

COSTA RICA

Study-Abroad

(May 19 – May 30, 2024)

I'd like to start this field journal by expressing how grateful I am to have gotten a chance like this one, with a group of inspiring people that are motivated to keep our planet safe. And I'd like to reflect on this experience and bid farewell to the beautiful country of Costa Rica.

I had the chance to meet with people that live in connection with mother nature. I feel like I had a good opportunity to rediscover our nature as human beings, but also reconnect with our environment that we don't really notice in a big city like Boston.

I'm currently working on a website that regroups my field journal, but also the data that we got from studying different types and species of animals that are in the Osa peninsula, next to Campanario.

From Airport to Coffee Farm: Our Exciting First Day

We all met up at the airport around 5 AM. As usual, some of us were late, while others had already arrived by the time I got there. We had the chance to see the Professor for the second time ever (at least for me), and our schedule quickly became busy due to some issues with our tickets and boarding passes. Once we sorted everything out, we went through security and grabbed a bite to eat while waiting for the rest of our group. We also learned that one of our group members wouldn't be able to join us at all. As we waited to board our flight, we got to know each other a bit better, and the reality of flying internationally to Costa Rica started to sink in. We were all very excited.

We flew to Charlotte and then took a connecting flight from Charlotte to San José, Costa Rica.



When we arrived at the airport and successfully cleared TSA security, we finally met Nancy. She introduced herself, and we did the same. Despite looking a little tired, everyone was surprisingly happy to hear that we had plans scheduled immediately after settling into our rooms at the hotel.

During the drive from the hotel to the coffee farm, Nancy explained the use of Bailey bridges and how they gained popularity in Costa Rica due to their ease of use and quick construction.

COFFEE FARM, at Britt Coffee Tour.

At the coffee farm, our tour guide, Louis, was a funny and heartwarming Costa Rican who proudly presented and explained the different types of coffee beans that we can obtain from the various plantations.

In Costa Rica, coffee beans were introduced around 1800, and within about 40 years, they became one of the country's first and biggest exports. This remains true to this day. Coffee grows best at elevations above 1,200 meters in areas where the temperature is moderately warm, between 59°F and 82°F. The coffee plant can produce for 15 to 20 years before it needs to be replaced by new plants, which are grown in nurseries for one year. The wood from the old plants can be used as firewood, for crafts, or for cooking.

After the tour, we had our first shared meal of the trip at the farm. It was the start of many enjoyable meals together throughout our journey.



Serenity and Splendor

After having breakfast with the group, we left the hotel in the morning and took the bus at 7 AM for a quick shopping trip. We made a stop at Walmart for some

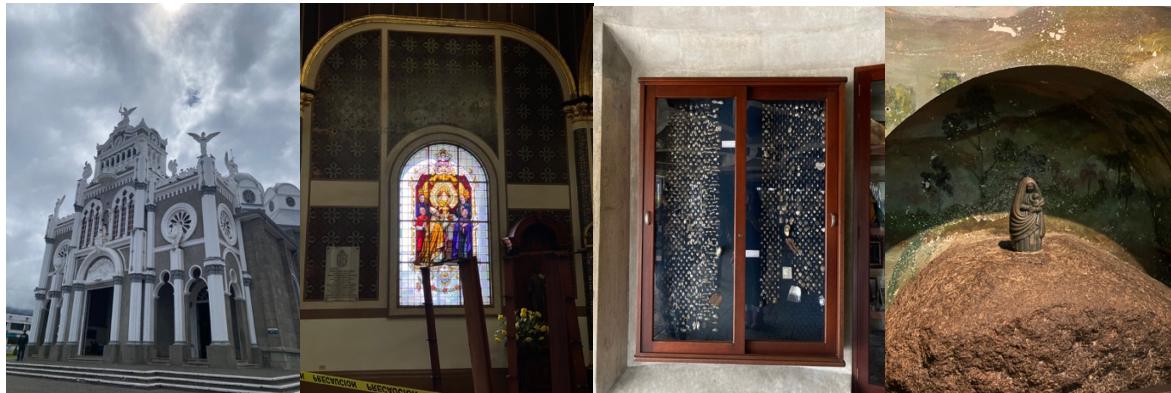
emergency shopping. Unfortunately, one of my friends left his phone behind, and by the time he realized it, we were too far away to return, so we had to leave it there.

After Walmart, we continued on the bus to visit the Indian village. Our first stop was the Cathedral of Cartago.

BASILICA DE NUESTRA SENORA DE LOS ANGELES

The Cathedral of Cartago remains unfinished due to natural problems, including damage from an earthquake. Costa Rica decided to stop building it because it was partially destroyed. The basilica has since been restored and is a unique mix of colonial architecture.

The story of the statuette at the heart of this cathedral is very touching. People used to travel from far places just to have a chance to pray here. Looking at the small pendants—depicting eyes, hearts, and even babies and fetuses—that represent the pain and suffering in people's lives, I felt an overwhelming emotion. The pendants are so numerous that they create a powerful impression. These tiny, molded pieces of metal, despite their size, carry significant meaning. Each one tells a different story of suffering, whether it's a physical illness or a broken heart. They all unite in their surrender of pain to a higher power, God.



QUEZTAL LODGE:

After a quick stop at a café for coffee and a snack, we boarded the bus and headed towards Quetzals de Altura and Paraíso Quetzal Lodge. This charming

hotel is conveniently located next to the Retiro El Santuario, our destination for the day.

It was an exciting moment as we set out on our first hike in Costa Rica, a thrilling new experience for all of us. Our tour guide led us through the lush, vibrant trails, and we were fortunate to have a particularly memorable encounter. We were delighted to spot the magnificent Blue Quetzal, one of the most stunning birds in the world.

We watched in awe as the quetzal fed its babies in the nest, its iridescent green and red plumage shimmering in the light. With its striking yellow beak and an impressive tail that can reach up to 65 cm in length, the Resplendent Quetzal is a true marvel of nature. This rare and beautiful sight was a highlight of our hike and a perfect introduction to Costa Rica's rich biodiversity.

We were in fact lucky, explained our tour guide, because sadly Quetzals are threatened by habitat loss. But many live safely in protected areas, where they're always and constantly being watched, in protected cloud forests.



And we finished our adventure, with a mindblowing meal prepared by the lodge's chef himself.

We then took our bus and started our way to our new destination: The Boruca Families!

Borucan WOMEN! and Community

SCHOOL:

After sleeping at the Boruca family's home, we woke up at 6 AM to have breakfast and walked to the local high school to offer our services. We didn't know if we were going to paint or help with something else, like cleaning. Once there, we discovered that the bus had broken down, so nobody was at the high school—there were no kids, no students. The school has a capacity of 180 students and is 27 years old. Services like transportation and food (breakfast and lunch) are offered by the government. All of the staff is Borucan, but the high school does not teach the Borucan language. Every public infrastructure needs to be accessible for wheelchair users based on Costa Rican law. Knowing that the school is on a hill, it's not easy to create facilities for wheelchair users, so they are planning to switch the school's location from up the hill to the cathedral's place.



We washed the floor and scrubbed it with water and broom.

WATERFALL

We hiked to the waterfall, which was a 20-minute hike from our Borucan family's home. Apparently, coming to that waterfall after 4 PM brings bad luck, so it's advised not to visit the waterfall at that time.

It's also a sacred place for the Borucans. They used to use the stones from the waterfall, which have a specific shape, to bury their people. That's why we can find the same rocks used in the church up in the village.

On our way back I found a frog next to a small source of water that falls into the waterfall.



We swam and had fun at the waterfall. Afterward, we hiked back to our respective houses, had lunch, and showered before the water went off. We then went to the vice mayor Milene's house, where many women were waiting to explain how they create their own traditional masks and materials, such as cloth for clothes.



We stayed until the night. We had planned a dinner around the fireplace with everyone, but sadly, it started raining, so we couldn't stick to the original plan. We played cards together until it was time to go back to our houses and families. We had dinner, and that marked the end of our day and our stay with the indigenous families.

Milene, the vice mayor, is the daughter of Margarita, the lady we were staying with. I noticed that all the women were the ones working or playing important roles in their community. I didn't see any men, except for Margarita's son, who

lives next to her house and has an injured leg that requires an operation. Margarita explained that in Costa Rica, they have a good social and health plan where people get most, if not all, of their medical bills covered thanks to government insurance.

Cultural Immersion and Discovery

Morning:

We woke up at 6, had our last shared meal with our borucan family, and got ready to go the local collective museum.

MUSEUM

The first community museum to ever be inaugurated in Costa Rica is this one. For 40 years, this museum has relied solely on volunteers, and it still does. They all worked hard, putting in sweat and love to showcase their culture. Moving the rock cost around 3 million colons (approximately \$6,000). The rock weighs 15 tons!

Margarita explained how they, as women and as an indigenous community, are proudly working hard to preserve their culture through the years, ensuring it doesn't disappear with their grandparents. She said they literally put blood, sweat, and tears into building that museum, encouraging other indigenous communities to do the same and preserve their beautiful culture.



ARCHEOLOGICAL STONE SPHERES SITE

We took the bus to Sierpe. We stopped at the protected archaeological stone spheres site in Osa, known as bolas de piedra, attributed to the extinct Diquis culture. These stones are very interesting because it's still not certain why they are placed the way they are.

The latest and most recent hypothesis regarding the placement of the stones revolves around the idea that indigenous cultures saw these stones as an artistic, symbolic, and spiritual creation from the universe, viewing them as the center of the world, according to pre-Bruno's spirituality.

We arrived at the hotel, but my roommates and I couldn't go on the hunt for dart frogs, which in my opinion was one of the highlights of the whole trip. Looking back, I am very disappointed in myself for not going, but I was exhausted from the bus drive and starting to get sick.

The funniest thing happened to the rest of the group: the boat was supposed to get them after the dart frog hunt never showed up.

We used that time to get to know each other in a deeper way, which I do not take for granted, as I made some friends who are very close to my heart. We then all dined in the restaurant and went to sleep.

Kayaking through mangroves



KAYAK

We took the bus to the banana plantation canal to go kayaking. It was my first time kayaking ever, and I was so stressed because they told us that crocodiles might live in that water. In fact, the day before, we asked if we could go swimming in the river, but they said it was populated by crocodiles.

Despite the initial stress, kayaking with all my friends was so much fun. The first few animals we saw were lizards like the basilisk (*Basiliscus basiliscus*), the American crocodile (*Crocodylus acutus*), and white-faced capuchins (*Cebus capucinus*). We also kayaked under a bridge where dozens of bats were sleeping. Big black vultures were waiting for their next meal on the palm trees along the canal where we were kayaking. It was an exhilarating experience, being so close to nature and wildlife.



In Sierpe's river waters the most important type of mangroves are the Pinuelas, or Tea mangrove. Their fruits are brown and woody, with a pointy apex.

These trees grow to make a forest in the Sierpe area, but it doesn't continue further north. Mangrove forests produce lots of organic matter, over three tons of leaf twig detritus per acre per year.



We went back and loaded up the boat that is going to get us to Campanario. Nancy showed us mangroves that grow on the costs, and the sides of the water in general. Red mangrove was the major population of the water, we could see the bottom part of the tree through the water. It was very impressive to observe how those trees adapt very easily to their environment.

The red mangrove (*Rhizophora mangle*) grows as a long bushy tree to 30 feet. And it also grows near or on the costs of the ocean, as it needs a high salinity level, making it the dominant and most important population of tropical trees around the area we were in.

After 2 hours on the boat, we arrived at Campanario. We then introduced ourselves to the rest of the team and got some rest for the day upcoming day that was waiting for us.



Adventures in Nature: Hikes and ants

Excited, we woke up very early to hike with Freiner. We saw lots of blue morphos in Campanario. During the hike, we saw the two other types of monkeys remaining on our list: the spider monkeys and the howler monkeys. Some of their trees were so close to our rooms that they were very close to us.

The most impressive animal I got the chance to see was the tapir. After following its steps, we got to observe it very closely. With its baby, also called a watermelon due to the stripes on its body, they were probably looking for food.

Young and baby tapirs are born with those stripes to make it easier for them to hide from predators, such as pumas. Tapirs are very interesting animals. They have an averagely slow reproductive cycle in comparison to other mammals, and due to their large and big body, being the largest native land mammal, they're very sensitive to their environment. Their main sources of nutrients are fruits, plants, and leaves. They eat small portions, therefore it is very important for them to be in an abundant area of vegetation.



Once back at the biological center, we immediately started our leaf cutter ants lab. Comparing morphological types, we observed that there are three different types of ants:

- **Minims**, which are the smallest workers, usually take care of the fungus gardens. They are very small; in fact, their head width is less than 1 mm.
- **Mediae**, which we also called workers, are those who cut the leaves and bring them to their nests. They carry the leaves on their backs.
- **Majors**, also called soldiers, are the largest worker ants. They defend the nest from intruders but also participate in other activities like carrying leaves. Whenever there are a lot of vibrations around the nest, they come out and attack.

During the lab, we calculated the time for an ant to travel 2 meters. Based on that, we hypothesized the total weight of leaf material these ants could transport in 10 days. We also made assumptions and hypotheses about what might interrupt the foraging of the ants. Different weather changes, like rain, and disruptions to the ants can affect their work and productivity.



Exploring the Wilderness: Cameras, Pumas, and Bats

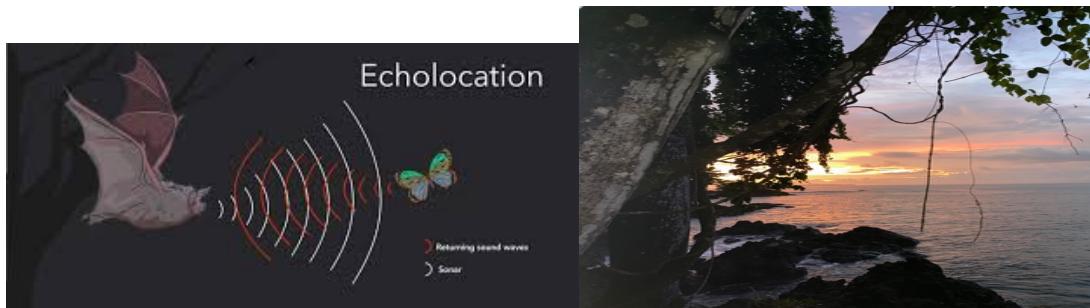
I personally believe that day seven was my favorite day ever. I hiked three times in one day, in the morning we went out to do the solo time assignment, which was quite an achievement, and I was pleasantly surprised at my own stamina.

My favorite hike was probably when we went to fix the cameras and place them near Freiner's dad's house. Freiner and his dad had recently spotted a puma in that area, which made me incredibly eager to see the camera recordings and hopefully capture footage of the puma. We also had the opportunity to meet Freiner's dad, who explained that the land he was working on had been purchased by an American investor planning to build a hotel or tourist attraction. While they were excited about the prospect of welcoming new visitors to discover this beautiful place, they also expressed concerns about people respecting the local culture and natural environment.

Once we returned to Campanario, we had a bit of free time before preparing to visit the bat cave. The way we caught the bats was very interesting. We waited for sunset and then set up a very thin net. Bats are unable to sense such thin nets and fly straight into them. This is because bats rely on echolocation to navigate and hunt. They emit high-frequency sounds that bounce off objects and return as echoes, which helps them "see" their surroundings. However, the net was too fine for their echolocation to detect, causing them to fly directly into it. We trapped them by twisting both ends of the net, and then Nancy carefully held them with her hands covered.

When handling the bats, we noticed that their wings were covered with very thin and elastic skin. This specialized skin, known as the patagium, stretches between their elongated finger bones and is crucial for flight. The elasticity of the skin allows bats to maneuver quickly and efficiently through the air, which is essential for their hunting and navigation in the dark.

During our exploration of the cave, we observed two species of bats, noting that many of the females were pregnant.



Corcovado national park:

We had to wake up earlier than usual because of the long hike that was waiting for us. Freiner promised us a 4 to 5-hour hike, but we would be rewarded with a good swim in the Corcovado protected waterfall.

On our way to the Corcovado National Park, we stumbled upon a bat tree, where bats live inside an empty tree. The most surprising thing happened: it started raining. Freiner explained that it was the rainy season and that if a tropical storm arrived, we might have rain for at least a few days. And he wasn't wrong. Thankfully, we all had our ponchos.

We saw more animals at the station than in Corcovado Park. There were lots of butterflies there, and Freiner explained that gold miners sneak into the park without the guards knowing and mine for gold illegally during the night. They also hunt species like pumas and rare birds. He explained the illegal trade that they fuel by selling these species and products derived from them.

We got to see the American crocodile once again, but closer this time.



Then we took a good swim in the waterfall, coming back to the station we took the boat, looking at the blue clear water we got to observe dauphins. And spent the night working on our last part of our Hermit Crab Lab.

Data

Night Population (combined totals for all groups)

194 Number of Individuals Captured: day 1 (n_1)
193 Number of Individuals Captured: day 2 (n_2)
18 Number of Recaptures: day 2 (R)
1,028 Total Calculated Population in Study Area: (N)

May 2011 Total: 2531
May 2012 Total: 3160
May 2013 Total: 9629
May 2014 Total: 3054
May 2015 Total: 2234
May 2016 Total: 2690
May 2017 Total: 3513
May 2018 Total: 2885
May 2019 Total: 1486
May 2020 - 2022: Covid
May 2023 Total: 2475
May 2024 Total 5123

Calculations

$$N = \frac{n_1 \times n_2}{R}$$

Questions

- How does this year's total hermit crab population compare to the previous years?

Our number is the second highest on the list.

- Is there anything in the investigation procedures that may have lead to an incorrect conclusion of the approximate population size of the hermit crabs on this particular beach?

We didn't do the recapture correctly because we went back two days after instead of two days in a row so the nail polish might have washed off.

- Did you observe any interesting behavior in the hermit crabs as you were doing this study?

The first night the crabs had a "normal" behavior where they were running all over the beach, on the rocks next the water and the rocks next the Campanario's place. The second night, the crabs were more aggressive and harder to catch because they were hiding in the bushes on the rocks, less exposed to us, it was also so much buggy outside.

A Day of Bonding and Exploration: School Visits and Snorkeling

On the 27th, we had the opportunity to visit a local school and meet the kids. We spent the whole morning there, starting with cleaning their library and bringing a few books with us. We also brought toys and games for the children. The kids ranged from preschoolers to teenagers around 6th or 7th grade. We played with them and interacted, having lots of fun together. It was a joy to see their excitement and enthusiasm as we engaged in various activities. The experience was incredibly rewarding and memorable for all of us.



After our visit to the school, we walked to Freiner's house, which was a 20-minute walk. Along the way, we got to see what the city and neighborhood looked like. The streets were bustling with activity, and we enjoyed observing the daily life of the residents. When we arrived at Freiner's house, his wife and daughter were waiting for him to return with us, along with food. We all introduced ourselves, and the warm hospitality made us feel right at home. We shared a delicious meal, with everyone contributing stories and laughter. After the meal, we were all tired from the day's activities, so we took a nap at the table. Once we were refreshed, we got ready and went back to Campanario by car, reflecting on the day's enriching experiences and the new connections we had made.

When we came back, Freiner came with us and we went snorkeling for an hour. We saw lots of different fish and coral. The water was very hard to swim in because of the wind and waves, making it challenging to see much. Despite this, we observed many colorful fish and various types of marine life. The rocks in the water were dangerous to swim near because the waves were pushing us towards them, so we had to be very careful.

We finished the night by making sugar cane drinks by hand. We crushed sugar cane with a big wooden stick and enjoyed the fresh, sweet juice. Afterward, we packed all our stuff and bags to wake up early the next morning.



Closing Chapters: Our Last Day in Costa Rica

We woke up early and had breakfast. Afterward, we covered our bags and suitcases with black bags and loaded them onto our boat, which took us to Sierpe. Upon arriving in Sierpe, we boarded a bus that drove us to Manuel Antonio. On the way, we finally got the chance to see sloths, which we hadn't encountered during our entire trip. Sloths are fascinating creatures that primarily eat leaves, which makes them folivores. They spend most of their lives hanging upside down in the treetops of Costa Rica's rainforests. Their slow metabolism and movement help them conserve energy, making them a unique and intriguing part of the local wildlife.

After our encounter with the sloths, we had some free time to explore the touristic market. The market was filled with handmade souvenirs, such as bracelets, pocketknives, and bags. It was a great opportunity to pick up unique items and gifts that captured the essence of Costa Rican craftsmanship.



We then went to eat near the Jaco area. After a delicious meal, we embarked on another drive to Garabito, where we visited the famous bridge known for its large population of

American crocodiles and lizards. The sight of these impressive reptiles in their natural habitat was both thrilling and educational.

Our journey continued as we took the bus to Orotina, where we stopped at a souvenir store. My friends and I bought gifts for our families back home, including coffee, accessories, house utensils, and various other items that would serve as wonderful reminders of our trip.



Eventually, we drove to our hotel, Hotel Bristol, where we settled in for the night. The next morning, we headed to the airport to catch our flight to Charlotte. Unfortunately, the flight

from Charlotte to Boston was delayed by two hours, so we had to wait. We finally arrived in Boston around 2-3 AM, and we all hurried home, tired but happy.

This marked the end of our beautiful journey, filled with unforgettable experiences, new friendships, and a deeper appreciation for the natural wonders and cultural richness of Costa Rica.

