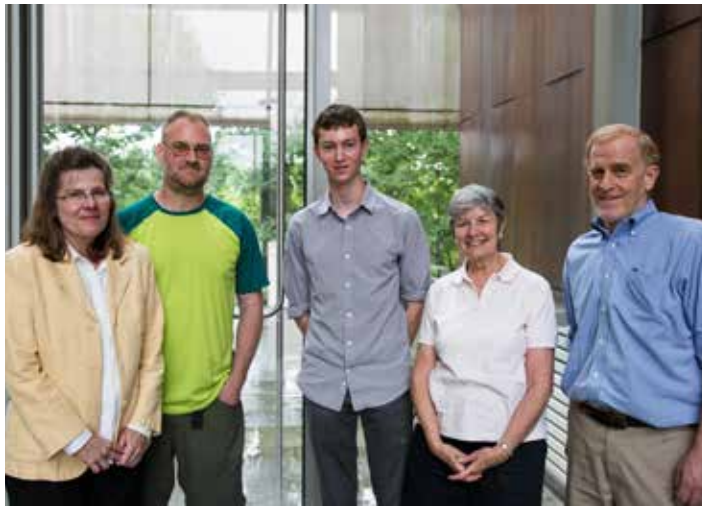


Recent high school graduate Benjamin Kepecs, a 2016 Cullman Science Intern, contributed to NYBG's research this past summer on a large, complex, and diverse group of Yellow-eyed grasses (Xyridaceae) that are important for understanding the biology of the relatives of major cereal and grain crops, and natural hybridization in plants. Xyridaceae form the groundcover of many neotropical savannas and freshwater wetlands that are biodiversity hotspots. These habitats are ecologically fragile and vulnerable to shifts in temperature and precipitation. Since the Yellow-eyed grasses are sensitive to such environmental changes, information about them can help inform decisions about conservation.

Species in this family can be difficult to tell apart. Two or more species may at first glance look the same, yet have significant genetic differences, so it has been important to develop a predictive, hierarchical classification and taxonomy for the group. Lisa M. Campbell, Ph.D., Administrative Curator, leads this research on the evolutionary history, systematics, and morphological and anatomical diversity in Xyridaceae, with a team of international collaborators. Ben's assignment was to fill in missing data in the DNA sequencing matrix, working with Damon P. Little, Ph.D., Cullman Associate Curator of Bioinformatics.

Ben made an important contribution to the project by redesigning a set of primers to make them more effective in amplifying genes in this group. Lisa said, "This result is exceptional for someone who just completed high school!" This fall Ben begins his studies in biochemistry at Columbia University.



Benjamin Kepecs, Cullman Science Intern (center), presented his research project at the August NYBG Science Intern Symposium, attended by his Biology teachers from Salanter Akiba Riverdale High School, Tobie Brandriss (second from right), and Bob Goodman (far right), and mentors (from left), Dr. Lisa Campbell and Dr. Damon Little.

Questions or observations about NYBG's research programs can be directed to:

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In 2016 we celebrate NYBG's 125th Anniversary and its role as an oasis in this busy metropolis since its founding in 1891, and look forward to the Garden's continued leadership as a dynamic New York City cultural institution.

A National Historic Landmark, this 250-acre site's verdant landscape supports over one million living plants in extensive collections. Each year more than one million visitors enjoy the Garden not only for its remarkable diversity of tropical, temperate, and desert flora, but also for programming that ranges from renowned exhibitions in the Haupt Conservatory to festivals on Daffodil Hill.

The Garden is also a major educational institution. More than 300,000 people annually—among them Bronx families, schoolchildren, and teachers—learn about plant science, ecology, and healthful eating through NYBG's hands-on, curriculum-based programming. Nearly 90,000 of those visitors are children from underserved neighboring communities, while more than 3,000 are teachers from New York City's public school system participating in professional development programs that train them to teach science courses at all grade levels.

NYBG operates one of the world's largest plant research and conservation programs, with nearly 200 staff members—including 80 Ph.D. scientists—working in the Garden's state-of-the-art molecular labs as well as in the field, where they lead programs in 49 countries.

Learn more about NYBG's anniversary at nybg.org/125

NYBG/125

SPOTLIGHT ON PLANT SCIENCE AND CONSERVATION
FALL 2016

NEW YORK BOTANICAL GARDEN



It is unlike any other native Ash—Pumpkin Ash (*Fraxinus profunda*)—distinguished by its fuzzy twigs, much larger fruit, and the pumpkin-like swelling that the tree develops at the base of its trunk when it grows in standing water. Daniel Atha, NYBG's Conservation Program Manager, helped discover and document five populations of rare Pumpkin Ash in New York City, including on the Garden's grounds, adding almost a dozen rare trees to the flora of New York State.

Ashes form a high percentage of forest trees in the eastern United States but are under threat from the invasive beetle, the Emerald Ash Borer, which has already killed hundreds of millions of trees in North America. But Pumpkin Ash, one of eight Ash species found in the Northeast, may be more resistant to this borer than the more common Green or White Ash. Daniel is part of a consortium to investigate the genetic relationships among our native Ash trees to find resistant strains and traits that can be used to protect remaining trees and for replanting efforts. To learn more, visit nybg.org/ash



Clockwise from top left: Red Admiral butterfly visiting Swamp Milkweed in Central Park; pressing plant specimens in Myanmar; *Microcycas calocoma*, a Critically Endangered cycad endemic to Cuba; counting seedlings of invasive Incised Fumewort along the Bronx River.

The world's plants are in peril—one-third of Earth's 350,000 known plant species are at risk of extinction because of habitat destruction and a changing climate. Yet plants are fundamental to our lives—as food and medicine, and for creating the air we breathe. For 125 years, NYBG has been a leading force in saving the world's plants and fungi and, today, is leveraging its scientific resources for even greater results.

The newly established Center for Conservation Strategy, led by Brian M. Boom, Ph.D., Vice President for Conservation Strategy, Director, NYBG Press and Science Outreach, and Bassett Maguire Curator of Botany, focuses on projects in six Areas of Botanical Concern (ABCs), or regions where conservation action is urgent and NYBG has a unique ability to impact change. For example Amazonia, where NYBG has been working for well over a century, is one because its rain forests hold 10% of the world's known plant species and are in constant threat from deforestation. Others include the

Caribbean, Southeast Asia, islands of the Pacific, the Atlantic Coastal Forest of Brazil, and North America.

In New York, NYBG scientists and their partners are raising awareness of and developing management plans for such invasive plants as Incised Fumewort that is threatening ecosystems along the Bronx River, through the newly formed Invasive Species of New York City Working Group. NYBG is also developing the *New York City EcoFlora*, a dynamic database of local plants and their ecological relationships that will be informed both by published historical data and new observations made by trained citizen scientists. These efforts and the Center itself are dedicated to catalyzing conservation action worldwide in projects that range from rapidly assessing the conservation status of plants of the Americas to preserving plant-based traditional knowledge and cultural practices in the South Pacific. To learn more, visit nybg.org/science-new/ccs

Benjamin Torke, Ph.D., Associate Curator, Institute of Systematic Botany, recently returned from his fourth expedition to the Tapajós River Basin in the Brazilian Amazon, one of the most botanically under-explored places on Earth. His destination was the hard-to-reach Amazônia National Park, the region's oldest national park. Reaching collecting sites meant driving vehicles across makeshift bridges and boating through rapids.

The Tapajós River Basin, roughly the size of France, has extremely high botanical diversity that is found nowhere else but faces pressing threats from deforestation to make way for cattle ranching, mining, soybean farming, and even a dam. Ben co-leads a multi-institutional initiative with support from the National Science Foundation to improve the floristic inventory of the Basin to support its protection, with a focus on the region's extensive system of federally protected areas. The project team includes Brazilian colleagues from the Federal University of Pará in Santarém, the Botanical Garden of Rio de Janeiro, and the Instituto Chico Mendez, as well as local field guides, and Brazilian graduate and undergraduate students.

In one transect, the team sampled 415 trees and lianas, which yielded over 200 species, a remarkable number. Their hotel allowed them to transform the lobby into an "industrial" specimen preparation and drying center for the 1,000 plants collected. Data are being compiled into a Web-based guide. Yet in the whirl of work in the forest, there was a moment of pause. "We observed the fresh tracks and steaming scat of a jaguar, which made us all uneasy," said Ben. "But, seeing this reinforces the importance of protecting these parks."



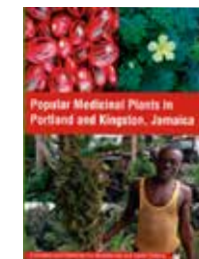
Dr. Benjamin Torke studying tree species diversity in the Brazilian Amazon.

NYBG is pleased to highlight two new publications.



Anemia (Anemiaceae)
(Flora Neotropica Monograph 118, NYBG Press) by John T. Mickel, Ph.D., Senior Curator Emeritus (at left). This monograph represents the culmination of John

Mickel's lifetime work on the systematics of the fern genus *Anemia*, comprising 115 species found mostly in tropical America with a fossil record dating back to Jurassic times. The genus turned out to be far more complicated than John imagined because many of the species hybridize, making it challenging to identify them. "This book stands out," says Robbin Moran, Ph.D., Nathaniel Lord Britton Curator of Botany and an expert in ferns. "Not only has John made a tremendous contribution to fern studies but he has also identified where further research needs to be done."



Popular Medicinal Plants in Portland and Kingston, Jamaica (Pear Tree Press), by Ina Vandebroek, Ph.D., Matthew Calbraith Perry Assistant Curator of Economic Botany and Caribbean Program

Director, and David Picking, Research Fellow, The University of West Indies (Mona Campus). This community guidebook records the disappearing oral traditions of Jamaicans living in urban Kingston and rural Portland Parish regarding their use of medicinal plants. Two years of research combine biocultural knowledge with scientific information from published biomedical literature. The result is in-depth information on the effectiveness and safety of using herbal remedies, providing a permanent record of medicinal plant use to return to the community, and supporting Ina's goals of biocultural conservation, following more than a decade of work with local and traditional communities in the Caribbean.