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Solving a Five-Decade-Old Botanical Mystery, NYBG Scientist and Colleagues Identify a New Species of Amazonian Rain Forest Tree Using DNA Analysis

With Its Habitat Shrinking, the Species Is Likely Endangered, Researchers Write in Paper Published Online Today; Naming the New Species Is An Important Conservation Step



Leaves and fruit of *Aenigmanu alvareziae*, a newly identified species of Amazonian tree. Photo by Patricia Álvarez-Loayza, Ph.D.

Bronx, NY—Solving a five-decade-old botanical mystery, a New York Botanical Garden (NYBG) scientist and his colleagues have identified a new species of tree in the Amazon rain forest based on an analysis of the tree's DNA, finally placing it on its own branch of the tree of life with a name that means “mystery of Manu,” after the national park in Peru where it was first collected in 1973.

In a paper published online today by the journal *Taxon*, NYBG Curator Emeritus Wayt Thomas, Ph.D., and his co-authors name the species *Aenigmanu alvareziae* and assign it to the bitter-bush family (Picramniaceae), a group of tropical trees and shrubs found mainly in Central and South America, many of which have been used in traditional medicine to treat skin ailments.

The researchers write that the species' habitat—a type of rarely flooded lowland—is “exceedingly rare, rapidly disappearing, and protected in only a few reserves,” such as Manu National Park. Evaluating the species' conservation status, they conclude, “We believe that factoring in the limited habitat, the most accurate threat category at this time is that of Endangered.”

Determining the new species' identity, however, could ultimately help protect it and its habitat in the face of deforestation and climate change.

"The most effective way to conserve a habitat is to know the biological diversity within that ecosystem, identify the species, and determine their rarity," said Dr. Thomas, whose research focuses on plants of the American tropics, including the Picramniaceae family. "Then you have the data to argue for preservation, such as, 'This forest has 14 endangered species and eight that are new to science.'"

The Peruvian species remained an enigma for nearly 50 years because it did not appear to be related to any known species. Not only were scientists unable to identify the plant as a species that had already been described, they could not determine what family of plants it belonged to.

Co-author Robin Foster, Ph.D., a retired curator at Chicago's Field Museum who is now a researcher with the Smithsonian Tropical Research Institute, collected the first known specimen of the tree in 1973 while on a field trip in Manu National Park, which is part of the western Amazonian rain forest. The tree, about 20 feet tall, had tiny orange fruits shaped like paper lanterns.

"When I first saw this little tree, while out on a forest trail leading from the field station, it was the fruit—looking like an orange-colored Chinese lantern and juicy when ripe with several seeds—that caught my attention," Dr. Foster said. "It had characteristics of plants in several different plant families and didn't fall neatly into any family."

Various attempts to identify the plant, including studying its pollen, were unsuccessful, and the mystery plant sat in the Field Museum's collection of dried plant specimens for years. A research grant revived efforts to solve the botanical puzzle by analyzing the plant's DNA, but the dried specimens did not yield usable molecular material. Patricia Álvarez-Loayza, Ph.D., a scientist who conducts research in the Manu National Park, sent a fresh specimen of the plant to the Field Museum in 2015.

DNA analysis revealed that the mystery plant's closest relatives were in the Picramniaceae family, which surprised researchers because its overall appearance did not match other species in the family. The Field team sent specimens to Dr. Thomas for evaluation.

"When I opened the package and looked at the specimens, my first reaction was, 'What the heck?' recalled Dr. Thomas, the lead author of the *Taxon* paper. "These plants didn't look like anything else in the family. Once I looked really carefully at the tiny flowers, which were only two to three millimeters long, things fell into place."

Dr. Thomas and his colleagues found that the plant was not only a new species but also represented a new genus, a group of closely related species. The genus name, *Aenigmanu*, means “mystery of Manu,” while the species name, *alvareziae*, honors Dr. Álvarez-Loayza, who has spent years researching and monitoring the forest in Manu National Park.

“*Aenigmanu*, a new genus of Picramniaceae from Western Amazonia” is available at the following link: <https://onlinelibrary.wiley.com/doi/10.1002/tax.12588>

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The New York Botanical Garden is a museum of plants, an educational institution, and a scientific research organization. Founded in 1891, the Botanical Garden is one of the world’s preeminent centers for studying plants at all levels, from the whole organism down to its DNA. Garden scientists conduct fundamental research on plants and fungi globally, as well as on the many relationships between plants and people. A National Historic Landmark, the Garden’s 250-acre site is one of the greatest botanical gardens in the world and the largest in any city in the United States, distinguished by the beauty of its diverse landscape and extensive collections and gardens, as well as by the scope and excellence of its programs in horticulture, education, and plant research and conservation. Learn more: nybg.org

The New York Botanical Garden, 2900 Southern Boulevard, Bronx, New York 10458

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