

TREES with PEELING BARK to shed Vines

Jiote, Pimienta Gorda, Guayaba

August
2022



FLAAR
MESOAMÉRICA

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Parque Nacional Tikal (PANAT) - Reserva de la Biosfera Maya (RBM)
Peten, Guatemala

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Caption for front cover photograph:

Every *Bursera simaruba* trunk bark is in a different pattern. This one had a copper-magenta color that attracted me from half a football field away.

Photo by: Nicholas Hellmuth, July 22, 2022, 1:26 pm, in front of Hotel Tikal Inn.

Title page cover photograph:

PANAT-Mundo-Perdido-area-Pimenta-dioica-peeling-bark-iPhone-13-ProMax-1207pm-Jul-22-2022-0711-PS-NH.jpg

Caption for title page cover photograph:

Peeling bark comes off of this tree in vertical strips that curl together before falling to the ground. Other photos in this FLAAR Report show the curled strips of allspice tree bark on the ground.

Photo by: Nicholas Hellmuth, Mundo Perdido area of Parque Nacional Tikal, PANAT, July 22, 2022, 12:07 pm.

Camera: iPhone 13 Pro Max in RAW mode (DNG format).



APPRECIATION FOR FACILITATING THE RESEARCH PROJECTS

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HOTEL TIKAL INN

We thank Roxana Ortiz for offering to provide lodging for our research team at the Tikal Inn for our field trips starting in October 2022. Since we are not receiving payments for our field work, our budget appreciates complimentary lodging.

In order to post photographs on botanical and zoological websites, you can't do this if there is either no Internet or weak Internet. Thus it is very helpful that when we are provided rooms and meals, that functional Internet is available at the Hotel Tikal Inn.

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WE THANK

Sergio Balam for providing space to store our field trip equipment.

We **Appreciate**

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

These donations are from a family in Chicago in honor of the decades of botanical field work of botanist Dr John D. Dwyer, who worked in many areas of Mesoamerica, including in the Yaxha area in the 1970's while the site was being mapped by FLAAR.

This donation is also in recognition of the urgency and need for conservation of both wildlife and rare plants in the bio-diverse ecosystems of the Reserva de la Biosfera Maya (RBM) of Guatemala. Parque Nacional Yaxha, Nakum and Naranjo (PNYNN), Parque Nacional Laguna de Tigre (PNLT) and the wetlands of Municipio San Jose are three parts of the over 5 million acres of the RBM.



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Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Jul. 21, 2022. Camera: iPhone 13 ProMax

Introduction to trees of **Peeling bark of Guatemala**

Guatemala is a biodiversity paradise of flora, fauna, and ecosystems. Our goal at FLAAR (USA) and FLAAR Mesoamerica (Guatemala) is to share our 50+ years of fieldwork findings. We have reports on flora, fauna, and ecosystems for professors and students, as well as books on plants, animals, and habitats of Guatemala for school children in our MayanToons publication series. We also prepare animated videos on plants and animals of Guatemala (MayanToons).

This FLAAR Report addresses how trees try to protect themselves from vines and lianas that may “choke” the trunk of the tree. The leaves of the vines up in the treetops may shade out the trees. In FLAAR’s Maya ethnobotanical research Garden (Guatemala City) we have several vines (*Passiflora* and others) that close the entire top of trees.

Three common species of trees native to Reserva de la Biosfera Maya (RBM) try to not allow these vines to climb up their trunks. The trees shed their bark. We have photographed trees in the Caribbean area of Izabal (Guatemala) where trees throw off up to an entire meter of bark to push vines off the tree (as the vines are attached to the bark when the bark falls off the vines do too).

Lots of trees also want to get rid of lichen.

In this report, we introduce three trees that visitors to Tikal can see. You can find the names and which ones are edible, medicinal, and useful to make products for local Mayan families.



Bursera simaruba trunk bark is in a different color and pattern. The one at the left edge is trying to throw off lichen. The one in the middle has a copper-magenta color that draw my attention half a football field away. Photo by: Nicholas Hellmuth, July 22, 2022, 1:25 pm, in front of Hotel Tikal Inn.



This *Bursera simaruba* tree has not been successful in throwing off the lichen, but it is still trying.
Photo by: Nicholas Hellmuth, July 22, 2022, 1:26 pm, in front of Hotel Tikal Inn.
Camera: iPhone 13 Pro Max, RAW format (DNG)



Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Jul. 19, 2022. Camera: iPhone 13 ProMax

My Personal Experience with **Peeling bark of *Pimenta dioica*, Allspice, pimienta gorda trees**

At age 19 (1965), when I lived and worked in Tikal national park for 12 months straight, I saw both Palo de jote and allspice. We drank tea from allspice leaves at least once a week. I found the same tree at Yaxha while carrying out fieldwork mapping Yaxha.

I remember waking up to the beauty of these trees in Tikal, at the request of the park biologist Mirtha Cano (circa 2011-2012), when the park houses were available for our team. There were dozens of Pimienta Gorda trees in the open forest surrounding the park administration area.

When I returned to Yaxha in August 2018-July 2019 I noticed there were dozens of allspice trees with peeling bark all over Yaxha. They were especially visible around the IDAEH camp area on the north part of Lake Yaxha. This same area had gorgeous peeling bark of Palo de jote trees as well.



Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Jul. 19, 2022. Camera: iPhone 13 ProMax

■ Full Botanical Names

<i>Bursera simaruba</i> (L.) Sarg.	<i>Pimenta dioica</i> (L.) Merr.	<i>Psidium guajava</i> L.
birch, ca-c-ch, ca-cah, cha-c, chacah, cha-ca, cha-cah, gumbolimbo, gumbo limbo, gumbolimbo blanco, hukup, indio desnudo, indio peludo, palo chino, palo jiote, red gumbolimbo, sirvella simarona, white gumbolimbo, xa-ka, xaka	Pimienta gorda, allspice	coloc, guajava, guava, guayaba, pata, pa-ta'h, piche, pichi, pu-tá, putah, piche
Burseraceae	Myrtaceae	Myrtaceae
MED, PRD, FUEL, RITL, ORN, POIS, best known for incense	MED, FOOD, SPC, BEV, OIL. Edible seeds (spice), leaves for tea	FOOD, MED, PRD, FUEL, TAN, BEV.
Balick, Nee and Atha 2000: 116	Balick, Nee and Atha 2000: 98	Balick, Nee and Atha 2000: 98

Where are these trees with **Peeling bark found in adjacent México?**

I put in bold font the states of Mexico that border Peten and/or are in the Maya Lowlands:

Bursera simaruba (L.) Sarg. AGS, CAM, CHIS, CHIH, COL, DGO, GTO, GRO, HGO, JAL, MEX, MICH, MOR, NAY, OAX, PUE, QRO, QROO, SLP, SIN, SON, TAB, TAMS, VER, YUC, ZAC

(Villaseñor 2016: 681)

I do not understand why *Pimenta dioica* (L.) Merr. is nowhere in the list of Villaseñor 2016. Maybe this tree got lost in the many other genera names of the dozens of antiquated names. *Pimenta dioica* (L.) Merrill is listed for Belize (Balick, Nee and Atha 2000: 98)

Psidium guajava L. BCS, CAM, CHIS, CHIH, COAH, COL, DGO, GTO, GRO, HGO, JAL, MEX, MICH, MOR, NAY, NLE, OAX, PUE, QRO, QROO, SLP, SIN, SON, TAB, TAMS, VER, YUC, ZAC

(Villaseñor 2016: 805)

We show the local and Mayan names in the tabulation above and the synonyms for the three trees with peeling bark in Appendix A.

Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Jul. 19, 2022. Camera: iPhone 13 ProMax



Other trees to look for at Tikal National Park that May have peeling bark

Two of the three trees with peeling bark at Tikal are plant family Myrtaceae. Thus, it would be smart to look for other trees of this plant family such as Genera

- *Calyptranthes*
- *Eugenia*

Myrcianthes fragrans definitely has peeling bark, need to find at PANAT and nearby!

Psidium guineense Sw. definitely has peeling bark, need to find at PANAT and nearby!

Psidium salutare (Kunth) O. Berg and *Psidium sartorianum* (O. Berg) Nied. Need to find.

In Izabal, during our 17-month field work project (one week per month) we found the following trees with peeling bark:

Rapanea ferruginea (Ruiz & Pav.) Mez is a synonym of *Myrsine coriacea* (Sw.) R.Br. ex Roem. & Schult. Neither are listed by Schulze and Whitacre (1999).

<i>Amyris</i> sp.	<i>Guettarda combsii</i> L	<i>Rapanea ferruginea</i> (Ruiz & Pav.) Mez
RUTACEAE	RUBIACEAE	PRIMULACEAE
Palo de gas	Guayabillo	Fierrillo, Pimientillo, arrayán, palná
Aldea Buena Vista	Aldea Buena Vista, Mirador del Cañón, Tapón Creek	Taponcito Creek
At Tikal: <i>Amyris elemifera</i>	Yes, at Tikal (Schulze and Whitacre 1999: 209)	

To see which trees can be found in Peten, one (of several) source is INAH and IARNA-URL 2012.

Where have trees with peeling bark been found in Parque Nacional Tikal (PANAT)?

Schulze and Whitacre (1999) have a good introductory list of trees of Tikal. Therefore, we need to complement their list with more recent ones to learn how many more species of trees of Tikal National Park have peeling bark.



The bark is peeling off all up and down the main trunk, on all sides.

Psidium guajava, guayaba (fruit tree), overlooking the aguada behind the Visitor's Center (on top of the slope where I lived for 12 months in 1965 (as a student intern working for the Tikal Project assisting in architectural recording and photography).

Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Jul. 19, 2022. Camera: iPhone 13 ProMax



■ The bark peels off in vertical segments. It curls to some degree but not as much as on allspice trunks.

Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Jul. 19, 2022. Camera: iPhone 13 ProMax



Closeup of the peeling bark.
Photo by: Nicholas Hellmuth, 2:42 pm, July 21, 2022, PANAT.
Camera: iPhone 13 Pro Max



Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Jul. 22, 2022. Camera: iPhone 13 ProMax

What species of trees with peeling bark did Cyrus Lundell find in Peten?

Lundell and every botanist before and since him knew the three trees we are presenting today. What we need to learn (for a second edition after additional field trips to Tikal) is how many other trees have trunks with remarkable peeling bark.

Lundell mentions the peeling bark very clearly (1937: 33):

The bark of the trees is exceedingly variable. It is thin and relatively smooth, often greenish, on species of the Leguminosae and Ceiba. *Bursera simaruba* and *Pimenta officinalis* have papery bark which peels off in thin sheets. The former species is red in color and the latter white, both very distinctive.

Lundell describes the habitats of each tree significantly better than Standley, Steyermark, Williams, et al. However, the Chicago Museum botanists were excellent with traditional botanical descriptions.

How many botanical descriptions of trees actually mention the peeling bark?

Bursera simaruba (L.) Sarg. Gard. & For. 3: 260. 1890. *Pistacia Simaruba* L. Sp. Pl. 1026. 1753. *B. gummifera* L. Sp. Pl. ed. 2. 471. 1762. *Elaphrium ovalifolium* Schlecht. Linnaea 17: 248.1843. *B. ovalifolia* Engler, Bot. Jahrb. 1: 43. 1881. Jiote; Chino; Chinacahuite; Palo jiote; Solpiem, Cajha, Xacago-que (Huehuetenango, fide Tejada); Palo chino; Chacah, Chacah Colorado (Petén, Maya); Chaca (Huehuetenango) ; Palo mulato (Petén); Indio desnudo (North Coast); Chic-chica, Chicah (Petén); Cacah (Quecchi).

Common or abundant in many lowland regions, often in primeval forest, but more plentiful in rather dry or moist, secondary forest or thickets, very common in fencerows, ascending from sea level to about 1,800 meters, but most frequent at 1,000 meters or less; Petén; Alta Verapaz; Baja Verapaz; Izabal; Zacapa; El Progreso; Chiquimula; Jalapa; Jutiapa; Santa Rosa; Escuintla; Guatemala; Sacatepéquez; Suchitepéquez ; Retalhuleu; San Marcos; Huehuetenango; Quiche". Southern Florida; Mexico; British Honduras to Salvador and Panama; West Indies; northern South America.

A small or medium-sized tree, or in wet forest often 25 meters high or more and sometimes a meter in diameter, the young bark green or greenish brown, the oldbark light red to dark reddish brown, peeling off in thin paper-like sheets, the branches thick and brittle or soft, the branchlets usually glabrous; leaves deciduous, the leaflets usually 5-7, on short

or long petiolules, broadly ovate to ovateoblong or lance-oblong, mostly 5-12 cm. long, acuminate or cuspidate-acuminate, more or less pubescent when young or almost glabrous, in age usually glabrous or nearly so, rarely persistently pilose beneath; flowers 3-parted, greenish or yellowish, fragrant, the panicles much shorter than the leaves, sometimes very short; fruit variable in size and shape, 6-10 mm. long, 3-valvate, usually tinged with red. Known in British Honduras as "birch" or "gumbolimbo"; sometimes called "copon" in Honduras, "palo retinto" in Tabasco, and "mulato" in Oaxaca and Veracruz. The usual name in Guatemala is "jiote," of Nahuatl derivation, given because of a fancied resemblance of the peeling bark to a skin disease common in tropical America. El Jiote is a caserío of the Department of Jutiapa.

The name "chino" is used currently in Zacapa and Chiquimula. The name "indio desnudo," of only occasional use, is a particularly appropriate one, for the coppery trunks, especially when seen in a rather dark forest, have almost the appearance of an Indian's skin, so much so that one is likely to be startled by the sudden appearance of a tree.

The wood is whitish or light brown, often discolored blue, without distinctive odor or taste, light in weight, fairly soft but firm and tenacious; specific gravity 0.30; grain fairly straight to irregular, of medium to coarse texture, fairly strong, easy to work, finishes fairly smoothly, very perishable. It is

suitable for boxes and crates, but little use is made of it in Guatemala, except for firewood or charcoal.

The wood is said to be employed in Guatemala for soles of caites, the sandals worn by many Indians. The principal use of the tree in Guatemala and all Central America is for living fenceposts, and for this purpose it is planted generally in the lowlands and sometimes to middle elevations. Branches placed in the ground take root quickly and develop into trees sufficiently large to hold barbed wire. Planted more densely, the trees form satisfactory hedges. Wisdom states that the young shoots developing in May and June are eaten by the people of the Jocotan region. He states also that copal is obtained from the tree in the same area. The trunk is notched and the resinous sap drains into gourds placed beneath. This is then boiled with water, the resin rising to the surface, where it is skimmed off and placed in cold water to harden. It is shaped into oblong blocks, very hard and brittle, which are wrapped in corn husks, tied at the ends with strips of corn husk, and in this form taken to market, to be used as incense in the churches. For ceremonial purposes among the Chorti Indians it is shaped into disks called pesos, the size of a small coin, and these are offered as payment to the Christian and other deities.

The tree is much used in domestic medicine, being one of the numerous "remedies" for snake bites. Poultices of the leaves are used in case of gangrene to prevent its spread. The resin often is used as a substitute for glue and as cement for mending broken china and glass. The Caribs employed it to paint their canoes, to preserve them from the attacks of worms. The name "gumbolimbo," used in British Honduras and even in southern Florida, is believed to be a corruption of the Spanish goma elemi, sometimes given by the Spaniards to the resin or copal.



Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Jul. 21, 2022.
Camera: iPhone 13 ProMax

In treating the species of *Bursera*, Bullock excludes *B. Simaruba* from the Mexican flora and presumably would exclude also the Central American forms, using instead the name *Bursera ovalifolia*. The type of *B. Simaruba* is Jamaican. The characters given by Bullock for separating the two species do not hold in Guatemalan material, and we see no reason for attempting to separate it from *B. Simaruba*. The species is a somewhat variable one, it is true, with a remarkably wide range, but treated as a single species *B. Simaruba* is immediately recognizable.

(Standley and Steyermark 1946: 439-441)

Standley and Steyermark are renowned experienced botanists, Standley was also a good ethnobotanist. However, there is no description or photos of the peeling bark. Therefore, FLAAR Reports uses digital photos, to show the entire tree (more than an herbarium drawer).

Pimenta dioica (L.) Merrill, Contr. Gray Herb. 165: 37, / 1.1947. *Myrtus Pimenta* L. Sp. PL 472. 1753. *M. dioica* L. Syst. Nat. ed. 10. 1056. 1759. *Pimenta officinalis* Lindl. Collect. Bot. sub 1. 19.1821. *Myrtus Tabasco* Schlecht. & Cham. Linnaea 5: 559. 1830 [as to Mexican specimens only, not as to type]. *Eugenia micrantha* Bertol. Nov. Comm. Acad. Bonon. 4: 422. 1840 (type from somewhere in Guatemala, J. Velasquez). *Pimenta officinalis* [Berg], Tabasco sensu Berg, Linnaea 27: 425. 1856 [not *Myrtus tabasco* Schlecht. & Cham.]. *P. Pimenta* (L.) Karst. Deut. Fl. Pharm. Med. Bot. 790. 1882. *Myrtus piperita* Sesse* & Moc. Fl. Mex. ed. 2. 124. 1894 (the type from Papantla, Veracruz, Sesse et al. 2043). *Pimenta dioica* var. Tabasco sensu Standl. Ceiba 3: 172. 1953 [not *Myrtus Tabasco* Schlecht. & Cham.]. *P. Tabasco* sensu Lundell, Wrightia 2: 58. 1960 [not *Myrtus tabasco* Schlecht. & Cham.]. Pimiento; Pimienta gorda;

Pimienta; Peensia (Coban, Quecchi?); Pimienta de Chiapas; Pens (Quecchi) ; Ixnabacuc (Peten, Maya, fide Lundell); Pimienta de Jamaica. Common in moist or wet climax forest, usually on limestone, 350 meters or less; Peten; Alta Verapaz; cultivated commonly in fincas of Guatemala, or sometimes for ornament or for its fruit in parks, along streets, or about dwellings, at low and middle elevations. Southern Mexico, including the Yucatan Peninsula of Mexico; British Honduras; Central America; West Indies; perhaps northern South America.

A tree up to 20 meters high, 30 cm. in diameter, with pale brown bark peeling off in thin scales or rather large sheets; vigorously growing branchlets flattened and 4-angled, the angles terminating distally in the position of stipules; branchlets, inflorescence and young foliage closely appressed-pubescent with sordid or yellowish-white hairs, the hypanthium conspicuously canescent; leaves coriaceous, soon glabrate, ovate or elliptic, 3-9 cm. wide, 9-20 cm. long, mostly 2-3 times as long as wide; blades variable in shape, generally acute but the very tip obtuse or subacuminate, the base acute to rounded or even cuneate, the margins at base even on the broader leaves cuneately long-decurrent on the stout broadly channeled petioles 1.5-2 (-3) cm. long, 1.5-2.3 mm. in diameter; midvein deeply sulcate above, elevated its whole diameter beneath; lateral veins 9-12 pairs, distant, rather prominent beneath, stronger than the few intermediate ones, somewhat diminished distally and forming a connecting series of high irregular angular arches the bases of which may be as much as 1 cm. from the margin; minor veins forming a pale elevated network on the lower surface, the numerous glands conspicuous among them; inflorescence a myrcioid panicle 6-12 cm. long, many-flowered, 3 to 4 times compound, the peduncle 2-4.5 (-7) cm. long, up to 2.5 mm. wide below the first node; flowers mostly clustered near the tips, sessile but



Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Jul. 10, 2022. Camera: iPhone 13 ProMax

the lateral ones on short branches and so appearing pedicellate; bracts subtending the flower-clusters 1-2 mm. long, deciduous at anthesis; buds turbinate, 2.5-3.5 mm. long; calyx lobes 4, nearly equal, broadly rounded, concave, thinly pubescent without, densely canescent-tomentulose within, about 2 mm. wide, 1.5 mm. long; disk cup-shaped in flower, 2.5 mm. wide, the stamens interspersed with white hairs; style 4-5 mm. long, prominently capitate, the stigma twice as thick as the style; stamens about 150, up to 5 mm. long; petals white, suborbicular, about 5 mm. long; ovary bilocular, the ovules 1 (-2) in each locule; fruit subglobose or oblate to somewhat pyriform, (4-) 6-8 mm. in diameter, prominently verrucose with convex oil-bearing glands; seeds usually 2, laterally compressed, suborbicular, the embryo forming a double spiral.

In Jamaica the production of allspice has been an important industry. Those who regard the plant of Mexico and Central America as a species distinct from the West Indian one point out that the commercial product from Mexico is held to be inferior to that of Jamaica; that the dried fruits of the mainland plants are larger than, and contain less than half as much volatile oil as, the Jamaican berries. It is apparently true that the West Indian plants have somewhat smaller flowers and fruits, and more slender panicles, than those of Central America, but in other respects they are scarcely distinguishable. The Central American populations have passed under a series of names based nomenclatural on *Myrtus tabasco* Schlecht. & Cham. *Linnaea* 5: 559. 1830, but that name applied to a Venezuelan plant which is probably not the same as the Central American ones. For a note on the nomenclature of *Myrtus tabasco*, see Fieldiana, Bot. 29: 511-512. 1963.

It is interesting to note that this species, as suggested by its name, "dioica," is popularly supposed to produce male and female flowers upon different trees. This is, in fact, the origin of the Linnaean name "dioica," Linnaeus in 1754 having received from Philip Miller Jamaican specimens and a letter asserting the existence of the two types of flowers. Some botanists have denied vigorously the existence of two types of flowers in the tree, whereas others have stated categorically that the trees were polygamous or dioecious. Merrill (Contr. Gray Herb. 165: 30-38. 1947), in an article on the nomenclature of *Pimenta dioica*, reviewed a series of statements by horticulturists and others who knew the tree in the living condition; the evidence was somewhat contradictory, but the consensus was that some individual trees definitely are barren at least in certain years and perhaps always; that barrenness may result from damage to the plant because of wasteful methods of harvesting; that even the so-called "male" flowers are usually perfect, with well-developed stamens and pistil. Merrill suggested that barrenness in at least some individuals might result from a combination of genetically controlled factors producing seasonally late flowering and at the same time self-sterility.

The notes in the following paragraph are those of Mr. Standley: This is one of the most delightful of Central American trees because of the intense and highly agreeable odor that it exhales, whether fresh or dry. Most plants with characteristic odor lose it upon drying, but all spice specimens in the herbarium retain their fragrance indefinitely, and to such a degree that it is very apparent whenever the case containing the specimens is opened. The name allspice is derived from the fact that the spice furnished by the tree, consisting of the dried unripe berries, is supposed to combine the flavor of cloves, cinnamon, and nutmeg. This fruit is much used as a condiment for flavoring

food in most American and European countries, and it is sold commonly in Guatemalan markets. It is also employed to some extent in domestic medicine. In Guatemala the Indians often apply the powdered seeds to the corpses of children, saying that thus they are preserved indefinitely, a practice that probably is of very ancient origin. The trees may be seen in most of the small fincas of the country, easily recognizable even when sterile by the characteristic odor and by the distinctive bark, much like that of the guava. It is said that the bark is shed more or less regularly twice a year, but it always is peeling from the trunks, giving them a somewhat mottled appearance. When covered with its abundance of white flowers the tree is very handsome, conspicuous from a long distance, but the flowers last only a few days at most. The wood is tough and closegrained; heartwood reddish brown, the sapwood of a lighter color; of medium luster, very hard and heavy, fine-textured; finishes very smoothly. Probably no use is made of it locally.

(McVaugh 1963: 382-385)

Whew, finally a mention of the peeling bark.

Psidium guajava L. Sp. Pl. 470. 1753. Guayaba (fruit) ; guayabo (plant); pataj, paid (Quecchi); cac (Poconchi); ch'amxuy (Ixil); piac (Cacchiquel, Antigua); ikiec (Cacchiquel, Tecpam).

Mostly in moist or dry thickets, especially in pastures, frequently forming almost pure stands of considerable extent, 1800 meters or less, most common at 1000 meters or lower; planted generally; probably found in every Department of Guatemala. Florida; Mexico; Central America; Costa Rica and Panama; West Indies; tropical South America; naturalized in the tropics of the Old World.



A shrub or tree up to 10 meters high, pubescent on the young growth, and the inflorescence and at least the lower surface of the leaves sparingly or densely pubescent with mostly appressed, soft silvery-gray or pale reddish hairs up to about 0.5 mm. long; branchlets terete, or quadrangular with pronounced angles or low wings below the nodes; leaves elliptic or oblong, 3-6 cm. wide, (4.7-) 8-14 cm. long, mostly 2-3 times as long as wide, rather abruptly rounded or occasionally narrowed to the obtusely pointed or rounded tip, the base abruptly rounded or subcuneately narrowed, the margins decurrent on the stout petiole 1-2 mm. thick, 4-7 (-10) mm. long; veins prominent beneath, usually markedly impressed above; lateral veins 12-20 pairs, often conspicuous and parallel, not forming a marginal vein but diminishing distally, each approaching to within 1-2 mm. from the margin, then incurving and joined to the next succeeding vein by a strong straight perpendicular vein; upper surface of blade inconspicuously gland-dotted, glabrous or thinly pubescent, the small veins little or not at all elevated and scarcely apparent; lower surface finely appressed-pubescent or glabrous, thickly gland-dotted; inflorescence axillary, 1-flowered (very rarely 3-flowered), the peduncle (7-) 10-20 (-25) mm. long, 1 mm. or more thick, up to 2.5 mm. thick in fruit; bracteoles subulate, often glabrous, 3-4 mm. long; buds at maturity 13-16 mm. long, completely closed at tip, the hypanthium 5-7.5 mm. long, constricted at summit and thence enlarged into the ovoid pointed calyx; calyx at maturity splitting irregularly into 4-5 lobes which are appressed pubescent distally; proximal third of the calyx, and the summit of the ovary, glabrous; style 10-12 mm. long, the flat peltate stigma 0.5 mm. wide; petals white, elliptic, cucullate, 10-12 mm. long; stamens 1507-275, the longest as long as the style; anthers 0.8-1.2 mm. long; fruit globose or pyriform, 2-6 cm. long, yellow or pinkish.

Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Jul. 21, 2022.

Camera: iPhone 13 ProMax

The following notes were supplied by Mr. Standley: The Maya name of Yucatan is "pichi"; sometimes called "coloc" and "putah" in British Honduras, and the name "pichi" also is used there by Maya-speaking people. The name "guayaba" is of Antillean origin. It occurs in many place names of Guatemala, such as El Guayabo, Los Guayabales, etc. The tree is a very common one in the lowlands of Guatemala, often forming pure stands called guayabales. The fruits are eaten by many animals, and it is probably on this account that the seedlings are spread so widely, the hard seeds being indigestible. It is noteworthy that the young plants spring up in perhaps greatest abundance in cattle pastures. The wood is brown or light brown. It is little used except for firewood, but in Guatemala spinning tops sometimes are made from it. In El Salvador it is utilized for fine-toothed combs, but these, when wet, are inclined, even when well polished, to disintegrate or shed their fibers; hence the wood of Salamo (*Calycophyllum*) is preferred for the purpose. The bark is employed in some parts of Mexico, and perhaps also of Central America, for tanning leather. A decoction of the leaves is astringent, and is administered as a remedy for diarrhea. The fruit of the guava is highly esteemed in Guatemala, and in most other regions where it grows, in spite of its very strong and not altogether pleasant odor. Vast quantities of the fruits are eaten raw by children and older people, but enough is left, so great is the production, for a great variety of mammals and birds. In Guatemala the fruits are not common in most of the markets, probably because most people have an ample supply at or near home. The fruits are stewed and often served as a dessert. Their most important use is in preparation of the thick jelly or guava paste which, cut in thin squares, is one of the favorite and most common desserts of all Central America. The fruits vary greatly in shape, size, and flavor, some being rather acid.

(McVaugh 1963: 392-394)

Zilch on the bark peeling off.

Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Jul. 21, 2022.

Camera: iPhone 13 ProMax

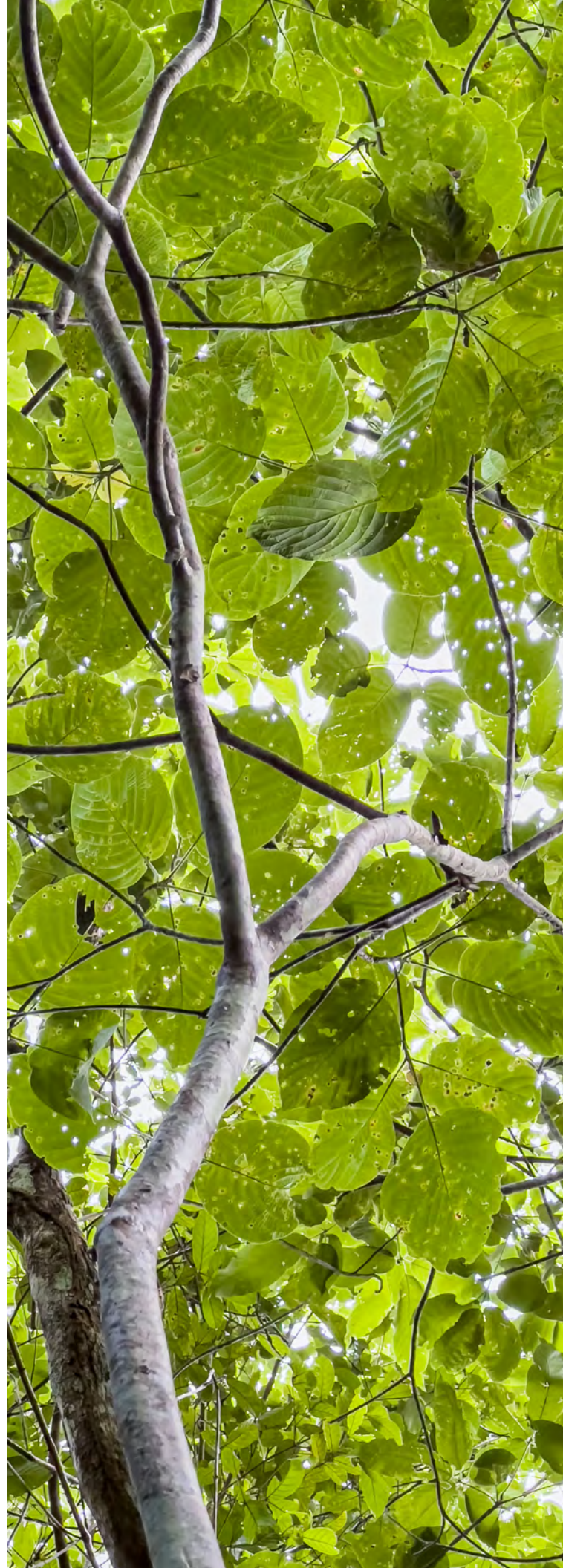




Photo by: Nicholas Hellmuth, 2:42 pm, July 21, 2022, PANAT.
Camera: iPhone 13 Pro Max



■ Lots of curled segments of bark have fallen onto the ground.

Photo by: Nicholas Hellmuth, 12:07 pm, July 22, 2022. Mundo Perdido area of Tikal National Park.

Camera: iPhone 13 Pro Max



Bark of the allspice tree falls off in vertical strips and then curls up (it may curl up and then fall off)
Photo by: Nicholas Hellmuth, Mundo Perdido area, Parque Nacional Tikal, PANAT, 12:06 pm, July 22, 2022.
Camera: iPhone 13 Pro Max, RAW format (DNG).



Here you can notice that the bark curls around itself before falling off; one vine is able to survive nonetheless.
Photo by: Nicholas Hellmuth, Mundo Perdido area, Parque Nacional Tikal, PANAT, 12:07 pm, July 22, 2022.
Camera: iPhone 13 Pro Max, RAW format (DNG).



Good view of the bark "curling off" and then falling to the ground.

Photo by: Nicholas Hellmuth, *Pimenta dioica*, brecha east of visitor's center, 10:36am, July 21, 2022.

Camera: iPhone 13 Pro Max, RAW mode (DNG file).



You can see all the strips that have fallen off the trunk onto the ground. All are curled up.
Photo by: Nicholas Hellmuth, *Pimenta dioica*, brecha east of visitor's center, 10:36am, July 21, 2022.
Camera: iPhone 13 Pro Max, RAW mode (DNG file).



■ Closer view of the trunk of the previous page.

Photo by: Nicholas Hellmuth, *Pimenta dioica*, brecha east of visitor's center, 10:36am, July 21, 2022.
Camera: iPhone 13 Pro Max, RAW mode (DNG file).



This is the best example that we found on our initial hikes in late July. There are hundreds more of pimienta gorda, allspice trees awaiting to be photographed and showed.

Photo by: Nicholas Hellmuth, *Pimenta dioica*, brecha east of visitors center, 10:36am, July 21, 2022.

Camera: iPhone 13 Pro Max, RAW mode (DNG file).

Three best known trees With peeling bark in Belize

During our 17 weeks of field trips (one week per month) in 2020-2021, in Municipio de Livingston (eastern half of Izabal Department), we found several other species of trees with peeling bark. For this first edition of the initial FLAAR Report for Tikal we feature the three trees with peeling bark that we found in our initial field trip in late July 2022.

Bursera simaruba (L.) Sarg. — Ref: FG 5: 439. 1946. — **Loc Use:** MED, BEV, CNST. — **Reg Use:** MED, PRD, FUEL, RITL, ORN, POIS. — Nv: birch, ca-c-ch, ca-cah, cha-c, chacah, cha-ca, cha-cah, gumbolimbo, gumbo limbo, gumbolimbo blanco, hukup, indio desnudo, indio peludo, palo chino, palo jiote, red gumbolimbo, sirvella simarona, white gumbolimbo, xa-ka, xaka. — **Habit:** Tree.

(Balick, Nee and Atha 2000: 116)

Pimenta dioica (L.) Merrill — Syn: *Pimenta officinalis* Lindl. — **Loc Use:** MED, FOOD, BEV, SPC. — **Reg Use:** MED, FOOD, SPC, BEV, OIL. — Nv: allspice, pimenta, pimienta, pimenta gorda, pimienta gorda. — **Habit:** Tree.

(Balick, Nee and Atha 2000: 98)

Psidium guajava L. — **Loc Use:** FOOD, MED. — **Reg Use:** FOOD, MED, PRD, FUEL, TAN, BEV. — Nv: coloc, guajava, guava, guayaba, pata, pa-ta'h, piche, pichi, pu-tá, putah, piche. — **Habit:** Shrub or tree.

(Balick, Nee and Atha 2000: 98)

Concluding Discussion and **Summary on Trees with Peeling Bark**

There is more field work that needs to be carried out to find all other species at PANAT with peeling bark. We will also be finding and photographing all trees in the park with prickles (conical spines) such as *Ceiba pentandra*. This is the best known species but we have found other species all over Guatemala with conical spines almost identical to those of Ceiba.

We are also working on finding and photographing all palms at Tikal.

All trees shown in Classic Maya art (such as Crocodile Trees) are of long-term interest to find and photograph at Tikal. Plus, we are geared up to find all trees at PANAT that are mentioned in the Popol Vuh (especially the trees that Seven Macaw perch on).

A first priority is all epiphytic cacti, bromeliads, orchids, ferns, 3-dimensional lichens, and other flora up in the treetops. This is one of the priorities of the PANAT park administration is to document these micro-ecosystems up in the trees with telephoto lenses so show the plants “up close.”

Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Dec. 19, 2018.
Camera: Nikon D810.



Appendix A

Synonyms for the three species of trees with peeling bark

Bursera simaruba (L.) Sarg. is an accepted name. Below are the synonyms (names used by earlier botanists before new research documented that all the old specimens were really just one single species).

All synonyms are from www.ThePlantList.org.

- *Bursera arborea* (Rose) L.Riley
- *Bursera bonariensis* Bold.
- *Bursera gummifera* L.
- *Bursera gummifera* var. *glabrata* Griseb.
- *Bursera gummifera* var. *polyphylla* DC.
- *Bursera integerrima* (Tul.) Triana & Planch.
- *Bursera simaruba* var. *yucatanensis* Lundell
- *Bursera subpubescens* (Rose) Engl.
- *Elaphrium arboreum* (Rose) Rose
- *Elaphrium integerrimum* Tul.
- *Elaphrium simaruba* (L.) Rose
- *Elaphrium subpubescens* Rose
- *Icicariba simaruba* M.Gómez [Invalid]
- *Pistacia simaruba* L.
- *Terebinthus arborea* Rose
- *Terebinthus simaruba* (L.) W.Wight ex Rose



Photo by: Nicholas Hellmuth, 2:42 pm, July 21, 2022, PANAT. Camera: iPhone 13 Pro Max

Pimenta dioica (L.) Merr. is the accepted name. Below are the synonyms (names used by earlier botanists before working them out as duplicate names all for one species).

- *Caryophyllus pimenta* (L.) Mill.
- *Eugenia micrantha* Bertol.
- *Eugenia pimenta* (L.) DC.
- *Eugenia pimenta* var. *longifolia* DC.
- *Eugenia pimenta* var. *ovalifolia* DC.
- *Evanesca crassifolia* Raf. [Illegitimate]
- *Evanesca micrantha* Bertol.
- *Myrtus aromatica* Poir. [Illegitimate]
- *Myrtus aromatica* Salisb. [Illegitimate]
- *Myrtus dioica* L.
- *Myrtus pimenta* L.
- *Myrtus pimenta* Ortega
- *Myrtus pimenta* var. *breviflora* Hayne
- *Myrtus pimenta* var. *brevifolia* Hayne
- *Myrtus pimenta* var. *longifolia* Sims
- *Myrtus piperita* Sessé & Moc.
- *Myrtus tabasco* Willd. ex Schlttdl. & Cham.
- *Pimenta aromatica* Kostel. [Illegitimate]
- *Pimenta communis* Benth. & Hook.f.
- *Pimenta dioica* var. *tabasco* (Willd. ex Schlttdl. & Cham.) Standl.
- *Pimenta officinalis* Lindl.
- *Pimenta officinalis* O. Berg
- *Pimenta officinalis* var. *cumanensis* Schiede & Deppe
- *Pimenta officinalis* var. *longifolia* (Sims) O.Berg
- *Pimenta officinalis* var. *ovalifolia* (DC.) O.Berg
- *Pimenta officinalis* var. *tabasco* (Willd. ex Schlttdl. & Cham.) O.Berg
- *Pimenta officinalis* var. *tenuifolia* O. Berg
- *Pimenta pimenta* (L.) H.Karst. [Invalid]
- *Pimenta pimenta* (L.) Cockerell
- *Pimenta vulgaris* Bello
- *Pimenta vulgaris* Lindl.
- *Pimentus aromatica* Raf. [Illegitimate]
- *Pimentus geminata* Raf.
- *Pimentus vera* Raf. [Illegitimate]
- *Pimenta officinalis* var. *ovalifolia* (DC.) O.Berg
- *Pimenta officinalis* var. *tabasco* (Willd. ex Schlttdl. & Cham.) O.Berg
- *Pimenta officinalis* var. *tenuifolia* O. Berg
- *Pimenta pimenta* (L.) H.Karst. [Invalid]
- *Pimenta pimenta* (L.) Cockerell
- *Pimenta vulgaris* Bello
- *Pimenta vulgaris* Lindl.
- *Pimentus aromatica* Raf. [Illegitimate]
- *Pimentus geminata* Raf.
- *Pimentus vera* Raf. [Illegitimate]



Photo by: Nicholas Helmuth, FLAAR Mesoamerica, Dec. 19, 2018.
Camera: Nikon D800E.

***Psidium guajava* L.** is the accepted name; below are the synonyms (names used in previous centuries)

- *Guaiava pyrigormis* Gaertn.
- *Guajava pumila* (Vahl) Kuntze
- *Guajava pyrifera* (L.) Kuntze
- *Myrtus guajava* (L.) Kuntze
- *Myrtus guajava* var. *pyrifera* (L.) Kuntze
- *Psidium angustifolium* Lam.
- *Psidium aromaticum* Blanco [Illegitimate]
- *Psidium cujavillus* Burm.f.
- *Psidium cujavus* L.
- *Psidium fragrans* Macfad.
- *Psidium guajava* var. *cujavillum* (Burm.f.) Krug & Urb.
- *Psidium guajava* var. *guajava*
- *Psidium guajava* var. *minor* Mattos
- *Psidium guava* Griseb.
- *Psidium igatemyense* Barb.Rodr.
- *Psidium intermedium* Zipp. ex Blume
- *Psidium pomiferum* L.
- *Psidium pomiferum* var. *sapidissimum* (Jacq.) DC.
- *Psidium prostratum* O.Berg
- *Psidium pumilum* Vahl
- *Psidium pumilum* var. *guadalupense* DC.
- *Psidium pyrifera* L.
- *Psidium pyrifera* var. *glabrum* Benth.
- *Psidium sapidissimum* Jacq.
- *Psidium vulgare* Rich.
- *Syzygium ellipticum* K.Schum. & Lauterb.



Photo by: Nicholas Hellmuth, 2:42 pm, July 21, 2022, PANAT.
Camera: iPhone 13 Pro Max

References Cited and Suggested Reading on Trees with Peeling Bark

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

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PDF, Articles, Books on Trees

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.

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

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

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

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

BALICK, Michael J. and Rosita ARVIGO

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2012 Primer Informe Nacional sobre el Estado de los Recursos Genéticos Forestales en Guatemala. INAB and IARNA-URL (Instituto Nacional de Bosques e Instituto de Agricultura, Recursos Naturales y Ambiente de la Universidad Rafael Landívar). 186 pages.

Available online:

<http://www.infoiarna.org.gt/wp-content/uploads/2017/11/Coedicin44>.

[PrimerInformeNacionalsobreelEstadodelosRecursosGenticosForestalesenGuatemala.pdf](#)

LUNDELL, Cyrus L.

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

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

LUNDELL, Cyrus L.

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

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VILLASEÑOR, José Luis

2016 Checklist of the native vascular plants of Mexico. Catálogo de las plantas vasculares nativas de México. Revista Mexicana de Biodiversidad, Vol. 87. Pages: 559-902.

Available online:

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

■ Helpful web sites for any and all plants

There are several websites that are helpful even though they do not belong to a university or botanical garden or government institute.

However, most popular websites 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 websites are clickbait (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 websites that have reliable information.

<https://serv.biokic.asu.edu/neotrop/plantae/>

Neotropical Flora data base. To start your search click on this page:

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

<http://legacy.tropicos.org/NameSearch.aspx?projectid=3>

This is the main SEARCH page.

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

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

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

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

<http://enciclovida.mx>

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

www.kew.org/science/tropamerica/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 pages specifically on ***Bursera simaruba*, *Pimenta dioica* and *Psidium guajava***

Bursera simaruba

<https://arboretum.ufm.edu/plantas/bursera-simaruba-2/>

Common names, description, distribution, uses and pictures of the species

<https://ecuador.inaturalist.org/taxa/130734-Bursera-simaruba>

Pictures of the tree, its leaves, and branches. Main characteristics and uses.

<https://ecosdelbosque.com/plantas/bursera-simaruba>

General information on the species and medicinal uses.

https://www.cicy.mx/sitios/flora%20digital/ficha_virtual.php?especie=1107

Phenology, common names, and synonyms.

<https://www.contextoganadero.com/ganaderia-sostenible/para-que-puede-usar-el-arbol-indio-desnudo-o-resbalamono>

An extense blog on the uses of the species.

<https://www.uninorte.edu.co/web/ecocampus/indio-encuero>

Botanical description and detailed illustrations.

<https://antropocene.it/es/2020/07/15/bursera-simaruba/>

Etymology, habitat, and distribution

Pimenta dioica

<https://panama.inaturalist.org/taxa/122811-Pimenta-dioica>

Pictures of the fruit, flowers, and leaves of the species. Botanical illustrations, general characteristics and uses.

http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1028-47962000000200005

Information about its sexual and asexual reproduction.

<https://www.gob.mx/agricultura/es/articulos/pimienta-gorda-la-pimienta-mexicana-161905>

Ethnobotanical uses, here it says it is known by its Nahuatl name: xocosuchil.

https://www.plantasyhongos.es/herbarium/htm/Pimenta_dioica.htm

Pictures and geographical distribution.

<https://antropocene.it/es/2020/03/05/pimenta-dioica/>

Distribution, botanical description, cultivation and traditional uses.

Psidium guajava

<https://www.botanical-online.com/plantas-medicinales/guayaba-propiedades-medicinales>
Medicinal properties of the species.

<https://www.gob.mx/snics/acciones-y-programas/guayaba-psidium-guajava-l>
General information and production in Mexico.

<https://catalogofloravalleaburra.eia.edu.co/species/77>
Detailed pictures of the leaves, flowers, the trunk and fruits of guava.

<https://www.arbolesornamentales.es/Psidiumguajava.htm>
Description, uses and cultivation of the species.

<https://colombia.inaturalist.org/taxa/62859-Psidium-guajava>
Pictures, botanical illustrations, characteristics and distribution.

<https://www.darwinfoundation.org/es/datazone/checklist?species=631>
Taxonomy, ecology and distribution.

Videos on *Bursera simaruba*, *Pimenta dioica* and *Psidium guajava*

Bursera simaruba

<https://www.youtube.com/watch?v=41yaa7Ym0Uo>
General information uses and components.

Pimenta dioica

https://www.youtube.com/watch?v=EQ6rZsUd__s
Small-scale production of the species in the Caribbean region of Costa Rica

Psidium guajava

<https://www.youtube.com/watch?v=se0pOIk0rRM>
How to cultivate guava at home

https://www.youtube.com/watch?v=8Ps2epmLZ_w
General information on common guava

<https://www.youtube.com/watch?v=8CPELfuod9o>
Guava's flower up close

<https://www.youtube.com/watch?v=0F3hul-Ec4I>
Grow, care, harvesting and eat of common guava

This report can be cited in your preferred style.

Here is the basic information:

HELLMUTH, Nicholas (2022). Trees with peeling bark to shed vines, Jiote, Pimienta Gorda, Guayaba, Parque Nacional Tikal (PANAT), Reserva de la Biosfera Maya (RBM), Peten, Guatemala. FLAAR (USA) and FLAAR Mesoamerica (Guatemala).

Camp Assistance in Tikal National Park in the past decade

We appreciate the house provided to us by the park administration. We also thank the Solis family, owners of Jaguar Inn, for providing a place to stay when the park facilities were occupied, as well as for the food in their restaurant.

Base Camp Assistance in Parque Nacional Tikal during July 2022 field trip

We sincerely appreciate the assistance of Gelber Aldana and Esdras García finding a place for our team of five to sleep comfortably. They also kindly provided sheets and a tent for the individuals that preferred to sleep in one (fewer buggies that way).

Future accommodation **while doing field work in PANAT**

We thank Roxana Ortiz for offering to provide lodging for our research team at the Tikal Inn during our future field trips, as our trips are not fully funded. Every workday is exhausting as we carry and use very heavy cameras, super-telephoto lenses, sturdy tripods, large gimbals, or ball tripod heads. Thus, it is crucial to be able to rest and totally recuperate every night to be ready for the following day of botanical and zoological adventures in Parque Nacional Tikal. Good internet access is also important to post photographs on botanical and zoological websites.

Contact info:

Book by Phone: (502) 7861 2444 or (502) 7861 2445

Email:

tikalinn@gmail.com

Website:

[https://tikalinn.com/:](https://tikalinn.com/)





■ Ecolodge **El Sombrero**

I thank Gabriella Moretti, owner of Ecolodge El Sombrero, for providing hotel rooms, meals and internet while doing fieldwork at Yaxha National Park, Nakum, and Naranjo. We also appreciate the hospitality of her sons Sebastian de la Hoz and Juan Carlo de la Hoz.

Equally crucial is having a place, like El Sombrero, to charge computers and cameras batteries, and recharge cell phones. Solar power is great, but it lasts only an hour or less if you plug in multiple equipment.

We also sincerely appreciate the storage space for our camping equipment: tents, camping mattresses, cooking equipment, etc. It would be complicated to transport the volume of equipment we use, back and forth from Guatemala City to where we may be camping in a remote area of Reserva de la Biosfera Maya during the following month.

Contact Info: +502 5460 2934, VentasElSombrero@gmail.com or WhatsApp.

www.elsombreroecolodge.com/en-us



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All national parks, nature reserves, and comparable are welcome to have and use our reports at no cost.

USAC, UVG, URL, and other Guatemalan universities and high schools, and schools, are welcome to post our reports, at no cost.

IF YOU WISH OUR FLORA AND/OR FAUNA MATERIAL AS A POWERPOINT PRESENTATION

Dr. Nicholas (Hellmuth) is flown all around the world to lecture. He has spoken in Holland, Belgium, Germany, Austria, Greece, Italy, Serbia, Croatia, Bosnia, Russia, UK, Dubai, Abu Dhabi, Thailand, Korea, China, Japan, Canada, USA, Mexico, Panama, Guatemala, etc. He can lecture in Spanish, German, or English (or simultaneously translate to your language). He has lectured at Harvard, Yale, Princeton, UCLA, Berkeley, and dozens of other universities, colleges, museums, alumni clubs, etc.

He also writes cartoon books on plants and animals of Guatemala and gives presentations to primary schools, high schools, etc. www.MayanToons.org shows our educational material for children.

In today's COVID era, we present via ZOOM, Google Meet, or comparable platforms. This way there are no costs for airfare, airport shuttle, hotel, or meals. But it is appreciated when a donation can be provided before the lecture presentation to assist our decades of research.

IF YOUR CLUB, ASSOCIATION, INSTITUTE, BOTANICAL GARDEN, ZOO, PARK, UNIVERSITY, ETC WISHES HIGH-RESOLUTION PHOTOS FOR AN EXHIBIT IN YOUR FACILITY ANYWHERE IN THE WORLD

The Missouri Botanical Garden (MOBOT) has had two exhibits of the FLAAR Mesoamerica photos on Neotropical flowering plants of Guatemala. Photos by the FLAAR team have also been exhibited at Photokina in Germany and in Austria, Guatemala, and elsewhere. For use of these photos in a book or exhibit, naturally we need to discuss how to share the costs. We have material for entire exhibits on:

- Orchids of Guatemala (including aquatic orchids),
- Dye colorants from Mushrooms and Lichens of Guatemala,
- Bromeliads of Guatemala,
- Trees of Guatemala,
- Treetop Ecosystems of Guatemala (includes arboreal flowering cacti, bromeliads, and orchids)
- Cacao Cocoa Chocolate and their Maya and Aztec Flavorings.

We naturally appreciate a contribution to help cover the costs our office expenses for all the cataloging, processing, and organization of the photos and the field trip data.

TO PUBLISH PHOTOGRAPHS

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

FOR YOUR SOCIAL MEDIA

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

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





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