Above, Aura is setting the trap. Below, holding the densiometer, and separating the collected specimens.

I was thinking of two things while walking: that my legs could not hold me anymore and that I wanted to see a coquí, Puerto Rico’s endemic frog. We had been within the green labyrinth of El Yunque, Puerto Rico’s tropical rainforest, for almost four hours. Although I wanted to look up and appreciate the plethora of stars, I kept my gaze down so that the flashlight on my head would
light the way. Falling down on one of those paths, full of rocks and roots, while carrying a backpack full of scientific equipment, is not a pretty picture. There were times when I slipped, but still had not fallen. I was in the back of the line, walking slowly to see if I could spot a coquí, but without missing the pace of the team. "Look, Luis," Aura said after a while. And there it was, quiet on a log, ready for the photo. After that, she asked us to turn off our flashlights.

Aura Alonso-Rodríguez is an ecologist. She studies human and climatic impacts on tropical ecosystems through insects. Two other people and I accompanied her on her once or two times-a-year pilgrimage to El Yunque, under the new moon. We were assisting her in her research, focused on understanding the impacts of Hurricane Maria on moth (nocturnal butterflies) communities. It is under the new moon that this type of sampling can be done effectively: the darkness reduces competition between the light from the trap and from the moon, thus attracting more moths.

The voices of the rainforest multiplied and amplified once we shut off the lights. To be immersed in the darkness of our rainforest and to listen to its sounds is not an opportunity that I am often given. In that moment, I finally looked up to the skies and appreciated the stars without fear of falling. As a drizzle began, we turned on the lights, and continued our walk back to the where we started.

We arrived around 6:30 P.M. to the El Verde field station, the research center of the University of Puerto Rico located in El Yunque. The objective was to go to the three spots that Aura selected, where we would place three traps with ultraviolet bulbs that would attract the moths. We carried three 25-pound batteries into the rainforest; each of us with a backpack full of equipment and several bottles of water and snack bars. It was almost 11 P.M. by the time we got back to the parking lot. The rain helped disguise the sweat and tiredness of our bodies.

That new-moon-weekend in July 2020 brought back memories of when I did research in the field, but it also reminded me of how complicated and complex it is, as many things are out of our control. Especially, when there is an ongoing pandemic. We returned to the house while listening to the symphony of our stomachs. And although we were tempted to open a few beers and socialize, we opted to go to sleep after eating, as we had to return to the forest around 5:00 A.M. When I saw Aura’s disappointment and frustration when finding the traps turned off the next morning, I knew we should have had at least one beer before going to sleep.
I arrived in Rio Grande, one of the municipalities where El Yunque is located, Friday afternoon. Aura and I met at a local supermarket to buy food for the weekend. The last time we saw each other was two months earlier, in Vermont, where we are studying. We stared at each other for a few seconds, and then hugged. Obviously, breaking pandemic protocols made us feel bad — even though we had been in isolation for a long time, preparing for that sampling weekend at El Yunque. It felt good to escape from the south of Puerto Rico, where I live. The drought, plus the Saharan dust, had the area all covered in brown and misty landscapes. These episodes of severe drought are becoming more frequent and intense in the Caribbean. Puerto Rico, like most islands in the region, is expected to see increasing temperatures due to climate change. Seeing so much green, while following Aura towards the house near the rainforest where we would be staying, was almost magical. "It is very dry here too, even if it doesn’t look like it" — she told me, as we got the equipment out of her car.

Aura has been collecting moths in El Yunque since the beginning of 2017. Little is known about them. In particular, their role in nocturnal pollination, which is important for the ecosystem, and for agricultural production. Aura told me that, "[all] butterflies belong to the order Lepidoptera, and more than 90% of them are nocturnal. The last study about them in Puerto Rico was done in 1998 (1); 1,045 species of butterflies were estimated, of which 26% are native to the archipelago." The objective of her project was to know the degree of difference, if any, in moth communities (assemblages) in two forest areas in El Yunque: one dominated by Sierra Palm (Prestoea montana), and the other by Tabonuco trees (Dacroydes excelsa). There are 4 types of forests and various microclimates that make El Yunque a special place. To that we add its cultural and traditional significance, particularly the one that our Taino ancestors gave it. Unfortunately, human impacts, such as light pollution, solid waste mismanagement, and poorly planned constructions, together with natural impacts that are intensifying due to climate change (also human-driven), such as droughts and stronger storms, have increased the vulnerability of our national forest, producer of water, air and beauty. People like Aura seek to understand how, specifically, these impacts harm their biodiversity, in order to outline effective ways for conservation.

I underlined “was” in the paragraph above because Aura's study now revolves around understanding how those assemblages changed with the impact of María, a 2017 category 4 hurricane that caused damage or death to 23-31 million trees in Puerto Rico [2]. "[Our study] is one way of better understanding the response and recovery of the forest to this impact." Preliminary data from the study suggests that the assemblages were completely changed by the impact of the hurricane, regardless of forest type [3]. Nonetheless, after the hurricane, the number of individuals (abundance) and the number of species (richness) was higher in the area dominated by Tabonuco trees. "These trees are strong, they create underground connections between them, unlike Sierra Palms that do not provide good shelter due." Therefore, given that the impacts will continue to occur, if we want to safeguard the biodiversity of the forest, it is important to conserve those areas dominated by Tabonuco, most of which are remnants of mature forest. Meaning that these areas have not been affected by human disturbances. Aura is confident that future samplings will shed more light on that preliminary conclusion.
The figure on the left shows the assemblages in Sierra Palm and Tabonuco before and after Maria. Each point represents the species composition at a different sampling site. By agglomerating the points in the different ovals, the statistics show that the assemblages changed due to the impact of the hurricane in both types of forest. The figure on the right, divided in two, shows richness and abundance. In both, the boxes on the left side show that the richness and abundance of both areas was similar before the hurricane. But those on the right side show that assemblages in the Tabonuco forest had more richness and abundance after the hurricane.

As we walked under the subtle light of dawn to where we had left the traps, Aura pointed out areas and described how they were like before the hurricane. Frankly, everything looked the same to me. It was remarkable how embedded she was in the landscape and the connection she had with the forest. I told the team that if they were following me, we would have already gotten lost and would never find where we left the traps. "I grew up in the forest," Aura said. And just as she had seen El Yunque transform, she also saw how the mountains of Carraízo, where she was raised, transformed throughout her childhood. Witnessing the change of the landscape catalyzed questions that she would later answer through her scientific work. "What do you feel?", I asked her when we got to the first spot and saw the light off. Although there was a hint of anger and frustration, Aura took a deep breath and began to tell us the possible causes. She had checked the voltage of the batteries and tested them before the weekend. But as she said, it was not in her control that they got damaged. Sometimes one wastes so much energy in pondering over something one does not control. And now, whenever something similar to the “battery situation” happens to me, I think about how Aura responded to it.

We proceeded to remove the trap — we noticed that several moths were caught, but not the number that she expected. Yes, seeing their corpses raised uncomfortable questions in me. But their life cycle is very short and sampling once or twice a year does not harm the population?I said to myself. When collecting all the equipment, Aura took out a densiometer and together with the other colleague measured the canopy to see how much light enters the area. By comparing the canopy cover data that Aura took before and after Hurricane Maria, she can determine how much the forest has recovered since the hurricane. Then we walked up the mountain to find the
second trap off. The same happened with the third. And what do you do when an experiment goes wrong in El Yunque? Well, you go for a dip in a swimming hole.

While floating in the river, Aura went over different options on how to deal with the setback. She would soon have to return to Vermont, and coinciding with the new moon in Puerto Rico is not an easy thing. So, she had to re-sample to not miss the opportunity. The next day, when I had to go back to the hot south, we returned with charged batteries and set up a camera to see how long the light bulbs lasted. Before I left, I went with her to the laboratory to help sort the samples we collected the previous night. We were classifying all the moths by morphospecies, that is, by how they resemble each other. "That's why I like insects, you have to learn how to see the details" - she said, while she explained to me how difficult it was to determine the real species, particularly that of the smallest ones.

I wanted to stay longer to help with the resampling, but responsibilities in the south required attention. As I was driving home along the old highway, it was clear how the green was turning brown. During that week, I could not get what happened in El Yunque out of my mind, plus my flat feet kept reminding me of how much we walked. Neither could I shake off that moment of silence and stillness when we turned off the lights. At the end of the week, Aura told me that they managed to acquire new batteries and that she decided to repeat the sampling the following month. Putting the camera served to check how long the bulbs were on and thus be able to adjust their results.

There are three new moons this summer of 2021, so maybe I'll be an assistant to my ecologist friend again. Meanwhile, I hope to educate myself more about Tabonucos, about where they are in Puerto Rico, and on what we can do as a society to protect them. As the song of Francisco Roque Muñoz says, "Un jacho de tabonuco, tengo yo para alumbrarme" (A piece of Tabonuco, I have to light up the way).


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