

Into Madagascar: Biology professor returns from research-teaching adventure in biodiversity hotspot

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Red-fronted brown lemur - conspicuous around camp. The species has “Near Threatened” status on the International Union for Conservation of Nature Red List of Threatened Species.

Exploring a tropical biodiversity hotspot where lemurs, chameleons and the cat-like fossa abound is not a bad way to skip out on winter.

Last month, as many parts of the country welcomed the start of a blistering cold winter season, biologist James Vonesh, Ph.D., set out for a month-long teaching stint in Madagascar, the fourth-largest island in the world, situated off the coast of southeast Africa.

Vonesh, associate professor of biology in the Virginia Commonwealth University College of Humanities and Sciences, was invited by the Tropical Biology Association (TBA), along with several other experts, to teach a field course in tropical biology to a group of nearly 20 [students](#) from 16 different African and European nations. The TBA is a nongovernmental, nonprofit organization working in partnership with environmental institutions throughout the Africa region.

What makes the island country unique is that it is home to some of the most diverse plant and animal populations on the planet. Madagascar, which is in the Indian Ocean, was once part of the prehistoric supercontinent called Gondwana. About 88 million years ago, it broke away from India, and it has remained solitary since, allowing its flora and fauna to evolve in near isolation.

Because more than 90 percent of Madagascar's plants and animals are unique to the island, it has long drawn a host of researchers and explorers wanting to learn more about its diverse ecosystems – and how best to preserve and conserve such natural wonder.

So, when Vonesh received the call from TBA, his decision was easy. This would be the adventure of a lifetime.

Camp Kirindy

For two days, Vonesh and his fellow participants traveled in compact minivans (with no air-conditioning) from Madagascar's capital city of Antananarivo along rugged, dirt roads down a winding stretch of mountain plateau. Eventually they arrived at the coast. The area, called Kirindy, was located in the dry forests of the Menabe region, known for its distinctive ecosystems with diverse animal and plant populations.

In camp, there were guest lodgings and a field station – their home away from home for the next few weeks.

There was little to no cell phone reception, nor Internet access. On most days, the temperatures would climb above 100 degrees, making field research a grueling task. Outdoor activities and data collection were reserved for early to mid-morning, and then again in the late afternoon, once the sun had begun its descent. Nonetheless, there was plenty of time for learning and discovering.

Faculty members from other parts of the world joined Vonesh at Kirindy, including a botanist, a conservation expert and a bat biologist from Madagascar, a forester from Switzerland, a primate expert from Rwanda and a biologist from Kenya. Vonesh's wife, Sophia Balcomb, Ph.D., an ecologist and editor for the *American Journal of Botany*, served as a faculty member as well.

The students came with varying levels of experience. Some already had exposure to conservation-type work, while others were at the graduate school level, ready to learn firsthand how to conduct field research.

Learning extended to the faculty as well. Vonesh, an expert in amphibian and reptile ecology, has served as a guest lecturer and visited other areas in Africa through the TBA program. However, he'd never served as part of TBA's Madagascar teaching program. "The experience was a very new one for me," Vonesh said.

Vonesh has historically conducted research in tropical areas, and the Menebe dry forest region would prove to be a stark contrast to the areas he has visited in the past. There would be no lush, evergreen rainforests with tall canopies that shield the forest floors.

In December, the dry forest was at its driest. Most of the vegetation surrounding the field station had no leaves, allowing for increased visibility of the area's unique wildlife. There were some flowering plants in the area and a relatively short canopy.

"This was a very good place to watch lemurs and birds. You could really see and follow them easily," Vonesh said. "Whereas, if you were to do the same in a rainforest, it would be very difficult because they would be too high up in the canopy or obscured by trees and vegetation."

Here, he would look at his surroundings through a fresh lens.

"In many ways I was as much a student of this region as my own students were, in terms of the natural history of the region, the fauna and flora," he said. "I was seeing this all for the first time as well. It created some unique opportunities and challenges. I had the chance to work with organisms that I had not historically worked with previously."



Verreaux's sifaka (*Propithecus verreauxi*) the largest diurnal lemur in Kirindy.

Learning about life in the dry forest

The first week in Kirindy included a series of guided walks that allowed faculty and students to get acquainted with the plants and animals of the dry forest. The faculty led seminars and discussions on a variety of research and conservation topics. They taught key skills and techniques for conducting field research, so the students would be prepared to use them to explore more of the forest.

Field exercises helped students gain hands-on experience and embark on

their own small-group research projects. Each student partnered with a student from another country, sparking a number of international collaborations. Students developed projects and designed the study protocols.

Vonesh worked with the students to develop their quantitative skills for estimating and quantifying species diversity and to employ quantitative tools for estimating animal abundance and diversity.

"This opportunity was unique in itself, providing a hands-on experience in a biodiversity hotspot and learning about the conservation issues faced by this really special place," Vonesh said.

"But it also allowed students to really sink their teeth into, for many, if not most, their first substantial individual research project," he said.

"They spent eight to 10 days in the forest collecting data and four to five days analyzing it and writing up their findings."

The culmination of the course was presenting their research during a symposium at the University of Antananarivo.

"That exposure to the research process is another major take-home focus that TBA really emphasizes," Vonesh said.

"It's always a joy mentoring the student research projects – they included a study on mouse lemurs, bird-nest predation, hunting spider abundance along a moisture gradient and one on ant diversity – none of which are my area of expertise, but there was a constant opportunity for learning," he said.

The Kirindy cast regulars

Overall, there was relatively low activity from the resident wildlife. But a

few made their presence known, providing Vonesh, fellow faculty and students with a chance to experience a variety of up-close-and-personal encounters. The wildlife regulars were the red-capped brown lemur, giant jumping rats and the fossa, the top predator in Madagascar.

"There were some charismatic mammals which were active and conspicuous, and really neat to see because they are really only found in this tiny forest patch of western dry forest," Vonesh said. "It made it a very neat experience to be there."

While the nocturnal fossa are widespread throughout the island, the creature is rarely seen. The group had the opportunity to observe and learn about the mating behavior of this cat-like predator because there was a mating tree on the edge of camp. There, on a regular basis, female fossa would climb the tree and prepare to meet and court a most suitable mate.

The group also had frequent visits from the giant jumping rat – critically endangered in Kirindy and unique to the area. Unlike many of their rodent cousins, which have multiple partners and copious numbers of offspring, the giant jumping rats form lifelong pairs and only have one offspring at a time. They live together as a family unit in a common den.



Another regular was the boki boki – a striped mongoose-like mammal that socializes in groups of three or four and is found primarily in the dry forest venues.

Fly butterfly, fly

For Vonesh, who has historically worked with reptiles, amphibians and otherwise aquatic critters, finding the ideal organism in the dry forest for students to research with their new quantitative skills proved to be challenging. The region was not suitable for aquatic research, and many of the reptiles were inactive due to the dryness.

Vonesh had to find a species that was abundant enough that his students would be able to gather enough data so that they could conduct a

meaningful analysis.

"It was tough, because there was not much that was abundant, conspicuous and diverse in a dry forest at the end of the dry season," Vonesh said. "But that's what pushed me to work with a group of organisms that I had not worked with before."

So Vonesh learned how to identify butterflies.

As the group walked along the forest trails, they would see a flurry of active butterflies bobbing along the path as they made their way from plant to plant.

"Fortunately, the skills and techniques being taught have a universal principle and could easily be applied no matter if the research was focused on trees, plants or other organisms," Vonesh said.

"There were enough butterflies that we were able to see a fair amount of a given species, and there were about 15 to 20 species that were commonly seen," Vonesh said. "So, there was enough diversity and enough abundance to work with ... my students were able to learn the right skills."

To add to the overall research experience, two larger research organizations – the German Primate Research Center and Wildlife Conservation Society, (WCS) – had field stations in the vicinity. The German Primate Research Center has been conducting long-term research observing the diverse lemur populations, and the TBA group visited with the center's researchers to learn more about the work done by the organization.

"Exposure to Madagascar was a great learning experience for me," Vonesh said. "Its flora and fauna are largely unique, and in many cases

extremely threatened. It was a great privilege to see some of these habitats and organisms firsthand."

Provided by Virginia Commonwealth University

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