

Discovery of a long-nosed 'shrew mouse' on a mountain in the Philippines will help to protect giant eagles

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An illustration of Balete's mouse. Credit: (c) Velizar Simeonovski, Field Museum

They might not get as much attention as the Amazon Rainforest or the Great Barrier Reef, but the mountains of the Philippines are one of the most biodiverse places on the planet. Inch for inch, these misty cloud forests are home to more unique species of mammals per square mile than anywhere else on Earth. Finding these mammals, most of which are tiny and hard to spot, is difficult work for even the most seasoned scientists. But the late biologist Danilo Balete had a special knack for field work. One of the mice he discovered has been revealed to be not just a new species, but a whole new genus.

"In the past several decades, we've learned just how incredibly important the Philippines are in terms of being home to mammals that are found nowhere else, and a lot of that knowledge can be traced back to fieldwork led by Danny Balete," says Larry Heaney, curator of mammals at Chicago's Field Museum and senior author of the paper describing the new mouse in the *Journal of Mammalogy*.

"Naming a [new species](#) after anyone is a big deal, a major honor given to people who make long-term, high-impact contributions to biodiversity science," says Dakota Rowsey, the study's first author, vertebrate collections manager at Arizona State University, and research associate at the Field Museum. "Naming a new genus after someone is one of the highest honors biologists can bestow."

The mountainous geography of the Philippines contributes to its biodiversity. Its [high mountains](#) are cooler and much wetter than surrounding lowlands, and it's difficult for [small mammals](#) to get from one mountain peak to the next. As a result, they tend to stay isolated on their own "sky islands," evolving separately from each other and forming new species. "The taller and the bigger the mountain range, the more species of mammals will be living there that don't live anywhere else in

the world," says Heaney.

Heaney has been studying the mammals of the Philippines for 40 years, and he first met Danny Balete in the late 1980s. At the time, Balete had recently completed his Bachelor's degree at the University of the Philippines and was already making a name for himself with his love of nature and skill at fieldwork. "I was establishing a research program, and asked around, 'Who would be a really good, enthusiastic young person to take into the field?' And several people immediately said, 'Danny Balete.' So I invited him to do some field work with me, and he did fantastically well," remembers Heaney. "He was just a superb field biologist. Danny could identify every plant, every frog, every bug, everything that you encountered, it was just astounding." Balete and Heaney went on to work together for the next 25 years until Balete's sudden death in 2017.

"Danny contributed hugely to scientific knowledge about biological diversity in the Philippines. His enjoyment of biodiversity was really infectious, making him a mentor and inspiration to a generation of researchers and conservationists," says Mariano Roy Duya, assistant professor of biology at the University of the Philippines, and coauthor of the new publication. "By the time of his death at far too young an age, he was already one of the most prominent biodiversity scientists working in the Philippines."



The late Filipino biologist Danilo "Danny" Balete. Credit: (c) Larry Heaney, Field Museum

But even after his death, Balete continues to shape what scientists know about Philippine mammals. When scientists discover something in the field, it oftens takes years for their work to be analyzed, written up, and published. That's the case with the newly-described shrew-mouse.

In 2007 and 2010, Balete went on expeditions to Mount Kampalili on the island of Mindanao as part of a Field Museum collaboration with the Philippine Eagle Foundation, who wanted to know what mammals lived alongside one of the largest and most critically endangered birds, the Philippine Eagle. While on Mount Kampalili, Balete and the team made a startling discovery: a dark brown mouse with small eyes and a long, tapering nose like a shrew, different from anything he'd ever seen on that island. It looked more like mice he'd seen hundreds of miles away on the island of Luzon.

"High up in the mountains, Danny was able to get cell phone service, so he sent me a text message right away, saying, 'We just caught this animal that looks a lot like the ones from Luzon, and it shouldn't be here,'" recalls Heaney. "So he immediately recognized that this was something really cool."

Three specimens of the new mouse were shipped to the Field Museum for further analysis to confirm Balete's hunch. And despite Balete's death, his colleagues continued to study the specimens from his fieldwork. Rowsey, then a postdoctoral researcher with Heaney, led a DNA analysis of the shrew-mouse and found that Balete was right, the rodent was different from any species known to science.

"That DNA study demonstrated that the new mouse was not related to the species up in the northern Philippines, but instead was related to species from Mindanao. It appears to be a remarkable case of what biologists call convergence—distantly related species that have independently evolved to resemble each other in ways that allow them to use habitats and resources in similar ways," says Rowsey.

Animals (and plants and fungi and other organisms) are given scientific names based on what their closest relatives are. Humans, for instance, are *Homo sapiens*. *Sapiens* is our species, and we're part of the larger

genus *Homo*, which includes our now-extinct closest relatives such as Neanderthals, *Homo neanderthalensis*. And since a genus is a higher-level group than a species, describing a whole new genus, like this mouse, is a bigger deal than finding a new species.



The holotype of the newly discovered mouse. Credit: (c) Danny Balete



Scientist Danny Balete doing fieldwork in the Philippines. Credit: (c) Larry Heaney, Field Museum



The cloud rainforest home of the new mouse on Mount Kampalili. Credit: (c) Danny Balete

"New species of mammals are being discovered globally at a considerable clip, maybe 50 to 100 new species per year," says Heaney. "Finding a brand-new genus, previously unknown to science genus like this one, that only happens at most a couple of times per year. In our 40 years of intensive study of Philippine mammals, this is one of nearly 50 new species, but just the fourth new genus we discovered."

The new genus's scientific name means "Balete's mouse," in honor of Balete's work in discovering it and so many other creatures. "As we

began picking up the pieces after his death, it became obvious to us that we had to name this new mouse after him, he deserves this," says Duya.

In addition to honoring Balete, the researchers say the [new genus](#) is important because it's another puzzle piece in understanding the diversity of life in the Philippines. Demonstrating that Mount Kampalili is home to a mouse found nowhere else on Earth may bolster conservation efforts by Indigenous communities which would help the mouse's neighbors, including the critically endangered Philippine Eagles.

"It's really important to show that when we protect one [species](#), like the magnificent Philippine Eagle, we protect not only our unique biological wealth but our cultural heritage as well," says Jayson Ibanez, coauthor and Director for Research and Conservation of the Philippine Eagle Foundation.

The Philippine eagle and the new "Balete's mouse" are neighbors to the Indigenous Mandaya group of Mount Kampalili. "Indigenous peoples get very excited whenever they learn that they share their homeland with a totally unique lifeform. And in this case, when we help protect Mount Kampalili, we also protect the primary watershed, airsheds, and biocultural sanctuaries for much of southeastern Mindanao, giving huge benefits to all the people who live here," says Ibanez. "With all of the threats from watershed destruction and climate change, we need all the help we can get."

In addition to the people quoted above, this study was contributed to by Sharon A. Jansa of the University of Minnesota and Eric A. Rickart of the Natural History Museum of Utah.

More information: Dakota M Rowsey et al, A new genus and species of shrew-like mouse (Rodentia: Muridae) from a new center of endemism in eastern Mindanao, Philippines, *Journal of Mammalogy*

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