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Tasistal Arroyo Faisan Part I: Tasiste Palms from Ground Level

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**Tasistal Arroyo Faisan
Part I:
Tasiste Palms from Ground Level**

**Tasistal #2 (in Arroyo Petexbatun area)
Municipio Sayaxche, Peten, Guatemala**

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February 2020

Appreciation

ASSISTANCE FOR LOCAL KNOWLEDGE OF PLANTS AND ANIMALS OF PETEXBATUN AREA

Julian Mariona, family owner of Hotel Ecologico Posada Caribe, Arroyo Petexbatun.

Kiki (Enrique Camorlinga) local guide who knows where the tasistal ecosystems can be found.

Credits

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

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Acoelorrhaphe-wrightii

Photography by: Nicholas Hellmuth.
FLAAR Mesoamerica. January 30 2020.
Arroyo Faisan, Petexbatun, Guatemala.
Camera: iPhone Xs.

TITLE PAGE PHOTOGRAPHY:

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Abstract

A “tasistal” is the local name for an area where tasiste palm trees are densely packed. In a tasistal, these *Acoelorrhaphe wrightii* palm trees are the number one tree in this kind of an ecosystem. We found close to one million tasiste palms in an area of only 250 meters by about 4 kilometers. This area was inland from Arroyo Petexbatun. Julian first showed us this area in October 2019 and we all returned to study this area more intensely on December 2nd, 4th, and 5th, 2019. In late January the capable certified drone pilot returned to Tasistal #1 with a drone twice as capable as the drone we used in December. This new drone, DJI Mavic Pro 2, was then brought to take introductory coverage of Tasistal #2 (Tasistal Arroyo Faisan). In today’s world doing a study of a habitat without a drone is not doing through photographic coverage.

In our December visit to Tasistal #1 we asked what other tasistal habitats could be found nearby. The helpful local Peten guides said there were indeed other such areas, so we waited for them to find how to access it, and get permission of the land owner to explore this second tasistal in late January 2020.

This second tasistal is much further away from our base camp (Hotel Ecologico Posada Caribe, on the shore of Arroyo Petexbatun, a several hour boat ride upstream from Sayaxche). So for the second tasistal, our January visit was to experience how to get there and to judge what equipment and teams we should have in the future to return and map this entire Tasistal #2.

So the present report is a set of photographs in two parts of the tasiste palms and nearby tinal areas photographed by Nicholas Hellmuth. In the future we would like to prepare and publish a report on all the flowers of smaller plants photographed by David Arrivillaga, often in macro mode.

Part 2 will be aerial photographs by experienced drone pilot Haniel Lopez. Any modern project to document trees and ecosystems that does not have access to a high-resolution drone is an incomplete project. We are in the year 2020, and it is essential to record what’s left of the original rain forest in a full manner, using modern technology.

75% of the drones that drone pilots have brought on several previous field trips were too wide angle and too low-res (they are what I call drones for bikers and hikers). These GoPro style cameras are next to useless for botanical and ecological field work. So we purchased a better drone ourselves. We look forward to assisting universities, eco-protecting institutes, and flora and fauna projects with this drone in other parts of Guatemala. This new drone was purchased in Guatemala and registered in Guatemala.

FLAAR and FLAAR Mesoamerica will not charge any fee; we just ask that the field trip costs and drone pilot costs be covered.

Full Botanical Name of *Acoelorrhaphe wrightii*

Acoelorrhaphe wrightii (Griseb. & H.Wendl.) H.Wendl. ex Becc

Many web sites spell the genus without one h; they spell it Acoelorrhaphe. So if you want to find everything on this palm, you may wish to Google both names.

Local names for *Acoelorrhaphe wrightii*

Paurotis palm, in Florida.

Guano prieto, tasiste in monograph on Árboles de Calakmul (Ochoa et al. 2018: 60).

I prefer not to use the name guano for *Acoelorrhaphe wrightii*. Yes, the fronds look similar (until you see the actual trees). But so far there are not many (and often not any) guano palm inside a tasistal. There are several palms of similar appearance named guano; *Sabel mauritiiformis* is the most common.



Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.

Synonyms for *Acoelorrhaphe wrightii*

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

Most early botanists called this a species of genus *Paurotis*. So also Google that genus name to find more early information on what today is accepted as *Acoelorrhaphe wrightii*.

Acoelorrhaphe wrightii is surely present at Parque Nacional Tikal

Kew Gardens data base on herbaria specimens lists only the *Acoelorrhaphe wrightii* found in the Pine area (pinal Bajo de Santa Fe), technically outside the NE corner of the Tikal park.

Schulze and Whitacre did not find any *tasiste* at Tikal (since they stayed in the areas easy to access).

Hopefully some day a botanist or student will show us a report by an ecologist that did indeed find *tasiste* palm in or near Tikal (or in or near Yaxha, Nakum, Naranjo). Our team of FLAAR Mesoamerica found *Acoelorrhaphe wrightii* in all three of the largest savannas of this remarkable park: lots in Savanna East of Nakum; a few in Savanna west of west edge of Naranjo; a few around Savanna of 3 Fern Species (several kilometers west of the far end of Lake Yaxha and then hike into the highest local hill). All areas are seasonally inundated.

Acoelorrhaphe wrightii was located at Yaxha Nakum Naranjo by the FLAAR Mesoamerica team

Dix and Dix do not list any tasiste palm for Yaxha in their 1992 report. We have asked them for a copy of their original report but got no copy. And the main library of the university has been closed for construction for several years. So the only place to find the Dix and Dix list is in the Yaxha park master plan. But rather probably, they did not hike into the remote parts of the park (these are the areas the undocumented trees are waiting for you). Logically most studies at Yaxha are on the hills around the ruins and on the shores around the lake.

Where else has *Acoelorrhaphe wrightii* been found in Peten?

You should be able to find *Acoelorrhaphe wrightii* in several areas of Peten that have flat areas adjacent to streams, lakes or adjacent to flat areas that are tinal habitats. Would be helpful if a student of biology or ecology could do a thesis on *Acoelorrhaphe wrightii* and document every area that you can find *Acoelorrhaphe wrightii* in Peten, Alta Verapaz, and Izabal. Our plant scouts have already found *Acoelorrhaphe wrightii* in the Laguna Lachoa area (southwestern Peten, near bordering northern Alta Verapaz). We have not yet had time or funding to get there to photograph this habitat.

We found about a dozen clusters of *Acoelorrhaphe wrightii* on the shores of many of the lagoons north and south sides of El Golfete, Municipio of Livingston, Izabal. So far no tasistals noted for these areas: only individual clusters (and most physically on the shore). We found addition *Acoelorrhaphe wrightii* on the shore of Lagunita Creek, not far from Rio Sarstun and Amatique Bay (flowering in March 2020).

Kew Gardens data base on herbaria specimens lists:

Acoelorrhaphe wrightii (Griseb. & H.Wendl.) H.Wendl. ex Becc.
02319696C. L. Lundell 177411964-02-05
Guatemala, Petén, Rio Pucte, on river bank

Acoelorrhaphe wrightii (Griseb. & H.Wendl.) H.Wendl. ex Becc.
02319697E. Contreras 40121964-03-06
Guatemala, Petén, Sayaxche, Rio Pucte camp, in tinal, 1 km. south of the camp, 200m east of the river

Acoelorrhaphe wrightii (Griseb. & H.Wendl.) H.Wendl. ex Becc.
02319698E. Contreras 53621965-03-20
Guatemala, Petén, El Ceibo, bordering Rio San Pedro, about 500m of the village

Acoelorrhaphe wrightii (Griseb. & H.Wendl.) H.Wendl. ex Becc.
02319699E. Contreras 151959-07-24
Guatemala, Petén, Tikal National Park, 46 km, on Brecha (J) Petrolera -- pinal Bajo de Santa Fe.

(<https://serv.biokic.asu.edu/neotrop/plantae/collections/list.php>)

Zero specimens for Alta Verapaz.

Zero specimens for Izabal (which has lots of swamps, rivers, lakes, and thus seasonally inundated areas).

Brief Description of *Acoelorrhaphe wrightii* by Standley and Record (1936)

Paurotis Schippii Burret, Notizbl. Bot. Gart. Berlin 12: 303.
1935. Type from "Pojektuun 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).

Seems like they did not hike into the seasonally inundated swamps, because there must be hundreds if not thousands of locations where *Acoelorrhaphe wrightii* can be found in Belize. There are more assessments of areas of Belize than there are for all Peten, Alta Verapaz, and Izabal put together. So more is known of what plants are in what habitats in Belize than for anywhere in Guatemala.



These tasiste palms are so tall it is a challenge to photograph them from the ground up..

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica.
January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala.
Camera: iPhone Xs.

Botanical Description of *Acoelorrhaphe wrightii* by Standley and Steyermark (1958)

In past decades tasiste palm was listed as *Paurotis wrightii*. Now that is considered as a synonym for *Acoelorrhaphe wrightii*.

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, carnosose, 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.

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).

Where else *Acoelorrhaphe wrightii* been found in Peten?

We have found *tasiste* in savannas in Parque Nacional Yaxha Nakum Naranjo. Only in grassland savannas: *Acoelorrhaphe wrightii* does not grow in corozeras, nor guanals nor escobal ecosystems. In other words there are usually zero other species of palm anywhere near a cluster of *Acoelorrhaphe wrightii*. Yet *Bactris* palms also like seasonally inundated river banks, but *Bactris* palms are not (yet to our knowledge) mixed with *tasiste* palms in PNYNN or Arroyo Petexbatun. Yes, we have found several areas of *Bactris* palms within 10 meters of the medium-high water level of late January 2020. But no *Bactris huiscoyol* palm in any grassland savanna nor *tasistal*.

In what Ecosystem(s) can you find native *Acoelorrhaphe wrightii*?

The monograph on Árboles de Calakmul is essential for documenting what trees are in this part of the Maya Lowlands. But with only one-page-per-tree there is not space for full discussion of the habitat. They say only bajo inundable. But some savannas are also seasonally inundated. The top left of their tiny photos (Ochoa et al. 2018: 60) suggests their photo shows a tasistal habitat rather than scattered individual tasiste clumps in a grassland savanna.

Along the Caribbean Coast you can find *Acoelorrhaphe wrightii* palm in wet areas also. There is no comparable coast in Peten. Would be interesting to learn whether you can find along the coast of Amatique Bay in Izabal?

In Peten we have found *Acoelorrhaphe wrightii* palm in two kinds of habitats:

1. Solid “millions” of tasiste palm in seasonally flooded flat areas adjacent to tinto lowlands which in turn are along the edges of slow muddy rivers.
2. Tasiste palm in isolated clusters with a lot of savanna grassland around them. These savannas in PNYNN are also seasonally inundated and occasionally (illegally) burned by local intruders.

In Belize the savannas are often very different, with pine and oak. Pine in a savanna is in an unexpected habitat about 3 km east of the Northeast corner of Parque Nacional Tikal. There are hundreds of square kilometers of pine savanna around Poptun, Peten, and around La Libertad, Peten. We need to check with the botanical monograph of Cyrus Lundell as to whether tasiste palm was found there (under a different name since his field work was in the 1930's).

Plus in Belize and the Yucatan Peninsula you get mangrove swamps and other habitats not found in Peten. Yet so far we have not seen tasiste palm listed for the seasonally inundated areas around the Canal de Chiquimulilla and other water areas near Monterrico (parallel to the coast of the Pacific Ocean).

Tasiste Palms can grow quite tall

Would be worth dedicating the time to measure the height of these tasiste palm trees. I bet they are higher than listed in many botanical monographs and peer-reviewed journal articles.



The *Acoelorrhaphe wrightii* tasiste palms have survived last year's burning of the savanna. The fronds at ground level are resprouting after their trunks were either burned or chopped down last year.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



These lasiste palms are so tall
it is a challenge to photograph
them from the ground up.

Amazing how high these *Acoelorrhaphe wrightii* palms grow. Notice the presence of other trees that are not palms. Every tree is trying to find a place to live, but *Acoelorrhaphe wrightii* are the best adapted for these seasonally inundated flat areas near streams that frequently flood over these flatlands.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.

Most savannas are burned by local people

Our local Petexbatun area guide, Kiki, said that the Tasistal of Arroyo Faisan has been burned so frequently and so intensely that much of the tasiste palm has been exterminated. And in its place other trees now grow (mixed with the thousands of tasiste that survived nonetheless). But Kiki said that several decades ago the Tasistal of Arroyo Faisan was literally solid dense palmetto palm (like Petexbatun Tasistal #1 a few kilometers to the west).



WWW.MAYA-ETHNOBOTANY.ORG

Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Acoelorrhaphe wrightii

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Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Acoelorrhaphe wrightii

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Acoelorrhaphe wrightii

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Acoelorrhaphes wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.

How does *Acoelorrhaphe wrightii* survive fire?

It is well known to botanists and ecologists that palm has evolved over time to survive fire (even though the intensity and frequency of fires in the tasistal of Arroyo Faisan has resulted in a loss of perhaps 10% or 20% of the mass).

Uses of *Acoelorrhaphe wrightii*

Most old botanical monographs do not realize that tasiste seeds are used as food supplements, but the ton. So surely the Classic Maya ate tasiste seeds thousands of years ago.

Tasiste trunks are used as wall poles in local Maya houses. They are not thick enough nor strong enough to serve as corner poles. Fortunately these palms grow in clusters, so when they are chopped down, when it rains new sprouts pop up. But if too many are chopped down and too much fire burns the area, then a percent are lost for that decade.

Moderate potential medicinal usage by local people

There is significant potential for the seeds of *Acoelorrhaphe wrightii* for medicinal purposes in addition to being edible per se. But a lot more lab research needs to be accomplished and the seeds in December were very few and already too dried out to have what lab chemists needed.

Close relative(s) of *Acoelorrhaphe wrightii*

The same *Acoelorrhaphe wrightii* palm grows in the Florida Everglades; there it is named Paurotis Palm, or Everglades Palm.

Saw Palmetto Palm, *Serenoa repens*, grows in Southeastern USA. It looks very similar to tasiste, *Acoelorrhaphe wrightii* palm. In fact the Saw Palmetto food supplements,

sold by the TON in health food stores and actually also in all normal grocery stores and pharmacies, are reported to be adulterated with seeds of *Acoelorrhaphe wrightii* palm (see below). This is crucial information because it suggests that a parallel product should be developed and marketed, Mayan Food Supplement (for prostate health), made from seeds of *Acoelorrhaphe wrightii* palm of Guatemala.

Here are three places where you can read this when you Google: Saw Palmetto Palm, *Serenoa repens*, adulterated with *Acoelorrhaphe wrightii*

www.researchgate.net › publication › 329041258_Adulteration_of_Saw...
(PDF) Adulteration of Saw Palmetto (*Serenoa repens*), Version 3

Nov 19, 2018 - **Adulteration of Saw Palmetto (*Serenoa repens*)**, Version 3. The goal of this bulletin is to provide information and/or updates on issues of **adulteration of saw palmetto (*Serenoa repens*)** to the international herbal industry and the extended natural products and natural health communities in general.

cms.herbalgram.org › pdf › BAP-BABs-SawPalmetto-CC-102018-v2
Saw Palmetto - **American Botanical Council**
PDF

Oct 23, 2018 - *Acoelorrhaphe wrightii* grows in a different habitat than **saw palmetto**, and has considerably larger fruit; therefore, the two species are not likely to be confused by **saw palmetto** harvesters, making such an **adulteration** intentional (S. Foster, e-mail to S).

cms.herbalgram.org › BAP › pdf › BAP-BABs-SawPalmetto-CC-FINAL
on Saw Palmetto (*Serenoa repens*) - American Botanical ...
PDF

24 *Acoelorrhaphe wrightii* grows in the United States, the Bahamas, Cuba, southeastern Mexico, Belize, Guatemala, Honduras, Nicaragua, Colombia, and Costa Rica. **Saw palmetto** extract **adulterated** with other plant oils, such as canola (*Brassica napus* ssp.

According to the American Herbal Products Association's 2005-2010 tonnage survey, 15 there were 680.4 metric tons (1.5 million pounds) of saw palmetto fruits harvested in 2009 and 635.0 metric tons (1.4 million pounds) harvested in 2010.

(<http://cms.herbalgram.org/BAP/pdf/BAP-BABs-SawPalmetto-CC-FINAL-update03-2017.pdf>)

So it might be helpful to alert the owners of every tasiste palm area that instead of obliterating these palm trees to make cattle ranches, they can make money (and provide jobs to local people) if the tasiste palms and tasistal habitats are totally preserved. 1.4 MILLION pounds (635 metric TONS) is a lot of palm seeds.

Palms that Look Similar

Guano palm (that's its name when young); botan palm (that's what its called in Peten when it is decades old and a remarkably tall palm. A nice specimen of the tall version is visible at the north end of Nakum in Parque Nacional Yaxha Nakum Naranjo).

Thrinax radiata, Chit, Florida thatch palm (www.backyardnature.net/yucatan/chitpalm.htm).

Junco, also called kala, looks similar, but ironically is neither a palm nor even a relative. This plant is actually *Carludovica palmate*. But the first junco palms I was shown by Don Chus (along Rio Icbolay) I thought were young guano palms. Junco is also used to thatch Mayan houses. The fresh stems of junco are edible.

There are scores of local palms; some look similar; others are different (spiny huiscoyal palm, *Bactris* species, corozo palms, all the different xate palms).

A good place to see, experience, and study the diversity of palm trees of Guatemala is in Parque Nacional Yaxha Nakum, Naranjo.

So it might be helpful to alert the owners of every tasiste palm area that instead of obliterating these palm trees to make cattle ranches, they can make money (and provide jobs to local people) if the tasiste palms and tasistal habitats are totally preserved. 1.4 MILLION pounds (635 metric TONS) is a lot of palm seeds.



Photography by: David Arrivillaga.
 FLAAR Mesoamerica. February 13,
 2020. Livingston, Izabal, Guatemala.
 Camera: NIKON D5. Lens: Nikon 28-
 300mm VR. Settings: 1/1000, f/10,
 ISO 800.

Burned, Abandoned Logwood Fence Posts

Between the Arroyo Faisan and the tasistal habitat there used to be thousands of *Haematoxylum campechianum* trees. But year by year, month by month, day by day, they are being illegally chopped down (to sell as fence posts for cattle ranches).



I was surprised to find lots of totally abandoned fence posts cut from *Haematoxylum campechianum* trees. These were not in the palo de tinto area; these were not only in the transition area within the tasistal. So either this tasistal is narrow and there is *Haematoxylum campechianum* growing on the other side, or (highly unexpected) there is *Haematoxylum campechianum* growing within the tasistal.

You can see the tasiste palm fronds at the top of the photo, but these fence posts have been hauled here (the palo de tinto trees are not visible in the tasistal thicket area).

These abandoned fence posts get burned when the entire tasistal is set on fire. In April and May it is so dry that merely tossing a cigarette into the tasistal will start a fire.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.

Transition Zone between riverside tinal and pure tasistal

Along the river is a mish-mash of diverse species of plants and trees that can handle having their trunks under water several months a year (most but not all years). Lots of palo de tinto but not solid (in part because these are being chopped down every day by local people to make fence posts and also because a tinal usually has lots of other tree species around each palo de tinto).

As you go inland, every 50 or so meters the land is a few centimeters higher. Within perhaps 200 meters from the Arroyo Faisan (pure guess of the distance) you begin to get occasional individual clusters of tasiste palm within the tinto ecosystem. Every 20 meters further away from the river you get more palm and fewer tinto area plants. Eventually you reach areas of solid tasiste palm (except that due to such constant burning a lot of the tasiste has not recovered; so there are more native invasive spaces around the tasiste). Would be great to get deep into this tasistal to see if in the middle it is as solid tasiste as are areas of Tasistal Petexbatun #1.



Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth.
FLAAR Mesoamerica. January 30,
2020. Arroyo Faisan, Petexbatun,
Guatemala. Camera: iPhone Xs.

Many other trees now grow within Tasistal #2

Tasiste #1 (near Arroyo Petexbatun) is primarily 90% or more pure and solid clusters of tasiste palm, with occasional nance trees and *Crescentia cujete* trees. You get all three species in a normal grass savanna also. The difference is that a grassland savanna is wide open. You can easily hike through it.

In Tasistal #2 (near Arroyo Faisan, a tributary of Arroyo Petexbatun) we found fewer *Crescentia cujete* trees. We would need to return with an entire day available in order to find nance trees. And it would help identify the other trees: however I did notice both common local species of *Coccoloba*.



Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.

Our local guide said that many decades ago this area was 90% solid tasiste. But now dozens of other tree species are growing in this flatland.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



This is the transition area (between the end of the tintal that starts at the river) and the beginning of the solid tasiste palm area (the tasistal). This is why you need a drone with high resolution. Not yet sure whether 20MP is enough to show this transition (but we did not have funds for the 150MP drone of Phase One Industrial; that drone would document every individual tree in the entire area, literally a breakthrough for ecological and botanical studies of this part of Guatemala).

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.

A tasistal is “solid tasiste”

The local guide, Kiki, told us that since the Tasistal Arroyo Faisan has been burned so frequently that it is no longer as “solid tasiste” as it was 20 or more years ago. Nonetheless, even on the side of the tasistal towards Arroyo Faisan, there were thousands of tasiste palms.



Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Acoelorrhaphe wrightii

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.

The Seasonally Inundated Tintal between the Arroyo Faisan and the start of the Tasistal Area

Tasistal #1 evolves from the seasonally inundated tintal habitat along the edge of Arroyo Petexbatun. Tasistal #2 begins mixed with vegetation from the adjacent tintal habitat along the edge of Arroyo Faisan.

We had the opportunity to see and experience the seasonal flooding in late January 2020. I have hiked through many tintal ecosystems at Tikal, at PNYNN, and hiking the 120km round trip to El Mirador. Plus driving to Calakmul many decades ago with a group of enthusiasts who wanted to learn about Maya sites that were in those early years not yet commercial tourist havens. It was so remote in that decade (probably 1970's or early 1980's) that a jaguar walked across the road in front of us.

But all these experiences in tintal habitats were in the dry season. So January 2020 was the first time I had seen a tintal under water. Thus I wish to share some snapshots of this (since to get here is 800 km round trip driving, 6 hour round trip boat to get to base camp; then 2 hours round trip to get to Arroyo Faisan; then dugout canoe experience...).



Tintal inundated.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Every year the water level is different, depending on how much it rains in this year.

2019 was an unusually dry year. Lago Petexbatun dried up so much it was amazing. Reports in the main newspaper of Guatemala, Prensa Libre, showed that some of the streams had so little water remaining none of the local people could use their boats to get back and forth to Sayaxche.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Here is a knarled tinto tree (*Haematoxylum campechianum*, also called palo de Campeche). The large leaves of a *Coccoloba* tree are visible at far left. This area was no longer under water because it is slightly higher elevation.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.

Lots of *Coccoloba* trees, both in the tasistal but more in the transition zone



WWW.MAYA-ETHNOBOTANY.ORG

The three trees that I can recognize immediately in a tasistal or in the intermediate area in transition to a tintal are:

Acoelorrhapha wrightii

Haematoxylum campechianum

Coccoloba species (two species are common)

Here are young *Coccoloba* trees. They are short since this area is burned down every year.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



This is a *Cocoloba barbadensis* tree. Its young leaves tend to be copper or copper-red in color. Plus the vein pattern is very clear..

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.

Crescentia kujete trees tend to be in savannas and in tasistals also

We found only two *Crescentia kujete* trees in the tasistal or in the tasistal edge where the transition to tinal begins. Perhaps there were more *Crescentia kujete* trees inside the tasistal but there was not time to get deep into the tasistal on this field trip. It is very easy to get lost, so you should never go explore a tasistal by myself (as I did while the rest of the team was preparing for lunch break; we bring our entire almuerzo food with us on a field trip).



Close-up photograph of the leaves that I estimate are of *Crescentia kujete*.
Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Crescentia cujete.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



***Crescentia kujete*, calabash tree, jicara. Morro is often used as a local name but morrow is really the *Crescentia alata* which prefers dry areas.**

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



This view allows you to see that this *Crescentia cujete* tree is in a fire-disturbed area of the tasistal.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.

Concluding Discussion and Summary on *Acoelorrhaphe wrightii*

We asked how many other tasistal ecosystems could be found here and were told that in past decades there was one more. But Julian said that with all the new cattle ranches expanding throughout the Petexbatun area, that this third tasistal could have been all chopped down, burned, and turned into cattle pasture. He will check on this, and if this area is still virgin, we would like to visit it in the future.

Our team has found tasiste palm in both savannas in Parque Nacional Yaxha Nakum Naranjo: lots in the Savanna East of Nakum and several tasiste trees in the savanna parallel to the west side of Naranjo sector of this park. I also estimate there will be tasiste palms in the diverse ecosystems of the Savanna of 3 Fern Species that I discovered via old aerial photography, a totally unique set of varying habitats west of the end of Lake Yaxha.

But not any of these areas in PNYNN is a tasistal; instead the tasiste trees are in open savannas. These open savannas also have a few more jicara trees (or at least they are more visible because in a closed tasistal you can't see around you because the tasiste trees are so thickly growing in dense clusters).

Our long-range goals at FLAAR Mesoamerica are:

- To continue to assist PNYNN by having a volume on the tasiste palms in all three savanna habitats within this extensive park.
- One volume on the Tasistal Arroyo Petexbatun
- One volume on the tasiste behind the Hotel Ecologico Posada Caribe
- One volume on the third tasistal of Petexbatun area if this still exists
- The present volume on the second tasistal of Petexbatun area

We hope these reports will encourage botanists, ecologists to undertake field work, and students to undertake theses and dissertations to incorporate information on tasiste in other areas of Peten, Alta Verapaz, and Izabal. Then show the similarities and differences between tasiste savannas of PNYNN and tasiste savannas in Chiapas, Tabasco, Campeche, Quintana Roo, etc.

And especially important, to find modern uses of Tasiste seeds so that local people will be encouraged in a realistic manner not to chop them down for cattle ranches or burn them down so they can capture all the animals as they attempt to flee the fire, heat, and smoke.

Acknowledgements

So far, the entire list of botanical herbaria collections of tasiste palm is four specimens from three areas (over the last 56 years). Yet in one single year of field work in PNYNN we found tasiste palms

- throughout the Savanna East of Nakum
- several in the Savanna West of Naranjo
- a few in the Savanna of 3 Fern Species

So 75% as many areas as found by other botanists from foreign herbaria (Guatemalan herbaria are not yet scanned so we would like to visit them in-person to find how many more specimens they have). In the monumental digital list of Neotropical Plantae actually two are in one area (Arroyo Pucte). So the entire herbaria list for the prestigious New York botanical Garden is 3 locations.

The documentation of tasiste in PNYNN was a result of the hospitable cooperation

- of the two helpful co-directors of PNYNN Leonel Ziesse and Mario Vasquez
- With hospitable cooperation of park botanist Lorena Lopez.
- With the help of the military team at the entrance to the park, who kindly accompanied us on the two strenuous hikes to the far-away Savanna of 3 Fern Species
- With the help of capable local park ranger and excellent guide Teco (Moises Daniel Pérez Díaz)
- With the help of the park rangers who accompanied us to assist in carrying the camera equipment
- With the help of all the hospitable team at the Naranjo sector of the park, Proyecto de Investigación Arqueológica y Rescate en Naranjo (PIAREN)
- With room and meals and electricity to charge our camera batteries, video batteries, mobile phone batteries by Gabriella Moretti, Sebastian de la Hoz, and Juan Jose de la Hoz.
- With the help of the team of FLAAR Mesoamerica.

Plus, in another area of Peten, far to the west, we have found close to

- One million tasiste palms in Tasistal Petexbatun #1
- More than we could count in Tasistal Arroyo Faisan, Petexbatun #2 (probably over a quarter million)
- Lots of tasiste (but not a million) behind the Hotel Ecologico Posada Caribe.
- reports of a Tasistal #3 not far away

It is notable that the literally leading botanists of the 1940's through 1960's (Standley and Steyermark and their capable team) did not find or notice one single solitary tasiste palm anywhere in Peten. Yet our team found hundreds in the Savanna East of Nakum, a dozen in the Savanna West of Naranjo, and a few in the Savanna of 3 Fern Species (west of the end of Lake Yaxha).

Plus close to two million *Acoelorrhaphe wrightii* palms in the Petexbatun area (and we still have a possible third tasistal nearby). So it definitely helps to know local people in Peten (in the Petexbatun area for over 40 years; I was first in Sayaxche as a backpacker circa 1964).

I hope botanists, ecologists, and students can find even more tasistal ecosystems elsewhere in Peten, Verapaz, and Izabal. With the assistance of the Municipio of Livingston alcalde and his helpful team, we undertook two botanical field trips to diverse and remote areas of Izabal (in February and mid-March 2020). We found individual *Acoelorrhaphe wrightii* palms along rivers, lakes, and lagoons; but always in small clusters. So far no savanna in this part of Izabal (like the three we documented in Parque Nacional Yaxha Nakum Naranjo last year). And no tasistal masse either.

In Izabal the local people do not use or know the name tasiste; they call the identical palm pimienta or pimientillo.

We also hope that chemists can find more uses of the seeds of *Acoelorrhaphe wrightii* palms for prostate health and as a general food supplement.

As soon as a helpful individual or Foundation can provide funds for an additional field trip, we will visit and record Tasistal #3. FLAAR Mesoamerica is a non-profit research and educational institute in Guatemala; FLAAR is a non-profit research and educational institute in USA. Frontdesk FLAAR.org will reach both organizations (we assume you know what symbol to put into the blank space and join it together to function).

Appendix A

Potential of Tasiste Palmt to provide income to assist local families: example from Tabasco, Mexico

The following text is from the web page www.skyscrapercity.com/showthread.php?t=1021833&page=3

This information is super-important and essential that people in Guatemala in general and Peten in particular realize that tasiste palm habitats should not be burned down; instead these areas should be protected and harvested in an eco-friendly manner.

Cultivo del Tasiste y artesanías, nueva alternativa en Balancán

La semilla de esta planta también conocida como Palma de Pantano se ha convertido en una gran posibilidad económica, siendo inclusive exportada al país de la hoja de maple, Canadá, donde su aceite es utilizado para la fabricación de cosméticos.

2009-12-28•Regiones

La especie *Acoelorrhaphes wrightii*, conocida como Tasiste o Palma de Pantano y que anteriormente era considerada como maleza hoy es el fundamento de una nueva industria..

Surge en el municipio de Balancán, El Tasiste, producción agropecuaria y forestal no maderable de Balancán S.P.R. de R.L., como una nueva alternativa en el modo de vida para los productores rurales de esta demarcación fronteriza con Guatemala, debido a que en la zona Ríos, de La Hulería, se produce la palma El Tasiste, para lo cual se emplean familias enteras en el cultivo y elaboración de casas y artesanías.

Balancán cuenta con una riqueza biótica, que si bien ha sido duramente tratada en los últimos 50 años, aún mantiene muestras representativas de recursos forestales factibles de aprovechamiento, entre los que destacan el Cedro Rojo, la Caoba, el Jobo, la Ceiba, el Guayacán, el Macuilis y el Tinto.

Al ser estigmatizada como una mala hierba, cientos de hectáreas de Tasiste o Palma de Pantano (*Acoelorrhaphes wrightii*), se perdían entre la quema y la cortada; sin embargo, para la comunidad “El Pípila” en el municipio de Balancán, Tabasco, y otras 5 más en

el estado de Tabasco y parte de Campeche, la semilla de esta palma se ha convertido en una gran posibilidad económica, siendo inclusive exportada al país de la hoja de maple, Canadá, donde su aceite es utilizado para la fabricación de cosméticos.

El ejido El Pípila, ubicado a 23 kilómetros de la cabecera municipal de Balancán, con al menos 700 habitantes dedicados de tiempo completo al cultivo del Tasiste, han encontrado en esta planta considerada antes como maligna, un gran aliado para el ingreso económico dentro del hogar y también una posibilidad de desarrollo para la pequeña comunidad.

Sergio Thompson junto con su esposa Mélida y sus tres hijos Sergio, Erica y Vianey, son una de las varias familias en la comunidad El Pípila que cultivan parcelas de Tasiste, cada integrante, cumple una función; en el caso de los hombres, ellos son los encargados de cultivarla y arrancarla de la palma, los niños la recogen del suelo y las mujeres la desgranar con métodos artesanales.

El Tasiste se da para los meses de agosto y septiembre, aunque a consecuencia de los cambios climáticos, esta planta ha empezado a dar luz en los meses de junio y julio, dos temporadas al año, las primeras fechas con mayor cantidad de fruto y las segundas con menos; el precio de venta, es de 3 pesos con 50 centavos el kilo y luego de ser desgranada es encostalada para su peso en la plaza de la comunidad.

Aunque no es mucho lo que pueden percibir por la venta de la palma, tomando en cuenta que se reproduce dos veces al año y el precio por kilo es relativamente bajo, el trabajo y los ingresos, lo compaginan con la ganadería, otra de las actividades fuertes en el municipio de Balancán.

Los tasicultores enfrentan varias dificultades para el cultivo de este producto, entre ellas, el recorrido hacia las parcelas que se encuentran a media hora de la comunidad y que corresponden a tramos de carreteras inestables, el esquema de organización y el precio de venta, que esperan se incremente cuando surjan más interesados en la plantaciones.

El futuro

De acuerdo, a la encargada del área de desarrollo forestal de la Comisión Nacional Forestal (Conafor), Livia Estrada Pérez, en todo el territorio tabasqueño existen cerca de 40 mil hectáreas de Tasiste; por motivos de ocupación y desconocimiento, un 20 por ciento de este producto no es aprovechado, sin embargo el 80 por ciento restante ha sabido utilizar las riquezas que trae consigo esta semilla.

La Conafor en este sentido, señaló que el futuro de la comunidad se encuentra en la creación de la mesa comunitaria y la capacitación en cuanto al proceso de conversión de la semilla al aceite, para ofertar a los canadienses el producto completamente procesado y no necesariamente que ese proceso lo tengan que realizar en el extranjero.

“El futuro, que es la propia mesa comunitaria, es lo más difícil, ya tienen una figura jurídica, ya tienen apoyos como cadena productiva y capacitación, en donde se busca que puedan comercializar el producto y que no se quede sólo en la parte del secado, que ellos puedan hacer lo mismo que se realiza en Canadá”, subrayó.

En la visita que esta casa editorial realizó a la fábrica donde se prosigue el secado de la semilla, el presidente de la cadena productiva regional del tasiste, Francisco Velázquez González, aseguró que existe un proyecto que se planteó a la Sagarpa donde se busca una máquina de secado de granos y una bodega para ampliar el mercado.

Así mismo, tentativamente se maneja un viaje a Montreal, Canadá, para la última semana del mes de julio con miras a la exploración del mercado, en donde se pueda traer el proceso de conversión de la semilla al aceite y que sea México quien pueda ofertar el producto listo, para su uso.

Balancán • Enrique Domínguez

Fuente: Milenio Tabasco.

Appendix B

Tasiste east of northeast corner of Parque Nacional Tikal Documented by Botanist Cyrus Lundell

WRIGHTIA, Volume 2, May 1961, Number 3, PLANTAE MAYANAE—II COLLECTIONS FROM PETEN AND BELICE Cyrus Longworth Lundell

https://archive.org/stream/mobot31753002567417/mobot31753002567417_djvu.txt

(Lundell 1961: 111-113)

On March a muleback trip from Tikal was made to explore the pineland (pinal), and three days were spent in the area. Camp was set up on a ruin covered island of upland forest (ramonal) several miles west of the pinal. This island was named Isla de Los Pavos. Progressing eastward along Brecha "J" Petrolera, the upland forest gives way abruptly to swamp forest dominated by the logwood (tinta), *Haematoxylon campechianum* L., and the typical knarled low forest of the tintal association. An aguada in the heart of this tintal was named Aguada Lagarto, after its inhabitants. Progressing eastward the tintal association gives way to the hololal, in which the "holol" tree, *Quercus oleoides* Schlecht. & Cham., dominates, and in which the "tasiste" palm, *Paurotis psilocalyx* (Burret) Lundell, is a characteristic element. Progressing through the hololal association, an area is reached in which tall scattered pines grow, and this is the pinal proper (see figs. 21 and 22). Aside from the pines, some of which reach a diameter of over two feet and a height of some eighty feet, the pinal association floristically is almost identical to that of the hololal with species of *Paurotis*, *Myrica*, *Quercus*, *Ateleia*, *Byrsonima*, *Croton*, *Sebastiania*, *Ilex*, *Eugenia*, *Rapanea*, and *Cameraria* forming the open canopy of low, mostly knarled trees, less than thirty feet in height. Below in the undergrowth *Psychotria fruticetorum* Standl., and two melastomes, *Clidemia neglecta* D. Don and *Miconia ciliata* (Rich.) DC, are conspicuous. Open areas are very limited, and in these and in open undergrowth, the tussock forming sedge, *Rhynchospora cephalotes* (L.) Vahl dominates. Over much of the hololal and pinal, an impenetrable cover is formed by the "saw-grass" *Scleria bradeata* Cav. The pinal of the Bajo de Santa Fe has essentially the same floristic composition and general appearance as the hammocks in the pinelands of northern British Honduras and the everglades of southern Florida. Two related species of *Pinus* and *Paurotis* characterize both. Although the pinal association of Bajo de Santa Fe is distinctive, it is not particularly rich in species, so there will not be a substantial number of additions to the flora of northern Peten. The Melastomaceae, notable by their scarcity in other

associations, are conspicuous here although only three species have been collected. The herbs, mostly grasses and sedges, are typical pineland species. The pinal was of possible importance to the ancient Maya as a local source of torch wood, for pine torches were used extensively. All collections in the pinal, and its marginal hololal association, are included in the following list. Of the seventy-eight species recorded, fifty-six are new records for northern Peten (see Lundell, *The Vegetation of Peten*, Carnegie Inst. Publ. 478: 49-81. 1937). These are indicated by an asterisk.

Appendix C

If you want to find tasiste palm in a grasslands Savanna, then Parque Nacional Yaxha Nakum Naranjo is the best place to start

From the aerial photographs of circa 2006 of Instituto Guatemala Nacional, I was able to locate two savannas. Arqueologa Vilma Fialko and Arquitecto Raul Noriega of proyecto... Naranjo told us about the interesting habitats to the immediate west of the west side of the impressive city-state of Naranjo (east of Yaxha and Nakum; west of Belize border). With the help of Horacio Palacios as knowledgeable in Naranjo area, and Teco as knowledgeable in finding paths to habitats where there are no roads, we hiked through the area west of Naranjo. We found it was one of the most bio-diverse habitats of the park:

- Tintal to the south
- Merges with grassland savanna
- Grassland savanna has very diverse tree habitat on it's east side
- Grassland savanna had sawgrass area at its north
- Sawgrass merges into a jimbal habitat (since there is more water here).

Appendix D

How to Reach Petexbatun area Tasistal #2, Tasistal Arroyo Faisan

Since I am not trying to get tenure at any university, and since I prefer to share what I find with other botanists, ecologists, and students, we provide here all the information on how to reach this tasistal. It is important to plan in advance, to have permission of the land owner, etc. We also make ourselves very visible to all local people (would be a challenge to hide anyway, since many local people know me from the last 40 years).

There are several hotels in this area but we prefer the Hotel Ecologico Posada Caribe since the owner, Julian, has experience with local flora and fauna and he knows the best local guides.



Then take a boat and turn left up the Arroyo Faisan. Keep in mind that in the dry season (May in some years) this stream will be so low that no boat can transit it).

There is a bulldozed “road” from the tasistal area straight to the shore of Arroyo Faisan. In the rainy months (which vary by year) this road will be up to a meter under water. So you need a dugout canoe and two paddlers to get you from Arroyo Faisan to where the water is shallow enough to hike by yourself.

Canoe paddling to get from tasistal to Arroyo Faisan Petexbatun.

Photography by: Nicholas Hellmuth.
FLAAR Mesoamerica. January 30
2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Canoe paddling to get from tasistal to Arroyo Faisan Petexbatun.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Canoe paddling to get from tasistal to Arroyo Faisan Petexbatun.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Canoe paddling to get from tasistal to Arroyo Faisan Petexbatun.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Canoe paddling to get from tasistal to Arroyo Faisan Petexbatun.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Canoe paddling to get from tasistal to Arroyo Faisan Petexbatun.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Canoe paddling to get from tasistal to Arroyo Faisan Petexbatun.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



Canoe paddling to get from tasistal to Arroyo Faisan Petexbatun.

Photography by: Nicholas Hellmuth. FLAAR Mesoamerica. January 30, 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.



No matter how high your boots, the water level is even higher (so I just wore hiking shoes that could handle the water).

Photography by: Maria Alejandra Gutierrez. FLAAR Mesoamerica. January 30 2020. Arroyo Faisan, Petexbatun, Guatemala. Camera: iPhone Xs.

There are several reasons we find ecosystems not noticed by capable botanists, zoologists, ecologists, or geographers. 1st, with 55+ years in Guatemala we know lots of the local people. We have done field trips with Julian (in photo on the previous page) since the 1970's-1980's. In the first of these field trips his father also worked with us. Since the local people know us for decades, they realize we enjoy finding areas and kinds of plants that no previous professor has found in their part of Central America.

2nd: the local people realize we are also looking for ways to improve their local health, the education in their local schools, and that we are developing plans for projects to encourage them to harvest local plants in an eco-friendly manner to earn support for their families (in this case, to harvest seeds of this palmetto palm instead of burning down the entire mass each year).

3rd: the local people notice that we share all our experience and knowledge with them.

When you walk from the stream towards the tasistal, take a right at the first “major intersection.” The tasistal is about 100 meters ahead.

We only visited the first 150 meters of the tasistal; we had not enough time (nor final resources) to spend the time to hike all the way around it; nor to hike all the way through it (we used the drone to get an overhead image of the overall tasistal).

There are no flowers and no seeds in late January.

References Cited and Suggested Reading on *Acoelorrhaphe wrightii*

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.

Not available as a download.

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

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

BALICK, Michael J. and Rosita ARVIGO'

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

BUENO, Joaquín. ALVAREZ, Fernando and Silvia SANTIAGO (editors)

2005 Biodiversidad del Estado de Tabasco. CONABIO, UNAM, Mexico. 370 pages.

COOK, Suzanne

2016 The forest of the Lacandon Maya: an ethnobotanical guide. Springer. 334 pages.

Sold online: www.springer.com/la/book/9781461491101

ESTRADA-BELLI, Francisco and David B. WAHL

2010 Prehistoric Human-Environment Interactions in the Southern Maya Lowlands: The Holmul Region Case Final Report to the National Science Foundation.

Figure 21 is a wonderful photograph; first, it is large enough (half page size). Second it is adequately exposed. But most important of all, this helpful photo shows lots of *Acoelorrhaphe wrightii* around what I estimate is a single *Crescentia cujete* tree.

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.

Free download:

https://ecosur.repositorioinstitucional.mx/jspui/bitstream/1017/1656/1/100000050585_documento.pdf

GARCIA de Miguel, Jesus

2000 Etnobotanica Maya: Origen y evolución de los Huertos Familiares de la Península de Yucatán, México.

LESUR, Luis

2011 Árboles de México. Editorial Trillas. 368 pages.

LUNDELL, Cyrus L.

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

LUNDELL, Cyrus L.

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

LUNDELL, Cyrus L.

1961 Collections from Peten and Belize. *WRIGHTIA*, Volume 2, May 1961, Number 3, PLANTAE MAYANAE— II.

Free download:

https://archive.org/stream/mobot31753002567417/mobot31753002567417_djvu.txt

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

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

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

Tasiste is briefly described, with four mid-sized photos (page 60).

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

http://aleph.ecosur.mx:8991/exlibris/aleph/a22_1/apache_media/74R92GMRSJSEPFDEE5NJY4SJI2I8AK.pdf

PARKER, Tracey

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

PEÑA-Chocarro, María and Sandra KNAPP

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

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

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

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

SCHULZE, Mark D. and David F. WHITACRE

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

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

Free download on the Internet.

SELVEN 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.

Free download.

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, Vol 24, Part I. Chicago Natural History Museum.

WILSON, Michael

- 1972 A Highland Maya People and their Habitat: The Natural History, Demography and Economy K'ekchi' PhD dissertation. 475 pages.

His field work was near San Pedro Carcha, which is now a suburb of Coban, Alta Verapaz. The climate is moist due to moist clouds during many times of the year.

Free download on the Internet.

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*

There are hundreds of web sites on this palm for gardeners in Florida. Not very many comparable web sites for this palm in Mesoamerica. One of the few sites for Mesoamerica is:

www.backyardnature.net/yucatan/paurotis.htm

Let's next look at photos of this palm in Florida, because this palm in Peten is in remote areas and no way to visit them every month to photograph them when they flower and fruit (unless tax deductible donations from a considerate individual or foundation come our way).

<https://idtools.org/id/palms/palmid/factsheet.php?name=Acoelorrhaphe+wrightii>

Clever concept to help you identify which species of palm is in front of you.

www.lilife.com/Encyclopedia/PALMS_AND_CYCADS/Family/Arecaceae/24175/Acoelorrhaphe_wrightii

Good photo of large area when the seeds when green.

www.monaconatureencyclopedia.com/acoelorrhaphe-wrightii/?lang=en

A web site with introductory coverage of many plants.

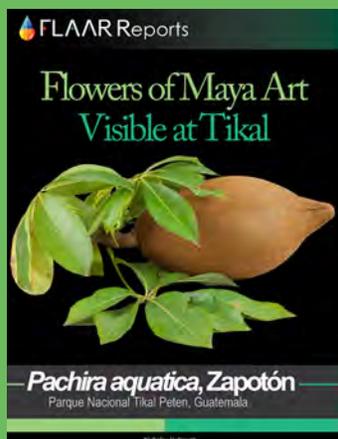
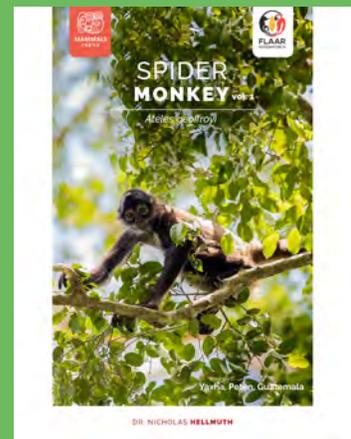
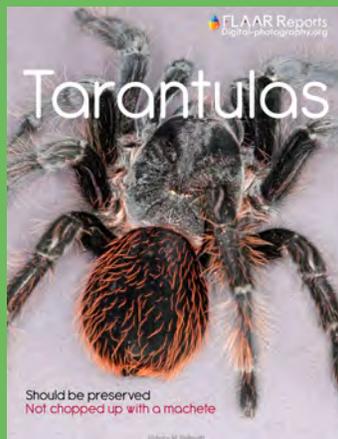
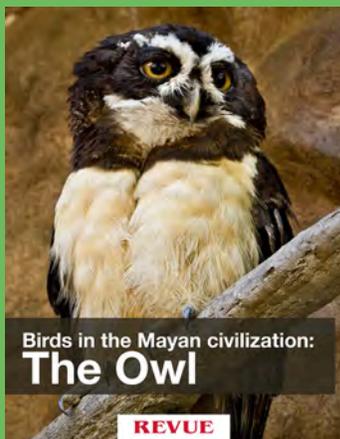
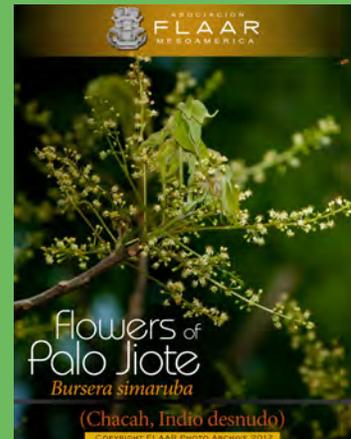
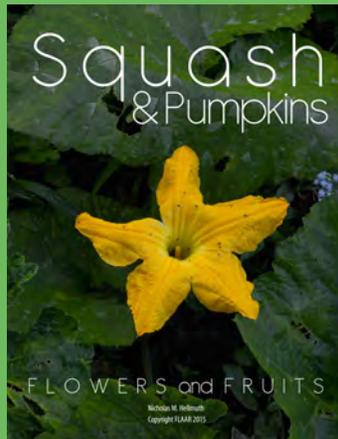
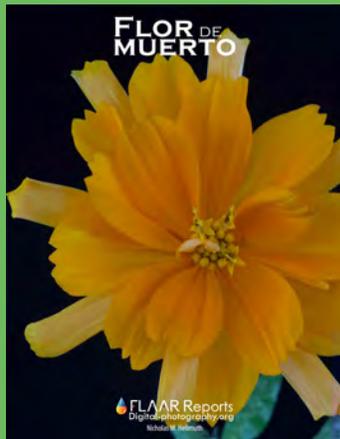
www.palmpedia.net/wiki/Acoelorrhaphe_wrightii

Has diverse photographs. The ones showing masses of seeds are rare to find elsewhere.

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

The top photo is helpful to see the seed pods sticking up; eventually they tend to lean down (though photo is sadly enlarged past its resolution)

Front covers of earlier photo essay style reports on insects, birds, pendant nests, and other aspects of the flora and fauna of Guatemala.



WWW.MAYA-ETHNOBOTANY.ORG

