

Scientists at NYBG add 81 new species to the catalog of plant life on Earth

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Photo by Andrew Henderson, Ph.D.

The palms that Vietnamese villagers weave into hats, many varieties of lichens that depend on the pristine environment of the Great Smoky Mountains, and small, shrub-like trees that are threatened by development and deforestation in Brazil were among the scores of plant and fungus species that scientists at The New York Botanical Garden discovered and described in the course of one year.

As part of their effort to catalog all plant [life on Earth](#), Botanical Garden

scientists named 81 new [species](#) of plants and fungi in 2011. They also established four new genera and two new orders of plants and [fungi](#). Genera and orders are groupings of related species.

Working in the field, laboratory, and research collections around the world, Garden scientists found or cataloged new species in a wide variety of familiar [plant groups](#), including South American [blueberry](#) relatives and bromeliads; Southeast Asian [mushrooms](#); a Mexican oak; and a Colombian cycad, one of a family of plants often referred to as "[living fossils](#)."

"This impressive collection of new species from around the world that Garden scientists discovered and described in just one year is a testament of their dedication to one of our central goals—finding and cataloging all of the plant life on Earth," said James Miller, Ph.D., the Garden's Dean and Vice President for Science. "But this also shows how little we know about the plants on Earth and how far we still have to go to get a comprehensive catalog of them."

The announcement of the new species discoveries comes little more than a month after another important development concerning the study and conservation of Earth's botanical biodiversity—the agreement by the Garden and three other leading botanical gardens to create the first online catalog of plants by 2020. The project, called the World Flora, will make comprehensive information about as many as 400,000 plant species—including the 81 newly discovered species—available to the international community.

All of the new species, genera, and orders were either published by Garden scientists in scientific journals or books in 2011 or had been accepted for publication by the end of the year. In many cases, Garden scientists collaborated with researchers at other institutions.

The discoveries highlight developments that are shaping botanists' research in the 21st century not only in the field and in plant collections but also increasingly in the laboratory. In addition, they call attention to the environmental risks that many plant species face.

One of the most intriguing examples of these developments involves the species of palms that are used to make the distinctively wide, conical hats that many Vietnamese wear.

Because of decades of war and isolation, scientists were unable to conduct significant field research in Vietnam for most of the second half of the 20th century. It was not until 2008 that Garden scientist Andrew Henderson, Ph.D., one of the world's leading palm experts, and his Vietnamese colleagues published a scientific description of the main palm species used in the hats. Based on its physical similarity to species in the genus *Licuala*, they assigned it to that genus, naming the species *Licuala centralis* (photo, left).

However, analysis of DNA samples that Henderson collected during his field research revealed that the plant's genetic material was not similar to that of other *Licuala* species. In fact, it and several related species constituted a new genus. Henderson and his collaborator, Christine Bacon of Colorado State University, named the genus *Lanonia*, from the Vietnamese words for the plants—*la non*, or "hat palm."

As a result of their work, *Licuala centralis* has been renamed *Lanonia centralis*, illustrating the way in which laboratory research has become a critical complement to work in the field and in plant collections.

With its somewhat isolated location between the South China Sea to the east and highlands to the west, Vietnam is a center of palm species that are endemic, meaning they are found only there. That makes the country's palms especially interesting to researchers. However, as in

other tropical countries, deforestation is reducing the country's forest cover, potentially threatening endemic species with extinction before they can be discovered and studied.

"Vietnam is full of undescribed new species," said Dr. Henderson, who continues to work on identifying and cataloging the palms of Vietnam and the rest of Southeast Asia. "You can drive some places and look out the window and see new species, and the reason for that is because Vietnam was at war for so long. Biology and taxonomy were ignored."

In addition to establishing *Lanonia* as a new genus, last year Dr. Henderson named 19 new species of palms based on extensive research in the Garden's William and Lynda Steere Herbarium and other herbaria in the United States, Central and South America, and Europe. Twelve of the new species are in the genus *Geonoma*, whose members are small- to medium-sized plants generally found in the understories of tropical forests in Central and South America. In the course of his research, Dr. Henderson examined nearly 5,000 *Geonoma herbarium* specimens. He scored each specimen on a series of nearly four dozen physical characteristics to discover similarities and differences among them. That allowed him to identify the new species.

Garden botanists did not have to travel to distant countries to make significant discoveries in the last year. Of the 21 new species of lichens described by James Lendemer, Ph.D., he and his colleagues found 15 of them in the [Great Smoky Mountains](#) National Park in North Carolina and Tennessee, the most visited national park in the United States. That fact demonstrates that even in an area visited by eight to 10 million people a year, much biodiversity remains to be discovered.

In fact, in the course of five field trips to the Smokies, Lendemer and his colleagues, including Garden curator Richard Harris, discovered that the Smokies were home to many more lichen species than had previously

been known, increasing the number of recorded species there by 60 percent.

Lichens are composite organisms consisting of a fungus and an alga or another organism capable of photosynthesis. They grow on a wide range of surfaces, including bare rock and the leaves and bark of trees. Many species are sensitive to pollution and are seen as indicators of environmental health. They also serve many important functions in a healthy ecosystem.

"Lichens are critical components of terrestrial ecosystems," said Dr. Lendemer. "They're important in nutrient cycling. Animals and insects eat them and use them for shelter."

Some lichen species may even be specifically adapted to grow on certain types of trees, including ones typically found in old-growth forests. Dr. Lendemer and his collaborators found one of the new species, *Arthonia kermesina* (photo, right), only on large, old spruces at high elevations in the Smokies.

In addition, Brendan Hodkinson, Ph.D., who discovered two new orders of lichens—Sarrameanales and Trapeliales—in collaboration with Dr. Lendemer, noted that lichens most likely have importance to human life in ways that remain to be discovered, such as the apparent ability of some species to fix nitrogen, an important characteristic for making soil productive for food crops.

"Since lichens produce so many different chemical compounds, there's a lot there that could be worked with," Dr. Hodkinson said. "There are definitely a lot of potential human applications that haven't been looked at."

The value of [lichens](#) for both their known and potential uses makes it

important to increase efforts to find and conserve them, according to Dr. Lendemer. One starting point for that work is to discover new species.

"Without a name, a species can't be saved," he said. "Giving a species a name inserts it into a dialog, but if you don't describe it, you can't have that dialog."

Among other new species discovered by Garden scientists in 2011, Benjamin Torke, Ph.D., and collaborators described five new species of *Swartzia*—a genus of tropical trees—found only in eastern Brazil. Dr. Torke and his colleagues are working to evaluate the new species on the conservation scale used by the International Union for the Conservation of Nature. Because these species are found in restricted habitat, much of which has been cleared for agriculture or development, Torke believes it is likely that they will be categorized as nearly threatened, if not vulnerable to extinction.

Tropical trees, bromeliads, and a new “living fossil” among other notable finds

In addition, Garden scientists made notable discoveries in several well-known or especially interesting families of plants:

- Garden graduate student Julian Aguirre and a colleague described five new species in the genus *Aechmea*, a type of bromeliad—a family of tropical flowering plants, many of which are cultivated as houseplants;
- Paola Pedraza, Ph.D., and retired Garden scientist James Luteyn, Ph.D., described seven new species from Colombia in the genus *Vaccinium*, the genus that includes domestic blueberries;
- Roy Halling, Ph.D., and colleagues added five new species to the

- genus *Phylloporus*, a group of Southeast Asian mushrooms;
- Lawrence Kelly, Ph.D., and collaborators described a new oak species, *Quercus delgadoana*, found in Mexico; and
 - Dennis Stevenson, Ph.D., and colleagues added *Zamia tolimensis* to the catalog of cycads, plants that are often called "living fossils" because they existed at the time of the dinosaurs.

Dr. Miller notes that these discoveries come at a time when approximately 50,000 square miles of forest are being destroyed worldwide every year, threatening plant biodiversity.

"A significant percentage of plant species are in serious decline, and probably a large number of them are species that we haven't discovered yet," he said. "We're working as quickly and as efficiently as we can to catalog these species, but it's a race against time."

Provided by The New York Botanical Garden

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