THE FIELD NATURALIST

Quarterly Bulletin of the Trinidad and Tobago Field Naturalists' Club

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Botany Group Trip, August 2019

VASCULAR PLANTS ALONG THE SOUTHERN BOUNDARY OF THE ARIPO SAVANNAS

by Linton Arneaud and Sarah Evelyn

Figure 1. A pre-COVID group photo of botany members standing next to the Aripo Savannas Scientific Reserve (ASSR) sign which was first erected back in 1982, and was later designated the Aripo Savanna [Strict Nature Reserve] Environmentally Sensitive Area or ASESA in 2007 under the ESA Rules, 2001.

Note: Despite Chapter 66:01 Section 8 (f) Forest Act 42 of 1915 (amended Act 148/1955), the ASESA continues to struggle with squatting, hunting and fires to this very day.

In August 2019, the Botany Group visited the largest remaining natural savanna ecosystem in the country, the Aripo Savanna Environmentally Sensitive Area (ASESA). It was declared an Environmentally Sensitive Area (ESA) since it is a habitat to numerous endemic, rare and threatened species. The group met at the Cumuto Forestry Division car park where we were briefed by Dan Jaggernauth and Linton Arneaud. During Linton's briefing, he indicated that the intended trail was surveyed by past botany members in 2003, and was documented by John Lum Young.

The eager botanists, including three children, started the trail at 7:33am but not without observing the alligator or pond-apple tree (*Annona glabra*) in the yard of the Forestry Division. This tree is commonly named alligator apple because alligators love to eat the fruit. It belongs to the same family as the soursop (*Annona muricata*) but is not as sweet. The tree possessed many flowers, but

Inside This Issue

Editors' note :
Many thanks to all who contributed and assisted with articles and photographs.

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WELCOME NEW MEMBERS!

The club warmly welcomes the following new members:

Bhisham Toolsie
Serina Hearn

Continued from Page 1

only one fruit was observed. Lester Doodnath reminded the group that flowers, when fertilised, bear fruits. Around 7:37am, we checked in with security staff posted to oversee the construction of the highway, took our group picture (Figure 1) and continued botanising.

Linton pointed out the importance of the ASESA. He explained that in 1977, David Rooks, a former president of the TTFNC in the 1960s, was part of the "Save the Savannah Committee". David helped to lobby approximately 200 persons to support the fight to keep the Aripo Savannas as an open space. Linton further explained that the ASESA's southern boundary nature walk was particularly interesting, since a new 5km segment of the Churchill Roosevelt Highway Extension to Manzanilla – Phase one (CRHEM-01) is being constructed alongside the trail. Thus, by recording species richness in 2003 (Lum Young), the present

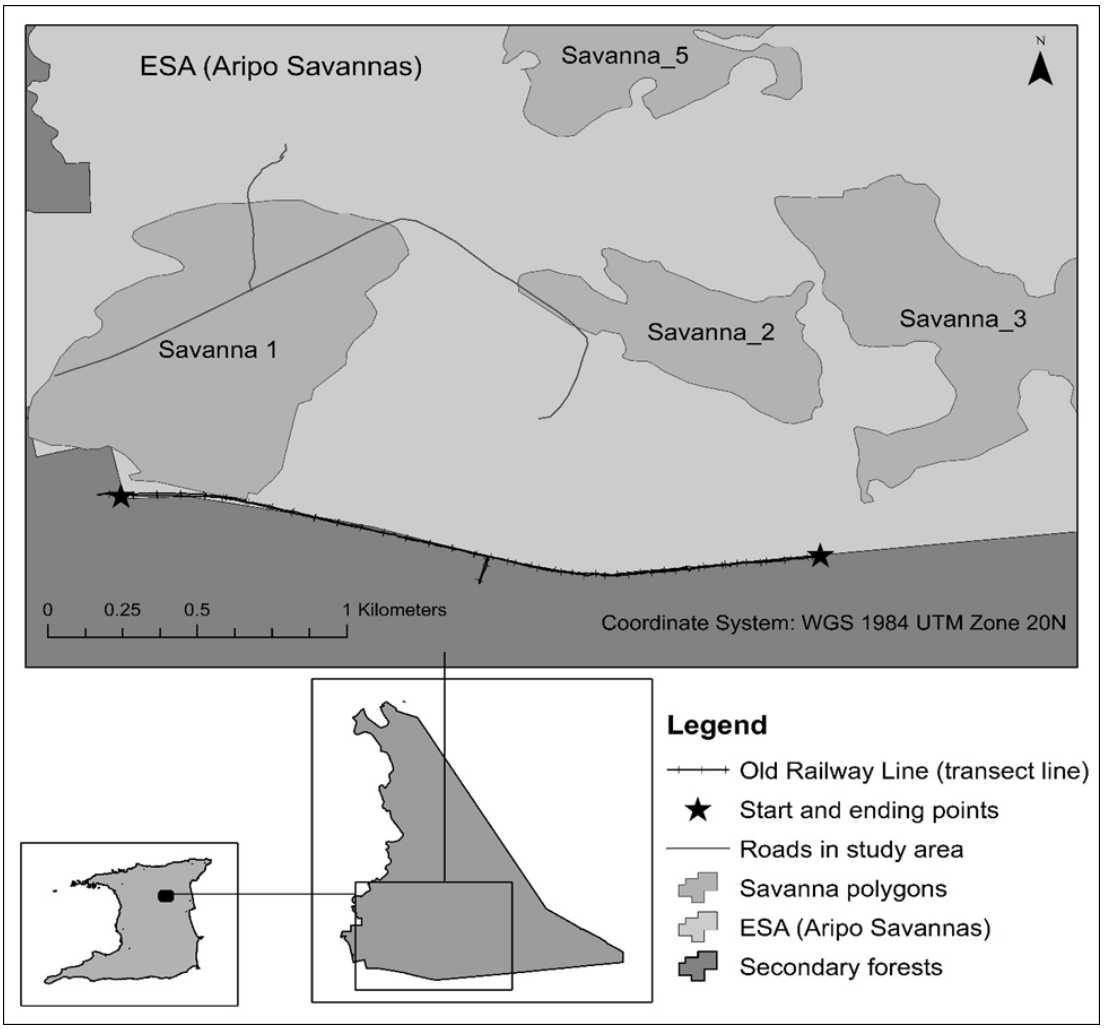

Figure 2. Permanent transect line for botanical walk along the southern boundary (Old Railway Line) of the ASESA, T&T (GPS coordinates: start- Lat. 10.591058, long. -61.186337; end- Lat. 10.593241, long. -61.2079205). Observations were made on both sides of the transect line. (approximately 50-metres on either side).

report (Arneaud and Evelyn), and future studies, scientists will be able to determine the impact of the highway (if any) on the surrounding environment. Linton noted that we would be making observations on both sides of the Old Railway Line and he then proceeded to take the GPS coordinates of the trail to ensure that the same path can be assessed and compared in future reports (Figure 2). Linton also indicated that future reports should strive to follow similar designs.

Linton, (who has a special interest in palms) pointed out the diversity of palm species in the area. We were able to identify eight palms while standing in one location, including his favourite, the moriche palm (*Mauritia flexuosa*) or snake palm as some locals call it. Linton pointed out the dioecious (single -sex) nature of the palm and noted that the fruit is edible (Figure 3). He listed several uses for this palm, starting with food items such as ice creams, wines, flour and oils, then by pointing out other surprising nutritional products such as natural food colouring and weight loss supplements. Linton noted that extracts from the palm could be used to treat melanoma-related diseases due to its tumour repressing capabilities. He then surprised most of us by indicating that moriche palms act as a carbon sequester and have been known to absorb vast quantities of carbon dioxide in northern South America (Amazonian Basin). Finally, he concluded by saying that the moriche palm stands here in the ASESA are extremely important for their ecological functions: flood water retention, water filtration and aquifer replenishment. We also noticed a juvenile cocorite palm (*Attalea maripa*), manac palms (*Euterpe precatoria* and *E. oleracea*), timite palm (*Manicaria sacciferia*), savanna roseau (*Bactris campestris*), wait-a-while palms (*Desmoncus orthacanthos*) and a palma palm (*Oenocarpus bataua*). We were given the infamous bread and cheese (*Mandevilla hirsuta*) flower to taste which had a few members reminiscing. We also spotted *Coccoloba latifolia* which is used as a pot cover at a good river lime. An olivier tree was spotted, but we were unable to distinguish if it was the yellow

Figure 3. Moriche palms (*Mauritia flexuosa*)–the most dominant tree species found on the edges of Marsh forests along the southern boundary of the ASESA, Trinidad.

Note: the palm is dioecious, male palms bear inflorescences (inset picture on the left), whereas the female palms produce infructescences (inset picture on the right).

Figure 4. Common characteristics of some plant families observed during the survey.
**Note: Characteristics shown by red arrows on photos and indicated by underlines in descriptions below. Clockwise from top left:*
(A) Euphorbiaceae: Always have latex (milky white most of the times) with glands at the base of the leaves. Stipules are mostly present; however, sometimes, they are reduced to hairs, spikes or seldom absent.
(B) Melastomatoideace: Always have opposite, simple leaves that are acrodromous or checkerboard. Indumentum or trichomes usually are present.
(C.) Caesalpinioideae (Mimoseae): Most species often have lateral stipules with extra-floral nectaries on the petiole or winged-rachis. Root noodles and leguminous fruit are also predominant.
(D) Annonaceae: Always have simple alternate leaves, the bark is always fibrous. Inner bark or leaves (when crushed) releases an odour, always has translucid, pellucid dots on leaf blades. Exudate absent.

(*Buchenavia tetraphylla*) or white olivier (*Terminalia amazonia*) species. We also noted two species of Stachytarphetas: the blue vervein (*Stachytarpheta jamaicensis*), known for its medical uses and liked by many hummingbirds, and another that we were unable to identify to a species name. The younger ones in the group were fascinated with the sensitive plant (*Mimosa pudica*), as its small pinnately compound leaves close together upon touching. Some of the flowers that caught our eyes were wild ixora (*Isertia paviflora*), railway daisy (*Bidens pilosa*), graveyard daisy (*Wedelia trilobata*), and a slender vine *Dioclea guianensis* with hairy stems and purple flowers. We met up with a postman butterfly, and Mike Rutherford explained that there are two species and that they can only be identified via the red spots on their under-wing.

Linton reminded the group that while the trip is about fun, it should still be educational. He explained that Euphorbiaceae is a family of plants with white latex that can irritate the skin and that most species in the family could easily be identified by their persistent stipules and glands on the leaf base or petiole apex (Figure 4A). We saw *Mabea taquari* (no common name) and milkwood (*Sapium glandulosum*) from that family (Figure 4A). He also indicated that

some plants could easily be identified by their leaves. Leaves can be simple (leaf blades undivided into lobes) or compound (leaf blades divided into leaflets/lobes). The latter may have petiole/ule that is swollen at the base (lower pulvinus), swollen at the apex (upper petiole) or both. We observed wild ixora (*I. parviflora*) from the family Polygonaceae which have simple alternate leaves with sheathing stipules or an ochrea. We found a citrus plant (*Citrus sp.*) along the Old Railway Line. Cultivated citrus plant species have unifoliate or compound leaves (meaning that there is only one leaflet with pulvini). Venation can also be used to identify plant; as we observed the checkerboard-like veins of the *Aciotis purpurascens* (no common name) (Figure 4B).

Other plants were identified during our botanical walk. Black wattle or *Acacia mangium*, an invasive plant species, was another tree that was easily identified; with its irregular oblanceolate-like shape leaf with parallel veins and a small gland at the leaf blade-petiole intersection. This invasive species may have been naturalised in Trinidad and Tobago, due to its high density and ability to effectively reproduce. Linton went on to explain the difference between native plants (plants that are indigenous to a particular area in geologic time and have successfully existed there for many years) and naturalised plants (non-native plants which establish themselves in a foreign environment and reproduce without human assistance). Linton showed us some features of pois doux (*Inga fastuosa*) with its winged rachis, compound leaves and glands (Figure 4C). There are 11 species of Inga in Trinidad and Tobago, and they can all be identified by these vegetative characteristics. The saltfishwood (*Machaerium robinifolium*) has prickles, compound alternate leaves that are pinnate. He further explained the difference between prickles (modified leaf hairs that are sharp and pointed, as seen in the roses), spikes or spines (reduced, sharp-pointed leaves/stipules attached to plant vascular system, as seen in cactus) and thorns (reduced, sharp-pointed modified branches/stem as seen in citrus).

Linton appeared to be happy to explain the difference between sedges and grasses. Sedges are perennials that have solid triangular stems, whereas grasses are annuals/perennials generally have hollow round-stems with nodes/joints. Dan noted that the group should avoid getting cut from razor grass

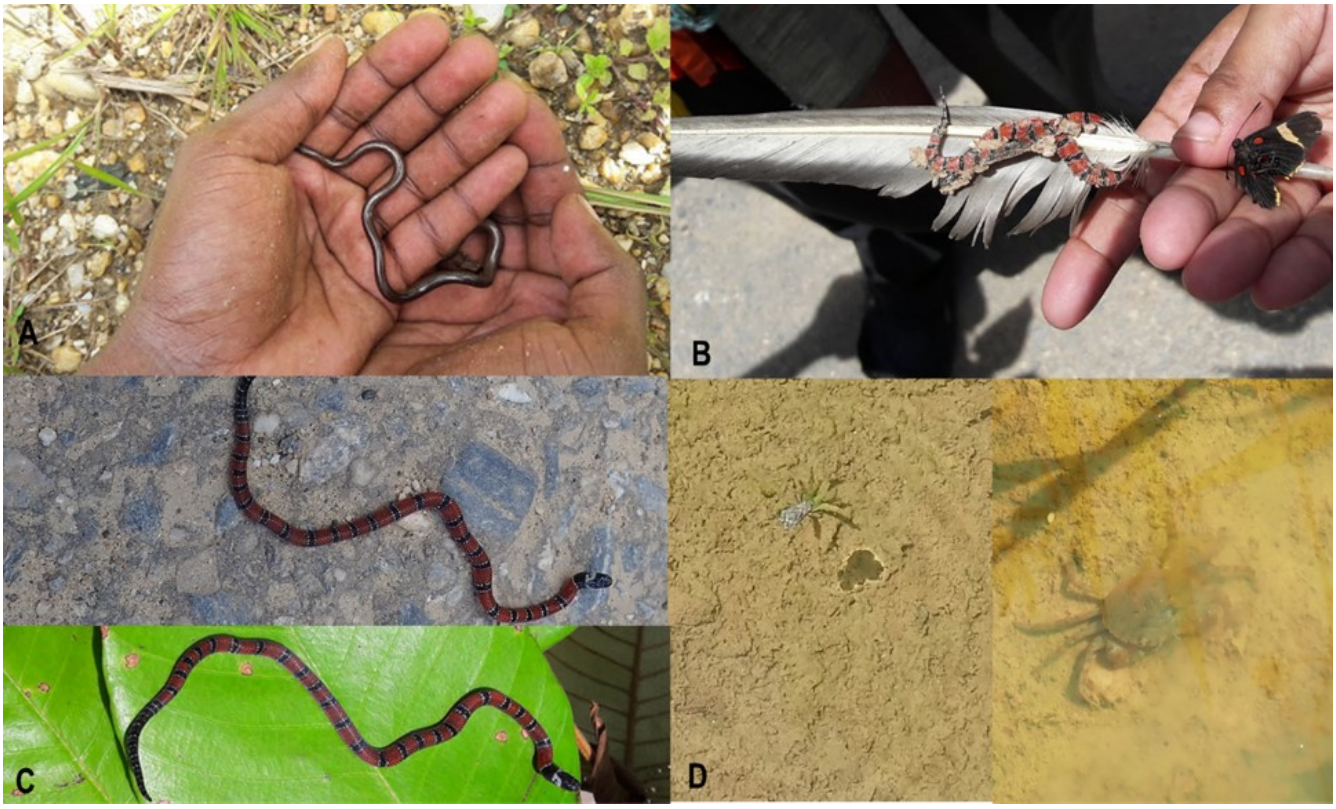

Figure 5. Some fauna species found along the Old Railway Line, ASESA, Trinidad. Clockwise from top left: (A) A living worm snake; (B) A dead coral snake and butterfly on a bird feather; (C.) Another dead coral snake found on the road, and placed on a leaf for photography; (D) A water spider and crab found in separate puddles

Figure 6. Observations of water spouting from an old WASA pipeline along the Old Railway Line, ASESA, Trinidad. (A) August 2019, (B) October 2019 and (C) November 2019. Can you see the different floral families? (Arecaceae, Cyperaceae, Poaceae, Melastomataceae, Euphorbiaceae Heliconiaceae, Apocynaceae, Orchidaceae, and Mimosoideae)

(*Scleria bracteata*).

Along the Old Railway Line, many other fauna species were spotted. On the nearby bushes, wasps and fruit-flies were easily spotted. Looking closely into the shallow water puddles, we saw tadpoles, spiders, crickets, dragonfly larvae and adults, earwigs and freshwater crabs. We spotted the reduviid bug which carries Chagas disease (the same disease that was responsible for Charles Darwin's death from cardiac failure). Mark Charran was the brave one to pick up a worm snake (Figure 5A) and tried keeping it still long enough for everyone to take photographs. In the distance we spotted the white-bearded manakin, black and red hummingbird and a few red-bellied macaws (who depend solely on moriche palms for their existence). Linton pointed to a spot along the railway line where the red-bellied macaws usually feed and nest. Consequently, it seems that the noise from the highway project has forced macaws further into the marsh forests, where moriche palms are sparse.

The group started its exit at 9:45am. Along the way, we spotted what we believe to be a chestnut belly kestrel and a flambeau butterfly. Some members spotted two coral snakes and some dead butterflies, which unfortunately probably may be due to heavy traffic from construction some metres away (Figure 5B, C&D).

Almost at the end of the journey, there was a corroded pipe which seemed to be sprouting groundwater. Linton noted that of the eight years he has been working in the ASESA, this was the first time he noticed water running out of the pipe. He suspects that it is underground water, since he has been observing water spouting out for some months. Linton also stated that he intended to take more pictures of the pipe; he believes that it may be a sign that the hydrology of the ASESA and by extension the surrounding area may be at risk to changes. This, in turn, can affect the rich endemic floral species in the ESA, and should be monitored further (Figure 6).

At the end of our botanical walk, we were delighted and indebted to Dianne Richardson Lestrade for an invitation to iced tea and snacks after a long trip at the El Suzanne establishment, off the Cumuto road. There, the botanists were confused by a mature cocorite palm (*Attalea maripa*), as the micro-environment where it existed (i.e., an open canopy at the top of a precipice, exposed to wind) altered the posture and fronds of the palm. The group also had confusion identifying a tree with purple and red flowers as we were unable to get close to the specimen, however, by use of Lester's binoculars, we speculated that it might be either a flowering Angelin tree (*Andira inermis*— purple flowers) or savonette tree (*Lonchocarpus sericeus*) with red hot poker wild vines (*Norantea sp.*) with the purple and red flowers, respectively.

All photos by Linton Arneaud and Lester Doodnath.

Contact the authors or editors for the full list of 130 species recorded.

Club Trip Report, 27-28 January 2018

CHACACHACARE

by Jo-Marie Westmaas

Club members pose for a photo L-R : Dan Garnet Hislop, Dan Jaggernauth, Jerome Foster, Reynold Boyce, Selwyn Gomes, Lawrence James

The first club trip of 2018 was to Chacachacare on the 27th - 28th of January. We were expertly ferried to and from the island by boat man Mario Young. The club members who stayed overnight were visited by nine fishermen, who generously offered us fish broth - at around one in the morning!

The first stop on Sunday was to the nuns' cemetery. The cemetery is the resting place of 10 nuns– nine Dominicans and one sister of Mercy, Sr. Mary Luigi Sansoni, who was buried in 1946. Following the relocation of the Cocorite leprosarium to the island, the Dominicans attended to the lepers from 1926 to 1950.

The nuns are also said to haunt the island. I was expecting fog and organ music, maybe a stray bone. To my surprise, however, it was a small, fairly well maintained area. The graves were covered in piles of decorative stones. Someone joked that I'd get my toe pulled. The identity of the offending nun would remain uncertain, as the sisters could not be reached for comment.

The structures from the time of the nuns have deteriorated a good deal. It would appear that every square inch is graffitied; people were determined to leave their mark. The wood has rotted through considerably, and in some cases, appears ripped out.

Further ahead, we were treated to the sight of a blue emperor butterfly (*Morpho menelaus*). After a brief period of observation and picture taking, we continued and shortly after reached the beach.

Club members pose atop the lighthouse

I was shocked by the staggering number of plastic bottles that now formed part of the landscape of an otherwise scenic beach. The bottles have allegedly floated over from Venezuela. However, I noticed bottles from local beverage companies in the horde.

I was invited to try some sea lettuce (*Sesuvium portulacastrum*) by Dan. I'd never tasted anything remotely similar, so I wasn't sure what to expect. It was pretty damn good; it had the right amount of salt and crunch to give Holiday Snacks a run for their money.

We took a quick break on a concrete dock. Snacks were shared, and we made small talk with a couple of guys who were fishing. It was soon time to get up again, and we made our way to La Tinta Bay.

Sea island cotton (*Gossypium barbadense*) seen on Chacachacare

La Tinta Bay is a mere seven miles from Venezuela. It was so named for the ink-like appearance of the water. Talk came up of a drug bust gone wrong, and I kept an eye out for stray brass among the rocks.

Despite this, however, the activities of the day were quite mundane; we passed some more guys fishing from the rocky shore on our way to the trail that leads to the lighthouse. The lighthouse was built on Mt. Cabresse - the highest point of the northern bit of Chacachacare, 825ft above sea level. Sea island cotton (*Gossypium barbadense*) plants, remnants from the days of the cotton plantations, can be observed on the trail.

A decent way up, we came across some birders who'd made the trek hours before. Cameras were trained on a small grey and yellow bird- a dickcissel (*Spiza americana*). Not long after we finally reached the top of the hill. A modern radar station stands close to the lighthouse - a popular perch for black vultures (*Coragyps atratus*).

Ascending the stairs of the lighthouse, which was built in 1897, was more like climbing a couple winding green ladders. At the summit, one could see Venezuela clearly. The panoramic view was definitely worth the climb.

On the way back, Dan drew my attention to the manchineel, also known as the poison tree, (*Hippomane mancinella*) growing near the shore. Dan explained that the fruit, while looking and smelling highly edible, is quite dangerous. It causes severe inflammation and blistering. Burning the wood will cause eye irritation. Sheltering under the tree is also not recommended for the above mentioned reasons. So unless you really need to cop out of something unpleasant, I'd stay away from this tree. The fruit of the seaside mahoe (*Thespesia populnea*) looks similar to that of the machineel, and it grew in the same vicinity. Dan broke a piece of the machineel tree, which bled white latex (also dangerous), differentiating it from the seaside mahoe.

After getting back to the base at Marine Bay, we had a few hours to kill. A few members went swimming in the bay. The water looked fantastic. So good, in fact, my phone and notebook joined them. Around 4:30pm we were met by Mario on the dock and we made our way back to the mainland.

(Top) Agave; (Bottom) *Agave evadens*

(Top) Tropical parula; (Bottom) Northern scrub flycatcher. *Photos by Jerome Foster*

All photos were taken by Jo-Marie Westmaas, Brian D'Abreau and Jerome Foster.

Naturalist-In Series...

THE YEAR OF BORNEO 2 - UNKNOWN SARAWAK

by Chris K. Starr

Review of:
Odoardo Beccari 1904. Wanderings in the Great Forests of Borneo. London: Archibald Constable 424 pp. Available online at the Biodiversity Heritage Library.
[49th in a series on "Naturalist-In" books; see www.ckstarr.net/reviews_of_naturalist.htm]

Odoardo Beccari (1843-1920) was an Italian botanist. Soon after graduating from the University of Bologna, he spent several months at Kew Gardens in England, where he got to know Charles Darwin and some other leading English biologists of the time, as well the Rajah of Sarawak, Sir James Brooke. At Brooke's invitation, he accompanied his mentor, Giacomo Doria on a collecting trip to Sarawak in 1865. Doria left in 1866, but Beccari was to remain for three years until he had to leave on account of ill health. It was his first time in the tropics, and in later years he looked back on the Borneo years as the happiest time of his life. This bears a close parallel to Henry Walter Bates's memory of his time in the Amazon (see review no. 30).

In the following decade, Beccari made two further trips to South Asia, visiting Sarawak and several other territories from India to New Guinea. The botanical results of his South Asian explorations were published in an extensive monograph in 1877-1890. His base of operations was Kuching, the capital of Sarawak, about 25 km up the broad Sarawak River from the coast. At that time, agriculture was relatively new, so that very little of the forest had yet been cut down. He lodged in a bungalow close to primary forest, with the river (still about 250 metres wide that far upstream) very close by, so that for most of the first two years he had little reason to venture far afield. As an example, he was able to collect specimens of at least 50 dipterocarps within walking distance of his base. The Dipterocarpaceae are a family of almost 700 known species of often very tall trees. They are characteristic of lowland rain forest, with their greatest diversity in Borneo.

Note that Brooke (1803-1868), although an Englishman, was not the Governor of a British colony. Rather, in 1842 the Rajah of Brunei had ceded Sarawak to him as a personal fief in gratitude for Brooke's role in putting down a rebellion. Brooke reigned as an absolute monarch over an area the size of England and Wales. Beccari's attitude toward the Brooke administration was a very positive one. Among other things, it had been fairly successful in suppressing piracy and head hunting. Piracy had been the main occupation of coastal Malays, while head hunting—of which Beccari gives an extensive discussion—was a core traditional activity of the aboriginal peoples.

Like every other naturalist-in writer about Borneo, Beccari gave considerable attention to the various groups in this multi-ethnic island. As we find in other places, many of the various jobs were associated with particular ethnicities. The Chinese provided the best carpenters and smiths and most of the merchants, the Malays were the fishermen and sea-farers, and the Indians had their own specialisations, as did the mixed population. It didn't need to be said that the colony's administration was in the hands of Europeans.

As for the aboriginal Dayaks, or Dyaks, the separation into Sea-Dayaks of the coast and Land-Dayaks of the interior is now deemed of limited use, although it can serve for our purposes. The Dayaks as a whole had been—and to a certain extent still were at the time—warlike among their tribes, mainly in small head-hunting expeditions. Hunted heads remained as family heirlooms, openly displayed in their houses, as a man's prestige in the community rested in large part on the number of heads collected by him and his ancestors. Although Beccari didn't say so openly, it was plain that many Dayaks missed the good old days, and the practice continued at a low level. Soon after arrival, before he had learned to size up the local people, he was approached by a man with a cutlass whom he took to be a Dayak head hunter. Beccari "eyed him with a certain amount of diffidence, for the thought struck me that he might take a fancy to my head. Having my gun I felt somewhat reassured; but I very soon found out that the supposed head hunter was a very civil fellow." In fact, he soon became Beccari's best guide in the local forest. There are no accounts of threatened or actual violence, but in some areas he knew to take precautions and slept with a revolver and cutlass at hand.

After some months in Kuching, he found himself regretting that he had not had any contact with the Land-Dayaks and so determined to venture up into the hills to visit some of their villages. He found them to be mild-mannered and hospitable for the most part, and it suited him largely to go native while in the interior. Greeted by the headman on arrival in one community, he was invited into his house to sit in the place of honour, over which hung several smoked human heads

Although he had no medical training, Beccari could diagnose and deal with many of the common ailments and carried a supply of medications. In a region where local medical attention was almost unheard of, this made him very popular. All sick and invalid members of the village, as well as from surrounding villages, came for treatment by the great healer. Such was the interest, that some even seemed to regret not being ill, as they would have liked to experience the remedies.

It is plain that Beccari felt considerable affection for many individual Dayaks and the aboriginal people as a whole. There are word sketches of some of his assistants, e.g. one Sahat "was at heart a pirate, if not originally one. His instincts were cruel, and yet he was honest, plucky, a first-rate canoeman, and clever in most things that natives can do. He spoke

fluently several dialects, was a decent cook, and could act on an emergency both as tailor and hairdresser." And "Bakar in my eyes was a perfect philosopher, and the most happy man I have ever known." He recorded and often used native names for plants and animals

Beccari took Wallace's The Malay Archipelago (see review no. 31) as his starting point, so that he deliberately chose some collecting areas because Wallace had not been there. At the time there were practically no roads, so that travel in the interior was mostly by water. This could be slow going, not so much on account of physical factors as the reluctance of his Dayak helpers to go beyond the next village, so that as they came to a new village they had to stop and arrange for a new crew. However, he found some areas so wild and unfrequented that even local guides did not know their way. It could seem as if no human being had ever been there before, and they had to keep marking their way in order not to get lost. And, traveling for days through dense forest could become a claustrophobic experience. Unlike on the sea or in open habitat, the sky was hidden most of the time, so that "the world appears to close in behind us, the fear of advancing grows with the thought of not being able to turn back, and the unknown generates a sense of horror."

Inconveniences and hazards were plentiful. Among the former were the abundant leeches on land and in fresh water. "There is no way of avoiding them; they get into the shoes and under the stockings, and, fastening especially around the ankle, gorge themselves with blood before one is aware of their unwelcome presence." He spent miserable nights in some villages due to swarms of mosquitoes and the great number of dogs that made a terrible and constant racket.

Among the potentially greater hazards were the giant honey bees, *Apis dorsata*, with colonies of many thousand intolerant workers. They usually nest very high on emergent trees and so present no danger to anyone passing peaceably at ground level. However, many of the plants of interest to Beccari workers were epiphytes, so that his climbers ran certain risks. Occasionally a big tree felled for agriculture or other purposes made it relatively easy to collect epiphytes. They came upon a recently felled tree, not knowing that it held a colony of these bees, which swarmed out to attack the intruders. Beccari dove into a deep waterhole to escape them, but as soon as he came up for air they were waiting for him. Again and again.

Even in the midst of strangeness and physical discomforts, Beccari could wax poetically. "Stillness, heat, sandflies, horseflies, and mosquitoes reigned supreme, but did not combine to make our journey an enjoyable one. The absolute silence and solitude was startling. Not a hut, not a single boat did we meet with for hours and hours together. Towards noon, nature appears asleep; not a bird's note, not a sound of any kind breaks the profound stillness. The very water appears to move on as a solid mass, and not the slightest breath of air moves its polished shining surface."

Among the plants that he especially wanted to find were the parasitic Rafflesia. After a long search, he finally succeeded. These peculiar plants grow below ground in the host plant's tissues, so that only the enormous, conspicuous flower springs up above ground. I have never seen one, but the best way to locate one in flower is undoubtedly by its very offensive smell, like rotting meat, as Rafflesia is fly-pollinated.

Chapter 3 includes a review of Sarawak's various edible fruits. This is a topic dear to my heart, as I maintain a personal life list of fruits I have eaten (not a joke, even if it sounds like one). These now amount to 79 species, 21 of which I first delectated in Southeast Asia, so that Beccari's remarks are a real blast from the past.

Beccari was a critical naturalist. While he studied Wallace's reports and those of other great naturalists, as well as noting what his local informants told him, he sometimes said that he was unable to confirm one or another observation. According to local testimony, for example, there was a flying snake "capable of spreading out the skin of its sides to such an extent as to enable it to float from one tree to another." While noting that he had never seen such a snake, Beccari found no evident reason why such a form could not evolve. After all, there were flying squirrels, flying lizards and flying frogs. Note that none of these animals flies in the strict sense. Rather, like flying fish they can glide for significant distances while maintaining altitude.

He was also a philosophical naturalist who

Giant flower of *Rafflesia arnoldi*. *Courtesy of Wordpress.*

thought about the causes of things. As an example, the shores of waterways in the Asian tropics are often occupied by a dense monoculture of the short nipa palm, *Nypa fruticans*, extending as far upstream as the salt water. Why, he wondered, are mangrove and coconut pantropical, while nipa is restricted to this one part of the world?

What of his thoughts on organic evolution, the central question for all biologists at that time. Although he had met Darwin and very much admired 'On the Origin of Species', and considered himself a follower of Wallace, Beccari was not entirely with them. Some of his speculations put him more in the Lamarckian camp. That is, he doubted the power of natural selection to drive all of evolution. For one thing, he saw only negligible variation within populations, which would leave no material on which natural selection could act. In the absence of significant genetic variation, he held to "the theory that the environment has been the most powerful and principal agent in causing animals, as well as plants, to assume their present form and structure. That the organised beings now living have been originated through the action exerted on them by the external world, is an old theory which was propounded by a few elect naturalists, who had not much faith in the creation of living beings simply by the action of a supernatural will."

His clearest speculation along these lines concerned the archerfish, *Toxotes sp.*, and its remarkable feat of spitting a jet of water at a potential prey insect above the water's surface to knock it down. Not only can it direct the water up to two metres, but it corrects for the refractive difference between water and air in its aim. How could this possibly have come about? Noting that the archerfish catches insect prey in a manner analogous to that of a chameleon, he reasoned that "in both cases we have special adaptations in certain organs whose modifications can only have been caused through impulses of the will. It must have been the wish to capture prey, and this only, that has rendered possible these morphological adaptations by means of which the desire could be attained." In short, in striving to capture prey out of reach, an ancestral fish came to bring it down with a jet of water, which innovation was passed on to its offspring.

In addition to the 24 chapters, the book has an appendix on "The Bornean Forest", an admirably extensive index, and extensive illustrations, including three maps. Included in the appendix is a review of vegetation, including epiphytes and ant-plants. Beccari was a pioneer in describing these latter and their close relations with ants, most notably in the plant genera Hydnophytum and Myrmecodia. These epiphytes typically have a swollen, tuber-like base with cavities in which the ants nest. At first it was supposed that stimulation by the ants caused the base of the ant-plants to swell in such a way as to make it suitable as a nesting space, rather like the many kinds of galls. However, it was shown by horticulturists that the plants develop in the same way even in the absence of the ants.

References

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Beccari, O. 1902. Nelle Foreste di Borneo. Florence: S. Landi … pp. Available online at the Biodiversity Heritage Library.

Archerfish aiming a jet of water at an insect above the water surface. *Courtesy of Mother Nature Blog.*

Epiphytic ant-plants. Left: *Hydnophytum* sp. in place on a tree trunk. Right: *Myrmecodia* sp. removed from its tree and partly cut open to show ant-harbouring cavities.

Naturalist-In Series...

THE YEAR OF BORNEO 3 – TWO MORE LOOKS AT SARAWAK

by Chris K. Starr

Review of:
Charles Hose 1929. The Field-Book of a Jungle-Wallah. London: H.F.& G. Witherby 216 pp. Reprinted 1985 by Oxford Univ. Press.
Robert W. Shelford 1916. A Naturalist in Borneo. London: T. Fisher Unwin 331 pp. Reprinted 1985 by Oxford Univ. Press.
[50th in a series on "Naturalist-In" books; see www.ckstarr.net/reviews_of_naturalist.htm]

Charles Hose (1863-1929) took up an administrative position in Sarawak in 1884 at the invitation of the second Rajah, Charles Brooke. We are not told exactly what his job was, leading to the suspicion that his official post was a cover for something else. It would not be far-fetched to think that Rajah Brook was using him to check up on the various district officers. In any event, Hose had plenty of liberty to explore in an age when Borneo was even more outside the main routes of travellers. As noted earlier, most of Sarawak was forested, with very few roads outside of the towns, but it was well supplied with rivers, which served as the main routes.

This engaging little book opens, appropriately, as he awoke on the boat the morning of arrival at the mouth of a river (presumably the Sarawak River by Kuching) with the sense of great expectation that the situation called for. His main focus throughout his stay was the Baram River and its tributaries on the north-eastern edge of Sarawak. The eight chapters have such titles evocative as "All on the Bornean Shore", "A Mountain Treasure House" (about an ascent of Mt Dulit), and "The Wealth of the Jungle".

Hose's observations were more those of an amateur naturalist than an original researcher, although this distinction was not nearly so pronounced then as now. His attention and knowledge were mainly directed to vertebrate

animals, especially his comments on particular birds and their habits, together with scientific names. His later publications included a monograph on the mammals of Borneo.

Hose was especially taken with the slim little mudskipper fishes, *Periophthalmus*, spp. This genus of 18 known species in the Indo-Pacific region and one on the Atlantic coast of West Africa are strange in form and endlessly engaging in their habits. They can be quite abundant on tidal mud flats, where they inhabit burrows in the soft mud and move about actively on the surface at the water's edge. Their main physical peculiarities are the long, tubular body, bulging eyes at the top of the head and the fleshy, protruding pectoral fins. They use the latter to move along on the surface of the mud in a gait known as "crutching". As Hose commented, "they are fast becoming land animals, and seem only to resort to the water for breeding purposes, although they never go far from it." The thing that strikes me [Chris] from many idle hours watching them moving about on the mud flats, ducking in and out of their burrows and squabbling on the surface, is their un-fishlike manner, more like frogs in some of their behaviour and lizards in others.

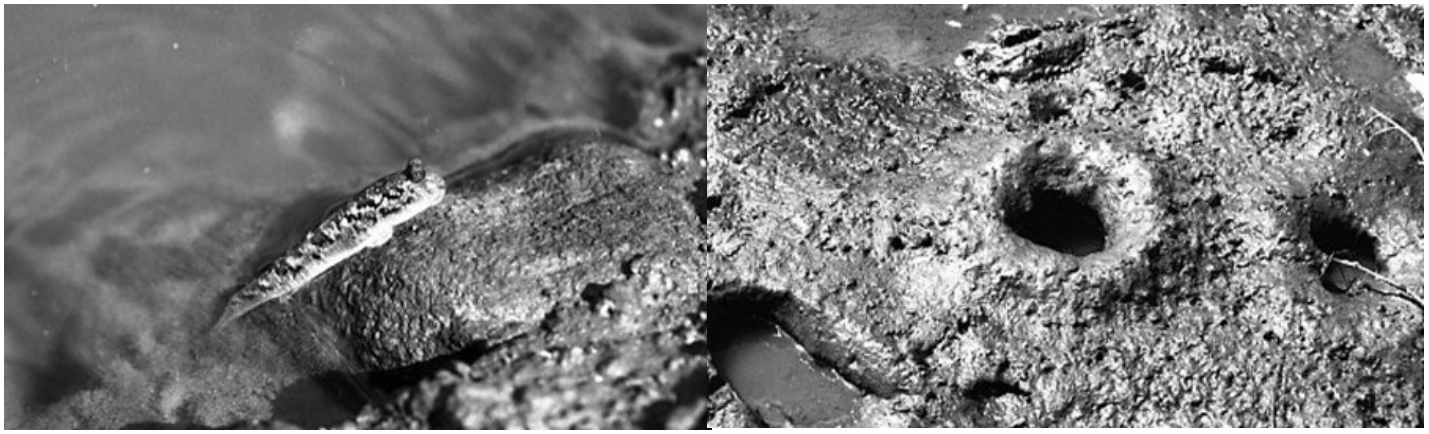
Hose's remarks on invertebrates were much more general, with very little mention of scientific names. I notice that one can sometimes infer from his observations of a particular ant what it must have been, but Hose himself seems not to know. However, he picked up on Beccari's observations of the ant-plants of the genus Myrmecodia (and by implication Hydnophytum; see previous review), suggesting that they must gain an advantage from harbouring the inquiline ants, most likely through defence against herbivorous animals. This is now the conventional wisdom regarding these ant other ant-plants (Chomnicki, in press).

Robert W. Shelford (1872-1912) was a British entomologist and museum administrator. His health was never strong, and his early death resulted from the recurrence of a childhood illness. He went to Sarawak in 1897 to serve as curator of the Sarawak Museum, remaining until 1905. Then, as now, natural history museums in the tropics served three overlapping functions: a) to help satisfy the needs of the local people, b) to disseminate knowledge of the local biota, and c) as centres for research.

Note that, although his book was published earlier, he went to Sarawak some years after Hose, about whom he includes plenty of mention. The book is illustrated with 32 full-page photos of landscapes, buildings and animals. He gives both native and scientific names of plants and animals treated, one of the things in which this book surpasses Hose's.

Reflecting something that Darwin, Wallace or Beccari might have said, Shelford regretted that, "It is an unfortunate thing that the vast majority of collectors and field naturalists are poor philosophers, whilst a great many philosophic zoologists are sorry failures when it comes to observing the living animal in its natural surroundings." In a different context, this would be called an appeal for the unity of theory and practice.

Shelford's job both required and allowed him to spend a great deal of time exploring Sarawak. He had very broad interests, with research expertise focused on orthopteroid insects (the subject of



Unidentified mudskipper in central Luzon, Philippines. At left, a fish is resting on a stone at the water's edge. At right, two typical burrows in the mud.

Chapter 5), especially cockroaches, of which he described 44 new genera and 326 new species. He kept many insects in captivity, the better to observe their habits. He also made a special study of camouflage and mimicry (Chapter 8), something that must strike the attention of any temperate zone entomologist who comes to the tropics. His Tables I-III, listing models and their apparent mimics, is an especially valuable feature. He also had chapters of beetles and--following both Burbidge and Beccari—on Hydnophytum, Myrmecodia other plants in their relations with ants.

Naturalists writing about Borneo tend to take a large interest in the very diverse human aspect. Hose was an exception to this rule, but not so Shelford, whose interests included anthropology. His classification of the aboriginal groups of Sarawak placed Land-Dayaks quite apart from the Sea-Dayaks. He took delight in the native stories and legends, which were often told around the campfire and appropriate to the place. In his remarks on many native beliefs, he remained non-committal on whether he believed them to be true. "This may very well be the case, but all I can say is that I have never seen it myself." In my interpretation, this was not just the politeness of a guest among a foreign people. Rather, he had the sense to realise that people living close to nature are often acute observers, while at the same time they can hold some quite fanciful ideas even about species that they often observe. A cautious suspension of judgement was therefore the prudent policy, especially in a land that still remained largely unknown to the scientist.

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A leaf insect, *Phyllium* sp., showing the wonderfully close resemblance to leaves of these distinctive members of the order of stick insects (Phasmida). *Source: Encyclopedia Britannica.*

Two young Sea-Dayaks in traditional attire. This photo, apparently from around the time of Hose's and Shelford's times in Borneo, has been widely reprinted.

Your Ideas and Observations

A Quarterly Update

THE ANT-MIMICKING SPIDER, *Aphantochilus rogersi*

by Rainer Deo

During a night walk in the remote forests of Moruga I glanced, from the corner of my eye, a strange-looking and very black "ant" perched on a leaf. With my primary focus being to find reptiles and amphibians however, I paid it no attention and walked right pass it. Moments later, Hukaymah Ali spotted the same "ant" and also pointed out that it was nothing like she'd ever seen before. I decided to give it a closer inspection, and, as soon as I realized what I was looking at, my mind was blown.

It was an ant-mimicking spider! I had a bit of previous knowledge on jumping spiders that mimicked ants but this species belonged to the family of crab spiders (*Thomisidae*) and I had no idea that it contained ant mimics. What made the entire situation more confusing, was the fact that the spider was missing two legs and as most will know, insects have 3 pair of jointed legs while arachnids have 4.

Various groups of arthropods, including wasps, spiders and beetles, are known to mimic ants and for two main reasons: to trick their prey and to trick potential predators. Spiders are the most common ant mimics, and the species, *Aphantochilus*, use their disguise to get close to their model ant and prey, *Cephalotes,* or as they're commonly known, turtle ants.

Preying on these large ants is more difficult than one might imagine. The risk of getting injured or alerting the rest of the colony means that the spider would have to be a very quick and stealthy hunter. They attack from behind and primarily target the very vulnerable petiole of the ant, a narrow area between the ant's thorax and abdomen. Aside from the great resemblance, the spiders have also been recorded using a captured ant as a shield against other ants that become suspicious.

The ant-mimicking spider. *Photo by Rainer Deo*

Please send us your ideas and observations to admin@ttfnc.org for inclusion in the next Bulletin!

Club members continue to meet and enjoy Club activities over Zoom during the current COVID-19 pandemic. *Photo via Zoom*

A FEW RESEARCH OPPORTUNITIES FOR AMATEUR NATURALISTS

by Chris K. Starr

Most of natural science has been fairly thoroughly professionalised for more than a century, so that amateur scientists have fewer and fewer opportunities to make original contributions to our shared knowledge. In fact, today the practice of just two disciplines still has a significant amateur component: astronomy and natural history. Among other things, both are highly fact-intensive.

Charles Darwin famously remarked in a letter "How odd it is that anyone should not see that observation must be for or against some view if it is to be of any service." Some have taken this to mean that simply working out the bionomics of a given plant or animal without a testable hypothesis in mind is unavoidably a waste of time. I cannot agree. Aside from the great pleasure of getting to know a particular species better than anyone has done before, how can it possibly be valueless to discover and make known—to draw an example from solitary wasps—its habitat, the siting and form of its nests, its prey array, and its seasonal activity?

I have often advised Biology students to get up close and personal with some plant or animal, to pick a species and endeavour to learn the ins and outs of its way of life. This helps to build a sense of the organism, and if the species is well-chosen one is almost guaranteed of adding new and meaningful knowledge.

Naturalists based in the New World tropics are especially well placed to discover things that no one knew before. Species richness is exceptionally high here, yet professional biologists and serious amateurs are relatively scarce. Accordingly, on our field trips—especially those of the specialist groups—we often notice things that are not yet reported in the literature. The Bug Group has been following up some of these opportunistic observations, while some others remain open for investigation. My purpose here is to describe eight such opportunities—three with spiders and five with insects—with some suggestions on how the amateur naturalist might fruitfully address them. Where the exact species are not yet determined, I can assist in getting specialists to help with identifications.

1. Life history and reproduction of *Zosis geniculata* (grey house spider)

This pan-tropical uloborid spider, an orb weaver, is common in buildings. It is abundant on the UWI campus, for example. It is surprising, then, that its basic biology has not yet been the subject of any major study. (The Wikipedia entry on the species amounts to just two short sentences, and an EBSCO -Host search turned up all of eight papers, none of them going to the heart of its way of life). Given its commonness and accessibility, the natural history of *Z. geniculata* should be a relatively straight-forward project, with plenty of models available in studies of other web-building spiders. It will almost certainly be relatively easy to maintain in the lab, which will be advantageous in studying both development to maturity and its reproductive behaviour.

References
(none, for good reason)

2. Life history and predation of *Scytodes* spp. (spitting spiders)

Although not nearly as easy to find as *Zosis geniculata*, our two species of spitting spiders also often live in buildings. I have several times found them in my bathroom, which suggests that they prefer a humid environment. The larger of the two, which I tentatively identify as *Scytodes thoracica*, is mostly grey with brown spots, while the smaller – apparently either *S. cubensis* or *S. guttipes* - is mostly a darker brown (Brescovit & Rheims 2001). Members of the family Scytodidae are known as spitting spiders, because they not only give off venom from their chelicerae but also a glue-like substance that can be spat in such a way as to entangle a prey or antagonist. There are reports of some species preying on other spiders, even

attacking them in their webs, a phenomenon known as web invasion. Casual, after-the-fact observations suggest that the supposed *S. thoracica* preys on *Physocyclus globosus*, a very common daddy-longlegs spider (Pholcidae) that is found much the same places. One way to study this would be to keep some *P. globosus* in the lab, introduce hungry *S. thoracica* at the edge of their webs, and record how the two species respond to each other. If that works well, it could be fruitful to do similar trials with *P. globosus* and the smaller *Scytodes* sp.

Reference

Brescovit, A.D. & C.A. Rheims 2001. Notes on the genus Scytodes (Araneae, Scytodidae) in Central and South America. Journal of Arachnology 29:312-29.

3. Kleptoparasitic spiders in orb webs

Inactive webs of some of the larger orb weavers, such as *Argiope argentata* and *Nephila clavipes*, one often finds one or several much smaller spiders. If the resident spider is a mature or sub-adult female, the smaller spiders may be males of the same species with designs on the female, outstanding examples of sexual dimorphism. However, instead or in addition there may be *Argyrodes* spp. (Theridiidae), commonly known as dew-drop spiders on account of their distinctive shape. After years of uncertainty and speculation, it now seems well established that these are kleptoparasites that feed on fragments of prey trapped in the web or prey too small to attract the resident spider's attention (Hénaut et al. 2005). Their relationship to the orb weaver, then, is no longer in doubt.

However, there is still much to be learned about such things as a) the array of *Argyrodes spp.* associated with different orb weavers, b) whether this array changes as the orb weaver goes through its life stages and builds increasingly large webs, and c) how the array of *Argyrodes* varies between isolated and aggregated orb webs. My suggested approach is to choose an abundant species of orb weaver in which *Argyrodes* are at least occasionally found and to tabulate the pattern of the kleptoparasites' species from a large number of webs of orb-weaver females of known life stages. By introducing new prey or prey fragments into a web, one can also observe responses and interactions of the resident and her *Argyrodes*.

Reference

Hénaut, Y., J. Delme, L. Legal & T. Williams 2005. Host selection by a kleptoparasitic spider. Naturwissenschaften 92:95-99.

4. The array of hawk moths (Sphingidae) at a single locality

Hawk moths, or sphinx moths are a distinctive group with 82 known species in Trinidad, 29 in Tobago (Cock 2017, 2018). The suggestion comes from Matthew W.J. Cock, the leading expert on Trinidad and Tobago's Lepidoptera, that a thorough study of the diversity of hawk moths at a single locality in Tobago would be fruitful. Matthew's recommendation is to choose an area of mixed habitat in the central or western part of the island.

The best approach is to make use of one or more accessible lights over a long period (ideally two or three years) in a very consistent manner. Mercury vapour lamps, such as are often used on the outsides of buildings, work best. Orange lights do not work well. The same lights should be checked until about 21:00 or 22:00, preferably every night, with a follow-up around dawn for any moths that arrived very late and are still in place in the morning chill. It will be advantageous if any of the lights illuminates a white or very pale vertical surface, such as a building wall. Hawk moths are drawn by the light and settle on the pale surface, where they can be collected by hand. Lepidopterists sometimes put up a white sheet, but for present purposes this is only a good idea if it can be put up in the same way every night.

The procedure, then, is simply to record all hawk moths on the study surface each night, leading to a dataset that can be analyzed in a number of ways. In the early stages of the study it will be necessary to collect all specimens, but later the common species will become familiar enough to be identified and recorded on sight.

This project can add materially to our faunistic knowledge of Tobago hawk moths, but that is just a lagniappe. The real fruits will include: a) an understanding of the relative abundance of the different species at this locality, b) a good estimate

of the level of diversity according to standard indices, and c) the seasonality of the commoner species.

References

Cock. M.J.W. 2017. A preliminary catalogue of the moths (Lepidoptera except Papilionoidea) of Tobago, West Indies: An updated and annotated checklist. Insecta Mundi 0539:1-38.

Cock, M.J.W. 2018. Hawk-moths (Lepidoptera: Sphingidae) of Trinidad, West Indies: an illustrated and annotated list. Living World 2018:10-81.

5. Life history of butterflies

Almost everyone likes butterflies. They are good -looking, lively, and most are active during the daytime. The species found in Trinidad and Tobago are well known at the faunistic level (Barcant 1970), and identifying them is not unduly difficult.

The basic bionomics of particular butterflies is an exhaustible subject that embraces three main problems: a) seasonality, b) larval food plants, and c) developmental stages and their duration. Let's consider each of these in turn.

Even here in the humid tropics, free from the horrors of winter, not all times of year are the same. This is seen in butterflies, even without following any particular species throughout the year, because a butterfly's approximate age is shown in its wings. The adult lifespan of a butterfly is usually some weeks or months, and as it ages its wings lose scales and become frayed around the edges. If members of a given common species tend to emerge as adults during a particular season, most of the specimens one finds in the field will have a distinctly fresh look, especially in the wings.

Adult butterflies tend to visit a broad variety of flowers for their nectar, while the larvae (caterpillars) have quite a narrow range of food plants. These are relatively easy to identify just by noting where the caterpillars are found, usually with clear signs of having chewed on the leaves. If one wants to take this topic a step further, this can be done by means of cafeteria experiments, in which fresh leaves of known plant species are laid out for caged caterpillars. As a general rule, it will be unmistakable which plant(s) they choose (Douglas 1986, Feltwell 1986).

Working out the life cycle is a methodical, relatively long-term undertaking that usually requires observing females as they lay their eggs, collecting the eggs along with the plants on which they are laid, and rearing the hatching larvae through to pupation and adult emergence in the lab. Even with the best of care, it is unlikely that more than a small fraction of early larvae will make it all the way, so this is not a project for the impatient.

Reference

Barcant, M. 1970. Butterflies of Trinidad and Tobago. London: Collins 314 pp.

Douglas, M.J. 1986. The Lives of Butterflies. Ann Arbor: Univ. Michigan Press 241 pp.

Feltwell, J. 1986. The Natural History of Butterflies. London: Croom Helm 133 pp.

6. Behavioural ecology of a mud cricket, *Ripipteryx* sp.

The family Ripipterygidae is restricted to the New World tropics. These very small, slim orthopterans are typically found on or near the wet shores of both flowing and stagnant waters. The very spare ecological information on three Colombian species summarized by Baena-Bejarona (2015) serves to illustrate how very little is known of how mud crickets live. One species, *Ripipteryx sp.*, is abundant near my house up the Caura Valley during much of the year. Available taxonomic literature does not allow a definite identification of the species, although Günther (1980) records one species, *R. rivularia*, from Trinidad.

Because they are so mobile, a thorough study of these creatures would probably require an artificial laboratory habitat.

References

Baena-Bejarano N (2015) Aspects of the natural history of Ripipteryx (Orthoptera: Ripipterygidae) species in Colombia. Journal of Insect Behavior 28: 44–54.

Günther KK (1980) Katalog der Caelifera-Unterordnung Tridactylodea (Insecta). Deutsche Entomologische Zeitschrift 27: 149–178.

7.Habitat preferences, nest structure and colony composition of two Termes species

The higher termites *Termes fatalis* and *T. hispaniolae* are found in both Trinidad and Tobago

(Scheffrahn et al. 2003). Their nests are fairly easy to recognize, as they are very dark brown (almost black) and typically attached to tree trunks at the base; they have an overall untidy look, unlike the elegant nests of some other higher termites. The termites, themselves, look very much alike. However, if one has specimens of the soldiers it is easy to know which is which, as *T. hispaniolae* is the larger.

Both species are found in closed-canopy forest. Colonies appear to be especially abundant in the Arena Forest and Bush Bush, although without sampling many colonies we cannot tell whether the two species are found together in either locality.

T. Bearss mentions that a literature search of the genus turns up little more than scattered references and next to nothing about either of our two species. If one were ambitious, an analysis of colony composition of one or both species (Merritt & Starr 2010) would be fruitful.

References

Merritt, N.R.C. & C.K. Starr 2010. Comparative nesting habits and colony composition of three arboreal termites (Isoptera: Termitidae) in Trinidad & Tobago, West Indies. Sociobiology 56:611-22.

Scheffrahn, R.H., J. Kreček, B. Maharajh, J.A. Chase, J.R. Mangold & C.K. Starr 2003. Termite fauna (Isoptera) of Trinidad & Tobago, West Indies. Occasional Papers of the Department of Life Sciences, University of the West Indies (12):33-38.

8. Niche separation of two Nasutitermes species

The arboreal-nesting termites *Nasutitermes corniger* and *N. ephratae* are both common throughout Trinidad and Tobago (Scheffrahn et al. 2003). They represent a very good case of ethospecies, as the termites themselves are very hard to tell apart, while their nests (a product of their behaviour) can usually be distinguished at a glance. In particular, the nest surfaces are quite different from each other (Thorne 1980).

Not only do the two species overlap broadly in their widespread ranges, but they are commonly found together in the same localities. As far as I know, no one has yet raised the question of what separates the two ecologically, as they presumably could not co-exist without significant niche differences. There are some differences in nest substrates, but I doubt that this accounts for the separation. Rather, my working hypothesis is that the two specialize on different food sources within their shared habitat. Fortunately, the colonies' conspicuous foraging galleries proffer a convenient way to see where they go.

References

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Thorne, B.L. 1980. Differences in nest architecture between the Neotropical arboreal termites *Nasutitermes corniger* and *Nasutitermes* ephratae (Isoptera: Termitidae). Psyche 87:235-243.

Monthly Lecture Series - 13 August, 2020

PLASTIC POLLUTION IN THE CARIBBEAN SEA: MY EXXPEDITION EXPERIENCE

By Dr. La Daana Kanhai

Within the past decade, plastic pollution in the marine environment emerged as one of the key environmental issues facing Planet Earth. Global concern about plastics in the marine environment stems from their ubiquity, persistence and the threat they pose to marine organisms. The Caribbean is a geopolitically diverse region that is comprised of countries from Central America, South America as well as several Small Island Developing States (SIDS). The Caribbean Large Marine Ecosystem (CLME) is a global hotspot of biodiversity. Transboundary issues such as the influx of Sargassum and plastic debris pose a threat to marine organisms that inhabit Caribbean waters as well as many sectors that humans depend upon (tourism, fisheries, etc). Relevant data about plastics in the marine

environment is therefore needed to inform relevant responses to effectively address the issue. eXXpedition is a series of all-women voyages that is focused on the issue of plastic pollution in the ocean. eXXpedition's Round the World (RTW) voyage (2019 – 2022) is comprised of multiple legs and is focused on the collection of relevant global scientific data that will inform solutions. Between 29th November to 8th December 2019, leg 4 of the RTW voyage was conducted in the Caribbean between Antigua, Bonaire and Aruba and I was one of the ten guest crew members. During the TTFNC lecture, I presented the work that was accomplished as part of eXXpedition's (i) science-based programme (sampling various environmental compartments for microplastics and macroplastics, examining the issue of waste management on land, assessing marine debris in coastal waters) and, (ii) public education and awareness activities (blogs, local community engagement activities). Following this, I then presented an overview of some of the lessons that were learnt from this specific scientific expedition.

NATURE IN THE NEWS

A quarterly summary of local environmental news

by Kris Sookdeo

JULY

Following the partial proclamation of the Miscellaneous Amendments (No. 2) Act, 2020, the penalties for illegal hunting and other violations of wildlife conservation law were increased from $10,000 to $100,000. The act also changed the composition of the Wildlife Conservation Committee

The Animal (Diseases and Importation) (Amendment) Bill, 2019, was passed in Parliament (as at 12th December it was still awaiting proclamation). Among the changes introduced, the Bill provides for a fine of up to $200,000 and five years imprisonment for animal abuse and cruelty and other offences related to the proper care and treatment of domestic animals. Additionally, the Bill introduces specific provisions dealing with meat and animal imports and exports; measures to respond to animal disease outbreaks and manage the business of livestock farming across the country. The Bill also created an Animal Welfare Advisory Committee to advise the Minister.

New regulations for access to the Marine Park have been announced. The changes will be rolled out in a phased manner in the short, medium and longer terms. The first phase of the management will see the regulation of the vessels in the area.

Officers in Mayaro charged a man for possession of a hawksbill turtle (an Environmentally Sensitive Species) and an agouti during the closed season. He was sentenced to two years imprisonment and fined.

AUGUST

Following the laying of charges in April 2020 on two men for the possession of protected animals, one of the men pleaded guilty on all 46 counts and was convicted and fined $73,600 or in default, four months hard labour. The other man, who was charged with 25 counts and pleaded guilty on July 30, decided to change his plea to not guilty. His matter was adjourned to February 2021.

SEPTEMBER

Environment Tobago has called for an investigation into a roadway which was cleared in a forested area in Starwood, northeast Tobago. The clearing could have disastrous effects on the environment as runoff from this clearing could damage Tobago's coral reefs and the waters near Little Tobago.

As a result of the covid-19 restrictions, the sale of state game licences was temporarily postponed. Amendments were also made to the Conservation of Wildlife Act which banned all forms of hunting, be it on state or private land.

MEMORIAL TRIBUTE

Remembering Tom Bearss

By Johanne Ryan, reprinted from Asa Wright Nature Centre's newsletter,

Tom Bearss, a member of the Trinidad and Tobago Field Naturalists' Club, was Canadian born but had lived and travelled all over the globe, including Trinidad and Tobago. He had served on the Board of Management of Asa Wright Nature Centre and was a retired Canadian Trade Commissioner/Diplomat. Tom was an enthusiastic naturalist and birdwatcher for decades and was President of the Delta Naturalists Society. He was an active participant in the group and had an excellent record of recruiting volunteers. Tom participated in Christmas bird counts and launched a Casual Birders group which led weekly birdwatching outings to areas mainly in the British Columbia Lower Mainland. The birding group grew to be quite popular as many wanted to join in the fun. He also wrote a weekly blog sharing beautiful photos, information on birds and other news of the Delta Naturalists.

Tom was an avid reader of the Bellbird and showed a true love for birding when he wrote to AWNC on 29th March 2020: "I still enjoy very much reading about the Centre in your monthly newsletters, especially now from my 5th floor room in the Surrey Oncology Hospital. It was a beautiful Sunday in "lockdowned" BC, but I enjoyed seeing a Peregrine Falcon chasing the Pigeons and a Red-tailed Hawk mobbed by Crows as I birded over the Surrey trees through my window."

We pay tribute to Tom Bearss, a leader and cheerful spirit, who passed away on April 10th, 2020. May he rest in peace.

Tom Bearss, *Photo courtesy https://dncb.wordpress.com/*

Remembering Eurico Jardim

Eurico was an active member of the Club where he was present at many of the Club's events including general meetings, field trips and other social events. He loved the colour yellow, as he is seen in his yellow t-shirt. For some time, he was part of a group who walked from Bamboo Cathedral to the old Tracking Station in Macqueripe.

Eurico Jardim (third from left, front row) at a Club's event *Photo courtesy TTFNC*

MANAGEMENT NOTICES

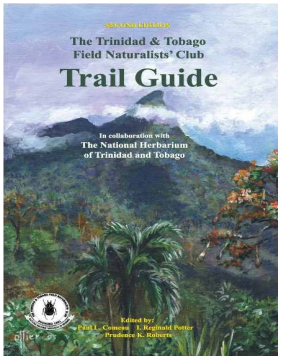
The Club's Annual General Meeting is carded for Thursday 14th January, 2021.

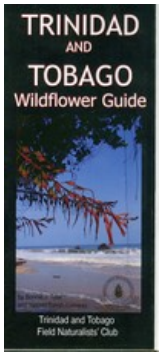
Monthly Club meetings continue virtually via Zoom under COVID-19 regulations and restrictions until further notice,

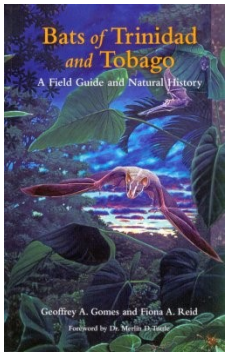
Trinidad and Tobago Field Naturalists' Club
P.O. Box 642, Port of Spain, Trinidad and Tobago

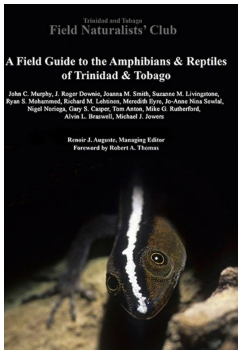
PUBLICATIONS

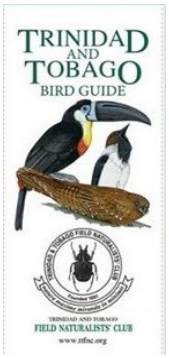
The following publications are available from the Club to members and non-members (*prices shown are those paid when purchasing directly from the Club*):











TTFNC Trail Guide ($150); T&T Wildflower Guide ($50); Bats of T&T ($200); Field Guide to Amphibians & Reptiles ($180); 2019 Living World Journal ($60); TTFNC Bird Guide ($50).

MISCELLANEOUS

Your 2021 Annual Membership Fees Are Due:
Please view bottom right of the mailing label to check if your subscription has been paid.

Did you know? It is now possible to renew your membership online? See www.ttfnc.org/funding for details. You can join the club this way, too!

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 'QB2021' in the email subject label.