

RAPHIA

Newsletter of Caño Palma Biological Station



La Crisálida



In addition to founding Caño Palma, Marilyn Cole wanted to build a community-based conservation project to benefit local people. Mitch Harrow tells the story. (Page 6)



Life at CP During the Pandemic

Research Coordinators Charlie and Alessandro, as the only remaining people on base, tell about life alone in the jungle. (Page 14)



Patterns of Ant Activity & Nesting Ecology



"Does flooding impact what animals are found in which parts of the station? Do distinct flood regimes, like we find at CPBS, result in distinct traits in animals in the different areas?" -- Emily Khazan (Page 10)



Pandemics & Panzootics



Amphibians around the world have been hit hard by a class-destroying fungus. Andres Jiménez found a population of Harlequin toads that are quite susceptible to this fungus, and theorizes why this small group has not been affected by it. (Page 11)



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Library & Archives Canada - They've notified us that *Raphia* issues dating back to 1991 have been digitized and are now available online at

https://epe.lac-bac.gc.ca/100/201/300/raphia_coterc/index.html

Of course, you can still access all issues of *Raphia* on our own website - <http://www.coterc.com/raphia-newsletters.html>

Marilyn Cole wanted to accomplish a lot when she set out to establish Caño Palma in 1991.

Located in the jungle, with marshland, waterways and the Caribbean handy, she saw a setting that would allow many types of research to take place. A lot of papers have been written since then, and *Raphia* usually features some. In this issue, Emily Khazan takes the spotlight with a paper on ants. Emily has a long-time connection to the station and, at the recent AGM, she was elected to COTERC's Board. She explains her interest in a Page 11 interview.

Marilyn also felt strongly that we should become involved with the local community. Even before the station got going, she had a project in mind. You can read the tale of Marilyn's long and frustrating journey to achieve her goal on Page 6.

Engagement with the local community has carried on till today. Charlotte has run various education programs in the village of San Francisco. And, given time during this pandemic, she's been working with York University students to further develop environmental programs as well as the "Great Zoom Challenge". Learn what Charlotte and the YIIPs have been up to on Page 4.

As we approach the station's 30th anniversary, hopefully we can say we're fulfilling Marilyn's vision.

It is my professional responsibility and immeasurable pleasure to share my obsession for the natural world with others - Sarah Marie Ivers



Sarah has a deep connection with the natural world. She also has a deep connection with Caño Palma. She and husband Logan, professors at Shawnee State University in southern Ohio, have escorted several groups of students to the station. She has donated equipment as well.

Now Sarah is offering her photographic work for sale on her new website - <https://www.sarahivers.com/shop>. Please take the time to visit and support her if you can. Sarah is generously donating 10% of the proceeds to COTERC and Arc of Appalachia, "organizations that have demonstrated a commitment to healing and preserving the biosphere".

I have never accepted the notion that one can be a scientist or an artist, but not both. After all, one skill - critical observation - is fundamental to both fields. As a scientist, I use my ability to capture what I see for the purposes of documentation and emphasis of specific characteristics or behaviors. As an artist, I rely on my scientific background to give form and purpose to my creative process. The influence of my scientific education is evident in my photographs, insect pieces, and especially my illustrations. I seek to represent all subjects as they are, using distortions only when they seem natural and expected. - SMI

This little blue heron was chanced upon in Tortuguero NP while out on otter survey. Title - "Observer"



Notes From the Station by Charlotte Foale

For the first time in 7 years, Caño Palma hasn't been part of my daily life. It's been the strangest time, but curiously, no less busy!

Keeping my sanity, and keeping me company, we have some amazing students through the **York International Internship Program (YIIP's!)**. When I say they keep me company, it is of course, through Zoom, email and WhatsApp. In this respect at least, we follow the trends.

We were absolutely thrilled that York University offered the opportunity for us to develop distance internships as it's giving us a chance to offer English classes to home-bound students in San Francisco, as well as to develop an Environmental Education program for future Community Interns to deliver.

As many of you know, we have provided Environmental Education classes for many years at the local elementary school. Each year interns have focused on local species and issues as well as how they fit in to the global context. This program has had to respond to the growth of the school, the needs of the students and teachers, as well as strikes, random class cancellations, and of course, the turnover of our own community interns. The pandemic unexpectedly brought us the one thing we never seem to have enough of. Time.



School is out and for the very first time, we're able to sit down, plan and develop a program that will pursue themes over the 6 elementary-school grades. With 3 amazing YIIP's working tirelessly from their home offices in Canada, and former Community Intern Camila Rojas helping review lessons from her base in Texas, we have really high hopes to have a great program in place for 2021. This will enable incoming interns to focus more on developing field trips for the Conservation Club as well as ever-needed tutoring. A huge thanks to Jayashri, Ranjeeta and Abinash – with special mention to Abinash for going above and beyond, and doing some fundraising for our local elementary-school students!

They are not however the lone contributors. Chantal, Aley, Sasan and Hassan, have been helping local students to get a step ahead in their English. The "Great Zoom Challenge" has involved developing and delivering English lessons, Monday through Friday each week. Some students come to the library, while for others we have home delivery of technology and worksheets so that they can participate. While many families have access to the internet, almost none have access to laptops, so having the schedule flexibility to do home visits has been really useful.

(cont'd on next page)

Notes From the Station (cont'd)

Mention here too, for the work of Firas, our final YIIP (!), who has been coordinating with Charlie, our Turtle Coordinator, and Board member Emily Khazan in developing materials for future grant applications and social-media campaigns.

While not York Interns, 5th grade students Gerald and Freddy have joined our youngest (honorary) staff member Emanuel in running a mobile library. A wheelbarrow-based enterprise, they have helped us to keep the community library relevant while many are stuck at home, by taking the books door to door.

With close to 100% unemployment in our tourism dependent area, our whole community is struggling. Keeping busy and finding ways to maintain hope and motivation are increasingly important for everyone. While globally there have been few pandemic positives, it has been a privilege to be able to work with such a fantastic group of York students, knowing that their contribution will be felt for years to come as well as seeing these local kids finding a way to help their community.

Thank you all for your continued support – we hope that the entire COTERC/Caño Palma family are staying safe.



La Crisálida (Part 1) by Mitch Harrow



Mitch Harrow, from Barrie, Ontario, studied environmental anthropology with Dr Snarr, eventually gaining a Masters in Environmental Studies. With 20 years experience in conflict resolution and education, he's spent the past 5 years helping communities design innovative spaces. Mitch has woven together this story of Caño Palma's butterfly sanctuary from many emails, letters, articles and historical archives, which served only to endear him more to the history of the station and the perseverance of its friends.

La Crisálida -- The Butterfly Project: Proposing a Unique Experience

It was a dream of Marilyn Cole, founder of Caño Palma Biological Station (CPBS), to build a community-conservation project that would support the region with jobs, funds, and education. That project turned out to be a butterfly farm called *La Crisálida*, and this is Marilyn's story. Hopefully, it will provide insight into the massive amount of work and obstacles involved in conservation projects.

Community-Based Conservation

What is community-based conservation? In the 1980s, communities began to protest that international conservation movements, in their efforts to protect the biodiversity of the Earth, didn't adequately consider local interests.

For a long time, the debate was considered on a pro-parks vs pro-people basis. The pro-parks side thought parks should be managed by those with the expertise to strengthen conservation. Pro-people advocates said locals should have the right to use and manage the resources in their area. That way, poverty and biodiversity loss would be considered as linked problems.

So community-based conservation is based on that latter idea – that is, for a project to be considered successful, the local population must be involved in its creation, management and sharing of tangible benefits. By fully participating, they learn new skills and become more effective at conservation management. When coupled with tourism, projects can bring in jobs that help reduce poverty. It's also a way to deliver informal environmental education.



An example of a successful community-based program occurred at Las Cruces Biological Station in southern Costa Rica where a long-term bird-banding program had hired local staff to be involved in bird monitoring, education and conservation programs. To quote, "...students gave up their slingshots after 'feeling the heartbeat of a banded bird' and releasing it back to nature...". Environmental education should connect people to the natural world.

An Idea Begins to Hatch (Fall 1990)

Marilyn proposed the Butterfly Project in the fall of 1990. A year later, COTERC received a grant of 2 million colones from the Canadian International Development Agency (CIDA). The project's goals (cont'd on next page)

La Crisálida (cont'd)

were 1) to preserve the natural resources of the area, 2) to involve and educate local people on the environment and give them a stake in its conservation, and 3) to provide an alternative income that involved habitat conservation rather than destruction. At that time, butterfly farming was a \$100-150 million a year enterprise – yet it was most often carried out in cities, missing the opportunity of conservation benefits within an eco-community. It had the added benefit that it created income with little use of land, fertilizer or insecticides.

The *Museo Nacional de Costa Rica* was brought in as a partner in order to involve Costa Ricans, obtain a local certified inspector, supply an educational centre, and strengthen relations between Canadian and Costa Rican institutions. John Osborne, owner of Productos el Mapache de Alujuela, would be working as a local supplier for COTERC with Greg Mayne, CP's station manager. Marilyn, overseeing the interests of COTERC, embarked on a long journey of red tape and long-distance relationships with the various major players.

Fondo, Funding and Fancy Dancing (July 1991 – June 1992)

Marilyn contacted several worldwide distributors about supplying them with pupae from the farm. In July, COTERC signed an exclusive agreement with John Osborne's company, London Pupae Supplies (LPS). By September, full funding had not yet arrived, causing delays with production and with suppliers.

In September, the Butterfly Project joined the Entomological Society of Ontario, allowing it to be recognized as a butterfly breeder. But the \$20,000 funding promised by Fondo Canada for building materials had not yet arrived in COTERC's hands. This caused a deadline issue – if the funds weren't obtained and used by the end of 1991, they'd be lost. Finally, in November, Marilyn got confirmation that the funding had been approved. Construction could begin. Was London Pupae Supplies still on board? They didn't respond to Marilyn's letters. It wasn't till June that she discovered LPS had changed their address! Fortunately, an extension was given for use of the funds, buying the project another year.



Tiger longwing
(*Heliconius hecale*)

Drowning in Red Tape (August 1992 – July 1994)

Then another problem. Though the funding for building materials and construction of the butterfly facility was obtained, backing had not yet been acquired for any salaries. Dick Burgess of LPS wouldn't make a commitment before such funding was in place. Marilyn had to get creative. In August 1992, she proposed "a unique experience" to John Osborne, offering him a 5% commission on sales in lieu of a salary. In October, he finally delivered a list of material and labour costs to Marilyn. But time was marching closer to the deadline - December 31st - for the funding to be used. Would the \$20,000 still exist? Negotiations dragged on.

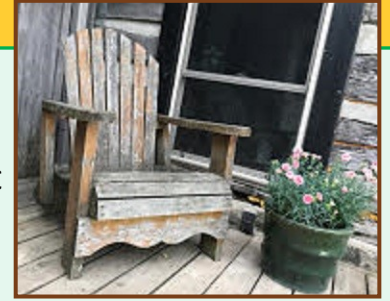
Hopes for success dwindled throughout 1993 as the string of unfortunate events continued. Marilyn was becoming increasingly frustrated as she watched the project being drowned in red tape. By February, the funding still hadn't arrived. She had to relay the bad news to John Osborne and Dick Burgess of LPS. Were they still interested in participating as problems piled up? They'd need to find a new local supplier. Their employee handling the butterfly project left. Caño Palma's station manager Greg Mayne had returned to Canada. And Costa Rica had enacted a new wildlife law that put into question whether or not the farm could be built on the CPBS property. By July 1994, Marilyn still didn't have the funding. Time to throw in the towel? Not Marilyn.

The conclusion of Marilyn's quest will appear in the Fall issue of Raphia.

Notes from the Chair by Kym Snarr

Dear Fellow Caño Palmers,

The summer of 2020 is one requiring plenty of adaptation! Think of your own life – what changes have come into it because of COVID-19? Certainly, COTERC and CPBS have had challenges to rise to! Flexibility is the key as we try to adapt our approaches in supporting the station.



COTERC continues to support the science at the station. Over time, we have assisted in building the necessary long-term monitoring projects of baseline data that can be analyzed for population trends. To sustain this, the Board has been strengthened with the addition of Emily Khazan (Research Coordinator, Dec 2014-Nov 2015; PhD Candidate, University of Florida) and Luis Fernandez (Ass't Research Director, 2014-2015, Masters in Biodiversity and Conservation). With their added skills and prior on-site work, they will elevate and improve the quality of future research.

Flexibility and adaptation are also the keywords at the station! With time in the field much reduced because of Covid restrictions, Alessandro Franceschini, the current Research Coordinator, is working with our data to consider publications that will allow the world to know more about the flora and fauna we study. Alessandro has also been busy with virtual classes and webinars to improve his skills as well as delivering virtual talks. He has been instrumental in updating the older species checklists, fleshing out location and IUCN status. Working as a team, we have been calling on former board members (Tom Mason) and science officers/station managers (Paul Grant, Todd Lewis, Josh Feltham) to assist with updating specific species. With evidence of non-native species thriving on the land and in the water, we can begin to think about what impact they might be having on native species.

With no interns physically present at the station, Charlotte has instituted another major adaptation. She has taken the YIIPs, students from the York (University) International Internship Program, who were supposed to be interning at the station, and reconfigured their program so that they could work from a distance. They are teaching at the local school virtually; aiding in developing appropriate science content for social media; and working on funding projects. This flexibility by Charlotte and our long-term project leader, Manuel Arias, has allowed our work to continue!

With your generosity via our [GoFundMe](#) page, COTERC has been able to continue to support the station financially! You donated over \$11,600. Your funds keep the station operational. Mainly, you're supporting the scholarship stipends of the Research Coordinators. For, without staff in place, the station can't operate



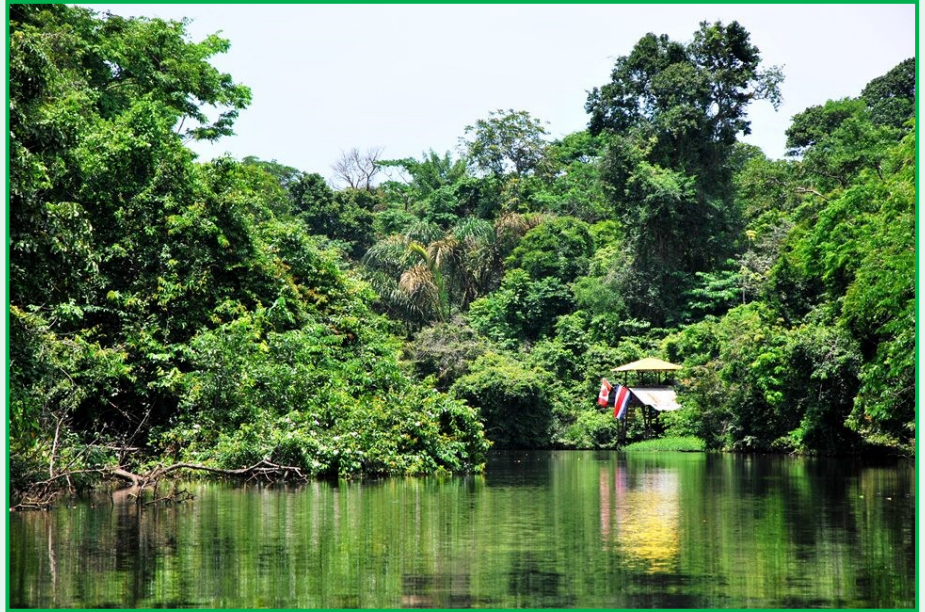
and couldn't receive interns once travel restrictions ease. COTERC is also strengthening its financial support by enlisting Luis Fernandez as the Board's Director of Grants and Funding. His strong background working in the field, and past success in fund writing will continue to strengthen the earlier work of former volunteer, Steve Gillis. Another recent success was an award from the Endangered Species Fund of the Toronto Zoo. We received \$5000 to continue our research with Great Green Macaws. A big thank you to the Toronto Zoo for showing us such support!!

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Notes from the Chair (cont'd)

Still, we need your support now and in the future. Do come to the station once it is safe, and do watch for upcoming events.

You might also consider volunteering with us with the skills you have. You don't need to be on the Board. We take volunteers who can carry out specific tasks. For example, we have a new volunteer, Emily Viggiani, who is a well-trained note-taker for board meetings. Emily is also working on the website subcommittee. Thank you so much for joining us with your passion for conservation! We also welcome Alisha Rizvi, a Guelph BSc student in Zoology, who is assisting with scientific work at a distance. In addition, former Board member, Anders Holder from Environment and Climate Change Canada, has been assisting with scientific content for our social media. We are grateful to all of our volunteers and all Board members who contribute to supporting our mission of education, conservation, and research! For anyone who wishes to help, please contact me directly at chair@coterc.org to discuss.



As I write this, our cabin where my husband and I live in Grey County is experiencing major thunderstorm

cells and tornado warnings. We all know that climate change has altered many weather patterns. What are the ecological implications? I wonder about my region, which has historically had the shortest growing season in southern Ontario. How are those ecological changes affecting that? What adaptations are currently taking place? As we all continue to adapt during this ongoing pandemic, we Caño Palmers can celebrate the ongoing adaptations at the station. This global pandemic has allowed COTERC and all of its international, national and local members to rise to the challenge and adapt to the new conditions. Your support allows us to do our work! We strive to keep the station a safe, viable research facility where scientists from around the world can gain invaluable lessons about themselves, and find personal and professional growth. I continue to feel the strength of each member in this community, and it is this strength that will lead the Board into the station's 30th year of operation!

Stay safe and be well,

Dr. Kymberley Snarr

Patterns of Ant Activity and Nesting Ecology Depend On Flooding Intensity in a Neotropical Floodplain by Emily Khazan

We continue our look at some of the papers based on research that has taken place at Caño Palma Biological Station.

Patterns of Ant Activity and Nesting Ecology Depend On Flooding Intensity in a Neotropical Floodplain

Emily Khazan, one of the authors of the featured paper, was research coordinator at the station in 2014 and 2015. She has been back to the station to carry out further research. Emily is currently in a PhD program at the school of Natural Resources and Environment at the University of Florida. An interview with Emily appears on the next page. Co-authors are Jelena Bujana and Brett R. Scheffers

This paper was originally published in the *International Journal of Tropical Insect Science*. You can find the whole article at:

<http://www.coterc.org/all-resources---by-year.html> (Scroll down a bit to '2020')

This is Emily's summary of her paper:

We are all familiar with ecological disturbances -- from predictable seasonal floods to freak tornadoes, extreme events impact environments and the species therein. Caño Palma is no stranger to disturbance. Floods occur regularly at the station, though not always predictably. The ever so slight changes in topography around the station result in slightly different flood regimes (that is, some areas stay dry while others are under water), which has obvious effects like impacting which palm species dominate these differently flooded areas.

We wanted to know if flooding interval and intensity impact more than just long-lived trees. Does flooding impact what animals are found in which parts of the station? Do distinct flood regimes, like we find at CPBS, result in distinct traits in animals in the different areas?

To answer these questions, we used ants as our focal group since they're abundant, easy to bait, and sometimes easy to catch. We collected ants from three areas around the station with distinct flooding regimes. We identified the ants and associated their nesting traits: do they nest on or under the ground, up in trees, or are they flexible with where they nest? We predicted that disturbance would shape the ant-species assemblages predictably based on nesting traits. We expected to find more above-ground nesting ants in areas that flood most frequently, and a more diverse community in less flooded areas.

After examining 591 baits, collecting hundreds of ants, and classifying them by nesting behavior, we found evidence for our hypothesis. Not only did we see differences in nesting behavior across the different sites, but we found that ants were least active in the most frequently flooded site.

This demonstrates that ecological disturbances can affect animal communities locally. It also shows how beneficial it is for ants to be able to nest in tree canopies in places like Caño Palma.

Finally, this study also provides a large species list of ants from the region for future researchers to take advantage of at CPBS.

Interview -- Emily Khazan



What is your background?

Growing up outside of Baltimore, Maryland, I was always a nature enthusiast. That led me to the University of Michigan where I earned a bachelor's degree in Environmental Studies. During and after college, I worked as a field assistant on several research projects, mostly about damselflies and their behaviors. With my interest in field work piqued and my background in environmental studies and conservation, I decided to pursue a Master's degree, which I earned from the University of Oklahoma. My field work for my MS was based in Costa Rica and Mexico, and after many months of tromping through the forests searching for giant damselflies, my interest in and love for tropical ecology was cemented.

As far as Caño Palma, I worked there as a research coordinator after finishing my MS. Since leaving the station, I've bounced around a bit, finally landing in a Ph.D. program at the University of Florida where I study community ecology and the physiology of butterflies.

Have you done fieldwork elsewhere?

I worked for many months at Los Tuxtlas in Mexico before and during my Master's degree. For my Ph.D., I conducted field work in Colombia, collecting and experimenting on butterflies across the Andes. I've also done field work in the American Southwest (Arizona, California), and Florida.

Why Caño Palma?

I actually stumbled upon the station randomly when perusing the internet for employment opportunities after I completed my MS. On the map, it looked like a place full of untapped research potential, and I found that to be true when I arrived. I have always been fascinated by the tropics, and the nature and ecology of Caño Palma is no exception. It's a special place because of the people who live and work there as well as the education it provides for foreigners and locals alike. The tranquility of its blackwater canal and amazing biodiversity, though, are what will always stay with me, and what motivate me to continue working with COTERC.

Why did you decide that you wanted to be on the COTERC Board?

Working at Caño Palma was an awesome experience for me as a researcher because I was able to examine the long-term datasets from the station and to establish my own research projects to ask cool questions about ecology and animal behavior. I noticed that there seemed to be a lot of untapped research potential for the station, and that researchers and graduate students would be able to benefit from all that the station has to offer. I wanted to be on the COTERC Board to continue to help elevate the research and science coming from CPBS. I want to work with the research coordinators to use the station's data, and publish that invaluable information for other scientists and conservationists. I look forward to increasing the awareness of the station in the research community, which will promote novel investigation and generation of data from the station, and increase the capacity of COTERC to educate people in Costa Rica and elsewhere on conservation and rainforest ecology.

Locating and Monitoring a New Population of the Endangered Harlequin Toad by Andres Jiménez

Andres is a biologist and environmental problem solver from Costa Rica who presently lives in Toronto. His work these days is with Birds Canada where he's the urban program coordinator, which involves enriching the nature experience in the city for all. His coauthors on the paper summarized below are Felipe Montoya, Federico Bolaños and Gilbert Alvarado.



The Harlequin Toad (*Atelopus varius*) is one of Costa Rica's most endangered amphibians. In fact, until 2003, it was believed extirpated from Costa Rica. Since then, four populations have been found. Our paper reports on a fifth population of 26 individuals that we discovered.

Before we discuss our paper, let's consider a couple of grim facts about the *Atelopus* genus:

- At one time, four species of *Atelopus* toads existed in Costa Rica. Now only those five isolated populations of the Harlequin Toad remain.
- Of the approx. 113 *Atelopus* species in Latin America, the IUCN deems 75% to be Critically Endangered.

What's causing such horrific numbers? The usual suspects -- habitat loss and climate change -- likely play a role. Primarily though, the *Atelopus* genus has been hit hard by a fungus known as *Bd* (*Batrachochytrium dendrobatidis*). It attacks amphibian skin, infecting it until the animal is no longer able to correctly breathe, hydrate, thermoregulate or regulate fluids.

Yet the Harlequin Toads we found had no cases of *Bd*. How's that possible? After all, they live in an area identified as having a high probability of *Bd* occurrence and they're highly susceptible to it. Well, Harlequins ordinarily live in the splash area around the streams they rely on for moisture. In contrast, our toads were mostly found from 1 to 6 meters above the riverbed, often in the foliage, tree trunks and bromeliads. They seem to move to open areas



Harlequin Toad

with more solar radiation like the riverbank or exposed vegetation. Such basking seems more important to them compared to the other Harlequin populations. Since research suggests that short periods of high body temperature can eliminate *Bd*, this could be helping our Harlequins survive by reducing infection risk.

As well, our newly discovered population occurs above 1000 m. In talking to highly experienced local people, they told us they don't recall Harlequins being present at elevations higher than 600–700 m. This possible change in distribution might be helping them to survive despite environmental stressors such as climate change and habitat loss.

To sum up, we've documented the absence of *Bd* infection in our Harlequin Toads, a species highly susceptible to it in an area identified with a high probability for its occurrence. This allows us to hypothesize that our newly discovered population benefits from spending less time closer to the river and more time in open areas basking.

The Amphibian Pandemic by Doug Durno

Bd is devastating. As we saw in the previous article, it's gradually stamping out the *Atelopus* genus of toads. But it's far worse than that. While we stress out about the global pandemic of COVID-19, amphibians worldwide are being ravaged by a **panzootic** (as pandemics are called among animals) attributed to *Bd*. So, what's happening?

Well, *Bd* causes the disease **chytridiomycosis** (any infectious disease ending with 'mycosis' is caused by a fungus). I suppose we could just say that *Bd* stands for Bad Disease. After all, it's been called things like the "doomsday fungus" and an "ecological supervillain". Want more? Chytridiomycosis has been described as "the worst disease ever recorded" and "contributing to the Earth's sixth mass extinction".

Wow. Bad Disease indeed. But what have *Bd* and chytridiomycosis done to earn those epithets? Well, they've caused an estimated decline of over 500 amphibian species – about 6.5% of the world's total. Of these 500 species, 90 have been entirely wiped out. Another 124 have declined by more than 90%, and their odds of recovering to a healthy population size are not good.

In some ways, chytridiomycosis is like Covid-19. It's easily transmissible. Some species can carry *Bd* and remain asymptomatic, acting as transmitters and reservoirs of the disease. There's no known cure. And once *Bd* gains a foothold, it's proven difficult, if not impossible, to eradicate.

Also like Covid, the spread of chytridiomycosis was sparked by the interconnectedness of the modern world. In Covid's case, it was spread round the globe by the extensive travel we enjoy today. For *Bd*, as international trade boomed, it came along for the ride. The pet trade has also been implicated by introducing the disease to new locations. Interestingly, the African clawed frog is thought to have been an original vector because of its large-scale use for pregnancy testing in the 1960s.

For a little good news, some scientists are saying that, though *Bd* is certainly devastating, they are finding indications that some amphibian species resist the infection. Others believe it may not be as deadly as originally thought.

However I have to end on a less happy note. A related fungus, *Bsal* (*Batrachochytrium salamandrivorans*), causes chytridiomycosis in salamanders and newts. Discovered in 2013 in northwest Europe, it's wiped out almost all fire salamanders there. It hasn't reached North America yet. But the U.S., with the largest diversity of salamanders in the world – the Southeast has about 20% of the world's salamander species – is fearful and is taking numerous steps to prevent *Bsal*'s emergence. Because of the pet trade, the U.S. Fish and Wildlife Service has banned the importation of salamanders. Still, some scientists believe *Bsal*'s arrival in North America is inevitable.

Bd

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Jungle-bound by Alessandro Franceschini & Charlie Pinson

During the pandemic, many of us are self-isolating at home with all its conveniences. On the other hand, there's self-isolating in the jungle. That's the position research coordinators Alessandro Franceschini (Italy) and Charlie Pinson (Australia) were in.

For four weeks, there were three of us living on base. Then the last intern, Jim Takahashi, got a flight back to the Netherlands. We said goodbye in early May, and were now faced with the possibility of not seeing any new faces at the station until the world settles down.

But hey, you can't complain about being stuck in paradise! While the whole world has gone mad, we get to spend this time in one of the most biodiverse settings on the planet.

We are as healthy as we've ever been. While we have still had a lot of work to do, we've also had a lot more free time, which we've used to work out, or do yoga, to read or to meditate. We've had a lot of time to reflect and focus on ourselves.

Because of restrictions put in place by the government, our survey efforts have been significantly reduced. So, when we do go out into the jungle, or onto the beach, or in the kayaks, we appreciate it much more than we did before.

Maybe the luckiest aspect of this whole situation is that the two of us are very similar people (we have a lot of the same loose screws). We get along well and work together brilliantly. We pretty much operate as a single unit, tackling situations and assigned tasks together. We've definitely formed a solid friendship in which we aren't afraid to speak our minds – dude, can you not chew so loud???

As for what we've missed? People. We are two very sociable guys and the most difficult part of being in this situation is definitely the isolation. We've taken to talking to the dogs, the birds and occasionally the trees. We sing, and we dance, and we do whatever we have to do to take our minds off the fact that we're pretty much alone out here.

Our friends and family are safe, but they, along with most of the world, are having a much harder time getting through this than we are. We are able to see our situation here for what it is, and appreciate it, taking solace in the fact that we pretty much haven't had to concern ourselves with the chaos consuming the outside world. We are very much aware that this is one of the best places we could be to ride this thing out, and for that we are grateful.

With continuing restrictions as Costa Rica goes through its second wave, we have unfortunately had to accept the fact that we won't have the personnel arriving to run a turtle season, which means we now say good-bye to Charlie. Research continues, and Alessandro and Manuel will be focussing on forest-based projects.

We wish Charlie the best of luck as he returns to Australia to take on new challenges and opportunities.

The Great Potoo by Doug Durno



"Little more than a flying mouth and eyes" - Description applied to the great potoo (a bird found in the Caño Palma area) in the Handbook of the Birds of the World.

I remember the first time I saw a frogmouth. It was an oasis in out-back Australia. I was under a tree looking up through the leafy limbs for birds. A large eye was staring at me. That's the only reason I saw that frogmouth. Otherwise it looked like the branch it was stretched along.

Frogmouths got their name for the obvious reason – like a frog, their mouths open quite wide.

Potoos, the New World version of

frogmouths, are similar. Their cavernous gape acts like a large net, great for nabbing the flying bugs that potoos dine on, primarily beetles and moths.

As for its eyes, unlike the tawny frogmouth I observed, the great potoo doesn't have to open its eyes to see you approach. When it detects danger, it slowly stretches out its head and freezes it into a position so that it looks like a broken branch (below right). However, like all species of potoo, the great potoo has two small slits in each upper eyelid that allow it to see what's going on without revealing those big, orange, giveaway eyes. In addition, potoos have a second pair of see-through eyelids that, when flying, protect their eyes from injury by the bugs they're trying to catch.

By now you're wondering why I haven't mentioned the most obvious feature of the great potoo – its camouflage. Like Harry Potter's magic cloak, the cryptic pattern of the great potoo's feathers allows it to hide in plain sight. Combining plumage that greatly resembles the bark of a tree with its high roost during the day, neither you nor a predator is likely to notice it.

Though they use a tree to nest, they don't actually build a nest. They find a spot on a branch with a slight depression where the female deposits its single egg. It's even better if that spot is located where a branch has broken off. Then they can incubate the egg while looking like a dead tree branch.

Finally, while it's unlikely you're going to stumble upon a potoo, they aren't hard to detect if you wander into the jungle at night. It's just that their calls, one harsh and whiny, another a human-like moan, can make that walk a bit scary as your imagination conjures up something more threatening than a harmless bird.



A tale of 2 leatherbacks tagged off Nova Scotia

Ruby and Isabel traveled 12,000 km from Canada to Trinidad

This is an edited version of the original article by Paul Withers of CBC News

Good luck, persistence and international co-operation has delivered a rare trove of data from two endangered leatherback turtles tagged off Nova Scotia last summer.

The turtles, Ruby and Isabel, were carrying a tracking transmitter and a device that stored a huge cache of precise GPS locations accumulated during their 12,000-kilometre migration from Canada to Trinidad.

"In the case of Isabel's data, we had over 12,000 GPS positions that have been collected for that turtle since she was tagged last July" says Mike James, lead scientist with the sea turtle unit at Fisheries and Oceans Canada. In the summer and fall, leatherbacks feed on jellyfish in Atlantic Canada before migrating south to breed.

The data allows scientists to reconstruct the movements of the sea turtles throughout their migration, including where it's needed most -- in and around Trinidad, the nesting destination for most of the declining northwest Atlantic population that are in Canadian waters.

"We know that there are a lot of threats to the turtles in those areas and there are a lot of interactions with local artisanal fisheries, and there are a lot of places where there happens to be a lot of human impact on the turtles. But we just don't have the data to understand that very well," James said.

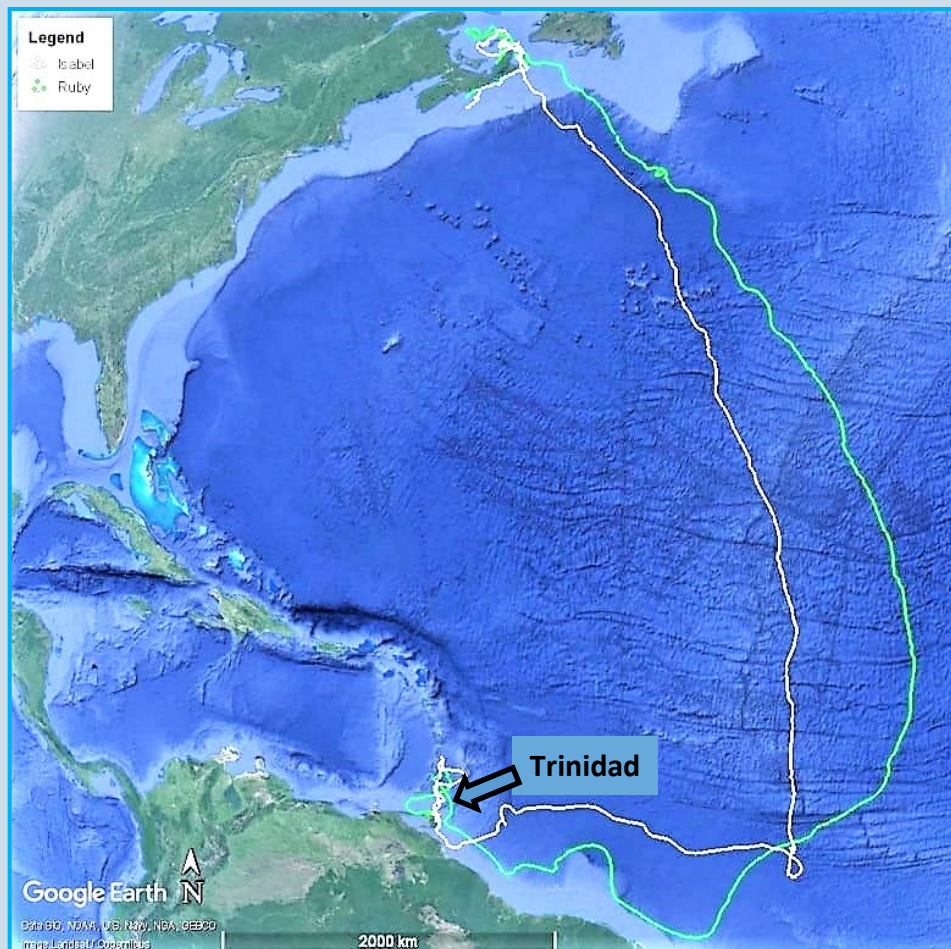
Recovering an archival tag, as it is known, is rare. Sometimes the tags fall off during mating or are otherwise lost on the journey.

In the 20 years leatherbacks have been tagged in Atlantic Canada, archival tags have been recovered only four times: in Panama, French Guiana and twice in Colombia. Now two have been recovered within a single week in May. "I've never recovered this much

data from leatherbacks at one time," James said.

Ruby is one of the biggest leatherbacks ever captured in Atlantic Canada. She is the size of a pool table and weighs a tonne. A flipper tag told scientists she had previously nested in Trinidad.

Data shows Isabel travelled 12,252 km and Ruby 12,891 km after being tagged.



With new satellite transmitters attached, scientists will be able to track the complete year-long migration loop when Isabel and Ruby return to Nova Scotia sometime in August.

Research Coordinator's Report by Alessandro Franceschini & Charlie Pinson

April As April went on and authorities put more restrictions in place due to Covid-19, we had to cancel or restrict many surveys. Basically, anything in a protected area was out of bounds. Since there's little or no contact between surveyors, animals and plants, we asked permission to do some of the surveys, but hadn't heard anything back by the end of the month.

We took advantage of the reduced amount of time spent on surveys to focus more on administrative work. Charlie and Jim Taylor are writing an ID guide for snakes. Alessandro continued the analysis of the carnivore report and prepared the yearly report for MINAE. Besides this, he participated in a meeting on macaws organized by the Macaw Recovery Network. As well, he presented his work and initial results to the Virtual Ecology and Evolution Conference on April 25th. Finally, he filmed a short video for the Macaw Recovery Network, outlining the station's work with macaws, and how we are dealing with our present situation.

Mammal survey – In doing surveys around the station, the most significant detections were two ocelots and a jaguar.

Turtle Tagging and Monitoring – Only two morning censuses were conducted this month. Evidence of most turtle activity was washed away before we could record it. Of the three activities we did record, one was a successful hawksbill nest. The other two were poached leatherback nests.

We've also been informed that 7 of our tags, belonging to 6 turtles, have been recovered in Nicaragua. Though this means that turtles are dead, the information is useful in deducing migration routes and interseasonal habitats, as well as estimating mortality rates in sea-turtle fisheries.

Snake Morphology – Until we had to stop surveys, we were having quite a successful month with 19 snakes of 8 different species captured – including 3 fer-de-lance. Unfortunately we don't have PIT tags at the moment because of travel restrictions.

Erosion Study – We've established a sound protocol to monitor beach erosion along Playa Norte. Once a week we take measurements while doing morning census. We have 100 points where we measure in order to monitor the rate at which the cliff is going backward. As well, we measure the height of the cliff. Future goals are to use the data to produce a heat map on GIS showing the level of erosion on Playa Norte. (Study started by Rick van der Haar)

May With surveys still being restricted, we worked on updating the CPBS checklists for birds, mammals, fish, reptiles and amphibians as well as getting caught up on admin work.

Permission was granted on May 15th to resume some surveys limited to the station area. So, surveys for coastal erosion, tent-making bats, otters and macaws were restarted. However surveys within Tortuguero National Park and the Archie Carr Wildlife Refuge are still prohibited. The following surveys have been totally cancelled: mammals, plant phenology, shorebirds and snake morphology.

Macaws – Only great greens were seen. 109 were observed around Caño Palma, which is a pretty good number.

Erosion Study – After a month's absence from the beach, we found only 69 of the original 100 marked points. Since marking new points would mean starting over again from zero and we'll probably end this project next month, it would be meaningless to start with new measurements. (cont'd on next page)



Research coordinator's report (cont'd)

Tent-making Bat Project - Following the snake transect, we monitor the state of tents found along it. Though we've found 185 tents, the occupancy rate is really low.

June Mammal survey and morning census were started again. Because surveying is basically limited to the Caño Palma area, we've limited otters to the north and south transects. Moreover, due to new measures against Covid-19, it's now forbidden to be on the canal after 5 pm. So we had to drop caiman survey.

By analyzing previous surveys, Alessandro tried to uncover a pattern based on where caimans and otters are found. He has tentatively found that areas where caimans are present at higher densities coincide with areas where otter scats are less abundant or absent.

Plant phenology – The interesting aspect of this month's surveys was that, while no tree was fruiting or producing leaves at high intensity, trees on both transects were flowering at high intensity. This seems a coordinated activity by the trees in the area to flower just before the rainy season, which could limit the flight of pollinator insects.

Erosion project – With limited personnel available, this project has been dropped for the time being since it requires a relatively high number of hours to complete. As well, it's most useful when combined with turtle data. Since turtle survey has been quite limited this year, the erosion data would be of limited value.

Tent-making bat project - We conducted four surveys along the Caño Palma trail. On average, 191 tents were examined. We found a total of 10 new tents, and 6 tents died. We were able to detect all 3 main species. However, the Honduran white bat was found in only one tent for two consecutive surveys; the common tent-making bat was found 2 times in two different tents; and finally, the Thomas' fruit-eating bat was found 15 times, though never in the same tent on consecutive surveys. Lastly, we found a fourth species, the much rarer **Jamaican tent-making bat** (*Artibeus jamaicensis*). It was found only once. As can be seen in photo below at right, it's a fruit-eating bat



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