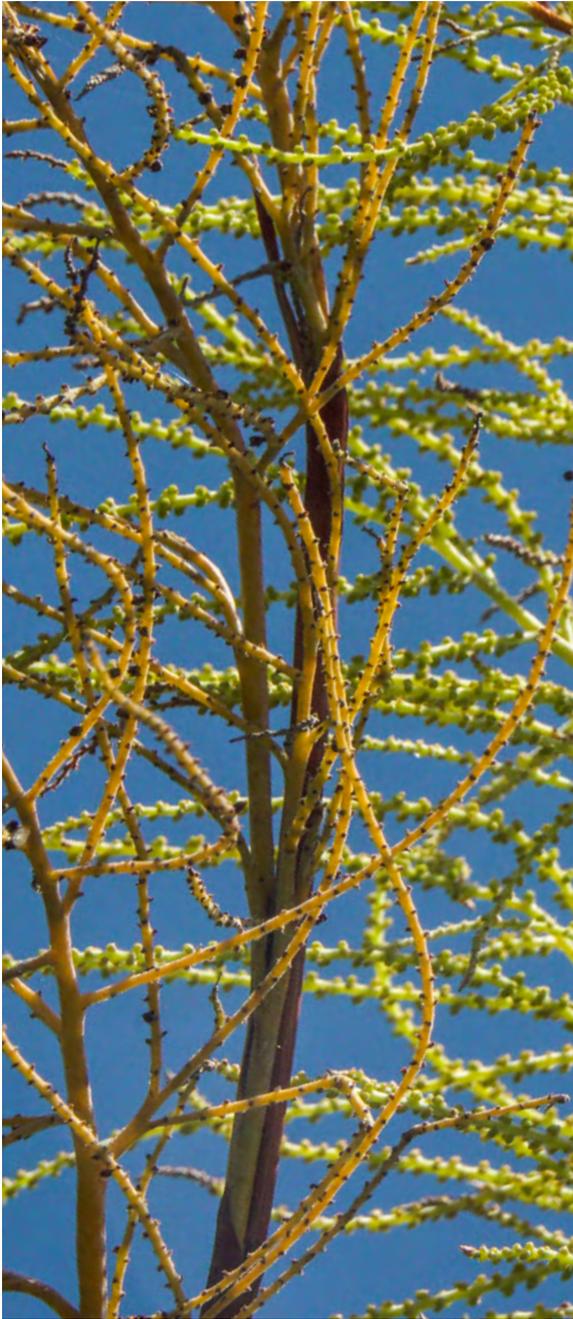
Camera: NIKON D810. Lens: Nikon AF-Micro-NIKKOR 200mm IF-ED Macro. Settings: 1/320 sec; f/11; ISO 3,200.



Acoelorrhaphes wrightii. (Griseb. & H. Wendl.) H. Wendl. ex Beec. Family Arecaceae.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 14, 2019, 12:39 p.m. Arroyo Petexbatún, Petén, Guatemala.
Camera: NIKON D5. Lens: AF-S VR Micro-Nikkor 105mm IF-ED. Settings: 1/800 sec; f/ 7.1; ISO 1,000.

SYNONYMS FOR *ACOELORRHAPHE WRIGHTII*



Acoelorrhaphe wrightii: Inflorescence and diminute fruits.

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 12, 2020, 7:43 a.m. Lagunita El Salvador, Municipio de Livingston.

Camera: Sony DSC-RX10M4. Lens: Sony FE 28-60mm, Settings: 1/640 sec; f/8; ISO 500.

If you look for synonyms for a plant, different web sites will give slightly different lists. So I prefer to utilize the botanical web site of Kew Gardens and their associates which can be found in this single web site www.ThePlantList.org. So far, 99% of their synonyms in this website has been that I am looking for. Only rarely is their list incomplete. For *Acoelorrhaphe wrightii* this web site is in the 99% range.

- *Acanthosabal caespitosa* Prosch.
- *Acoelorrhaphe arborescens* (Sarg.) Becc.
- *Acoelorrhaphe pinetorum* Bartlett
- *Acoelorrhaphe wrightii* f. *inermis* Hadac
- *Acoelorrhaphe wrightii* var. *novogeronensis* Becc.
- *Brahea psilocalyx* Burret
- *Copernicia wrightii* Griseb. & H.Wendl.
- *Paurotis androsana* O.F.Cook
- *Paurotis arborescens* (Sarg.) O.F.Cook
- *Paurotis psilocalyx* (Burret) Lundell
- *Paurotis schippii* Burret
- *Paurotis wrightii* (Griseb. & H.Wendl.) Britton
- *Serenoa arborescens* Sarg.

www.theplantlist.org/tpl1.1/record/kew-2153

A PALM THAT LOOKS "ALMOST IDENTICAL" TO *ACOELORRHAPHE WRIGHTII*

When I first saw the palmetto palm along the shore of an inlet of El Golfete, Municipio de Livingston, Izabal, I thought it should be identified as *Schippia concolor*. Back at the office on Guatemala City, the environmental engineer student Victor and plant scout Senaida, nudged me to accept *Acoelorrhaphe wrightii* as the more likely Genus species for what we found. Our team returned to El Golfete in mid-March and found lots more palms along the edges of several of the rivers and inlets off both north and south sides of the east half. Got better photos of the inflorescences and flowers or seeds. But, since you are in a rocking boat it's a challenge to get a good photo of the inflorescences blowing in the wind. But, at least now we have enough photos for a palm specialist to notify us whether it is hopefully *Acoelorrhaphe wrightii* or really *Schippia concolor*. Actually some botanists estimate that *Schippia concolor* is not present or likely to be found anywhere in Guatemala. Since there are zero pine trees anywhere in Parque Nacional Yaxhá, Nakum y Naranjo, Petén, and zero pine trees in the lowland areas of Municipio de Livingston, Izabal, Guatemala, I doubt *Schippia concolor* is present. The best article on *Schippia concolor* is by Balick and Johnson (1994).



Acoelorrhaphe wrightii. (Griseb. & H. Wendl.) H. Wndl. ex Becc. is an accepted name for this species.

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 14, 2020, 12:45 p.m. Lagunita El Salvador, Livingston.
Camera: Sony RX10 IV. Lens: Sony FE 200-600mm G OSS. Settings: 1/640 sec; Opening f/8; ISO 500.

CLOSE RELATIVE(S) OF *ACOELORRHAPHE WRIGHTII* PRESENT IN GUATEMALA

I am keen on finding, photographing, researching, and publishing on *Acoelorrhaphe wrightii* because my entire recent 55+ years in Tabasco, Chiapas, Campeche, Quintana Roo, Belize, Honduras, El Salvador, and all of Guatemala (especially Peten and Alta Verapaz) I have seen so many corozo, escoba, guano, botan (tall guano), edible pacaya, and all the xate palm species that I am motivated to learn a-bout more exotic and less-well known palms. But I never had seen a single *Acoelorrhaphe wrightii* palm until we were working together with CONAP and IDAEH park rangers in Parque Nacional Yaxhá, Nakum y Naranjo. Now, in Izabal, we are finding more of the same *Acoelorrhaphe wrightii* palms, but in totally different kinds of biodiverse habitats in the [Municipio de Livingston](#).



Acoelorrhaphe wrightii. (Griseb. & H. Wendl.) H. Wendl. ex Beec. Family Arecaceae.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Mar. 12, 2020, 12:28 p.m. Reserva Natural Tapon Creek, in front of Amatique Bay, Livingston.

Camera: Sony DSC-RX10M4. Lens: Sony FE 28-60mm, Settings: 1/640 sec; f/13; ISO 3,200.



Acoelorrhappe wrightii, a tiny bee hive or wasp nest under the pimientillo palm leaf.

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 14, 2020, 8:45 a.m. Biotopo Chocón Machacas, Municipio de Livingston, Izabal, Guatemala.

Camera: Canon EOS-1D X Mark II. Lens: Canon 50mm f/2.5 Macro. Settings: 1/10 sec; f/13; ISO 640.

IS *ACOELORRHAPHE WRIGHTII* PRESENT IN **PARQUE NACIONAL TIKAL**

Schulze and Whitacre have no tasiste palm under *Acoelorrhaphe wrightii* in their list of trees (they did admirable field work but collected primarily from the areas that were easy to reach with a vehicle or comfortable walk not too far from camp). They did not reach any of the small areas within the Tikal park that may potentially have different habitat than the hilltops and hillsides and tinal areas where most botanical research has been undertaken in the recent 70 years. Would need to check their list a total of 13 more times (once for accepted name and then 13 times for synonyms; or more clever, search by species since.



Acoelorrhaphe wrightii. (Griseb. & H. Wendl.) H. Wendl. ex Beec. Family Arecaceae.

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 14, 2020, 12:40 p.m. Biotopo Chocón Machacas, Municipio de Livingston, Izabal, Guatemala.

Camera: Sony RX10 IV. Lens: Sony FE 200-600mm G OSS. Settings. 1/1250 sec; f/4.0; ISO 800.

The one specimen listed in the Neotropical plant data base for Tikal of *Acoelorrhaphe wrightii* is about 3 kilometers outside the park:

Catalog #: 02319699

Occurrence ID (GUID): 5a5d55c2-0b11-4e67-b412-341138eba0a6

Taxon: *Acoelorrhaphe wrightii* (Griseb. & H.Wendl.) H.Wendl. ex Becc.

Family: Arecaceae

Collector: E. Contreras 15

Date: 1959-07-24

Verbatim Date: 24 Jul 1959

Locality: Guatemala, Petén, Tikal National Park, 46 km, on Brecha (J)

Petrolera -- pinal Bajo de Santa Fe.

So this specimen is in theory outside the park since the pine tree area is about 3 km east of the northeast corner of the park:

Este es un rodal de aproximadamente 200 ha de *Pinus caribaea*, localizado afuera del Parque, a 3 km al este del esquinero noreste, denominado El Pinal. Esta ubicado en una elevación de terreno rodeado por una amplia área de bajos dominados por tinal (*Haematoxylum campechianum*). Los pinos se encuentran asociados a la palma taciste (*Paurotis whrightii*), encino (*Quercus shippii*), nance (*Byrsonima* spp.), morro (*Crescentia cujete*) y zacate navajuela (Fialko, 2001). La altura de los árboles no supera los 20 m. Además, se encuentra registrado en el índice 3 de la Lista Roja de CONAP.

(Chan et al. 2003: 29)



Acoelorrhaphe wrightii.

Photo by: David Arrivillaga, FLAAR Mesoamerica, March. 14, 2019, 11:13 a.m Arroyo Petexbatún, Petén, Guatemala.
Camera: NIKON D5. Lens: 1AF-S VR Micro-Nikkor 105mm IF-ED. Settings: 1/800 sec; f/7.1; ISO 1,000.

SAME FOR YAXHA, NAKUM AND NARANJO, TASISTE **PALM TOTALLY MISSING FROM EARLIER LISTS**

During the many months each year (1970-1973) that I mapped the Maya ruins of Yaxha and two field trips to Nakum, I never saw any *Acoelorrhaphe wrightii* palms. So no shock that no one else found any *Acoelorrhaphe wrightii* either. *Sabal morrisiana*, botán, is the sole Areaceae in the Plan Maestro 2006-2010 for the park (page 146). This list is from Dix and Dix 1992. This opus is not in the bibliography. The year 2015 Plan Maestro lists three palms; botán, corozo and escoba. The FLAAR Mesoamerica team found and photographed those three, plus pacaya, bayal, huiscoyol, tasiste, *Gaussia maya*, and several others (about 300% more than documented in previous decades). We are keen to find even more since we estimate there should be between 20 and 30 palm species in Parque Nacional Yaxha, Nakum y Naranjo. We have asked professors Dix how we can obtain a copy of their 1992 report but no copy has been provided nor location of where we could see a copy. But the entire list is fully published in two Plan Maestro reports that can be downloaded in many places.



Acoelorrhaphe wrightii. "Saw palmetto palm" is the common name for some English speaking countries.

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 14, 2020, 12:41 p.m. Biotopo Chocón Machacas, Livingston.
Camera: Sony RX10 IV. Lens: Sony FE 200-600mm G OSS. Settings: 1/500 sec; f/4; ISO 800.

BRIEF DESCRIPTION OF *ACOELORRHAPHE WRIGHTII* BY STANDLEY AND RECORD (1936)

The local Pine forest forms a type that is not characteristic of Central America, except for similar areas in near-by Guatemala and certain portions of Atlantic Honduras and Nicaragua. The colonization by *Pinus caribaea* (Pine) of the inland savannas occurring on the coarse grits and quartz beach sands derived from the metamorphic rocks of the central region has created extensive forests of this species. The colonization of the moist type has probably occurred after an intermediate stage of *Crescentia cujete* (Calabash) and *Acoelorrhapha wrightii* (Palmetto) association. Palmetto survives in the Pine forest, which on the low-lying coastal plain is characterized by frequent *Acoelorrhapha* clans. In this moist type Pine seldom exceeds eighty feet in height and in extremely moist sites height growth is often reduced to forty or fifty feet. Pine enters the dry type apparently without such an intermediate stage and, finding its optimum habitat, attains a height growth of more than one hundred feet. Its usual associates in a scattered undergrowth are *Quercus* spp. (Oaks), *Curatella americana* (Yaha), and *Byrsonima crassifolia* (Craboo).

(Standley and Record 1936)

So far, we have not yet found any *Curatella americana* in any of the three seasonally inundated savannas in Parque Nacional Yaxhá, Nakum y Naranjo. If this plant is present primarily in association with pine, then I would not expect *Curatella americana* in PNYNN. Calabash tree and nance trees are easy to find in most savannas within the park: lots in the large Savanna East of Nakum. Calabash trees are noticeable also in the Savanna West of Naranjo. I estimate they can be found in the Savanna of 3 Fern Species (northwest corner of PNYNN, near the edge of the park). No oak yet noticed by us in the park, but nothing would surprise me; but since it may be pine-oak association, since there is no pine there may not be many or even any oak.

Acoelorrhaphe wrightii (Griseb.) Wendl. *Brahea psilocalyx* Burret, Notizbl. Bot. Gart. Berlin 11: 1037. 1934. Pimenta Palm. Stann Creek Valley and elsewhere; Cuba; Honduras (?). A tall palm, 6 meters high; petioles armed with stout hard prickles; leaf blades fan-shaped, 60 cm. long, pale green, composed of numerous folded segments; spadices a meter long, with very numerous slender branches, the branches whitish-pubescent, the flowers scarcely 2 mm. long; fruits globose, 8-9 mm. in diameter. Schipp states that the plant grows only in swampy places. *Brahea psilocalyx* was based on Peck 241 from Manatee Lagoon.

Acoelorrhaphe pinetorum Bartlett (Carnegie Inst. Wash. Publ. 461: 33. 1935), recently described from Belize, Bartlett 11201, is another name for this palm. If the plant of British Honduras should prove distinct, as seems doubtful, Burret's name is the proper one for it. Bartlett indicates as vernacular names Hairy Tom Palmetto, Papta, and Prementa, the last doubtless a corruption of the Spanish *pimienta*.

(Standley and Record 1936: 78-79).



Acoelorrhaphe wrightii. (Griseb. & H. Wendl.) H. Wndl. ex Becc. is an accepted name for this species.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 12, 2020, 10:36 a.m. El Golfete, south side lagunitas Salvador, Livingston.
Camera: NIKON D5. Lens: Nikon 28-300mm VR. Settings: 1/400 sec; f/8; ISO 800.

PALMAE

Chamaedorea karwinskyana Wendl. Reported recently by Burret from Camp 36 on the Guatemalan boundary, 900 meters, Schipp 894; also in Guatemala and southern Mexico. Stems 2.5-4.5 meters high and 2.5 cm. thick.

Paurotis schippii Burret, Notizbl. Bot. Gart. Berlin 12: 303. 1935. Type from "Pojkтуun Trail," 780 meters, in swamp forest, Schipp 893. Closely related to the palm listed in the treatment of the family as *Acoelorrhaphe wrightii*, but distinguished by having unarmed petioles. Burret now uses the generic name *Paurotis* O. F. Cook in place of *Acoelorrhaphe*.

(Standley and Record 1936: 405).

Would be helpful to find a botanical report to discuss why some petioles are armed and others unarmed.



Acoelorrhaphe wrightii. (Griseb. & H. Wendl.) H. Wendl. ex Beec. Family Arecaceae.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Mar. 12, 2020, 7:11 a.m. Reserva Natural Tapón Creek, Livingston.

Camera: NIKON D810. Lens: Nikon AF-Micro-NIKKOR 200mm IF-ED Macro. Settings: 1/200 sec; f/10; ISO 8,000.



Acoelorrhaphe wrightii. "Saw palmetto palm" is the common name for some English speaking countries

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 12, 2020, 11:24 a.m. Biotopo Chocón Machacas, Municipio de Livingston, Izabal, Guatemala.

Camera: Canon EOS-1D X Mark II. Lens: Canon EF 100MM Macro USM. Settings: 1/1250 sec; f/7.1; ISO 2,000.

BOTANICAL DESCRIPTION BY STANDLEY AND STEYERMARK (1958)

Notable that in 1958 these botanists call the palm *Paurotis wrightii*; yet in 1936, the same botanist (Standley) focused on the name *Acoelorrhaphe wrightii* (that today would be written with no capital letter for the species). The genus consists of a single species and by most recent authors has been treated under the generic name *Acoelorrhaphe wendland*. For comments on the correct name see Bailey and Moore listed above.

Paurotis wrightii (Griseb. & Wendl.) Britton ex Britton & Schafer, N. Amer. Trees 141. 1908. *Copernicia wrightii* Griseb. & Wendl. ex Griseb. Cat. Pl. Cuba 220. 1866. *Acoelorrhaphe wrightii* Beccari, Webbia 2: 109. 1907. *Brahea psilocalyx* Burret, Notizbl. Bot. Gart. Berlin 11: 1037. 1934 (type from Manatee Lagoon, British Honduras, M. E. Peck 241)- *A. pinetorum* Bartlett, Carnegie Inst. Wash. Publ. 461: 33. 1935 (type from pine woods near Belize, British Honduras, H. H. Bartlett 11201}. Palma. Figure 47. Moist or wet pine woods, sometimes in *Manicaria* swamps, or about or in savannas, 200 meters or lower; Alta Verapaz; Izabal; probably also in Peten. Southern Mexico to Honduras; Cuba; southern Florida. A rather small palm, the trunk slender, 3-8 meters high, 6-10 cm. in diameter, the plants usually forming colonies; leaf sheaths rufous-brown, glabrous, lustrous, dividing into numerous fibers; petioles 125 cm. long or shorter, usually coarsely dentate on the margins with brown incurved teeth; leaf blades grass-green above, dull pale green or silvery beneath, orbicular in outline, with about 40 segments on each side, almost glabrous or minutely whitish-pubescent; inflorescences ascending to erect, the spadix about a meter long, with about 9 spathes, the lowest spathe reddish, semicylindric, about 14 cm. long, glabrate, but when young floccose-pilose, especially on the margins; primary branches of the spadix 25 cm. long or less, the branchlets white-tomentose, only the ultimate ones floriferous, 5-12 cm. long; calyx segments pale brown, 1 mm. long, carnose, free and membranaceous at the apex, multifimbriate; corolla pale brown when dry, white-lineate, the petals fleshy, glabrous, 1.7 mm. long; fruit 7-8 mm. long and 6-8 mm. in diameter.

[Continues on next page]

In British Honduras called "Honduras pimenta" and "Hairy Tom palmetto." No good reasons have been given for separating the British Honduras palm from that of Cuba and Florida. Bartlett says that *Acoelorrhaphe pinetorum* differs from *A. Wrightii* "in a number of minute but definite floral characteristics that are sufficient to give it specific status," but these must be minute indeed, since he gives no hint of what they may be. Apparently the British Honduras palm's chief claim to recognition as a separate species is its range; but range, despite its frequent invocation, is not a specific character.

(Standley and Steyermark 1958: 277-279).

Standley and Steyermark say that "the plants usually forming colonies" but provide zero additional description. In a savanna or in a tasistal it is much easier to count how many stems rise from each root mass. When the plants are on the shore of a lake or river, or mixed in with a mangrove swamp, there is no way to leave the boat to reach the shore, and no way to walk on the shore, and even less ability to see the base of the trunks (because of all the ground vegetation, not to mention potential snakes or crocodiles). So we can only show the "colonies" from afar. *Acoelorrhaphe wrightii* palm clusters near the shore of lagunitas adjacent to El Golfete, Municipio de Livingston.



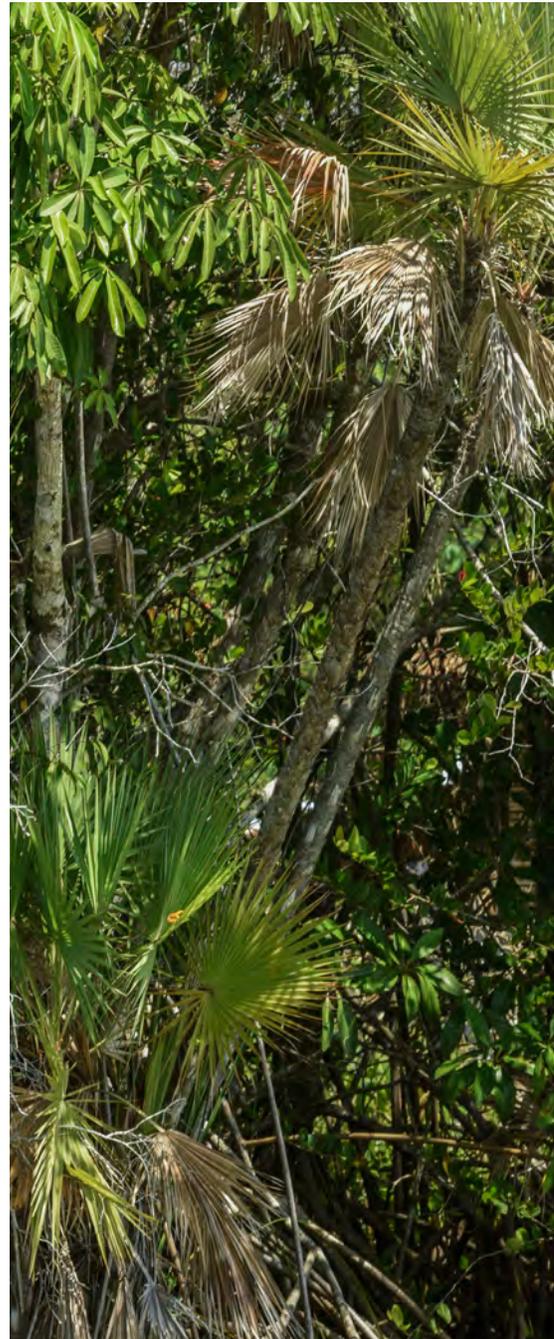
Acoelorrhaphe wrightii.

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 12, 2019, 10:36 a.m. Sabana Nakum, Parque Nacional Yaxha, Nakum y Naranjo, Petén. Camera: NIKON D5. Lens: Nikon 28-300mm VR. Settings: 1/400 sec; f/8; ISO 800.

CLUSTERS: HOW DOES *ACOELORRHAPHE WRIGHTII* GROW?

I have seen, in-person, up close, the different stages of growth of *Acoelorrhaphe wrightii* palms. Very easy, hike hour after hour through two tasistal areas in the Petexbatun wetlands area (several hours by boat from Sayaxche, Peten). Guano palms grow “hundreds in one ecosystem” but each tree is separate from all the others (even if entangled because of the thickness of the bajo or hillside forest vegetation). Same with corozo (cohune) palm trees: could be close to a thousand individual trees in the dense areas where they are 90% of the vegetation: called corozal or corozera (singular for the area, since it is one area that gets the name for the hundreds that are near each other).

But *Acoelorrhaphe wrightii* palms, in this savanna, always grow in a clump. However I count each stem as an individual (even if it happens to bump into another one from the same ground level root mass). Corozo palms also occur in totals of hundreds or thousands within a square kilometer in “corozals” or “corozeras.” But each corozo or guano or escoba palm is totally spatially and physically independent even if growing next to another. So neither guano nor corozo nor escobo palms grow in the same kind of almost conjoined clumps as do the *Acoelorrhaphe wrightii* palms.



Acoelorrhaphe wrightii.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 12, 2020, 10:21 a.m. El Golfete, south side lagunitas Salvador, Livingston.

Camera: NIKON D5 , Lens: AF-S VR Micro-Nikkor 105mm IF-ED. Settings: 1/250 sec; f/9/ ISO 500.

Acoelorrhaphe wrightii palms grow in clusters; each cluster (of 5, 9, or perhaps up to 15 stems), rises from a solid root mass. I did not notice many single individual independent trees (though I would not be surprised to find a single stem, where the others from the root mass have died or been chopped down or otherwise destroyed). Huiscoyol (*Bactris* species) also grow in clumps: with so many thousands of needle-thin and full length spines that you have to be very careful when studying these). But so far there are not enough *Bactris* palms found in the PNYNN park area to see whether they grow in clumps (as they do along rivers).

We found dense clumps of *Bactris* palms several meters away from dense clumps of *Guadua* bamboo along the Rio Icbolay, east of Parque Lachua, Guatemala. Rio Icbolay is a tributary of the Rio Chixoy. All this is in the area where southwestern part of Peten borders on northwestern part of Alta Verapaz. So far we noticed only a few *Bactris* palms growing along the edges of rivers or inlets in the Municipio de Livingston. Is this because *Bactris* palms prefer non-brackish water?. One of our plant scouts lives on the Rio Icbolay, so that's how we got to see, experience, and photograph the *Bactris* and *Guadua* bamboo along this totally non-touristed river. With the help of the guides at Lagunita Creek nature reserve we have found some relatives of *Bactris* palms there. But so far no *Guadua* bamboo along the shores since most of the shore is a mangrove swamp.



Acoelorrhaphe wrightii. "Saw palmetto palm" is the common name for some English speaking countries.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Mar. 12, 2020, 11:12 a.m. Reserva Natural Tapón Creek, Livingston. Camera: NIKON D810, Lens: Sigma 50mm Dg. Settings: 1/200 sec; f/14; ISO 800.



Acoelorrhaphes wrightii. (Griseb. & H. Wendl.) H. Wendl. ex Becc. is an accepted name for this species.

Photo by: Haniel López, FLAAR Mesoamerica, Mar. 12, 2020, 3:11 p.m. Reserva Natural Tapon Creek, in front of Amatique Bay, Livingston.

Camera: Canon EOS-1D X Mark II. Lens: Canon EF 24-105mm IS USM. Settings: 1/320 sec; f/13; ISO 4,000.

COVERAGE OF *ACOELORRHAPHE WRIGHTII* IN OTHER PERTINENT BOOKS

We have not yet found a MS thesis or PhD dissertation on *Acoelorrhaphe wrightii* palms. Normally *Acoelorrhaphe wrightii* palm is simply in a standard tabulated list, with no information other than that it is present. In a few instances the wetlands habitat where it prefers to grow is indeed mentioned, but this is rare. *Acoelorrhaphe wrightii* is not in the index of *Arboles tropicales* de Mexico (Pennington and Sarukhan 2005), even though this is a third edition. Fortunately *Acoelorrhaphe wrightii* is included in *Árboles del mundo maya*, by Peña and Knapp (2011). *Acoelorrhaphe wrightii* is in *Árboles de Calakmul* (Ochoa et al. 2018: 60) but a typical 1-page summary with tiny photos and no detailed information (since the authors have to cover 179 species!).

The *Acoelorrhaphe wrightii* palms deserve an entire chapter on the remarkable tasistal habitat of the Petexbatún areas, an additional chapter on the three savanna eco-systems where we found tasiste growing in Parque Nacional Yaxhá, Nakum y Naranjo, and a chapter on the *Acoelorrhaphe wrightii* palms of the Municipio de Livingston (plus a chapter on this palm elsewhere in Petén and Alta Verapaz as soon as funds are available to facilitate being able to send a team to these additional locations).



***Acoelorrhaphe wrightii*.**

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Mar. 12, 2020, 7:43 a.m. Reserva Natural Tapón Creek, Livingston. Camera: NIKON D810 , Lens: Nikon AF-Micro-NIKKOR 200mm IF-ED Macro. Settings: 1/80 sec; f/10; ISO 400.

HOW HIGH DO *ACOELORRHAPHE WRIGHTII* PALMS REALLY GROW?

Standley and Steyermark say 3 to 8 meters high (1958: 277). These are the heights we see along the rivers, creeks, and lagoons of El Golfete and near Rio Sarstún to the north. But in an area where there is more sun, I would not be surprised to find a *Acoelorrhaphe wrightii* palm up to 10 meters high. Along the rivers and lagoons of Izabal there is a lot of shade from large trees all around them, so here the palms may reach only 6 to 8 meters. The place we found really tall *Acoelorrhaphe wrightii* palms was a few hundred meters from the south shore of Arroyo Petexbatún, near the Hotel Ecologico Posada Caribe, several hours up the river from Sayaxché, Petén. Even in the annually burned tasistal ecosystems in the Petexbatun wetlands upriver from Sayaxché the *Acoelorrhaphe wrightii* palms grow fairly high. Surely we can find an *Acoelorrhaphe wrightii* palm taller than this, but here is an example from Municipio de Livingston.



Acoelorrhaphe wrightii. "Saw palmetto palm" is the common name for some English speaking countries.

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 2, 2019, 12:29 p.m. Savanna East of Nakúm, PNYNN, Petén.
Camera: Canon EOS-1D X Mark II. Lens: Canon EF 24-105mm IS USM. Settings: 1/30 sec; f/10; ISO 250.

WHAT IS THE **BARK** LIKE?

80% of the *Acoelorrhaphe* palms in a tasistal savanna are burned so their bark is seared. About 50% of the palms in grassland savannas of Parque Nacional Yaxhá Nakum Naranjo are also burned at least every two or three years. In fact I am so used to seeing the burned trunks that when I saw the original pristine trunks of the palms on the shore of an inlet of El Golfete, to the left of Hotel Tenamit Maya, El Higuerito, Izabal. I thought these were a different species. Elsewhere, same species of *Acoelorrhaphe*, but different ecosystem, I was pleasantly surprised to see a red color on part of the trunk of these palmetto palm trees. Thus these palms can make a great garden plant. But do not take them from any wild forest. Try to find seeds or find the actual root stock in a plant nursery.



Acoelorrhaphe wrightii.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Mar. 12, 2020, 12:14 p.m. El Golfete, Laguna 4 Cayos Livingston.
Camera: Canon EOS-1D X Mark II. Lens: Canon EF 24-105mm IS USM. Settings: 1/320 sec; f/13; ISO 4,000.



Acoelorrhaphe wrightii.

Photo by: David Arrivillaga, FLAAR Mesoamerica, March. 13, 2019, 12:25 p.m. Arroyo Petexbatún, Petén, Guatemala.
Camera: NIKON D5. Lens: AF-S VR Micro-Nikkor 105mm IF-ED. Settings: 1/800 sec. f/ 7.1. ISO 1.000.

INFLORESCENCE, **FLOWERS AND SEEDS**

Trying to take photographs of palm inflorescence blowing in the wind while the boat you are on is rolling with the waves results in photographs that are not very crisp. We have learned that using a tripod in a boat is no help because the entire tripod rolls with the movement of the boat. What is needed is a Ken-Lab gyroscopic stabilizer from Kenyon. I used this brand 30 years ago doing aerial photography of Tikal and Nakum from a helicopter. So it really would help to have a year 2020 model of Ken-Lab gyroscopic stabilizer. To hold a Nikon D5 or a Canon EOS 1D X Mark II would require a KS-8 (provides almost twice the stabilization of the KS-6 with no increase in running power required, www.ken-lab.com/kenyon-gyro-guide.html). Keep in mind that the combined weight of a Nikon D5 and an 800mm prime telephoto lens is considerable. This is a long way of saying that we do not yet have crisp macro photographs of the flowers of *Acoelorrhaphe wrightii* palms. But high-resolution 1:1 macro photos of individual flowers plus photos of the entire inflorescence would be helpful to find and photograph in the coming year.



Acoelorrhaphe wrightii.

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 14, 2020, 11:42 a.m. Reserva Natural Tapón Creek, in front of Amatique Bay, Livingston.

Camera: Canon EOS-1D X Mark II. Lens: Canon EF 300mm IS II USM. Settings. 1/1000 sec; f/13; ISO 3,200.

WHERE DID FLAAR MESOAMERICA TEAM FIND ***ACOELORRHAPHE WRIGHTII* IN IZABAL?**

We have found these palms in about eight different locations facing standing water in the Municipio de Livingston. 90% of these palms were physically on the edge of a river, creek, or laguna. We show these photos in our discussion of the habitat in which they grow in Izabal (since here it is totally different than Belize pine savannas to the north, PNYNN grassland savannas near Yaxhá, Nakum, and Naranjo, and completely different in the two tasistals we found in the Petexbatún areas upriver from Sayaxché). However all these areas are seasonally inundated. In fact there are no tasistal masses physically on the shore of any river or lake: the tasistal masses of far away Petexbatún area of Petén are inland about a hundred meters from the nearest river.



Acoelorrhaphe wrightii. (Griseb. & H. Wendl.) H. Wndl. ex Becc. is an accepted name for this species.

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, March. 14, 2020, 11:23 a.m. Reserva Natural Tapón Creek, Livingston.

Camera: Sony A7R (ILCE-7RM4). Lens: Sony FE 90mm Macro G OSS. Settings: 1/800 sec; f/13; ISO 3,200.

WHERE ELSE HAS *ACOELORRHAPHE WRIGHTII* BEEN FOUND IN IZABAL?

So far our initial two field trips were to the east half of El Golfete and to Lagunita Creek (near the mouth of the Rio Sarstun). Every kilometer or so in a river, lagoon, etc. you may find a small independent cluster of *Acoelorrhaphe wrightii* palms. So we expect that even more will be findable along the entire length of the Rio Sarstun (from Amatique Bay to the headwaters near Modesto Mendez). We also anticipate finding more *Acoelorrhaphe wrightii* palms on the west half of El Golfete and the rivers and creeks also (Rio Chochon Machacas, for example). We will also explore the mangrove swamps on the north side of the east end of Lake Izabal (though most of this shore area is occupied by hotels and vacation homes).



Acoelorrhaphe wrightii. (Griseb. & H. Wendl.) H. Wendl. ex Beec. Family Arecaceae.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Mar. 12, 2020, 12:28 p.m. El Golfete south side lagunitas Salvador, Livingston.

Camera: Canon EOS-1D X Mark II. Lens: Canon EF 300mm IS II USM. Settings: 1/250 sec; f/9; ISO 500.

REFERENCES CITED ON AND SUGGEST **READING *ACOELORRHAPHE WRIGHTII***

Most helpful monographs on this plant

So far there is no PhD dissertation that we have yet found and no monograph on *Acoelorrhaphe wrightii* palm. We have four FLAAR reports in progress, two .pdfs on Tasistal Arroyo Petexbatun and two parts on Tasistal Arroyo Faisan. These should be available before the end of April.

Helpful articles on this plant:

www.eeo.ed.ac.uk/sea-belize/education/fact_sheets/C4_Palmetto.pdf

Most helpful web sites on this plant

We have not yet found a web that that describes all needed aspects of this palm (because the traditional format for a web page is short-and-sweet, not long like an article or report).

AGUIRRE de Riojas, Regina and Elfriede de PÖLL

2007 Trees in the Life of the Maya World. BRIT PRESS, Botanical Research Institute of Texas. 206 pages.

Note: Regina de Riojas has dedicated much of her life to trees of the Maya and trees of Guatemala. Elfriede de Pöll has likewise dedicated her life, to biology of Guatemala, at Universidad del Valle de Guatemala.

Sold on Sophos: https://tienda.sophosenlinea.com/libro/trees-in-the-life-of-the-maya-world_41562

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

Note: 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.

After searching page by page in plant family ARECACEAE, found *Acoelorrhaphes wrightii* on top left of page 153: helpful list of uses that are not in most other botanical monographs nor articles.

Not available as a download, so all the more difficult to search (since searching on your computer is the most effective way to initiate botanical research nowadays; this is why our team dedicated several months to scanning Lundell's monograph (since the CIW kindly had no copyright, precisely to help share their non-profit research publications).

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Note: After botanist Cyrus Lundell worked in the La Libertad area of Peten and published his findings in 1937 and 1938, he moved elsewhere. And then decades later he worked for botanical entities in USA. All his 1930's research is published in a single monograph, *The Vegetation of Peten*. But all his 1940's-1960's botanical field work is scattered and splattered. It would be a monumental contribution to the botanical knowledge of the Mayan areas if all his botanical research for Peten and adjacent Belize could be scanned and turned into a single e-resource. Crucial is to have this research copy-and-pastable (so you can cite it in your own research). Crucial also is to have the scans spelling corrected. Our team at FLAAR Mesoamerica dedicated several weeks to scanning every page of *The Vegetation of Peten* and two months to spell-checking and hand-correcting every word. But we do not have access to the original articles of Lundell of the 1940's, 1950's, 1960's, etc.

Our scan of The Vegetation of Peten will be made available in May 2020 on our www.maya-ethnobotany.org at no cost to botanists, students, research entities and the interested public.

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2019 A Review of the Nomenclature and Types of the Genus *Acoelorrhaphe* (Arecaceae). *PalmArbor* 2019-3: 1-30.

Available online:
https://www.researchgate.net/profile/Celio-Moya/publication/338545020_A_Review_of_the_Nomenclature_and_Types_of_the_Genus_Acoelorrhaphe_Arecaceae_Una_Revision_de_la_Nomenclatura_y_los_Tipos_del_Genero_Acoelorrhaphe_Arecaceae/links/5e1b8b0592851c8364c8d80c/A-Review-of-the-Nomenclature-and-Types-of-the-Genus-Acoelorrhaphe-Arecaceae-Una-Revision-de-la-Nomenclatura-y-los-Tipos-del-Genero-Acoelorrhaphe-Arecaceae.pdf

OCHOA, Susana, RUÍZ, Hugo, ÁLVAREZ, Demetrio, CHAN, Gabriel and Bernardus H. J. DE JONG
2018 Árboles de Calakmul. ECCOSUR, Chiapas. 245 pages.

Note: 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.

Available online:

http://aleph.ecosur.mx:8991/exlibris/aleph/a22_1/apache_media/74R92GMRSJS EPFDEE5NJY4SJI2I8AK.pdf

PARKER, Tracey

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

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.

Note: 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.

PEÑA-Chocarro, María and Sandra KNAPP

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

Note: 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* (though tasiste is conspicuously missing). 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 very helpful.

PULESTON, Dennis

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

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

PULESTON, Dennis

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. 187 pages.

Note: This is his wife's reorganization of his 1973 PhD. No *tasiste*, no *nance* could I find. *Crescentia cujete* is only mentioned as a usable plant, seemingly based on Lundell's 1938 list rather than Puleston finding it in a savanna. In other words, there is no list in this Puleston opus that suggests he studied or made lists of savanna habitats. And there are no photographs of any savanna. Indeed the word savanna is not in his index. This is because the focus of all 1960's-1970's Maya field work was in traditional archaeology and in hilltop settlement areas. There were no house mounds in savannas so no interest (in those decades) in studying a savanna.

QUERO, H, and J. SALVADOR

2004 Arecaceae de la Península de Yucatán. *Etnoflora Yucateense*, Fas. 23. Universidad Autónoma de Yucatán.

RICHARDS, J. H.

2018 Germination and juvenile growth of the clonal palm, *Acoelorrhaphe wrightii*, under different water and light treatments: a mesocosm study. Florida International University, Department of Biological Sciences and International Center for Tropical Botany. Feddes Repertorium No. 129. Pages 92–104

Available online, but you have to request the full-text:
https://www.researchgate.net/publication/325560109_Germination_and_juvenile_growth_of_the_clonal_palm_Acoelorrhaphe_wrightii_under_different_water_and_light_treatments_a_mesocosm_study

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.

Note: 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).

Can be download on the Internet:
www.researchgate.net/publication/291135077_A_classification_and_ordination_of_the_tree_community_of_Tikal_National_Park_Peten_Guatemala

SELVIN Pérez, Edgar and Miriam Lorena CASTILLO Villeda

- 2000 A rapid assessment of avifaunal diversity in aquatic habitats of Laguna del Tigre National Park, Petén, Guatemala. In: Bestelmeyer, B.T. and Alonso, L.E. (eds.). A Biological Assessment of Laguna del Tigre National Park, Petén, Guatemala, pp. 56-60. Conservation International.

Downloadable:

www.academia.edu/1347846/A_Biological_Assessment_of_Laguna_del_Tigre_National_Park_Pet%C3%A9n_Guatemala

SMALL, J. K.

- 1992 The saw-cabbage palm. The history and distribution of *Paurotis wrightii*. J. New York Bot. Gard. 23: 61-70.

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. and Julian A. STEYERMARK

- 1958 Flora of Guatemala. Fieldiana: Botany, Volume 24, art I. Chicago Natural History Museum.

Free download from various web sites. But some versions are easier to copy-and-paste than other versions. All have spelling errors when any Spanish or Mayan word has an accent.

ZAMUDIO, Fernando

- 2005 Conocimiento ecológico y sistema de manejo maya del lagarto (*Crocodylus moreletii*) en Quintana Roo, México. Thesis.

Available online:

http://aleph.ecosur.mx:8991/exlibris/aleph/a22_1/apache_media/LP95GN64F2PFAJL5CT1MV251BHNSNS.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://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.

WEB SITES SPECIFICALLY ON **ACOELORRHAPHE WRIGHTII**

<https://edis.ifas.ufl.edu/st058>

University of Florida, on why fronds are often yellow color.

www.maya-ethnobotany.org/mayan-ecosystems-chiapas-peten-belize/acoelorrhaphe-wrightii-palmetto-palm-mayan-savanna-ecosystem-hellmuth-flaar-nakum-peten.php

Tasiste palm discovered near Crescentia cujete trees in Savanna East of Nakum, PNYNN.

www.palmworld.org/view_object.php?p=MjQ4

Helpful introduction.

<http://sds.yucatan.gob.mx/flora/fichas-tecnicas/Tasiste.pdf>

One small photo; one short page.

ACKNOWLEDGEMENTS TO FLAAR MESOAMÉRICA

The reports are a joint production between the field trip team and the in-house office team. So here we wish to cite the full team:

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 and fauna projects (which includes field work and the resulting reports that can be helpful for botanists, zoologists and ecologists, and for university students). She also coordinates activities at MayanToons, a FLAAR 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 nowadays is getting involved in the coordination and development of Flora and Fauna projects. She is studying environmental engineering from Universidad Rafael Landívar.

Sergio Jerez prepares the bibliography of each topic and download the pertinent research material for our electronic library on flora and fauna. We all use these two downloads plus our internal library on Mesoamerican flora and fauna (México through Guatemala to Costa Rica). He also does plant identification and works on the processing of GPS coordinates to create maps of the routes traveled during our expeditions.

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

Norma Estefany Cho Cu helps with preparing the camera equipment for each field trip and helps in the office (and on field trips) as a cook.

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

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

María Alejandra Gutiérrez is an experienced photographer, especially with the Canon EOS 1D X Mark II camera and 5x macro lens which are useful to photographing tiny insects, tiny flowers, and tiny mushrooms. She is also involved in work during and after a field trip, which includes photo sorting, naming and processing, as well as the consequent report preparation.

David Arrivillaga is an experienced photographer able to handle both Nikon and the newest Sony digital cameras. His 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 (total network is read by over half a million people around the world).

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.

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.

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

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 understand 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 design team, which does the editing of every photographic report and educational material of Flora and Fauna. She works together with the other members of the design team to prepare the finished PDF editions of the material of the Yaxha, Nakum and Naranjo Project.

Alejandra Valenzuela biology student who is now part of our Flora and Fauna photographic report and educational material editing team

Alexander Gudiel is a designer who joined the editorial design team on December 2020. He will combine the text, pictures and maps into the PDF according to the FLAAR Mesoamerica editorial criteria.

Cristina Ríos a graphic designer student who joined the editorial design team on December 2020. She will combine the text, pictures and maps into the PDF according to FLAAR Mesoamerica editorial criteria.

Byron Pacay handles GPS mapping of where we hike or go in the lancha (boat) on each field trip day. He also lists where we stop to take photos and what each one of us is photographing to then prepare tabulations with this information.

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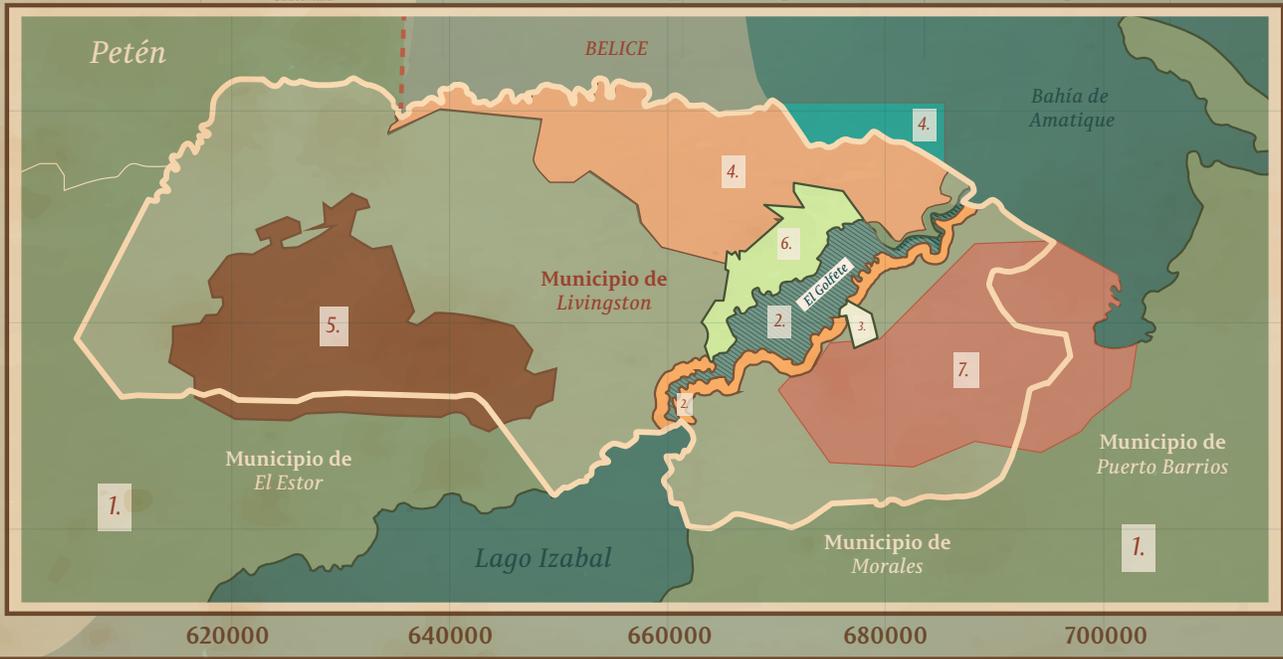
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Áreas naturales protegidas de Livingston



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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



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Bahía de Amatique

Aldea Plan Grande Tatin, Livingston

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1752000
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1748000
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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 (dashed red line)
- Acceso de tierra (dashed yellow line)

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 Áreas Protegidas 2017.
- Cuerpos de agua. Ministerio de Agricultura Ganadería y Alimentación (MAGA)
- Dirección de Análisis Geoespacial del (CONAP), Marzo/2017.

Edible Wetlands Plants of Municipio de Livingston, Izabal

Wetland Series 1: from Swamps, Marshes and Seasonally Inundated Flatlands of Izabal

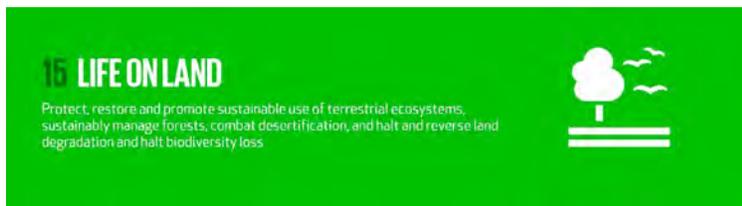
<p>Cyperus esculentus</p> <p>Chufa, Yellow Nutsedge, Earth Almond</p> <p>MLW#1</p>	<p>Eleocharis geniculata Eleocharis caribaea</p> <p>Caribbean Spike-Rush</p> <p>MLW#2</p>	<p>Montrichardia arborescens</p> <p>Camotillo Water Chestnut</p> <p>MLW#3</p>	<p>Nymphoides indica</p> <p>Floating Heart Water Snowflake</p> <p>MLW#4</p>
<p>Pachira aquatica</p> <p>Zapoton</p> <p>MLW#5</p>	<p>Pontederia cordata</p> <p>Pickrel Weed</p> <p>MLW#6</p>	<p>Sagittaria latifolia</p> <p>Water Potatoes</p> <p>MLW#7</p>	<p>Typha domingensis</p> <p>Cattail</p> <p>MLW#8</p>

Wetland Series 2: plants that grow along the beach shore of Amatique Bay

<p>Amphitecna latifolia</p> <p>Black calabash</p> <p>MLW#9</p>	<p>Coccoloba uvifera</p> <p>Uva del mar</p> <p>MLW#10</p>	<p>Manicaria saccifera</p> <p>Confra, Manaca</p> <p>MLW#11</p>	<p>Chrysobalanus icaco</p> <p>Coco Plum</p> <p>MLW#12</p>	<p>Avicennia germinans</p> <p>Black Mangrove</p> <p>MLW#13</p>	<p>Rhizophora mangle</p> <p>Red Mangrove</p> <p>MLW#14</p>
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Wetland Series 3: plants that grow alongside water: rivers, lagoons, swamps, or ocean

<p>Glossary of Wetland Terms</p> <p>Bibliography of Wetlands Habitat Names</p> <p>MLW#15</p>	<p>Acoelorrhaphe wrightii</p> <p>Pimientillo, Tasiste, Palmetto Palm</p> <p>MLW#16</p>	<p>Acrostichum aureum</p> <p>Mangrove Fern</p> <p>MLW#17</p>	<p>Annona glabra</p> <p>Alligator Apple</p> <p>MLW#18</p>	<p>Bactris major</p> <p>Huiscoyol Palm</p> <p>MLW#19</p>	<p>Diospyros nigra</p> <p>Zapote negro</p> <p>MLW#20</p>
<p>Grias cauliflora</p> <p>Palo de Jawuilla</p> <p>MLW#21</p>	<p>Inga vera Inga multijuga Inga thibaudiana</p> <p>River Koko</p> <p>MLW#22</p>	<p>Pithecellobium lanceolatum</p> <p>Bastard Bully Tree Chucum Red Fowl</p> <p>MLW#23</p>	<p>Coccoloba belizensis</p> <p>Papaturro</p> <p>MLW#24</p>	<p>Symphonia globulifera</p> <p>Barillo</p> <p>MLW#25</p>	<p>Crataeva tapia</p> <p>Matasanillo, Granadillo, Tortugo</p> <p>MLW#26</p>



The current Alcalde of Livingston, Mr. Daniel Pinto, together with his team on the Division of International Cooperation, has 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. In this regard, bot FLAAR (USA) and FLAAR Mesoamerica (Guatemala) will collaborate whit this Municipality achieve the Sustainable Development Goal (SDG), number 15 "Life on Land".

Throughout this cooperation project, different materials will be and publishes prepared, as this Photo Essay. These will help to collect information on species, different ecosystems (terrestrial, wetlands and fresh water asociated) and biodiversity. This information will also be useful as it is considered in various conservation estrategias to protect threatened species and prevent their extinction. Moreover, the municipality goals also look forward to promote the sustainable use, conservation and research of the flora and animal species of all terrestrial, wetlands, aquatic shore and coastal asociated ecosystems of the Guatemalan Caribbean region. You can learn more about this project and the SDG indicators wich are being pursued at:

<https://flaar-mesoamerica.org/rain-forests-rivers-lakes-bays-ocean-caves-canyons-livingston-the->

SERIES OF MUNICIPIO OF LIVINGSTON



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- www.maya-ethnobotany.org
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Hellmuth, N. (2022)
Wetlands Series MLW3: Edible Plants of Municipio de Livingston from Swamps, Marshes and Seasonally Inundated Flatlands of Izabal. Wetlands Report #16, MLW1 Number 16. *Acoelorrhaphe wrightii*, Pimientillo, Tasiste, Palmetto Palm. FIAAR (USA), FLAAR Mesoamerica (Guatemala).

BACK COVER PHOTO *Acoelorrhaphe wrightii*.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 14, 2020, 11:13 a.m. Arroyo Petexbatún, Petén, Guatemala.

Camera: NIKON D5. Lens: 1AF-S VR Micro-Nikkor 105mm IF-ED. Settings: 1/800 sec; f/7.1; ISO 1,000.

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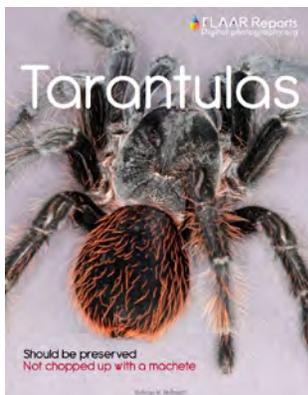
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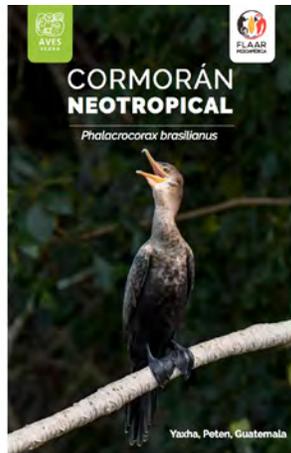
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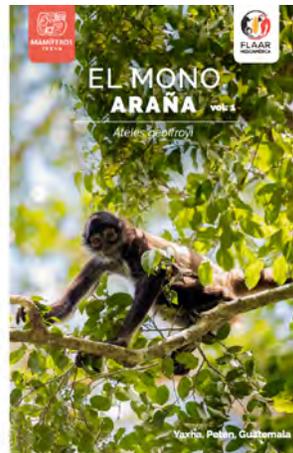
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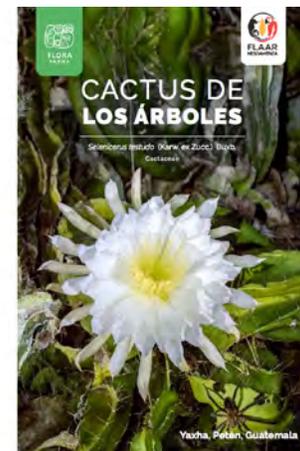
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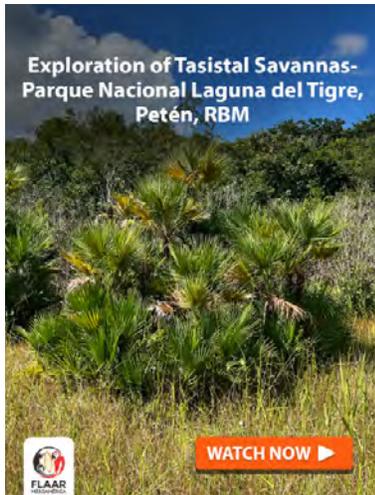
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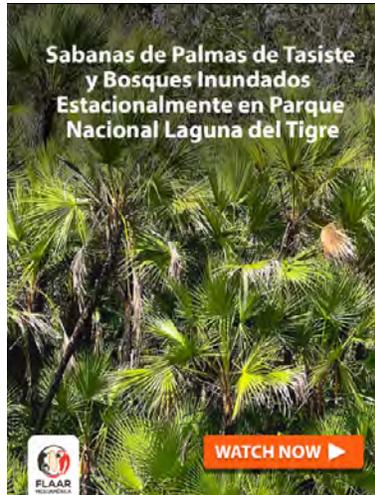
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VIDEOS OF NATIONAL PARK **LAGUNA DEL TIGRE**



Exploration of Tasistal Savannas- Parque Nacional Laguna del Tigre, Petén, RBM

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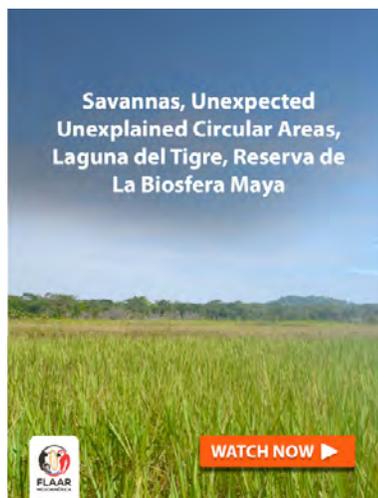
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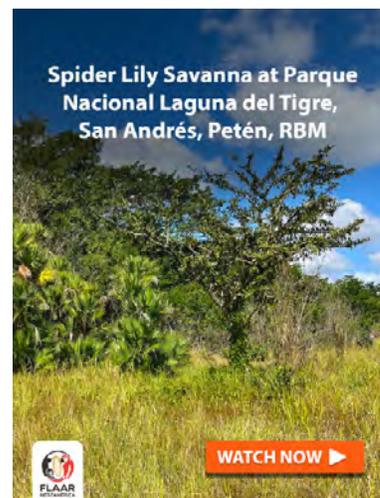
Savanna #10 far South part of Parque Nacional Laguna del Tigre, Reserva de la Biosfera Maya

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Savannas, Unexpected Unexplained Circular Areas, Laguna del Tigre, Reserva de la Biosfera Maya

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Spider Lily Savanna at Parque Nacional Laguna del Tigre, San Andrés, Petén, Reserva de la Biosfera Maya

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