



THE FIELD NATURALIST

Quarterly Bulletin of the Trinidad and Tobago Field Naturalists' Club

April– June 2022

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General Club Trip Report, May 30th 2022 SECOND VISIT TO THE MARAC PITCH LAKE By Kris Sookdeo



Luther Loubon speaking about the pitch lake. *Kris Sookdeo*

On May 30th 2022, the Trinidad and Tobago Field Naturalists' Club (TTFNC) visited the Marac Pitch Lake in Moruga. This is only the second time that the Club led a field trip to this site, with the last trip being in November 2014. As is typical for field trips in south Trinidad, the meeting point that morning was at the Mon Repos roundabout, opposite the fire station. We gathered there for 7:00 am and in total had 22 participants.

To get to Moruga the convoy headed first to Barrackpore via Golconda and Borde Narve. At

Barrackpore, we then took the Rochard Douglas Road to the Moruga main road and headed south, arriving at La Lune at 8:45 am.

The drive along the La Lune road was scenic, with a mixture of seaside views, small homes and agricultural plots with green hills to the north. Parking had been arranged at the residence of Luther Loubon. Luther, a geologist with one of the oil companies and member of the Geological Society of Trinidad and Tobago, was also joining us on the trip to the pitch lake, providing his much

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Editors' note :

Many thanks to all who contributed and assisted with articles and photographs.

Disclaimer :

The views expressed in this bulletin are those of the respective authors and do not necessarily reflect the opinion and views of the Trinidad and Tobago Field Naturalists' Club

The Trinidad and Tobago Field Naturalists' Club is a non-profit, non-governmental organization



WELCOME NEW MEMBERS!

The club warmly welcomes the following new members:

Karen Peters	Natalie Hardford	Xavier Ragbir	Vishal Rangersammy
Ravi Mahraj	Garth Ragbir	Kelly Kingnon	Reanna Chen
Natalie Mahraj	Leandra Dass-Ragbir	Scott Moses	Christie Carr



Trial Estate Trace . Photo by Ivan Laughlin

appreciated sub-surface expertise.

In recent months some of the popular hiking spots in the country had been plagued by vehicle break-ins. With this in mind, while it was entirely possible to drive and park closer to the start of the pitch lake trail, the management committee had decided to opt for the safer option of parking at the village and walking north along the road (c. 30 minutes) to the start of the trail.

Along the way I was introduced by Garth Ragbir to one of his guests who, coincidentally, happened to be a member of the Ottawa Field Naturalists Club to which the TTFNC is twinned. The walk was quite 'birdy' and at a few spots we imitated the call of the ferruginous pygmy-owl (*Glaucidium brasilianum*) which drew out several interesting birds, including white-flanked antwren (*Myrmotherula axillaris*), golden-crowned warbler (*Basileuterus culicivorus*), black-crested antshrike

(*Sakesphorus canadensis*) and rufous-breasted wren (*Pheugopedius rutilus*).

A well built hunter's camp is situated at the start of the pitch lake trail. The camp overlooks an agricultural plot in which plantains, hot peppers and other crops had been planted. This plot was being actively expanded with chunks of forest being felled and burned (hillside plots like this are quite common in the area).

Curiously, there is a street sign here that quite ambitiously proclaims the start of Trial Estate Trace. It is no more than a rough track at this time but was evidently a proper trace at one time. Further along, sections of an asphalted road can be found. The other end of Trail Estate Trace eventually re-emerges in the village of La Lune.

Along the trail, Dan Jaggernaut located fruit of the soapseed (*Sapindus saponaria*). Rubbing the fruit in his palms, he demonstrated the use of

soapseed, working up a reasonably foamy lather. According to Wikipedia, the fruits can contain as much as 37% of compound saponin, which accounts for the 'soapy' effect. True to its name, it is/was used in soap manufacture and washing in some



Demonstrating use of soapseed.

Photo by Kris Sookdeo

countries. A small waterway near the soapseed was mostly dry but the remaining pools contained the ever-present jumping guabine (*Anablepsoides hartii*). The remains of a crab (*Poppiana dentata*) were also found.

The forest here is typical of what is seen along the southern coast with a prevalence of sandbox (*Hura crepitans*). As we got closer to the pitch lake, the native forest gives way to a small field of teak and then finally opens out into a clearing around the pitch lake.

Gathering around, Luther spoke to us about the area's geology and what we were seeing around us. The pitch lake here comprises several small active seeps with both mud and hydrocarbons bubbling up to the surface. In several places the surface was soft and gave way slightly underfoot, threatening to ensnare our footwear after standing in one spot for a short time. Other sections were more viscous and were littered with the remains of various small animals that got stuck, including those of an unlucky black vulture (*Coragyps atratus*).

Despite this, the dry dirt banks formed by the mud volcanoes are obviously used by nesting iguanas and there were nets in place around some of these mounds, indicating that persons were trapping the iguanas here as they came to lay.

There was also a small marshy area on the pitch



Nets set to capture nesting iguanas.

Photo by Kris Sookdeo



Marac pitch lake. *Photo by Kris Sookdeo*

lake which was dominated by a tall sedge. Unfortunately, I forgot to check if there was any standing water with any fish life.



Top: Marac Forest; Bottom: Hunting camp at the start of the trail to the pitch lake. Photos by Ivan Laughlin



Top: Chunk of Marac limestone used in road construction; Bottom: Remains of a black vulture which got stuck in the pitch. Photos by Kris Sookdeo

A small swarm of Moruga grasshoppers (*Coscineuta virens*) passed overhead and several butterflies (mostly sulphurs and skippers) were seen feeding at the black sage plants dotted about the lake.

After a bit of exploring we began to head back out, mindful of the overhead sun and rising temperature. The walk out was largely uneventful. Back at the trail head we rested a bit at the hunter's camp (Luther knows the owner of the camp and it might make an interesting spot for a future

overnight visit). We briefly debated pushing on to the nearby fossil quarry site but, with the full heat of the day on us, we decided against it and soon started the walk back towards our vehicles.

While we did not get a chance to see the quarry, material from the quarry was used for construction of the road way and, in the unpaved road sections, eagle eyed members spotted small fragments of the red Marac limestone embedded with fossilised shell. Later at home that night, on checking Curtis Archie's excellent geology blog, I




Left: Balisier leaves shredded by the Moruga grasshopper. Photos by Kris Sookdeo

learnt that these Marac limestones are from the Lower Eocene and are in the region of 50 million years old!

Back at Luther's residence a surprise lay in store for members, as the family had prepared a feast in true Moruga fashion – hill rice (of the 'Black Hen' variety I believe), cassava dumplings, fish, pigeon peas, curried crab and more. The cooks for that day

deserve an award for both their culinary skill and their hospitality.

While eating we marveled at a massive swarm of Moruga grasshoppers which descended on the area. The grasshoppers covered the tops of all the trees but did not appear to be actively feeding. Rather, they appeared to be in transit and regularly lifted off en masse when the winds were favourable to journey onwards (for the most part, the grasshoppers tended to stay at the tree canopy level). Even the insect eating birds grew sluggish as they gorged on grasshoppers.

At long last it was time to leave and we again thanked our hosts for their hospitality, a wonderful end to a wonderful day. 

*Varieties of Moruga Hill Rice:

- Bongo Farina Short Beard
- Bongo Farina Long Beard
- Bongo Toffee
- Black End
- Black Hen



NATURE IN THE NEWS

by Kris Sookdeo




April

- A raid at a home in Barataria on April 18th led to the seizure of over 250 birds including baby macaws, parrots, parakeets, bullfinches, and picoplats. A capuchin monkey was also found and seized. Two people are assisting with inquiries.
- The Tobago House of Assembly's Division of Infrastructure, Quarries and Urban Development has completed the restoration of the building infrastructure on Little Tobago. Work is also being done to restore the jetty.

May

- Scrap metal thieves have struck at least nine hunter's camps in Cats Hill, Saunders Trace, Poole Village and Edward Trace stealing galvanise sheeting, metal fixtures and food supplies.

June

- Forestry Division game wardens have stepped up patrols at Las Cuevas beach following the discovery of a beheaded green turtle's body on the beach. Wardens have also reported poaching of macaw chicks in the North Coast area.
- North East Tobago has been officially designated a UNESCO Man and the Biosphere reserve. A ceremony was held on June 7th to commemorate the official inauguration which was previously announced by UNESCO on October 28th, 2020. UNESCO aims to establish at least one biosphere reserve per country in the Caribbean Small Island Developing States by 2030, doubling the total area of Biosphere Reserves worldwide.
- The district of Barrackpore has been hit by an outbreak of rabies, killing about 29 heads of cattle and two sheep over the past two months. 



Your
Ideas and Observations
A Quarterly Update

THE TRINIDAD PIPING-GUAN CHICKS


by Josh Bajnath



The Trinidad piping-guan (pawi) chicks in company of their father. Photos by Josh Bajnath



Locally known as the pawi, this bird — endemic to the island of Trinidad, is in the chachalaca, guan and curassow family Cracidae. It is a large bird, somewhat resembling a turkey in appearance, and research has shown that its nearest living relative is the blue-throated piping guan from South America.

In this photo (taken August 1st, 2022) a father seen here with two juvenile chicks on the acai berry tree 'showing them the ropes', (the mother flew away before the picture was taken). As the parents are seen fairly often around the estate we consider ourselves very fortunate to have them breed and bring forth healthy chicks. 



Botany Group Report, September 7, 2021
**PERMANENT SAMPLE PLOT ON
EL CERRO DEL ARIPO SUMMIT**
by Linton Arneaud and Dan Jaggernaut



Aerial view (20m) above the summit of the El Cerro Del Aripo, Trinidad, West Indies overseeing the Central Range. *Photo by Shane Manchouck*

At 9:35 am, the small team of three botanists started trekking up the El Cerro Del Aripo trail. Immediately, Linton and Shane Manchouck stopped mere metres after the starting point to capture herbaceous plant species that had caught their eyes. It was not long before they realized that they needed to stop botanizing in order to complete the day's task.

The description of the vegetation along the El Cerro Del Aripo trail seems to remain similar to what was recorded by Stevland Charles in 2010 (Quarterly Bulletin (QB) Issue No:1/2011, pg 1-5), Bruce Lauckner (QB 2/2013, pg 1-7), Reg Potter in 2013 (QB 2/2013, pg 8-12) and Elizabeth Seebaran more recently (QB 1&2/2021, pg 7-12). There were few human tracks along the upper section of the trail indicating that the trail was inactive for a couple of months—possibly as a result of the State of Emergency (SoE) situation in the country, due to Covid-19 restrictions. Additionally, Linton was pleased to see that litter along the trail was

marginal, and he picked up what little trash was observed on the way back.

All group members were concerned that there might have been an increase in fallen trees along the trail due to recent tropical depressions which were responsible for uprooting hundreds of trees across the islands. Over the past three months, heavy rainfall, accompanied by thunder and lightning and winds over 95 km/hr were responsible for ripping off numerous house roofs, swaying and breaking electrical poles, and rendering many homeless. To our surprise, we were only able to spot one tree that had fallen recently. This indicates that vegetation, in particular, emergent trees on the Northern Range can withstand strong levels of winds. It also indicates that the canopy is well sheltered or covered (from our drone observations). Along the trail, Linton familiarized himself with *Anthurium hookeri* (Araceae) and *A. jenmanii*, while Shane and Dan were keeping a watchful eye for *Maepire zanana*.



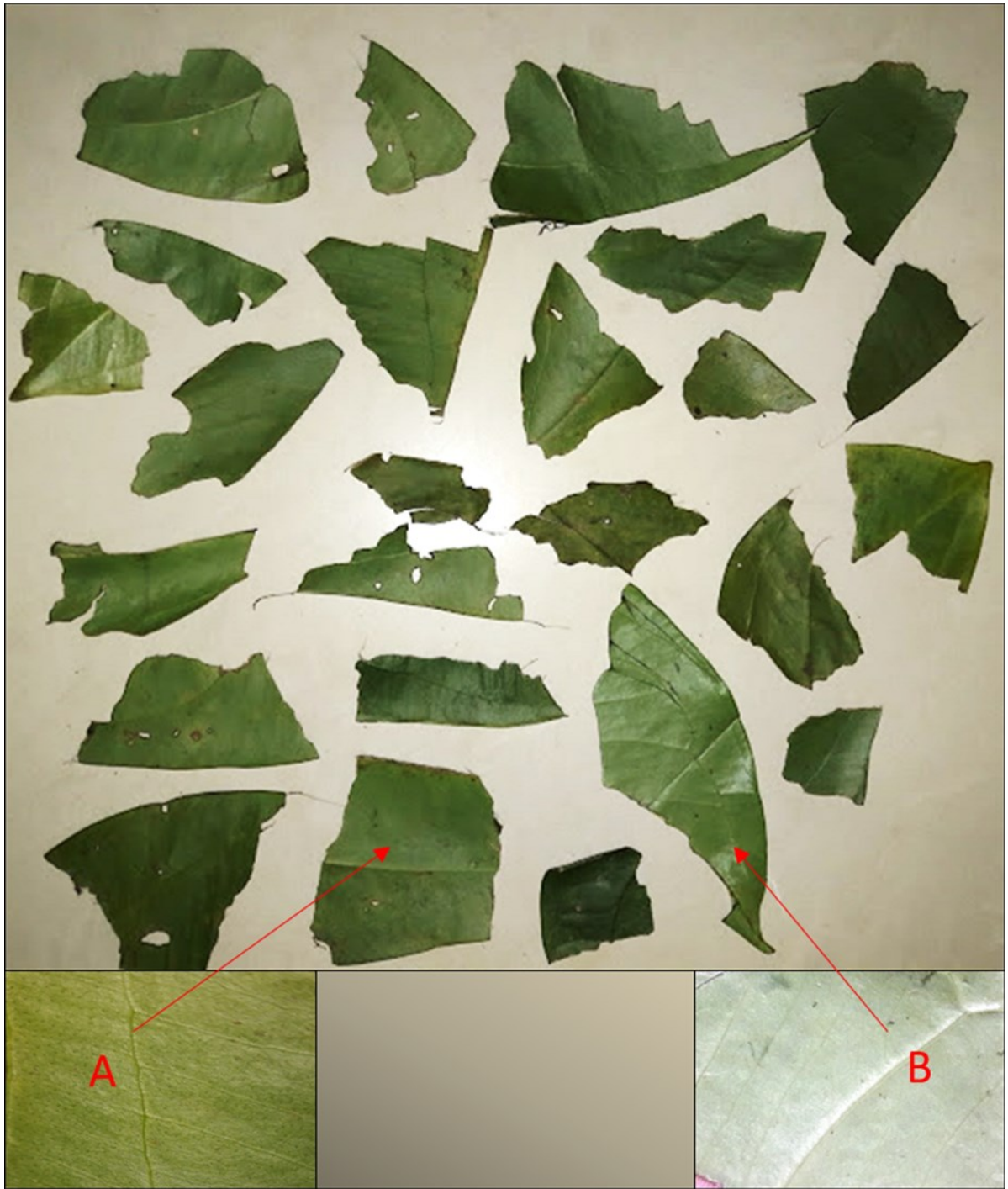
A silverpuff (*Chaptalia* sp.) plant in blossom was spotted at the start of the El Cerro Del Aripo trail. Photo by Linton Arneaud



Shane Manchouck smiles as he looks for herpetofauna within the newly created micro-environment formed as a result of a fallen tree. Photo by Linton Arneaud



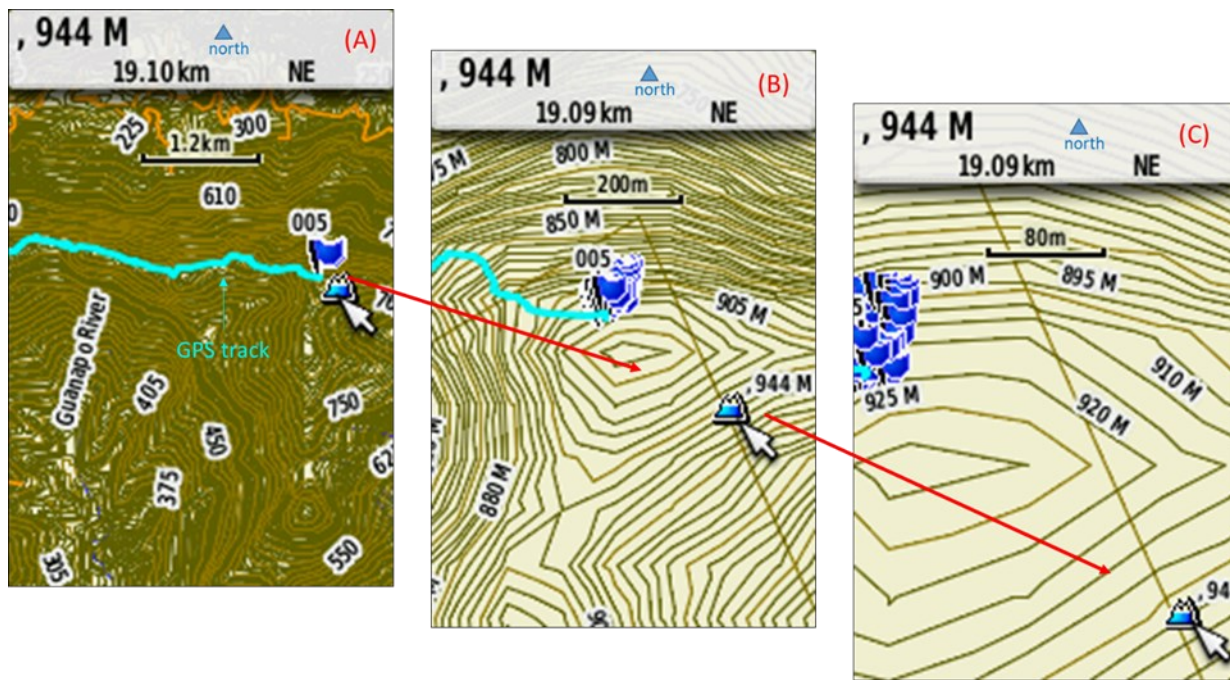
Members of the Botany Group at the summit of the El Cerro Del Aripo before setting up the permanent sample plot. From left to right: Dan Jaggernaut, Linton Arneaud and Shane Manchouck. Photo by Shane Manchouck.



Linton Arneaud collected 25 *Anthurium* samples (both epiphytic and terrestrial) along the 20km trail from elevations between 500m to 940m. Most of the specimens collected were *Anthurium hookeri*. Photo by Linton Arneaud

Note: A — *Anthurium hookeri*; B — *Anthurium jenmanii*

Note: *Anthurium hookeri* can be distinguished from *A. jenmanii* in the vegetative form by small black dots (pellucid dots or glandular punctates) on the underside of the leaves. These dots are more distinguishable in mature leaves.



Screenshot of Garmin Global Positioning System (GPS) Map 64s device showing the difference in elevation along the El Cerro Del Aripo trail along the Northern Ridge, Trinidad, WI.

(A) Track along the ridge leading to the actual Trigonometry Point mark (940 metres) location (blue flag 005) and GPS estimated highest point in Trinidad (mountain symbol- 944 metres)

(B) Trigonometry Point mark and GPS estimated the highest point zoom to scale (200 metres)

(C) Trigonometry Point mark and GPS estimated the highest point zoom to scale (80 metres)

Linton noticed that the actual trigonometry point mark was approximately 265m away from the estimated highest point on his handheld GPS device. Even though Eric and Matthew Gilbertson suggested that the true highpoint at El Cerro Del Aripo is 948m (QBI&2/2021, pg 15-18); using Shuttle Radar Topography Mission (SRTM) data and a GPS device. Linton believes that the actual trig point should be considered the country's highest point as more robust methods were applied during National and International Geodetic Surveys which recognized the present elevation (940m) as the highest point. Linton further indicated that Garmin international base map (see above) should not be expected to provide accurate measurements at a local scale.

Upon arriving at the top of the summit at 12:41 pm, Linton immediately scouted the area to assess the size of the permanent quadrat after recalibrating the GPS device for a second time. The group took a water break before collecting data. Shane guided up his unmanned aerial vehicle — UAV (Model: Mavic Air) to an estimated height of 20m to assess the topography of the ridge, with this information Linton and Dan walked the perimeter

(≈500 m) of the permanent quadrat (2035.21 m²) using a Garmin Global Positioning System (GPS) Map 64s device. Once the permanent quadrat was established, using a spherical densitometer (model C, Robert E. Lemmon, Forest Densitometers, Oklahoma USA), canopy coverage was estimated using five points; the four cardinal points from the centre of it and at the summit next to the flat concrete block with a trig mark.

This report will be the first attempt at a botanical assessment of the El Cerro Del Aripo summit, as no detailed information on the vegetation structure or tree species richness has ever been recorded by the TTFNC. Linton and Dan carefully examined the understory vegetation of the quadrat and recorded species names. Where a species name could not be provided, either the genus or family names were indicated. In cases where both Linton and Dan were not confident about the identification, photographs were recorded for subsequent identification.

Next, the circumference at breast height (CBH), total height (TH), GPS coordinates, and species name were recorded for trees within the quadrat.

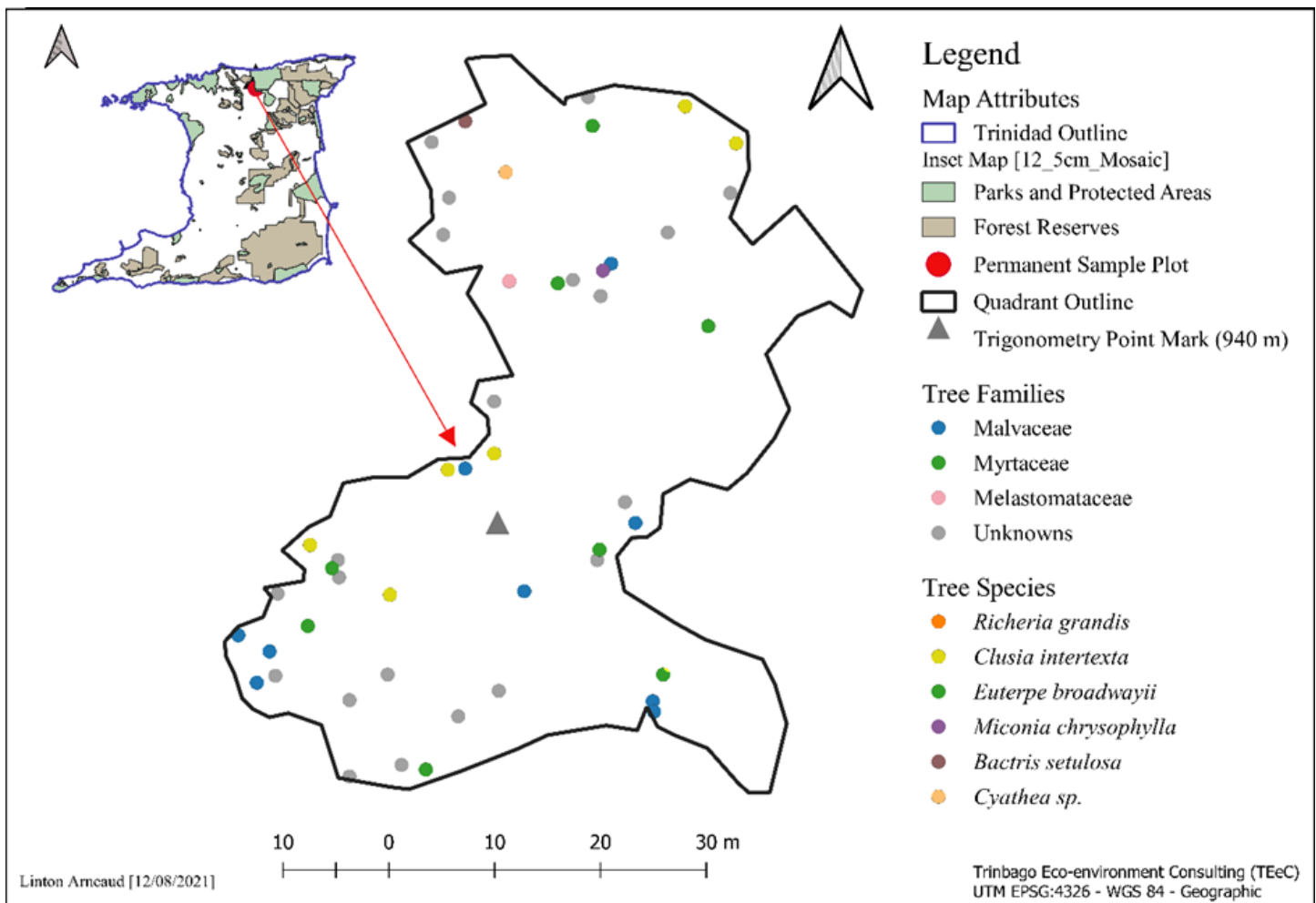
Circumference at breast height was measured for trees with a CBH greater than 31.5 cm using a dress-maker tape to the closest centimetre and later divided by pi (π) to calculate diameter at breast height (DBH).

Only a few TH of trees were estimated using a LaserAce Hypsometer (Measurement Device Limited UK) from ground level to the highest point reached by the leaves or apical meristems. In order to effectively use the instrument, an average distance (18-25 metres) between the operator and target tree need to be attained, together with having a clear view of the tree trunk. Clearing the understory vegetation in order to shoot tree bases with the laser was not an option, therefore, the group used initial measurements, the drone's

estimated height, and years of experience measuring tree height, to average tree height to the closest metre. With this information, the cross-sectional area of each tree was calculated following the standard Basal Area (BA) formulae = $DBH^2 \times 0.785$ (similar to Roberts. 2022, PhD Dissertation).

While Shane recorded the GPS coordinates of each tree (using the Universal Transverse Mercator-World Geodetic System (UTM-20N-WGS), Linton and Dan identified the trees. Linton indicated that with this information, researchers can compare tree species density, tree species diversity, growth rate, survival rate, DBH, and Basal area (standing volume) for the permanent sample plot over time.


Overall, the Botany Group visit to the El Cerro Del Aripo ridge was meaningful and informative.



Permanent sample plot established on the summit of the El Cerro Del Aripo Summit, Trinidad, WI.

***Note: please see the demographic parameters of species in Table 2**

The group hopes that their initiative and data collected would be useful to many in the future. Dan stressed the importance of educating the young people in Trinidad and Tobago on the importance of forest conservation and sustainable development.

He added that, globally, young people have lost confidence in their leaders who put profit before people, leaving a trail of mess for the present generation to clean up after. 



Other species observed along the upper trail (>700 m) of the El Cerro Del Aripo Peak, Trinidad, WI.

From left to right Photos by Linton Arneaud & Shane Manchouck

A—Giant Moss: *Leucobryum martianum* (Dicranaceae)
 B—Tank Bromeliad: *Glomeropitcairnia erectiflora* (Bromeliaceae)
 C—*Piper* sp. (aff. *Augustum*) (Piperaceae) with strange hanging inflorescences
 D—Mountain Mangrove: *Clusia intertexta* (Clusiaceae)
 E—Base of *Euterpe broadwayi* cluster with numerous epiphytes and bryophytes
 F—Auriculariales mushrooms covered with Giant Moss
 G—*Podocarpus trinitense* (Podocarpaceae) fallen branch
 H—*Anthurium aripoense* (Araceae) cluster growing on a rotting log

I—Cachez-vous: *Calathea casupito* (Marantaceae)
 J—Anare: *Prestoea pubigera* (Arecaceae)
 K—(Dryopteridaceae) Fern
 L—Bladderwort: *Utricularia* sp. (Lentibulariaceae)
 M—Mamoo: *Evodianthus funifer* (Cyclanthaceae) inflorescence (at 90° rotation)
 N—Manac: *Euterpe broadwayi* (Arecaceae) inflorescence
 O—Gri-gri: *Bactris setulosa* (Arecaceae) infructescence
 P—*Stromanthe tonckat* (Marantaceae)
 Q—*Vriesea* sp. (Bromeliaceae) inflorescence
 R—(Poaceae) sedge inflorescence
 S—Bamboo Grass: *Lasiacis* sp. (Poaceae) fruit

Table 1. Some species identified in permanent plot on the El Cerro Del Aripo summit, Trinidad, WI.

#	Common Name	Scientific Name	Family	*IUCN Listing
1	-	<i>Stromanthe tonckat</i>	Marantaceae	LC
2	Anare	<i>Geonoma interrupta</i>	Arecaceae	LC
3	Anthurium	<i>Anthurium aripoense</i>	Araceae	NE
4	Anthurium	<i>Anthurium hookeri</i>	Araceae	NE
5	Balisier	<i>Heliconia bihai</i>	Heliconiaceae	LC
6	Balisier	<i>Heliconia hirsuta</i>	Heliconiaceae	LC
7	Bois Bande	<i>Richeria grandis</i>	Phyllanthaceae	NE
8	Cachez-vous	<i>Calathea casupito</i>	Marantaceae	LC
9	Fern	<i>Thelypteris</i> sp.	Dryopteridaceae	-
10	Giant Tree Fern	<i>Cyathea</i> sp.	Cyatheaceae	-
11	Gri-gri	<i>Bactris setulosa</i>	Arecaceae	LC
12	Ink Plant	<i>Renealmia alpinia</i>	Zingiberaceae	LC
13	Koster's curse	<i>Clidemia hirta</i>	Melastomataceae	LC
14	Manac	<i>Euterpe broadwayi</i>	Arecaceae	NE
15	Melastoma tree	-	Melastomataceae	-
16	Mountain Mangrove	<i>Clusia intertexta</i>	Clusiaceae	NE
17	Nutgrass	<i>Cyperus rotundus</i>	Cyperaceae	LC
18	Palicourea	<i>Palicourea</i> sp.	Rubiaceae	LC
19	Piper	<i>Piper</i> sp.	Piperaceae	-
20	Running Bamboo	<i>Arthrostyidium</i> sp.	Poaceae	-
21	Sardine	<i>Miconia chrysophylla</i>	Melastomataceae	LC
22	Serette	<i>Brysonima</i> sp. (aff. <i>spicata</i>)	Malpighiaceae	LC
23	Tank Bromeliad	<i>Glomeropitcairnia erectiflora</i>	Bromeliaceae	NE
24	Wild Clove	<i>Psammisia urichiana</i>	Ericaceae	NE

*IUCN Listing based on Comeau et al. 2016 "Checklist to Vascular Plants of Trinidad and Tobago"

LC, Least Concern; NE, Not Evaluated

Table 2. Species identification, estimated total height (TH), diameter at breast height (DBH), basal area (BA) & coordinates (UTM-WGS) of adult trees >10 DBH/cm found on the summit of the El Cerro Del Aripo Peak, Trinidad, WI.

#	Scientific Name	*Elevation (m)	Total Height (m)	DBH	Basal Area (m ²)	Latitude	Longitude
05	<i>Clusia intertexta</i>	940.48	11	82.8	0.5382	1186633.277	692087.3114
06	Malvaceae	940.63	10	14.3	0.0161	1186633.397	692088.9516
07	<i>Clusia intertexta</i>	938.35	12.5	42.4	0.1408	1186634.85	692091.6782
08	Unkn 1	937.41	13	98.7	0.7651	1186639.828	692091.6497
09	Unkn 2	935.55	15	16.9	0.0224	1186655.73	692086.7456
10	<i>Euterpe broadwayi</i>	937.09	10.5	15.0	0.0176	1186651.145	692097.6018
11	Malvaceae	936.46	14	24.2	0.0460	1186653.055	692102.623
12	<i>Miconia chrysophylla</i>	935.74	15	20.7	0.0336	1186652.387	692101.8611
13	Unkn 2	934.77	18	23.6	0.0436	1186649.952	692101.6562
14	<i>Richeria grandis</i>	934.68	22	29.0	0.0659	1186654.473	692099.1143
15	Unkn 3	936.05	18.5	35.0	0.0963	1186651.485	692099.022
16	Melastoma	936.66	10	13.7	0.0147	1186651.34	692093.0061
17	<i>Cyathea</i> sp.	935.76	18	24.8	0.0484	1186661.737	692092.6186
18	Unkn	933.36	13	44.6	0.1561	1186664.573	692085.6012
19	Unkn	934.41	14	58.3	0.2666	1186659.272	692087.2724
20	<i>Bactris setulosa</i>	934.98	10.5	22.3	0.0390	1186666.582	692088.7621
21	<i>Euterpe broadwayi</i>	934.90	10.5	46.2	0.1674	1186666.208	692100.7976
22	Unkn	934.78	15.5	36.6	0.1053	1186668.971	692100.3442
23	<i>Clusia intertexta</i>	933.00	10	21.3	0.0357	1186668.139	692109.5381
24	<i>Clusia intertexta</i>	932.91	12	49.0	0.1888	1186664.626	692114.3715
25	Unkn	934.15	5	37.6	0.1109	1186659.867	692113.8517
26	Unkn	935.42	7	26.8	0.0562	1186656.072	692107.9661
27	<i>Euterpe broadwayi</i>	937.61	12	103.8	0.8461	1186647.134	692111.8459
28	<i>Richeria grandis</i>	938.24	18	49.4	0.1913	1186635.733	692110.5983
29	Unkn	939.97	11	22.9	0.0413	1186630.275	692104.0658
30	Malvaceae	940.16	19	91.4	0.6558	1186628.29	692105.0617
31	Unkn	940.23	8	25.8	0.0522	1186624.729	692101.472
32	<i>Richeria grandis</i>	940.27	18	92.7	0.6742	1186614.702	692108.4211
33	<i>Euterpe broadwayi</i>	939.64	10	106.7	0.8935	1186613.814	692107.7698
34	Malvaceae	939.63	15	44.6	0.1561	1186611.264	692106.7998
35	Malvaceae	939.84	16	24.2	0.0460	1186610.269	692106.9149
36	Myrtaceae	938.84	10	35.4	0.0981	1186604.615	692085.3965
37	Unkn	938.22	13	63.1	0.3121	1186603.91	692078.1805
38	Unkn	938.78	15	49.0	0.1888	1186605.044	692083.0968
40	Unkn	939.62	15	95.5	0.7166	1186609.721	692088.4304
41	Unkn	939.17	14	26.1	0.0535	1186612.176	692092.2452
42	Unkn	938.67	14	165.3	2.1446	1186613.665	692081.7349
43	Unkn	937.75	12	16.2	0.0207	1186611.211	692078.1389
44	Unkn	937.51	10	70.4	0.3889	1186613.494	692071.1246
45	Malvaceae	938.15	14.5	72.6	0.4139	1186612.82	692069.3782
46	Malvaceae	938.30	15	13.1	0.0134	1186615.814	692070.5644
47	Malvaceae	938.60	15	97.1	0.7406	1186617.345	692067.602
48	Unkn	938.87	14.5	36.0	0.1017	1186621.349	692071.2986
49	Myrtaceae	939.21	12	36.9	0.1071	1186618.268	692074.1604
50	Unkn	939.22	13.5	38.5	0.1166	1186622.931	692077.0874
51	Unkn	938.88	14	37.6	0.1109	1186624.589	692076.9686
52	Myrtaceae	939.20	13.5	37.6	0.1109	1186623.812	692076.426
53	<i>Clusia intertexta</i>	938.86	14	85.4	0.5718	1186626.012	692074.335
54	<i>Clusia intertexta</i>	939.24	10	21.7	0.0368	1186621.299	692081.9101
55	Myrtaceae	939.16	8	14.3	0.0161	1186625.726	692101.6851
56	Malvaceae	938.66	12	86.9	0.5934	1186621.703	692094.5975

Note: *Elevation as per Garmin GPSMAP 64s data output; Note: Average Canopy Coverage for the permanent sample plot = 86.6%



Botany Group Report, November 25 2021
**PERMANENT SAMPLE PLOT ON
 MT. TAMANA SUMMIT, TRINIDAD, W.I.**

by Chantal Leotaud and Linton Arneaud



Members of the Botany Group at the summit of the Mt Tamana before setting up the permanent sample plot. From left to right: Shane Manchouck, Linton Arneaud, Chantal Leotaud and Dan Jaggernauth. Photo by Chantal Leotaud

The group drove along the country road towards Mount Tamana and found our parking spot at the edge of a cocoa estate at the foothills, near to an estate house driveway. At around 10:45am, after parking near the private property by the local cocoa plantation, Dan Jaggernauth led Linton Arneaud, Shane Manchouck and Chantal Leotaud up through the Mt. Tamana trail. Dan noticed that there had not been much foot traffic along the pathway

Within the first 10 minutes of the hike, we noticed a lot of stinging nettle (*Laportea aestuans*) and black stick (*Pachystachys coccinea*); the black stick was near cultivated land — an old cocoa estate. Shortly after, the Botany group spotted the woody herbaceous spiny palm commonly known as roseau (*Bactris major*). Dan mentioned that there is water in the palm's immature nuts that can be consumed by humans, Linton then indicated that there are a variety of this palm (*Bactris major* var. *megalocarpa*) with large fruit that change from purple to purplish in colour when ripe. The roseau palm has other uses like in the making of thatch for some traditional indigenous homes. To make thatch,

the stem of the spiny palm is split and the inner parts made into strips. This strip extraction would then be mixed with mud to form walls and other compartments of the house structure. There were another species of stinging nettle (*Urera baccifera*) plants towering in the area, along with more black stick, as we hiked ahead.

Shortly after, the team approached the first opening of the Mt. Tamana cave system. The cave features were observed and Shane acknowledged the spectacle of bat emergence which happens at this cave system during the hours of dusk, and that it lasts through the evening.

There were an array of notable flora along the main trail up to Mt. Tamana's summit, including a variety of heliconia plants like balisier (*Heliconia hirsuta*) and canal lily (*Heliconia psittacorum*). We saw more black stick, complete with red flowers and more of the larger stinging nettle.

At around 11:26am, the group observed l'épinet, (*Zanthoxylum martinicense*), a species of prickly ash that was surrounded by the ever growing stinging nettle plants. During this trip Linton found himself collecting fallen seeds and fruits. One fruit that had



Unknown fruit (*Syngonium* sp.) found along the Mt. Tamana trail, possibly dispersed by a foraging bat species. Photo by Linton Arneaud



Flowers and fruits collected along the Mt. Tamana trail, Trinidad, W.I. and at the permanent sample plot: (A): black sage (*Lantana camara*) fruit; (B): yam seed (*Dioscorea* sp.); (C) cocoa seed (*Theobroma cacao*); (D) sugar apple seeds (*Annona squamosa*); (E) ficus (*Ficus maxima*) fruit; (F) unknown fruit (*Syngonium* sp.); (G,H,I) bois pois (*Swartzia pinnata*) seeds and fruit; (J) unknown germinating seeds; (K) agali (*Ficus yopoeensis*) fruit; and (L) unknown fallen flowers (*Combretaceae*). Photo by Linton Arneaud

Dan and Linton in awe was what seemed to resemble guinea pepper (*Aframomum melegueta*), however, upon investigation, it was not. Furthermore, where the fruit was collected, no signs of the plant were seen and it was speculated that it was accidentally dropped by a bat on its way back to the cave. Linton tried germinating the seed, however, only a few seeds germinated, all of which died after reaching approximately 5cm in height.

Also noted were a few ferns (*Polypodium*), spike moss (*Selaginella*), and sohari leaf (*Calathea lutea*). Dan and Linton suspect that there may be another variety of sohari leaf as the petiole on the ones identified was notably shorter than usual, Dan also indicated that Mr. Winston Johnson also speculated the same. Linton then stated that there are several native *Calathea* species in Trinidad and Tobago, and that having reproductive material will surely help with identification. Nevertheless, botanists should keep a close eye to this population of *Calathea* in Mt. Tamana as the population seems to deviate from its normal phenology - here the petioles are remarkably shorter. Additionally, the high canopy coverage under and around the plants


was indicative of a mature forest.

After hiking for a few more minutes, we saw a cannonball tree (*Couroupita guianensis*), a large deciduous tree with naturally fissured bark and globular fruits which are responsible for its cannonball name. Also seen were hog tannia (*Xanthosoma undipes*), mahoe (*Sterculia pruriens*) (seedling leaves are frequently palmately compound), mamou (*Evodianthus funifera*), Heliotropium sp, and Philodendron sp., along with large anthuriums (*Anthurium jenmanii*) and juniper (*Genipa americana*). There was also a mango tree (*Mangifera indica*) almost three-quarters along the trail, an indication of more land cultivation within the forest. The howler monkey (*Alouatta macconnellii*) calls could be heard in the forest to the left of us at around 12:20pm. We also saw numerous milkwood (*Sapium glandulosum*) trees, and observed the differences in the shape and number of lobes in bois canot trees (*Cecropia* sp.) and pondered whether it could be *Cecropia schreberiana*. Again, Linton indicated that reproductive material would help confirm this speculation.



After a 30 minute search, and lots of sweating and cutting vegetation under the scorching 33°C sun (according to Linton's cellular app), the team was pleased to locate the trigonometry point, which can be referenced to past and future studies. Photo by Linton Arneaud

After a tea break at the summit, Dan and Linton took well over 30 minutes to search and clear brushes in order to locate the trigonometric point. They created the boundaries of the permanent sample plot, and then began recording botanical data following previous methodologies (i.e., the El

Cerro Del Aripo Summit and El Tucuche Summit); once this was done, the crew got ready to leave the summit and started descending Mt. Tamana. The crew eventually arrived back at the trail start at around 4:00pm. Another botanical trip well spent! 

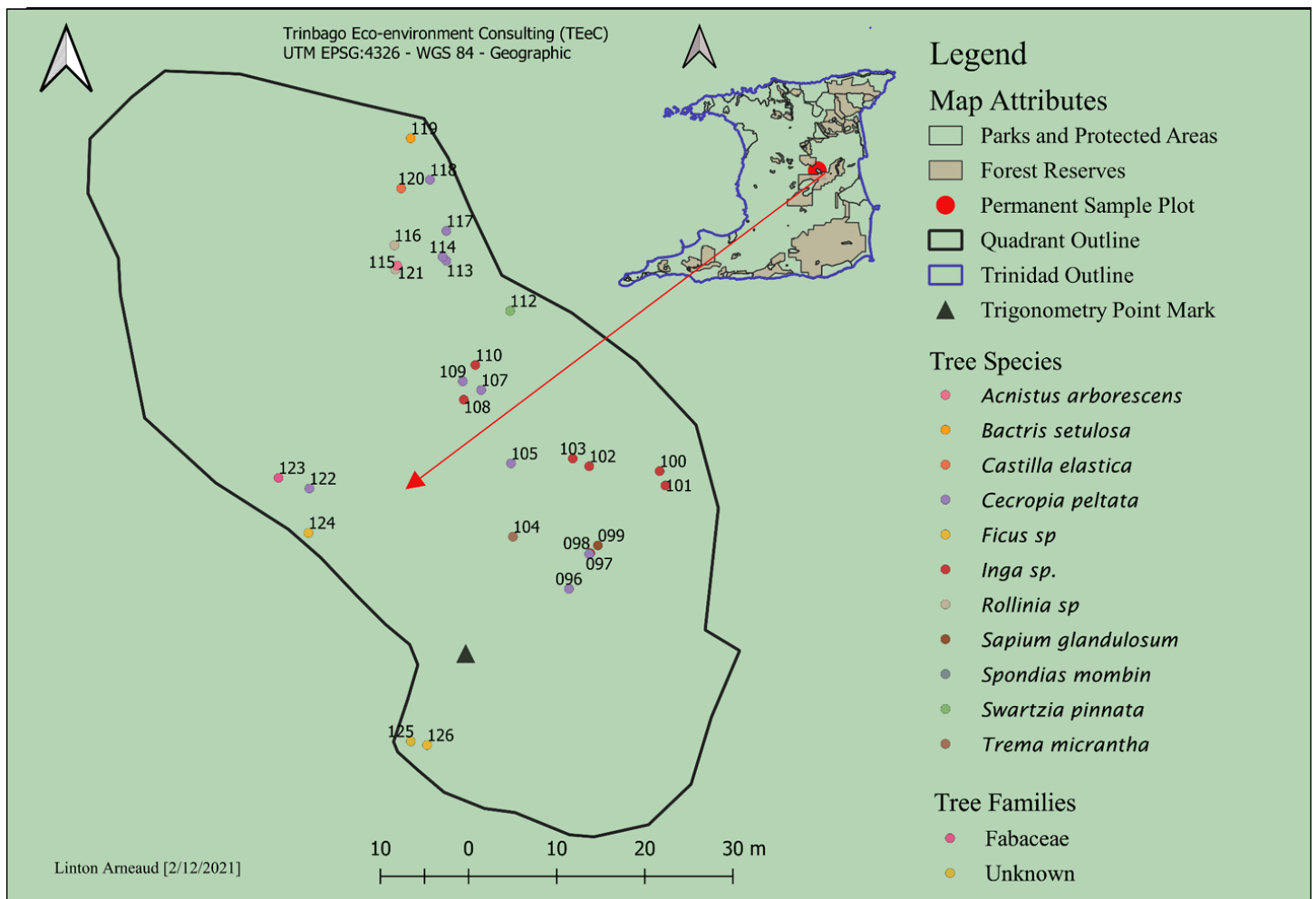


Photographs of notable flora along the Mt Tamana trail, Trinidad, W.I. and at the permanent sample plot (A) wild yam (*Dioscorea* sp.) leaf and fruit; (B) matapal (*Clusia rosea*); (C) *Gonzalagunia hirsute*; (D) *Anthurium* (*Anthurium jenmanii*); (E) *Mucuna* sp. flower; (F) flower of unknown tree (possibly *Meliaceae*); (G) spike moss (*Selaginella*); (H) *Melothria* sp. fruit; (I) unknown fern; (J) cannonball tree (*Couroupita guianensis*); (K) black stick (*Pachystachys coccinea*); (L) bois pois (*Swartzia pinnata*) seeds; (M) wild yam (*Dioscorea* sp.) leaf and tuber; and (N) bois pois (*Swartzia pinnata*) inflorescence

Photos by Chantal Leotaud



Aerial view ($\approx 30\text{m}$) above the summit of the Mt Tamana, Trinidad, West Indies (WI) overseeing south of the Northern Range. Photo by Chantal Leotaud



Permanent sample plot established on the summit of Mt Tamana, Trinidad, WI.

Note: Please see in Table 2, the identification number (ID #) and demographic parameters of species.

Table I. Some species identified in the permanent plot on the Mt. Tamana summit, Trinidad, WI.

#	Common Name	Scientific Name	Family	*IUCN Listing
1	Wild Tobacco	<i>Acnistus arborescens</i>	Solanaceae	LC
28	Male Christmas Bush	<i>Austroeupatorium inulifolium</i>	Asteraceae	LC
2	Cow Gru Gru	<i>Bactris setulosa</i>	Areaceae	LC
16	Railway Daisy	<i>Bidens pilosa</i>	Asteraceae	LC
22	Agouti Fig	<i>Bromelia plumieri</i>	Bromeliaceae	LC ^(Ex)
32	Cooperhoop	<i>Brownea coccinea</i>	Fabaceae	NE
3	Rubber	<i>Castilla elastica</i>	Moraceae	LC ^(Ex)
4	Bois Canot	<i>Cecropia peltata</i>	Urticaceae	LC
18	Dear Bush	<i>Centropogon cornutus</i>	Campanulaceae	LC
29	Female Christmas Bush	<i>Chromolaena odorata</i>	Asteraceae	LC
30	-	<i>Cucurbita</i> sp.	Cucurbitaceae	-
15	Nutgrass	<i>Cyperus rotundus</i>	Cyperaceae	LC ^(Ex)
26	Wild Yam	<i>Dioscorea</i> sp.	Dioscoreaceae	-
6	Scottish Attorney	<i>Ficus</i> sp. (aff. <i>yuponensis</i>)	Moraceae	LC
21	Gouania	<i>Gouania</i> sp. (aff. <i>velutina</i>)	Rhamnaceae	LC
13	Balisier	<i>Heliconia bihai</i>	Heliconiaceae	LC
7	Pois Doux	<i>Inga</i> sp.	Fabaceae	-
31	Wild Cucumber	<i>Melothria</i> sp. (aff. <i>pendula</i>)	Cucurbitaceae	LC
25	Philodendron	<i>Philodendron</i> sp.	Araceae	-
19	Piper	<i>Piper</i> sp.	Piperaceae	-
14	Kudzu Vine	<i>Pueraria</i> sp. (aff. <i>phaseoloides</i>)	Fabaceae	LC ^(Ex)
8	Large Wild Cashima	<i>Rollinia</i> sp. (aff. <i>mucosa</i>)	Annonaceae	LC
9	Milkwood	<i>Sapium glandulosum</i>	Euphorbiaceae	LC
27	Cockrico Bush	<i>Senna bacillari</i>	Fabaceae	LC
17	Devil Vine	<i>Smilax</i> sp. (aff. <i>solanifolia</i>)	Smilacaceae	NE
10	Hog Plum	<i>Spondias mombin</i>	Anacardiaceae	LC
11	Bois Pois	<i>Swartzia pinnata</i>	Fabaceae	NE
23	Fern	<i>Thelypteris</i> sp.	Dryopteridaceae	-
12	White Sage	<i>Trema micrantha</i>	Cannabaceae	LC
24	Cat's Claw	<i>Uncaria tomentosa</i>	Rubiaceae	LC
5	-	Unknown	Fabaceae	-
20	-	Unknown	Solanaceae	-

*IUCN Listing based on Comeau et al. 2016 "Checklist to Vascular Plants of Trinidad and Tobago"
(All native species)

LC ^(Ex)—Exotic species

Table 2. Species identification, estimated total height (TH), diameter at breast height (DBH), basal area (BA), and coordinates (UTM-WGS) of adult trees >10 DBH/cm found on the summit of Mt. Tamana, Trinidad, WI.

ID #	Scientific Name	*Elevation (m)	TH (m)	DBH	Basal Area (m ²)	Latitude	Longitude
96	<i>Cecropia peltata</i>	297.47	14	48.1	0.1815	1158027.46	697326.81
104	<i>Trema micrantha</i>	297.03		21.0	0.0347	1158033.39	697320.43
122	<i>Cecropia peltata</i>	296.45	10	39.5	0.1224	1158038.79	697297.29
108	<i>Inga</i> sp.	295.84	8	11.1	0.0098	1158049.07	697314.75
97	<i>Cecropia peltata</i>	295.83	8	18.5	0.0268	1158031.45	697329.09
98	<i>Inga</i> sp.	295.83	10	14.6	0.0168	1158031.56	697329.20
106	<i>Spondias mombin</i>	295.58	10	16.6	0.0215	1158046.78	697321.23
109	<i>Cecropia peltata</i>	295.53	13	27.7	0.0603	1158051.17	697314.63
105	<i>Cecropia peltata</i>	295.48	12	27.4	0.0589	1158041.80	697320.16
107	<i>Cecropia peltata</i>	295.42	14	27.4	0.0589	1158050.19	697316.72
121	<i>Acnistus arborescens</i>	295.42	5	15.6	0.0191	1158064.40	697307.11
99	<i>Sapium glandulosum</i>	295.00	9	15.0	0.0176	1158032.45	697330.07
123	Fabaceae	294.94	9	17.2	0.0232	1158039.99	697293.78
126	<i>Ficus</i> sp. (aff. <i>yoponensis</i>)	294.80	20	54.1	0.2301	1158009.45	697310.82
114	<i>Cecropia peltata</i>	294.70	14	23.2	0.0424	1158065.43	697312.25
113	<i>Cecropia peltata</i>	294.70	14	22.0	0.0379	1158064.99	697312.69
110	<i>Inga</i> sp.	294.64	12	16.2	0.0207	1158053.06	697316.04
115	<i>Rollinia</i> sp. (aff. <i>mucosa</i>)	294.60	10	22.9	0.0413	1158063.96	697306.89
124	<i>Ficus</i> sp. (aff. <i>yoponensis</i>)	294.57	10	63.7	0.3185	1158033.70	697297.21
116	<i>Rollinia</i> sp. (aff. <i>mucosa</i>)	294.50	8	19.7	0.0306	1158066.72	697306.77
117	<i>Cecropia peltata</i>	294.04	12	26.4	0.0548	1158068.42	697312.67
125	Unknown	294.03	12	31.5	0.0780	1158009.88	697308.95
112	<i>Swartzia pinnata</i>	293.51	10	15.9	0.0199	1158059.28	697319.95
102	<i>Inga</i> sp.	293.33	13	22.3	0.0390	1158041.52	697329.03
103	<i>Inga</i> sp.	293.32	12	13.4	0.0140	1158042.39	697327.16
101	<i>Inga</i> sp.	293.13	12	36.6	0.1053	1158039.36	697337.69
118	<i>Cecropia peltata</i>	293.07	13	18.5	0.0268	1158074.27	697310.78
100	<i>Inga</i> sp.	292.81	13	27.1	0.0575	1158041.01	697337.02
120	<i>Castilla elastica</i>	292.57	12	82.8	0.5382	1158073.25	697307.50
119	<i>Bactris setulosa</i>	292.18	6.5	131.5	1.3580	1158079.01	697308.56

Note: *Elevation as per Garmin GPSMAP 64s data output

Note: Average Canopy Coverage for the permanent sample plot = 50.3%



Naturalist-in Series

WANDERING THROUGH DIXIE

by Christopher K. Starr



Review of:

William Bartram 1791. Travels Through North and South Carolina, East and West Florida, the Cherokee Country, etc. Philadelphia: James & Johnson 520 pp. Reprinted 2011 in facsimile by Cambridge Univ. Press. [54th in a series on "naturalist-in" books; see www.ckstarr.net/reviews_of_naturalist.htm]

William Bartram (1739-1823) was born into a Quaker family in Pennsylvania at a time when the greater part of the continent was very much a new world for naturalists. His father, John Bartram, had been King's Botanist for North America and was well regarded by scientists and horticulturists. At an early age William accompanied John on plant-hunting trips in eastern North America. He was very much a creature of the enlightenment, although he also partook of the new trend of Romanticism in its shift away from reliance on reason alone. As noted by Judith Magee, his great strength lay in harmonizing the empirical respect for data of the one tradition with the other's esthetic appreciation of nature.

A single quotation can serve to illustrate this: *"The verges and islets of the lagoon were elegantly embellished with flowering plants and shrubs; the laughing coots with wings half spread were tripping over the little coves and hiding themselves in the tufts of grass; young broods of the painted summer teal, skimming the still surface of the waters and following the watchful parent unconscious of danger, were frequently surprised by the voracious trout; and he in turn by the subtle greedy alligator."*

Bartram was a religious man, firmly situated in the natural theology framework of the time, in which natural history was not only an attempt to understand the lives of plants and animals but an exercise in penetrating God's plan. Even so, like the better contemporary naturalists, his observations came without prejudice about how they might fit into any larger scheme of things. This is seen in his skeptical attitude toward the hierarchical view of



Hydrangea. Source: Bartram

nature – known as the Ladder of Nature or Great Chain of Being – that had prevailed since the time of Aristotle two thousand years earlier. According to this view, all of nature could be ranked on a more or less linear scale from inanimate matter up through plants, lower animals and higher animals to modern humans. Bartram made no attempt to shoehorn his wealth of observations into a pattern that seemed to him highly artificial.

In 1765-1766, he assisted his father on a plant-collecting trip from the Carolinas down to Florida. This undoubtedly served as preparation when William Bartram began his own more ambitious trip in 1773 that would last almost four years. As he put it, the undertaking was "impelled by a restless spirit of curiosity." Travelling mainly on horseback, he probably covered at least 2000km from the foothills of the Appalachian Mountains south to Florida and then west to the Mississippi, with much backtracking, collecting plants and natural-history observations the whole way. In recent decades his route has been mapped as the William Bartram

Trail, parts of which are developed for hiking in the manner of the Appalachian Trail. It was not an easy time for him, but it was a very happy one, a daily feast of new findings. He spent a long time in the Alachua region or northern Florida, which in my experience stands out for the conspicuous neotropical elements present at their northern limits.



WB Trail. Photo courtesy: Historical Marker Database

Bartram's account is a long book of 32 chapters in four sections, with five full-page illustrations of plants and two of animals. It appeared at a time when literate people had ample leisure for reading. Books about travels to places inaccessible to most readers were especially appreciated, and 'Travels Through North and South Carolina' met with considerable acclaim. It was widely read, reprinted many times, and ensured the author's scientific reputation in his lifetime. He provides much more detail than is now fashionable, so that today's readers will want to skip parts. Fortunately, it is an orderly narrative, so that one can be selective without worrying about what one is missing (e.g. the lists of the predominant plants in different

habitats are no longer novel). This is facilitated by the extensive index.

It appeared not very long after Mark Catesby's first published account of the biota of North America, which was much narrower in scope and drawn from a much more settled area. The book's great popularity is readily understood when we consider that virtually all wilderness had long since been erased from Europe, yet here was a detailed, knowledgeable report from a region where wild nature still held sway in many places. And this was not the Congo or Southeast Asia but a continent with a similar climate and related biota to that of Europe. To his large Old World readership, Bartram presented a picture of how their own continent had once been. They must have wondered, for example, at his description in awed tones of some trees that had been left to grow to enormous size.

In line with this general attitude, he promoted the growth of an independent scientific community in the New World, not reliant on that of the European mother countries. Like his horticulturist father, William Bartram was ever alert to wild plants that might advantageously be brought into cultivation. This was part of an overall attention to "improvements" in the spirit of what was soon to be the young republic.

He also had a keen interest in animals, although not nearly as knowledgeable about them as about plants. This is shown by the fact that he usually mentioned plants by their scientific names, while animals are given their vernacular names. Among others, there are encounters with rattlesnakes, the coachwhip snake, pine snake and several frogs (most of them unnamed). He gave the first description of the habits of the gopher tortoise *Gopherus polyphemus*, found only in dry sand hills, where it digs deep burrows (hence the common name).

Especially along the Gulf Coast, he journeyed



(Left) Gopher Tortoise & (right) alligator. Photos courtesy iNaturalist & the New York Times

through abundant swamps and wetlands, where his adventures included some close encounters with alligators. This huge carnivore emits a loud roar, especially in the breeding season. Sometimes many of them are heard roaring at once, like distant thunder. “At the approach of day the dreaded voice of the alligator shook the isle [in Lake George], and resounded along the neighbouring coasts, proclaiming the appearance of the glorious sun.” His curiosity drove him to risk approaching such a nest, described as a mound of mud and plant matter, about four feet high and a little wider at the base. The female stays with the nest, which contains about 100-200 eggs, until they have hatched, aided in their development by the heat of fermentation of the vegetation.



Carolina parakeet by John James Audubon

The question of what becomes of the birds that disappear as winter approaches, to re-appear in the spring, was still very much on the naturalist agenda at that time. Various conjectures had been set forth since antiquity, e.g. that they fly to the moon or retire into caves and other cavities. Although the phenomenon of trans-continental migration had not yet been documented, it was well known that some North American species spend the warm months further north and fly to the southern states to overwinter. Bartram included a list of birds that arrive in Pennsylvania from the south in the spring and fly

back south in the fall, and another list of those that come south to overwinter in Pennsylvania and then return north. He had been told that the Carolina parakeet (*Conuropsis carolinensis*) overwintered clustered in tree hollows and wondered if it might be true. This very colourful bird, extinct since 1918, was still widespread in the eastern USA, where its large, raucous flocks must have been an impressive spectacle.

While John Bartram focused almost entirely on plants, William showed broader interests. In addition to many of the animals (mostly land vertebrates) that he encountered, he had a great deal to say about the native peoples and how they compared with each other. Part IV of the book is in the nature of an ethnographic appendix on the Muscogulge (=Creek), Cherokee and Choctaw peoples, among others.

He traveled at a time when Amerindian communities still predominated in many parts of the Southeast, although already losing ground to encroaching white settlers. In revisiting some places where he had been with his father 15 years earlier, Bartram noted the advance of white civilization and clearing of the forest in the interim. In some places he saw indications of once substantial Indian settlements that were no more. To a large extent, traders formed the vanguard of white advance into Indian territories, and Bartram made use of trading routes and transport.

The Count of Buffon (1707-1788) – a prolific and original intellectual as well as a dreadful blowhard who never set foot outside of western Europe – had advanced a view of New World species as degenerated forms of those from the Old World. Bartram disputed this, extending his argument to the human realm, based on extensive personal acquaintance with the native peoples of the Southeast, whom he considered as in no way inferior to the immigrant white population. (Black people, as non-aboriginal, did not enter into the refutation. And he made only passing mention of slavery, which was hardly present where he traveled.)

He evinced special admiration for the Seminoles. This vigorous tribe occupied a fine territory that provided everything they could want, so that they had no cause for discontent “except the gradual

encroachment of the white peoples. Thus contented and undisturbed, they appear as blithe and free as the birds of the air, and like them as volatile and active, tuneful and vociferous.”



Seminole chief, Mico Chlucco

As a Quaker, Bartram came from a group with a long history of fair dealing with the native peoples -- most notably in the foundation of Pennsylvania in 1681 -- in contrast to the genocidal tendencies of many other immigrants. Accordingly, he entered each new Amerindian territory as a guest in an egalitarian spirit and was for the most part treated without hostility by his hosts, who facilitated his travel and collecting by furnishing guides and helpers. In entering some territories, he was even warmly welcomed and invited to attend traditional festivities, for which he had a keen descriptive eye. About one of these he noted that, *“In a few days this festival exhibited one of the most ludicrous bacchanalian scenes that is possible to be conceive. White and red*

men and women without distinction, passed the day merrily with these jovial, amorous toppers, and the nights in convivial songs, dances and sacrifices to Venus, as long as they could stand or move; for in these frolicks both sexes take such liberties with each other, and act without constraint or shame, such scenes as they would abhor when sober or in their senses.” It makes one conscious what a modest, sedate affair the Trinidad Carnival is.

Both out of pacifist principle and as a practical matter, Bartram traveled unarmed. Even so, he deemed it prudent to avoid some areas where the Indians might be hostile, either because one tribe was not at peace with another or because they had suffered at the hands of white people. While looking into some reports of depredations by Indians on white settlements, he concluded that the Indians had a legitimate grievance and took the only measure available to them by attacking others of the abusers' kind.

As a friend of the native peoples, Bartram wondered whether it would be practical without coercion to induce them to adopt the ways of European peoples. And if they did adopt them, would it be to their benefit? He had his doubts.

Thanks to Brad Sanders of the Bartram Trail Conference for information about his itinerary. 🐛

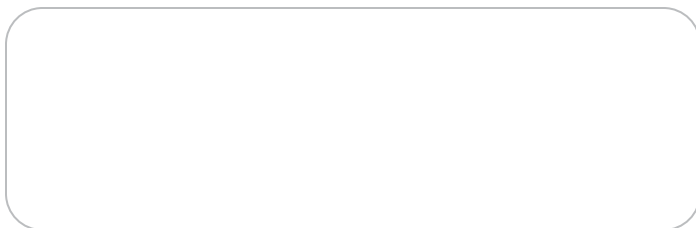
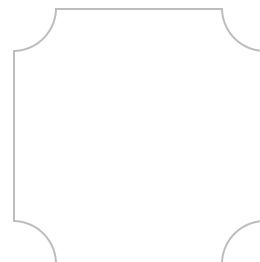
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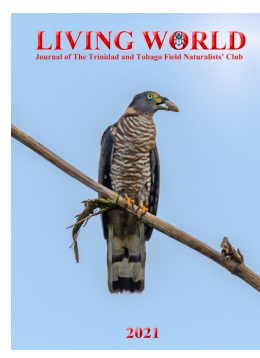
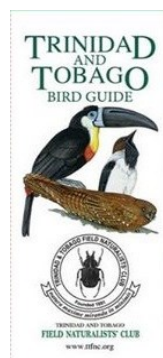
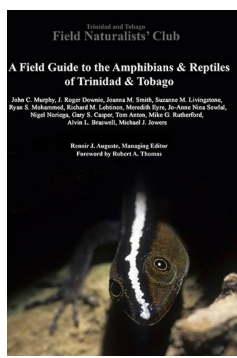
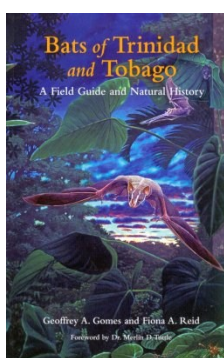
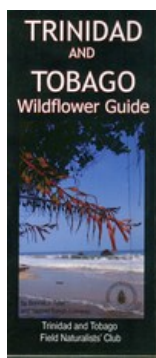
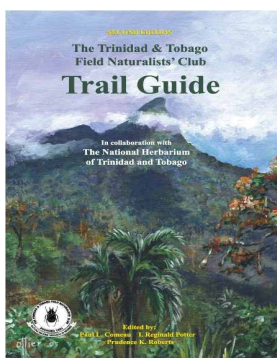
MANAGEMENT NOTICES

TTFNC COMMUNITY PAGE: A place for members of the Trinidad and Tobago Field Naturalists' Club to share their passion for the natural environment <https://community.ttfnc.org/>



PUBLICATIONS

The following Club publications are available to members and non-members (*prices shown are those paid when purchasing directly from the Club*):



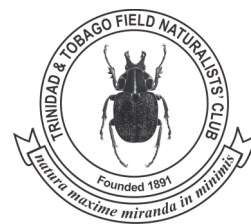
TTFNC Trail Guide (\$150); T&T Wildflower Guide (\$50); Bats of T&T (\$200); Field Guide to Amphibians & Reptiles (\$180); 2021 Living World Journal (\$60); TTFNC Bird Guide (\$50).

MISCELLANEOUS

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Do you have an article to submit for the next QB?

Submission of articles and field trip reports:

1. All articles must reach the editors by the eighth week of each quarter.
2. Electronic copies can be submitted to the editors at: admin@ttfnc.org or directly to the editors or any member of Management. Please include 'QB2022' in the email subject label.