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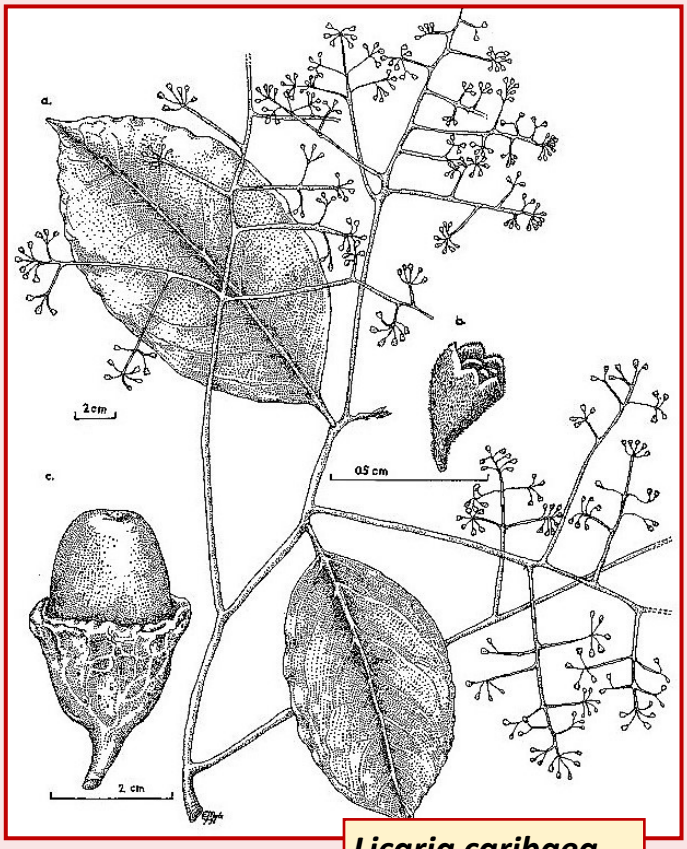
RAPHIA

Newsletter of Caño Palma Biological Station

Caño Palma
Always Something To Discover

Tales of Two New Species

Example of flesh fly, family Sarcophagidae (p8)



Licaria caribaea, type of laurel (p10)

COTERC & Caño Palma: Celebrating 30 years of discovery

In This Issue of Raphia

30 years

It's estimated that 8.7 million species of animals, plants and fungi exist on our planet. Only 1.7 million have been identified and named.

It's exciting to realize that out there in the jungle surrounding Caño Palma lie some of the 7.1 million that haven't yet been discovered.

Could you be the one to uncover a species that has never been described before? Well, in this issue we have the stories of two such happy events that occurred at Caño Palma. In both instances, the people involved weren't looking for a new species. It was a by-product of other research.

For those who made the discoveries, it must have been quite exciting. But, in the bigger picture, two new species out of 7.1 million sounds rather insignificant, doesn't it? But that's the thing about scientific advancement: it's mostly small steps. No matter what your contribution at Caño Palma - be it monitoring, inventorying species, doing your own research or helping others with theirs - you are contributing to the progress of science.

And that's what's great about our contributions to the station. We never know where they're going to lead. On a personal level, like Shelley on p12, when you arrive at Caño Palma, you're bound to discover new things (even about yourself) and let your mind open up to new ideas.

That's what our 30 years has been all about.

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Caño Palma -- The Beginning by Marilyn Cole

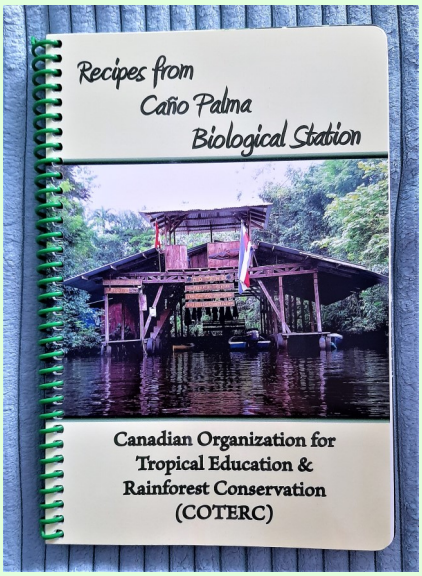
This appeared in the introduction of "Recipes from Caño Palma Biological Station", a cookbook put together by our late founder

For those of you not familiar with COTERC, it's a Canadian registered charity that was started in 1991 by myself and Ozzie Teichner. After working as assistants to a researcher at the Caribbean Conservation Corporation in Tortuguero, we ambitiously purchased 100 acres of lowland tropical rainforest on the Caño Palma, just upriver from Tortuguero.

At first, we thought only of preserving this wonderful piece of land with all its biodiversity. But out of this wish we came to realize that it was necessary to encourage students and researchers to visit and study the habitat. The goal was, and still is, to educate people about the perils of deforestation, and to appreciate and discover the endangered ecosystem of lowland tropical rainforest. And so the charity Canadian Organization for Tropical Education & Rainforest Conservation (COTERC) was created in order to manage and develop Caño Palma Biological Station and to further its mission from my home country of Canada.

The facilities were very primitive at the start of this venture: There was no dock, just a muddy landing area. The only building was the previous owner's thatched, 2-room hut. Food was cooked over a wood fire. The well was just a hole dug in the ground where a bucket was thrown in to bring water to the surface. There were no bathroom facilities. The first project was to construct a 4-room dormitory made of wood with a metal roof. Two outhouses were built as well.

Gradually construction began and today we boast a large kitchen/dining room/office building, a covered boat dock, dorms, a library, shower stalls and laundry area, a proper well, flush toilets, a rancho with upstairs accommodation for long-term researchers, and a separate building with 3 rooms for our staff. We've come a long way.



And we now have several projects for volunteers to take part in -- sea-turtle monitoring, shorebirds, caiman survey, snake survey, ACER plant phenology, large mammals and weather monitoring. [River otters and great green macaw surveys have been added since Marilyn wrote this.]

We've attracted volunteers and researchers from Canada, the United States and 24 other countries from all over the world either to participate in one of the established projects or to carry on their own research.

Marilyn Cole

Founder, COTERC & Caño Palma

Notes from Station by Charlotte Foale

Finally, the Station is buzzing with people and beginning to feel, dare I say, normal?

With the turtle season now well under way, we have been able to send out two teams most nights, as well as have teams for all other surveys.

A great turtle team was made all the greater with the return of one of our outstanding former interns, Sarah Ravoth. We started the season with two Research Assistants (RA's), who have worked on similar projects, but are on our beach for the first time – Filippo and Sebastian. They have done an amazing job in launching the season, with the support of our Research Coordinator Morgan, and invaluable long-distance advising from Molly McCargar. Sarah's return means that we're well positioned for a strong peak season, and that our interns and volunteers have 3 great leaders to help them develop their field skills on night patrol. We have also been fortunate to have MINAE join us for a patrol, successfully taking two poachers off the beach and recovering and reburying 257 hawksbill eggs.

With more personnel, Park surveys are back on schedule, and we have even managed to pull off the long-time dream of a "Big Mac Day" … possibly not what you're thinking, but a day when we were able to schedule 3 great green macaw surveys at distinctly different observation points at the same time, to get a clearer idea of movement around the area. As always, we must thank Toronto Zoo for their ongoing support of this project, providing funding for equipment as well as the signage that educates the increasing number of tourists visiting the local area about this magnificent endangered species.

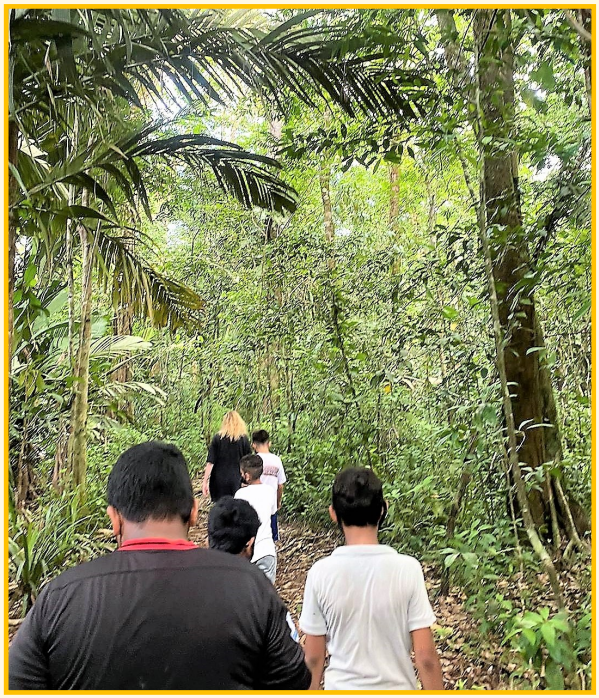
While there have been many things to make us happy, the most significant from a personal perspective has been the resumption of Conservation Club with local 5th and 6th grade students. With Covid precautions in place, we've been bringing students to the station every Saturday to learn about our Research Coordinator's specialty - bats. Each week the students receive presentations, participate in games, and spend some time in the forest, gaining a greater understanding of the local bat species and their importance to the local ecosystem. With school out for 2 months, this has been incredibly popular, and we have an ever-growing list of students from 3rd to 10th grade who want to participate in the next round.

Morgan (R) with Conservation Club

With so many positive things taking place, the year is flying by. We are getting close to our August/September nesting peak and will definitely need more hands on deck to continue with this important conservation work.

Thank you all for your continued support and interest – we hope that the growth that we're experiencing this year will continue into 2022, and for another 30 years.

Conservation Club In Action



Photos by Charlotte Foale

MINAE is the acronym for the Costa Rican Ministry of the Environment and Energy. As such, they are responsible for managing the conservation needs of the country. Recently, they joined in one of our nightly turtle patrols and succeeded in taking two poachers off the beach. In the process, they recovered the 257 hawksbill eggs pictured at left, which were then reburied. Thanks to all the good people working so hard at MINAE.

Notes from Chair by Dr Kym Snarr

30 years. That's a long time. Since 1991, thousands of people have visited Caño Palma. And most who come today weren't even born then. What does it all mean though? What has happened in our research sanctuary to make those 30 years worth the tremendous effort it takes to maintain a station in isolated Neotropical forest?

First of all, it's the people. That would be you. It's always been heartening to me to hear someone's story of how the experience of working at the station affected their lives in a positive way.

Then I recall all the research that has taken place at Caño Palma. It's not just the long list of published papers that you'll find in our archives. But so many students have learned the craft of research and doing papers for their courses. Field work is such an edifying endeavor, enlightening our minds not only with whatever topic we may pursue - but also with what we're capable of.

Besides research, we've put 30 years worth of effort into other aspects of science like monitoring and creating baseline databases as a jumping off point for more research questions to spring from. As mentioned, our website houses published and unpublished reports on our work which has been conducted by researchers, undergraduates, and volunteers. So many have contributed! But I'd like to especially recognize Emily Khazan, Director of Research, Morgan Hughes, our current Research Coordinator, and Dr Roberta Fulthorpe, Director of Data Integrity, for the time and sweat they've put into this essential undertaking. And of course, the hard work of former Director of Websites, James Taylor who was on the Board for many, many years. And now Nischala Surampudi along with Patrick Traynor working on our reinvigorated website, implementing a streamlined message on a new platform. Each Board member volunteers their precious time to help shape the present and future of the station.

Now, let's talk Covid. Its dark clouds have been hanging over our heads for far too long. We've had tough times keeping the station operational, from the perspectives of both staffing and finances. But blue skies have always been lurking just waiting for those clouds to pass, allowing us to get on with the important work of the station. We're reaching that point now as Charlotte, our station manager, is greeting more and more people from all over the world. A glance at whose been to the station recently shows people from the Canary Islands, Alaska, Peru and South Africa. Welcome back.

And that leads us into Caño Palma's future. What is our vision? We'll continue to welcome researchers and interns from across the globe! The experiential learning for all who come up the canal and past the dock will continue to be a rich one. With our improved baseline monitoring, we will be able to publish richer reports on changes over time for a multitude of taxa. As we expand our Board of Directors to include members from the USA and over the pond, we hope to include new perspectives that will keep the support we provide to the station robust and in keeping with current scientific perspectives.

Finally, one more important thing has happened recently - our charitable status was reinstated. That means our ability to issue tax receipts for donations is back in place. Please feel free to test the speed with which we can get these receipts into your hands!

One special thank you remains. That is to the Toronto Zoo. Not only did our founder, Marilyn Cole, come from the Zoo, but many former directors of our Board had their roots there too. The Zoo has also been quite generous to us in recent years. In fact, we just received another rather ample grant from them. Thank you TZ.

And thank you to all of you, our alumni, our friends, and our supporters. We couldn't embark on the next 30 years without you and what you have bequeathed to us.

Thank you Toronto Zoo

After a blustery day of surveying and sighting over 60 great green macaws, we'd like to extend a huge thank you to the Toronto Zoo, which has played a massive part in making this macaw research project possible.

After a tough Covid year, the Station was ecstatic to find out that the Zoo's financial support of our project will continue into 2021 through their Endangered Species Fund.

Past support has enabled us to buy essential equipment as well as to meet our educational objectives.

The signage they funded for the local community of San Francisco communicates information about different aspects of macaw ecology as well as providing an added attraction for small local businesses trying to get tourists through their gates. This year, we aim to submit a macaw paper for publication.

And none of this would be possible without the generosity of the Toronto Zoo.

--CF--

toronto ZOO

Michael James, MD, FRES -- R.I.P.

November 13th, 1945 - May 26th, 2021

It is with great sadness that I write about the passing of Dr. Michael James. Kit, as he was known to his friends, was a wealth of knowledge when it came to all things that crawl on 6 or 8 legs. It was always a pleasure to visit him and chat about what tarantulas he had or what new moth he had seen at his cottage. Kit was also one of the first people I knew to visit Caño Palma. He was actually there before the first dorm was built. This led him to become one of the first members of the Board of Directors for COTERC. His thoughtful approach to everything he worked on was a great asset to COTERC in the early years.

I first met Kit as a patient. For several years, Kit was Toronto Zoo's doctor. If someone had an injury or problem, Human Resources got you to see Dr. James. So, one day I was sent to him and we soon found we had similar interests. We worked on tarantulas and discussed ideas about COTERC and Caño Palma. I well remember the day he brought me a Sydney funnel-web spider from Australia (for the Zoo). And it was always pleasant to sit and have a chat over some of the fine Scotches that he favoured. He was the only person I knew that had a "greenhouse" in the basement for tarantulas.

Kit (short for "Cricket" by the way) has left us with some very fond memories. I know that he is greatly missed by Lynn and Liane and all his friends.

Tom Mason - Former COTERC Board member

The Flesh Fly That Specializes in Bat Poop by DDechmann & MVonhof

Serendipity often plays a role in scientific discovery. Such was the case with Dana Dechmann and Maarten Vvonhof, researchers studying Spix's disk-winged bats at Caño Palma. Below is a summary of their research paper describing their discovery of a new species of flesh fly.

Unlike most flies, flesh flies of the Sarcophagidae family are ovoviviparous - which means the mother doesn't lay eggs. Rather the larvae (maggots) remain within her body until she's found a suitable food source in which to deposit them to feed. One such source could be the open wound of a mammal, which is how they got their common name. Other favored sources are such appealing items as carrion, dung or other decaying material.

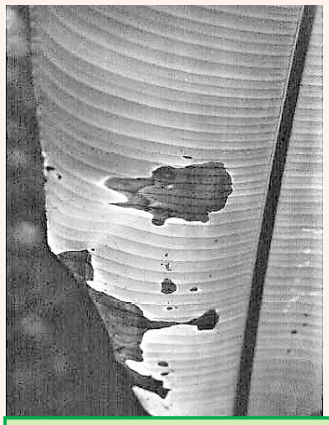
Sarcofahrtiopsis thyropteronthos, a flesh fly, was first discovered at Caño Palma in 1998 by Dina Dechmann and Maarten Vonhof. They uncovered its larvae In the faeces of Spix's disk-winged bat, the species they were actually studying. Almost every leaf with roosting Spix's also contained *S. thyropteronthos* larvae.

So, this story then is about the amazing adaptation of not just a flesh fly that uses bat poop to deposit live larvae (maggots). It's also the story of how rapidly the newly deposited fly larvae mature to go on to their next stage of development as pupae. As we learned in previous research reported in *Raphia* (Fall 2020, p6), the tubular leaf-roosts (often Heliconia) used by Spix's unfurl so quickly (cont'd on next page)

A photo of *S. thyropteronthos* couldn't be found. This is a flesh fly of the Sarcophagidae family.

The Flesh Fly That Specializes in Bat Poop (cont'd)

that they're only available to the bats for a day. That means they require a different roost-site each day. Leaves were generally fully unfurled after a maximum of 2 days, and any bat faeces remaining in the leaf fell to the ground, although it left a stain on the leaf's surface (photo at left).



Unfurled Heliconia leaf showing stains from bat poop.

Sarcophagid larvae of other species generally mature in 3 to 5 days. But *S. thyropteronthos* larvae appear to have a larval feeding period of only 1 to 2 days, and pupariation occurs within 72 hours. Dechmann and Vonhof submit that this may be an adaptation to the short duration of faeces within roosts.

In experiments, they found that larvae of *S. thyropteronthos* were successfully bred only from faeces of Spix's disk-winged bats. So, they suspect that these flesh flies specialize in larvipositing (depositing living larvae) in the fresh faeces located in Spix's roosts. It's noteworthy that *S. thyropteronthos* larvae were found in almost every roost examined. Despite extensive searching, larvae were never found in Heliconia leaves that were not occupied by Spix's.

As well, because of the short duration of the poop in the leaves, the roosts don't provide either a stable or predictable resource for larviposition. But Dechmann and Vonhof found an almost constant presence of the larvae in the roosts. Their research suggests that the female fly searches a large number of leaves each day to find suitable leaves. They conclude that she's very efficient in her searches.

Original paper can be found at:

(42) (PDF) A new species of Sarcofahrtiopsis Hall (Diptera: Sarcophagidae) living in roosts of Spix's disk-winged bat Thyroptera tricolor Spix (Chiroptera) in Costa Rica | Dina Dechmann - Academia.edu

Maggot Therapy

Green bottle flies feed on flesh wounds. However, they don't eat the living flesh. Rather, they consume the dead tissue, cleaning up the wound. Apparently this therapy has been used for thousands of years going back who knows how far. Australian Aborigines used it. It was utilized by Napoleon's armies, and during the American Civil War.

Now we call it biotherapy. But why bother with a treatment that most of us would be repulsed by? Well, doctors see many benefits. Maggot therapy has become popular again because antibiotics are becoming less useful as bacteria develop drug resistance. As the maggots consume dead tissue, they secrete antimicrobials that kill bacteria and reduce inflammation. At the same time, they shorten the healing period by inspiring the formation of new flesh with fresh connective tissue and capillaries. Let's see a doctor do that. Finally, present treatments are expensive, particularly if healing is prolonged. Maggot therapy can be done without a costly hospital stay.

All round good guys, those maggots.

Reference

https://health.howstuffworks.com/medicine/modern-treatments/maggot-therapy.htm

Resting on His Laurels by Pat Opay

This is taken from the Spring 1996 issue of Raphia when Pat was Scientific Officer at Caño Palma.

The biodiversity of Costa Rica's rainforest is impressive to say the least. With over 220 species of mammals, 350 species of reptiles and amphibians, and over 9,000 species of higher plants, it's one of the richest environments on Earth.

But the question you might ask is "Are there any NEW species waiting to be discovered?"

The station had been working closely with the Natural History Department of the National Museum of Costa Rica, in recording the plants, birds and butterflies of our area. Each of these groups is interesting in its own right, but one recent collecting trip turned up something very special - a new species of plant.

To carry out a plant inventory, the museum's botanists collect samples of leaves, bark, flowers, and fruit if available. A written description of each plant is also recorded. That would include such things as the site where it was collected, its size, and presence or absence of latex. During a recent collecting trip, we followed a small river near Caño Palma to see if we might collect some interesting plant species for the herbarium. We spotted one at river's edge, which Alfredo Cascante from the museum collected. None of us knew what excitement this sample was about to create. At the museum, they discovered Alfredo had found a new species.

Alfredo and his colleagues have identified the plant as a member of the genus *Licaria*, which belongs to the *Lauraceae* (laurel) family of roughly 2,850 species of trees and shrubs. This family is mainly found in the tropical forests of southeast Asia and South America. Many *Lauraceae* are familiar to us as food items, e.g. *Cinnamomum* produces cinnamon; *Persea americana* produces avocados; and *Laurus nobilis* (bay laurel) is used for flavoring fish and meat dishes.

The new species is a small tree with fruits that resemble large acorns, partially surrounded by a cupule or cup. (See next page for drawing.) The plant was found on the bank of a small river in tropical lowland wet forest, and at the moment neither its ideal habitat nor the extent of its range is known. More work is needed to find additional specimens, and to learn more about its natural history and life cycle. This is why Coterc's support of research into the rainforest is so exciting and so important. Who knows what other species of plants and animals await researchers there?

[The new species was named *Licaria caribaea*]

The paper describing this new species can be found at - https://www.jstor.org/stable/3391798?origin=crossref&seq=1#metadata_info_tab_contents

Biodiversity in Costa Rica - With just 0.3% of the Earth's landmass, Costa Rica still contains 4% of the planet's species. That would give it the highest density of biodiversity of any country.

Why such great biodiversity? Well, in only 51,000 sq kms (19,700 sq miles), Costa Rica has quite an array of ecosystems including lowland tropical rainforest, highland rainforest, semi-deciduous mid-elevation rainforest, tropical dry forest, cloud forest, mangroves, wetlands, and coastline. Since Pat wrote his article in 1994, estimates (at right) of the number of species in Costa Rica have risen.

Amphibians - 190+

Reptiles - 225

Mammals - ~250 (Bats = 109)

Birds - 922

Marine species - est. 95,000

Butterflies - 1250

Moths - 8000+

Licaria caribaea

Taken from paper by Jorge Gómez-Laurito & Alfredo Cascante
https://www.jstor.org/stable/3391798?origin=crossref&seq=1#metadata_info_tab_contents

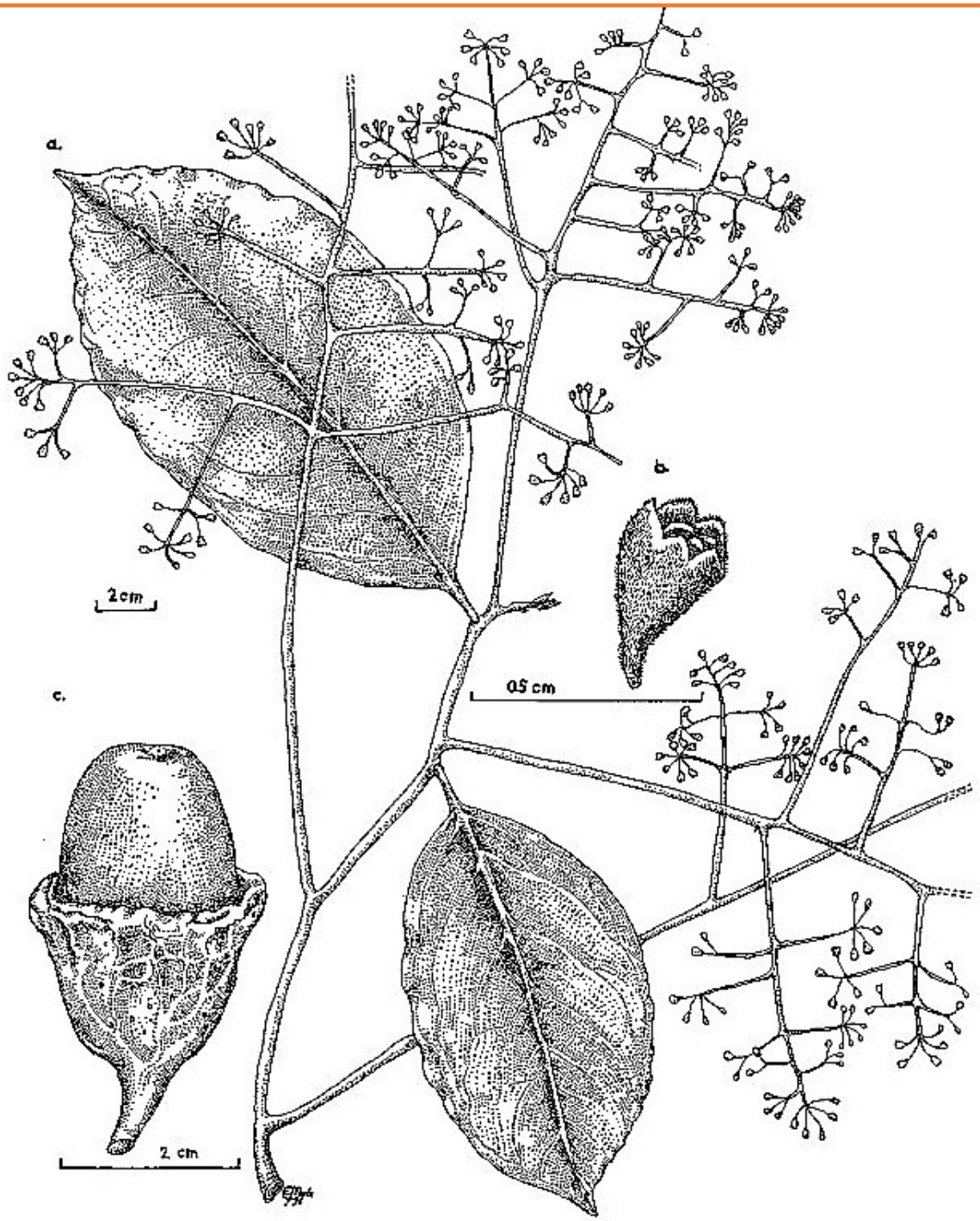


Figure 1. *Licaria caribaea* Gómez-Laurito & Cascante (*A. Cascante & A. Ruiz 705*). —a. Flowering branch. —b. Flower. —c. Fruit.

1a. Trees of medium- to high-altitude habitat,(600–) 1100–2300 m; leaves drying dark in color; inflorescences 5–20 cm long; fruits borne in a cupulate or hemispherical receptacle 13–20 mm long, 18–12 mm broad, not ridged . . . . . *L. excelsa*

1b. Trees of low-altitude habitat, 0–10 m; leaves drying brownish green in color; inflorescences 13–32 cm long, many-flowered; fruits borne in a broadly conical receptacle 31–42 mm long, 15–30 mm broad, longitudinally ridged . . . *L. caribaea*

Paratypes. COSTA RICA. **Limón:** same locality as type, 3 Mar. 1996 (ster.), *A. Cascante & P. Opay 987* (CR, USJ), 3 Mar. 1996 (ster.), *A. Cascante & P. Opay 986* (CR, USJ), 3 Mar. 1996 (fr), *A. Cascante & P. Opay 985* (CR, USJ).

Making A Connection by Shelley Hutchinson

Shelley is Vice Chair of the Coterc Board.

It's been said love shows up where you least expect it. I was so shy when we first met. I did not know what to expect. I mean, I had done similar things before, but unfortunately, I was usually disappointed. This time though, something felt extraordinary in my heart. I'd had too much time to think about what I would do and say upon arrival. Did I overthink this decision? Probably. Yet, I couldn't stop my mind and heart from swirling with excitement, fear and the possibilities in front of me. I'd learned how first impressions could be deceiving. So, I'd prepared myself to be open to those possibilities and be thankful for the experience.

As the small boat meandered through the canal, the wind in my hair felt exhilarating. A giant crocodile lay peacefully on the riverbank while turtles sunned themselves on logs.

My heart leapt into my throat. I'm finally here, and there behind the dock is the reason I came. I'd built up a vision in my mind, and was a little disappointed by my first impression. But I pivoted my attitude and reminded myself to be open to possibilities and be thankful for the experience. As the boat docked and introductions were made, I regretted my Spanish wasn't better. I had to admit that the time we spent conversing through emails made things seem familiar despite my shyness.

In some way, it may seem counterintuitive to have to learn to know yourself, yet extraordinary people or places will draw such a process out. Over the next month, this is, in fact, what occurred. I reflected on and questioned my values, beliefs, and principles. The things that I worried over and struggled for didn't seem to matter anymore. The lifestyle of having possessions, titles and achievements that I'd grown accustomed to didn't seem so important.

What did matter was waking before dawn to hear the jungle come alive. What had purpose were the long, enduring walks on the beach and the countless sleepless nights talking about the wonders of the day. The lack of sleep never fatigued me but instead was exhilarating. I was challenged but unlike I'd ever been before. I felt empowered with courage and peace. I had an assurance that I had never attained despite all my achievements in life.

I realized that the creature comforts of shiny material things, promotions and awards were the real disappointments. What I had learned and experienced here - honesty, kindness, patience, and acceptance - held enduring value. I had found the very nature and purity of life, the raw and remarkable simplicity of living in and with nature. I had been transformed through love, and it was 'pura vida'.

The time had passed much too quickly and, standing on the same dock where I had let first impressions blind my judgment, I fought back the tears. My heart was no longer full of fear but full of sadness. I could not leave. How do you leave knowing that a day will not go by without them in your thoughts? You do not. Rather, you commit. It has been over eight years of maintaining a long-distance relationship - a strengthened relationship each year I return and a passion worthy of championing.

The Great Kiskadee -- A Tyrant? by Doug Durno

To answer the question above: Yes, the great kiskadee is indeed a tyrant - a **Tyrant flycatcher.** This family, the **Tyrannidae,** got its name because so many of its species have rather aggressive natures. They're quite protective of their nests and territory. Some such as the kingbirds will mob larger birds like hawks and crows.

The Tyrannidae is a very large family, actually the largest bird family in the world with over 400 species. They're found only in the Americas though.

If you've been to the station, you've likely seen one of the most recognized and observed members of the family - the **great kiskadee**. In fact, if you've been most anywhere in the (sub)tropics from south Texas to northern Argentina, you've surely come across this species. And look out for that yellow patch on their head. If one displays it to you, it might mean it's romantically interested. Or it could be a threat, warning you to vacate the area.

If you did observe one at the station, it was likely across the channel in a clearing with trees around. Their favorite feeding style is dashing out from a perch to nab insects in flight in that big beak of theirs. But, like other Tyrannidae, they're omnivorous and opportunistic. So, they could leap down to the ground and nab a bug - or a small rodent, snake, lizard or whatever other living thing it thinks it can swallow. Berries are occasionally on their menu. Not to forget that, unusual among songbirds, they'll dive for small fish and tadpoles. To sum up, as someone put it: Great kiskadees "hunt like a flycatcher, fish like a kingfisher, and forage like a jay".

Great kiskadees build an unusual nest. It's a large domed structure composed of grasses and twigs. The distinctive feature is the side entrance. More unusual, a recent study claims that they orient the entrance, depending on the local climate, towards or away from the sun to regulate the temperature inside the nest.

As far as their 'tyrannical' nature, great kiskadees will try to chase off bigger nest raiders such as monkeys and snakes. In the air, they assail any perceived threat like a hawk with their patented move - exaggerating their size by lifting their wings back and then slowly moving them up and down, all accompanied by harsh screeching.

Great kiskadees are noisy birds. You'll often hear their persistent call of *kis-ka-dee*. So, pretty smart birds, eh - they've learned to say their name.

Social Mimicry in the Tyrannidae Family by Doug Durno

Rusty-margined flycatcher

Great kiskadee

Golden-bellied flycatcher

Social flycatcher

White-ringed flycatcher

Boat-billed flycatcher

The pictured birds are all tyrant flycatchers. Though not particularly closely related in all instances, they all have plumages that are quite alike. Note the black crowns, white eyebrow lines, black masks, white throats, brownish upperparts and bright yellow underparts. This is unlikely to be coincidence. And this isn't all species of Tyrannidae that have this plumage similarity. I've only posted those found in Costa Rica.

How did they come to look so similar? It's become a much-studied topic in recent years with various hypotheses being put forward.

One hypothesis posits that a smaller species will mimic a more socially dominant larger species. The proposed benefit for the smaller species would be that the larger bird would recognize it as one of its own and not chase it off. This would enable the subordinate species to get more of the available resources. So far, evidence from the field looks to be disproving this theory.

More likely is the idea that it would be good to resemble a larger, dominant bird that scares off other birds just because of its size. Your competition for food might be scared away just by seeing your similar plumage.

It's also been suggested that if a group of birds such as these kiskadee-like birds are in a tree canopy and vulnerable to attack from above by a raptor, if everyone's upperparts look the same, the raptor might be fooled into believing that its intended target is too large to take on.

Other examples of such mimicry in the bird world where the individual species aren't that closely related but look quite similar are the *Ramphastos* toucans as well as the hairy and downy woodpeckers.

Introductions Gone Wrong -- Bermuda Imports Lizards & Kiskadees

In 1905, Bermuda was having a problem with fruit flies that were destroying crops. To combat this pest, they introduced the Jamaican anole lizard. By 1957, the lizards had invaded the entire island. Not learning from this experience, Bermudian authorities decided that great kiskadees would be just the ticket to control the lizards. After all, kiskadees were known to eat lizards. So, 200 were imported.

Bermuda provided ideal habitat for the great kiskadee. And, being opportunistic and omnivorous, they were eating everything in sight - except the lizards. They outcompeted other birds, contributing to the decline of the eastern bluebird and white-eyed vireo. Meanwhile, within a couple of decades, kiskadee numbers soared to over 60,000.

And who doesn't love the Bermuda Singer, a cicada whose song has been described as "uniquely magical and romantic". Well, females of the species certainly fell for the male's crooning. Kiskadees also loved the cicadas - to eat. Now Bermuda nights are quieter. The much-loved buzz of the Bermuda Singer has been silenced. It is gone, extinct.

As well, by eating the fruit of invasive plants, great kiskadees helped spread their seeds, not often a good thing with invasives. Finally - let's hope - they ate the small fish that were placed along shorelines to control mosquitos.

So, let's try to sum things up: You bring in lizards to control a pest and the lizards go out of control. You bring in kiskadees to control the lizards and the kiskadees go out of control. Bluebirds, vireos, cicadas, invasive plants and fish are all negatively affected by the kiskadees. Quite the list of unintended consequences.

--DD--

Great Kiskadee Range

Within its large distribution area, the great kiskadee is rather sedentary, not migrating at all.

Ortega Is Up To His Old Tricks by Doug Durno

Daniel Ortega and his Sandinista party have in effect ruled Nicaragua for 30 of the last 42 years. Does Ortega want more? When the country holds its next election on November 7th, will he seek his fourth consecutive 5-year term as president? Well, just to end the suspense, I think we can safely divine from recent events that Ortega is hinting, just hinting mind you, that he will run - and win. Call me crazy, but when, since early June, over 25 of his opponents have been arrested - including 6 announced presidential candidates - I'll go out on a limb and say he's running.

That's the script of dictators, isn't it? You arrest opponents for crimes they haven't committed, control the media, and win re-election.

So, let's review recent happenings. Last December, the Ortega-controlled Congress passed the Sovereignty Law, giving them the power to unilaterally declare citizens as terrorists or 'coup-mongers', classify them as "traitors to the homeland", and ban them from being candidates. With that sort of power, all you have to do then is declare that your opponents are "seeking to undermine Nicaragua's independence and sovereignty (by) inciting foreign interference in internal affairs, requesting military interventions and organizing with foreign financing". Who's going to stop you?

So, what can stop Ortega? Only a major push by the people of Nicaragua to cause an insurrection against him. In 2018, they tried. But, since he and his Sandinistas held power over the judiciary, Supreme Court, military and media, dissenters didn't have much of a chance. Ortega systematically cracked down on anyone who spoke anything but the party line. About 450 people were killed, thousands injured and many more jailed.

Over 100,000 Nicaraguans have escaped the country since 2018.

Today, journalists are being imprisoned and news organizations shut down.

The irony is that Ortega is charging that opposition politicians are trying to perform a coup. In reality, it's Ortega who is the coup-meister.

President Daniel Ortega and Vice President Rosario Murillo, his wife

This is all essentially a replay of 2016 when the Sandinista-controlled Supreme Court sacked the opposition leader weeks before the election, leaving Ortega with no opponent with a chance of winning. With he and the Sandinistas manipulating the political system, Ortega and his wife Rosario Murillo, his vice-presidential running mate, won a landslide victory.

Yes, the UN Human Rights Council has issued criticism of Ortega. And yes, the Organization of American States has denounced this "new phase of repression". But he can easily withstand such words.

Reference

https://keyt.com/cnn-opinion/2021/06/14/nicaraguas-democracy-is-crumbling-its-been-a-long-time-coming/

Station Happenings based on reports by Morgan Hughes

April

Morning census - On the 22 surveys during the month, 7 nests were observed. Unfortunately, 2 were poached and 2 were dug below the high-tide line. Presently, greens have 3 active nests, leatherbacks 3, and hawksbill 1.

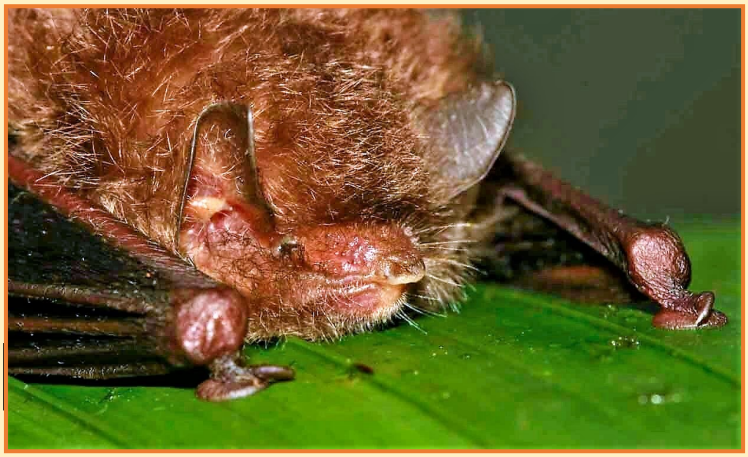
Mammal survey - Notable detections this month were margays at Caño Palma and in Tortuguero National Park. The Caño Palma transect also had a northern tamandua sighting.

Other mammal sightings - During caiman surveys, 2 kinkajous (*Potos flavus*) were seen as well as 2 jaguars. High levels of jaguar activity occurred near the station.

Kinkajou

Margay

Tent-making bats - A notable addition was made to the station's list of bats - **Peters's disk-winged bat** (*Thyroptera discifera*). There have been few documented sightings in Costa Rica. Two tents of 8 bats each were observed on the station transect.



Peters's disk-winged bat (*Thyroptera discifera*) is found in lowland rainforest in northern South America and north into Panama, Costa Rica and Nicaragua. Like Spix's disk-winged bat (*Thyroptera tricolor*, spotlighted in the Fall 2020 *Raphia*), they feature suction disks at the base of their thumbs and hind feet that they use for clinging to the smooth surfaces on the interior of banana or heliconia leaves. (Disks can be seen in pic). Such a roosting spot protects them from predators and the elements. Their diet is mostly insects.

ACER - All ACER forest measurements since 2015 were sorted and compiled. Any trees with inconsistent measurements across the years were remeasured.

Earth Day - Myself and Eva Telnoff, a new turtle intern, made a presentation at the school in San Francisco on the importance of protected areas. We also developed a children's book and crossword for use in six classes of kids aged 6 to 10.

(cont'd on next page)

Station Happenings (cont'd)

May

Neotropical River Otter - We received a short visit and training from Victor Manuel Santiago Plata, a PhD student from the University of Idaho who is researching the genetic connectivity of this otter throughout Central America. We will be collecting genetics samples for him over the next 6 months.

Sea turtles - Again, most nests observed were disturbed by flooding, poaching or predation.

Great green macaws - At 45 greens per survey on average, this was quite a good month. The majority were observed at the San Francisco site overlooking the Tortuguero River.

June

Sea turtles - With nesting season in full swing, we were able to have night patrols and morning census every day this month. A total of 25 nests were observed (along with 21 half-moons). Here's a summary of the 43 nests observed so far this season.

Species	Nests	Healthy nests
Leatherback	15	3
Hawksbill	18	15
Green	10	3
Total	43	21

Of those nests that didn't make it in June, 4 were predated, 3 were poached and 4 were eroded (some nests had more than one disturbance).

Sidenote to Sea Turtles - Six representatives from MINAE visited the station in order to address the high level of poaching occurring on Playa Norte. Following our recommendation, they began at 1:30 AM in order to patrol during the highest hours of poaching activity. They successfully apprehended two poachers.

Great green macaws - Just over 1500 great greens were observed in June from the 5 monitoring points. That's up substantially compared to previous months even though the number of surveys was similar. In fact, it's one of the highest monthly totals ever.

Obviously, since birds are quite mobile and can quickly move to another location, that can mean you might count the same birds more than once. To get a better handle on how many individuals are actually in our area, simultaneous surveys were conducted at the same time at three separate locations. The degree of overlap was found to be high. Plans are to perform simultaneous surveys monthly during peak season.

Canadian Organization for Tropical Education & Rainforest Conservation

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To ensure you feel involved, we welcome any comments or suggestions. If you have an idea for an article, or better yet, would like to write one yourself - if you have a photo or two that you think we could use - if you have a suggestion for improving Raphia, please send it along to us at raphia@coterc.org

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