

Tropical Impressions from students in the 2018 Tropical Research in Panama class

The rainforest at night is vastly different than the one during the day. It is amazing how nightfall can simply trigger an entirely new world to arise. It is a stage for a symphony of frogs calling out to each other—each one a unique call. Each time you direct your light in a given direction you're sure to see a plethora of small glimmers—the eye shines of spider scattered throughout. The floor of the forest is also constantly moving—ants take no breaks. Night brings out the nocturnal mammals as well—bats and sloths are abundant. There's something exhilarating about feeling out of your element in the nighttime forest—you feel as if so much can see you, yet you can't see it. Standing in a pitch-black forest is humbling to say the least, yet enthralling. *Thomas Cassano*



Hiking around the rainforest at night, one's eyes are often drawn to the surrounding vegetation and the roots threatening a swift trip and fall into detritus. However, if one finds time to look up one just might see members of the most diverse group of mammals: bats. Darting over trails and between trees, their flight patterns may seem random but over several sightings two main styles of flight can be viewed. The first makes frequent, rapid turns and flaps even faster. The second has markedly slower flapping, and will make fewer turns. These two classes of bats have wings with different aspect ratios. The former has short, wide wings for more agility at the cost of increased energy consumption (low aspect ratio). The latter has longer, thinner wings (high aspect ratio) that require less energy to stay aloft but decrease agility. The more agile bats have access to the greater abundance of insects in the thick vegetation, but because their style of flight requires more energy they also need to consume more insects. In contrast, the less agile bats are largely limited to whatever insects venture into the open spaces. Because their style of flight requires less energy however, they require fewer prey to survive. Agile bats can access

more prey, but they also must consume more. More efficient bats can access fewer prey, but they also require less. Like the chicken or the egg problem, this calls into question which adaptation came first for each kind of bat. Whatever the answer, it is nonetheless fascinating to point one's lights up and watch this dichotomy play out over the rainforest floor. *Ruben Gameros*



I think what astonishes me the most is the degree of camouflage these animals have, and how you can stare at a tree and its surrounding area for 5 minutes and keep finding more bugs, spiders, fungus, frogs and lizards with each new angle. The rainforest is like one giant game of Where's Waldo but to an extreme. I just keep thinking about all the inverts and animals I've walked right past or been looking right at but not been able to recognize. Some of these hikes have been pretty vigorous but by slowing down to observe and pick out the animals in disguise, you get a lot of recovery time. It's a win-win situation.

I've been imagining the rainforest my whole life, and it's just crazy to actually be here among the monkeys, tropical birds and freaky-looking spiders, wading through the rivers and ducking around the walls of vines descending from the forest canopy. The vines are especially interesting to me, the way they decorate the rainforest landscape, twirling around each other and draping across the branches. They act as a little highway system for organisms to cross from tree to tree, further connecting the vast canopy of trees in their understory. It's also crazy to come from Arizona, a place where all the species are adapted to live in conditions with tons of sunshine but very little water, to Gamboa, where abundance of water is the least of their worries. It's a shock, seeing what an ecosystem can do when it has ridiculous amounts of water and sunlight to work with.

Dr. Wcislo's talk yesterday really opened my eyes to how diverse Panama is and what sets it apart from other tropical rainforest environments, being a strip of land that connected two enormous continents and split ocean populations in two. It made me feel pretty special about being here in the midst of this. I had also never thought about the disproportion of how all of the universities filled with knowledge-hungry students are located in the temperate zone, away from the amazing biodiversity of the tropics. *Melissa Hayhurst*



Can't you just imagine yourself looking out at this serene landscape? You get to watch gorgeous birds fly by and listen to their melodic calls. There is nothing to do besides putting on some clothes and grabbing a map. This place is within walking distance from civilization. You get to see caiman come to the surface and force a scattering of all kinds of birds. Now, make sure you listen really close. Across this marsh are howler monkeys, which is probably a sound unlike any other you've ever heard. Their calls boom through the canopies and can be heard for miles. Imagine the cool breeze on your face as the clouds put a veil over the environment. Sprinkles of rain begin to come down and the forest comes to life. The pattering of droplets on the leaves all around you is so calming. Put yourself there right now. Panama is truly a sight to behold. Does this even sound real? Sounds a little too good to be true, huh?

Well, it is. Now, guess which one of the claims I made about this picture is false.

Lucky for you, I only made some white lies. You may have to do a little more than put on clothes and grab a map. You better have proper gear to be trekking through a rainforest. This place is filled with bugs that will attempt to ruin your day but DEET can keep them at bay! Apply some before you take off and you'll be fine. I also may have given you a false impression of the weather here. That cool breeze I mentioned was a bit of a lie. It is incredibly hot and humid in this region of the world. Sweating through your clothes is a regular thing in Panama and there never is a breeze to help cool you down. Your whole body should be covered though because the sweat is much better than getting eaten alive by the bugs. Those were the only lies though! Panama is home to some of the most breathtaking landscapes which allows for pictures like this. Although there may have been an extremely sweaty boy behind this camera, he was also

raving about how amazing this sight was to see in person. I sure am glad that I was the person behind this camera. Panama was an absolutely amazing experience. *Daniel Karstetter*

June 9th, 2018

Beauty of Nature

Gamboa, a small town with hidden treasures

So diverse, seems impossible to measure.

Surrounded by the forest and wetlands,

It is a sight that must be seen firsthand.

Spiders, fishes, bats and ants,

Then there's bees, trees, and more plants.

Plus, the deer, agouties and sloths

Can't forget the monkeys, squirrels and moths.

There's so many unbelievable sights,

But there's definitely more bug bites.

However, the education and the friendships made

Is an experience that I would not trade.

Scientific hypotheses and predictions,

Curiosity becomes an addiction.

Humidity is always in the air

Makes for frizzy and puffy hair,

But one should not care for how they look,

Because every activity is one for books.

Do not wait to encounter this later,

It is simply the Beauty of Nature.

Nhu Nguyen



The first observation of our field course was a papery brown nest, hung high in a tree in the Soberanía National Park. We stopped, pointed, and wondered:

“What species built that?”

“What’s it made of?”

“What happens when it falls?”

We asked questions until we were satisfied, and then we looked and listened some more. Howls that could’ve come from dogs or monkeys or some other creature echoed through the high canopy, and we asked about them. When we learned that the calls belonged to howler monkeys, I imagined primates swinging through the high, mossy branches, searching for shelter from the approaching storm.

A mass of bubbles teetering on the edge of a shallow puddle was not just a notable oddity, as it may have been at home, but became a research-worthy specimen. We learned that it was a foam nest of túngara frog eggs, laid to take advantage of the recent rainfall. Each passing marvel was cause for examination and speculation. I felt that I was a small observer to a grand performance thousands of years in the making, so I slowed down and engaged every one of my senses, hoping to sponge all the wonder I could from that small patch of the tropics.

The Panamanian rainforest redefines the idea of intellectual curiosity. Paths are not built for getting from place to place, but rather are intended to guide you through an ecosystem so energetic and vibrant that it challenges your idea of what it means to truly be alive. The forest and all its creatures are omnipresent, creeping in to reclaim their territory--inch by inch--and challenging the will of mankind to root itself in a place like this, a place with a will of its own, strikingly beautiful but undeniably wild. *Catherine Prendergast*



Stepping into the rainforest was unlike any experience that I will ever have. The presence of annoying mosquitos and other bugs was overwhelming. The humidity was seemingly unbearable. That however, ended when climbing to the top of a canopy tower and seeing the forest from overhead. The view was unlike any other, showing the depth and range of the rainforest. Watching Vultures soar majestically a hundred feet over the canopy as the dragonflies hovered between the branches. At the top of the tower was a sight that made me feel insignificant to the sheer size of the rainforest but just as significant that I was able to conduct my own research and leave my mark on such an awe-inspiring place. *Zachary Roland*



I have always greatly admired the rainforest but never imagined I would be able to visit myself. Even with high expectations I was completely blown away by the sheer vastness and diversity around me. My very first observations of the rainforest after I stepped out the door the first morning were the trees. As someone who has lived in Arizona my whole life, I was completely blown away by the overwhelming height and tree cover. As I made my way into the forested paths, the trees blotted out light and vines and other plants were so thick you could hardly see off the trail. Just as I thought I was getting used to my surroundings, our group stepped off the path to follow a river. After walking just a few feet I could no longer see the trail behind me and knew that without the river it would be near impossible to find the way back. This gave me a great appreciation for the rainforest and its power.

The animal diversity also struck me right away. The animals I had previously only seen in zoos were living in the wild right outside my door. One sighting that really stuck out to me were the capuchin monkeys. As our group was walking down a trail, we heard a large snap in the trees above us. Upon looking up, we saw many capuchin monkeys all coming toward us! I found it especially funny that these tiny monkeys were displaying signs of aggression and trying to scare us away by breaking branches and throwing things at us.



One of the most valuable experiences I had was meeting biology researchers in the field. On a night hike, our group encountered bat researchers who were kind enough to tell us about their project and even show us how they catch the bats.

Overall, my experience in the tropics has been incredible. At times it feels like a dream and I have to remind myself that I am actually here. I find myself constantly admiring the diversity and reminding myself that this is not a zoo or movie, but a real and beautiful place! *Lauren Welch*