



Amazonian Impressions

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In June 2015 Mark Riegner and Craig Holdrege led a twelve-day trip to the Amazonian rain forest in Brazil (http://www.natureinstitute.org/educ/2015_amazon.htm). Sixteen people from the United States and Brazil took part in the adventure, including our staff members, Bruno Follador and Henrike Holdrege.

IN EARLY JUNE we arrived in Manaus, Brazil, a city of nearly two million people in the center of the Amazon rainforest, just three degrees south of the equator. Looking from the city's "old town" out onto Rio Negro, you would think you were looking at a vast lake. About twenty kilometers downstream of Manaus, the Rio Negro and the Rio Solimões flow together in what Brazilians call "the meeting of the waters." The Rio Negro drains the Brazilian north; Rio Solimões has its origin in the Andes of Peru (and is called the Amazon River by Peruvians and most of the rest of the world). Below the confluence of these two large rivers, Rio Amazonas (as the

Brazilians call it) flows another nine hundred miles before it meets the Atlantic Ocean. Rio Solimões/Rio Amazonas flows from west to east through almost the entire width of a continent, receiving waters of numerous and large tributaries. It empties into the Atlantic Ocean, carrying twenty percent of all the fresh water that streams and rivers on earth bring to the oceans.

We took an excursion to the "meeting of the waters." There was a clear boundary visible between the two rivers. Rio Solimões carries tan, muddy, and nutrient-rich water, while the water of Rio Negro is dark, clear, acidic and nutrient-poor. We leapt off our small, motorized boats into

the Rio Solimões and swam into the warmer water of the Rio Negro. It is not until sixty miles downstream that the two rivers have fully merged and mixed.

For the twelve days of our trip we lived on our “house boat” (which accommodated all participants and guides as well as the ship’s crew), journeying through various tributaries of the Rio Solimões and the Rio Negro. Early June was near the peak of the high-water season. In some areas the water level was up to fifteen meters (nearly fifty feet!) higher than in the low-water season. Since the giant Amazon basin is very flat, the rising waters spread far into the forests. Many areas are flooded for four to six months, and some for nine months.

During our journey, the waters were still rising. We learned that they would peak around St. Peter’s Day at the end of June. And people in Manaus were concerned whether the Rio Negro would, as in the past



three years, flow over the harbor walls and flood the adjoining fish, meat, fruit, and vegetable markets. Because we were in the high water season, there were only a few occasions on which we walked on what the Brazilians call

terra firme, into the rainforest. Mainly we entered the forests on small boats. You have to imagine that we were moving near the crowns of the trees with the forest floor twenty-five to fifty feet below us. I wondered about the vegetation of the forest floor and the smaller trees that were fully submerged. Were they dormant like our trees in winter? Sometimes we could see submerged leaves on branches of trees through the dark clear water.

During the high water season the rich fish life spreads out into the vast flooded forests. There are many fish that feed on fruits and seeds that fall from the trees. Among them are the large fruit-eating piranhas with jaws so powerful that they can crack hard casings of nuts. The



much-feared carnivorous piranhas are also in the flooded forests during this time, so that it was safe for us to swim, almost daily, in the deep open river channels away from forest edges.

The people who live in the areas where the water level rises and sinks so strongly over the course of the year are faced with special challenges. Houses are built on stilts or rest on floating foundations of large horizontal wood beams that are lifted when the water rises. Some houses are abandoned during the high waters and re-occupied for the months of low water. In the high water season people move around in boats; sometimes wooden walkways connect houses with each other. Manioc cuttings that will be planted when the water has drained away (manioc flour is a staple) are securely stacked away above the high water mark.

Since we were moving beneath the forest canopy in our boats, we could observe at fairly close distance those tree-dwelling animals that would be one hundred feet up had we been walking in the same forest in November. We observed meter-long iguanas that spend most of their lives resting on tree limbs. Sometimes when they noticed us, they plunged into the water, and once right into our boat onto one of our trip participants—with no ill effects. Twice we saw large (maybe six to eight inches in diameter) beautifully brown-and-beige-patterned, motionless boa constrictors. It was as if they merged with the tree limbs they were coiled around.

Many kinds of ants live on these trees. Since their bites can have unpleasant effects, you try to enjoy them from a distance, which isn’t always easy as your boat maneuvers through the dangling air roots, lianas, and hanging tree branches. Termites build impressive nests on tree trunks and build tunnels along the trunks and branches as dark passages for moving from place to place without exposure to



the light. We saw wasp nests dangling from trees. Every nest and home must be built high enough to remain above water at the time of flooding.

Craig, with his interest in sloths, was rewarded by numerous sightings. After nightfall (the sun sets at about six p.m.) we would sometimes go out in the boats and the crew would search the crowns with spotlights. We saw many sloths. We also sometimes “saw” a sloth that turned out to be a patch of textured trunk or a tangle of branches and leaves. We could not always discern a baby sloth that was held by its mother when we were told that there was one. Our guides certainly had greater awareness and keener eyes than we did.

One morning we sailed through a village and encountered sloths in close proximity to the “road.” They were in their favorite tree, *Cecropia*, which has a long spindly trunk and sparse foliage of large palmate leaves. One was resting high up in a tree fork. Slowly it turned its face toward us—with its perpetual smile “painted” on its face. Eventually it let go of the tree with its forelimbs until it finally hung fully outstretched, upside down. It held onto the branch only with the three large claws of each hind limb.



Its back was toward us and, effortlessly, it turned its head to look down at the humans that were gazing at it. It didn’t seem particularly impressed or disturbed by our presence.

A short distance away, another sloth in a *Cecropia* began climbing higher up in the tree. Picture the most gentle and slow movement with not the slightest abruptness, no halting and starting anew, no angularity, nothing fast or jolting. To say “the sloth climbed up the tree limb” cannot express what we saw, even if it most effectively employed its enormous claws. It would be more accurate to say “it flowed up the tree limb” in one uninterrupted stream of slow motion, similar to that with which viscous honey flows from your spoon. A

beautiful and unforgettable sight!

One afternoon while we were silently observing in the forest, with a faint rainbow and billowing clouds in the far distance, we became aware of squirrel monkeys in our proximity. They are small and delicate. Swiftly and skillfully they appeared out of the dense canopy to our right, a whole clan it seemed, and hurried along on branches, jumping to bridge a gap and then holding on to the next branch with all limbs, the long tail included. When they had reached trees at a safe distance, they halted and, it seemed, looked at us with some curiosity. Moments later we heard a faint noise that we first took to be a chain saw. From the captain of the ship we learned that these were the voices of howler monkeys.



We had several opportunities to watch howler monkeys with our binoculars later on. Mostly we saw them with their orange-red colored coats in the tops of high trees, in small groups, slowly moving about or feeding on leaves and fruits. They are the largest monkeys in the Amazon, and they carry their name rightfully. One night, before



dawn, Craig and I heard an enormous sound through the open cabin window. We rushed to the upper deck and experienced what I later called “the voice of the Amazon.” Imagine an uninterrupted roaring, with modulations, out of several deep voices, soulful and mighty, that continues for a good while. It is a powerful and eerie sound that resounds through space, remotely comparable to the roaring of lions. And then—to our greatest surprise—as if under the guidance of a great conductor, the howler-monkey chorus stopped suddenly. This was the case every time we heard them. Who gives the signal to end?

Early June, we found, is not the time of most abundant flowering; it is more a time of setting fruit and fruiting in many plant species. However, gliding past forest edges, our attention was caught by colors that stood out from the dominance of green: orange, yellow, beige, pale beige (almost white), deep purple, red. These spots of color, that you could easily mistake for flowers from the distance, revealed themselves through our binoculars to be bunches of leaves. They were new leaves often on only some branches of a tree. They looked delicate, fresh, and somewhat limp, hanging down in clusters. While the tree still carried its mature foliage, it was also “pouring out” new leaves, not yet green, on some of its branches.

On the last day of our trip we left the ship in three small boats at pre-dawn. The motors were turned off and the boats were propelled by paddling. We had agreed to observe in silence. The night sky was clear, and I could discern the constellations of the zodiac; Aquarius was high above us. There were the night sounds: distant howler monkeys and the unfamiliar voices of frogs and insects. A night hawk skimmed the water. When the sky brightened, birds called out and flew from their nightly resting places.

We glided in silence through water channels that narrowed ever more as we entered the forest. Massive trees with their

broad trunks carried the most varied and exquisite gardens of epiphytes—everywhere plants growing on trees: bromeliads with leaf rosettes you have seen in pineapples; large-leaved philodendrons; varied greens of mosses and lichens; a variety of orchids, only a few in flower; ferns of various shapes and sizes. Each “tree garden” was an artistic masterwork in the arrangement of leaf shapes and sizes and shades of green. Sometimes there was no space unoccupied on those trunks. The most frequent host tree, I learned, can be translated as “the most beautiful of trees.”

Observing and contemplating the intricately interwoven relationships of plant and animal life in the Amazon, I felt that our ideas of “struggle for existence” and “survival of the fittest” do not do justice to the reality of an ecosystem in which every element seems to contribute to the whole and is sustained

by the whole. The epiphytes, for instance, are plants that live up on the branches and trunks of trees. The trees are their ground, and birds and other animals disperse their seeds. The epiphytes, in turn, are important for the growth of the trees. A multitude of creatures live in and on the epiphytes and the droppings of those same creatures enrich the rainwater that runs down the host trees. This “fertilizer” is immediately absorbed by mycorrhiza (a symbiosis between fungi and tree roots) and the root system of the trees—a system that is three times more dense than that of a forest in our temperate zone. The water *beneath* the root system proves to be nearly as nutrient-poor as the rainwater was in the first place.

Hardly any soil forms in these rainforests—something we could see the few times we walked through forests. You push aside a few leaves and meet a tangle of roots right on the surface. These rainforests grow *on* rather than *in* an extremely nutrient-poor soil. Everything is lifted up in this interwoven world.

The intensity and diversity of relations in this largest of all rainforests is unsurpassed. We all felt that it was an honor to be there, that we were in the presence of something we could hardly comprehend. On leaving the Amazon, I had no doubt that the vast Amazonian rainforest, whether by its health or its destruction, will have an impact on the health and life of our entire planet.

