

Each year NYBG places 30–50 high school and college students in Science internships, working directly with Garden scientists, participating in cutting-edge research, and gaining valuable experience that helps prepare them for college, graduate school, and careers in science and education. Julia Beros was one of 34 Summer Science Interns in 2017. She graduated in May from Sarah Lawrence College, and recently wrote this post for Science Talk, one of NYBG’s popular blogs:

“It’s hardly a secret that the Amazon rain forest, the largest expanse of tropical rain forest on Earth, houses great biodiversity and that environmental degradation from climate change and human enterprise is a massive and looming threat throughout the region. The most critically threatened areas also happen to be the least studied and inventoried, but they are estimated to have the highest biodiversity within the Amazon rain forest. NYBG scientist Benjamin Torke, Ph.D., is working to fill in the gaps in our understanding of the rich plant life in one such area in the state of Pará in the southeastern part of the Brazilian Amazon.

Recently, environmental degradation has threatened the potential for capturing and sharing this knowledge. In the southeastern regions of the Amazon, many of the detrimental effects of climate change are heightened by expanding human development. Ranching, logging, soy bean farming, mining, and settlement all contribute to the loss of natural habitat. The construction of a highway that bifurcates the forest has simultaneously created isolated regions of biodiversity and increased the rate of forest degradation.

The Amazon is not completely without protection, though. Many efforts have been made toward forest conservation and habitat preservation. To manage protected lands, government agencies, local indigenous communities, and other groups control various protected parks.

Sandwiched between two such parks, the Tapajós River is the primary site for Dr. Torke’s multi-year floristic inventory project. The goal of a botanical inventory such as this is to collect as much usable data to share as possible. In talking with Dr. Torke, it is clear this is no small endeavor. The amount of collected plant matter is overwhelming, and a huge amount of labor is involved in identifying and determining plant species. Much of that occurs in the field while plants are being pressed. Naturally, though, when collecting vast amounts of unknown, diverse species, determining the family, genus, and species becomes a dizzying task, one that continues long after the specimen data make it to NYBG’s William and Lynda Steere Herbarium and the C.V. Starr Virtual Herbarium, where it can be freely accessed for research. Endemic plants—species that are native and restricted to this area—could provide valuable insight into plants in the same family elsewhere and be relevant to studies of all Neotropical plant diversity. Understanding this region’s biodiversity is also critical in supporting and enhancing conservation research and action.”



Dr. Benjamin Torke studies a plant specimen on the Tapajós River.

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

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NYBG

SPOTLIGHT ON PLANT SCIENCE AND CONSERVATION

FALL 2017

NEW YORK BOTANICAL GARDEN



Since its founding in 1891, The New York Botanical Garden has been guided by a tripartite mission of plant research and conservation, horticulture, and education. Embedded in all three of these areas have always been, and continue to be, a deep concern for and commitment to promoting global environmental awareness and training the next generation of Earth’s caretakers.

At NYBG these efforts are wide-ranging, with informal and formal programs in unique learning facilities for students from pre-K through post-graduate studies. This issue highlights a few of the inspiring mentors who are having an impact in this critical endeavor as well as participants in several of the innovative offerings that make NYBG a leader and national model for science education.

Tynisha Smalls, Genomics Laboratory Manager (left), with Dr. Barbara Ambrose, Director of Laboratory Research and Associate Curator of Plant Genomics, explains the role of DNA and genomics in studying plant diversity.

NYBG Science Leadership Update

NYBG is pleased to announce two changes in the leadership of the Plant Research and Conservation Division.



Lawrence M. Kelly, Ph.D.
Dr. Kelly has been appointed Associate Vice President for Science Administration and Director of Graduate Studies, overseeing the activities of the Plant Research and Conservation Division in conjunction with other members of the Science Executive Team. He earned a Ph.D. from Cornell University, and since joining the Garden in 2003, has served as Director of the Commodore Matthew Perry Graduate Studies Program, in which students work on research projects related to systematics, genomics, economic botany, forestry, ecology, bioinformatics, and conservation biology. Larry’s research focuses on the evolution and classification of flowering plants. He is also Editor-in-Chief of *Flora Neotropica*.



Barbara A. Ambrose, Ph.D.
Dr. Ambrose has been named Director of Laboratory Research and Associate Curator of Plant Genomics. She received a Ph.D. in Molecular, Cellular, and Developmental Biology from the University of California at San Diego, and began her career at the Garden in 2008 as Assistant Curator of Plant Genomics. She has focused her research on understanding the genetic basis for the development of plant structures, providing insights into plant evolution and generating knowledge that may help us understand the capacity of plants to adapt to changing climates. Barbara also serves as an Editor of *Botanical Review*.

Jessica Allen, Recent Ph.D. Graduate

NYBG is a preeminent center for biodiversity research and conservation, and a primary mission is the education of future scientific leaders through the Commodore Matthew Perry Graduate Studies Program. More than 300 students have received Ph.D. and Master’s degrees through the Garden’s partners (currently the City University of New York, Columbia University, Cornell University, Fordham University, New York University, and Yale University). The strength of the program lies in its blend of classroom study, traditional fieldwork, collections-based research, and the cutting-edge molecular technologies used in the Plant Research Laboratory.

Jessica Allen, a recent Ph.D. graduate, is addressing pressing concerns about lichen conservation worldwide. She first came to the Garden in 2011 as an Intern in the William and Lynda Steere Herbarium, where she helped digitize the lichen and bryophyte collections. After entering the Graduate Studies Program, she trained under Dr. James Lendemer—a leading lichenologist and NYBG alumnus—and in 2014, she was awarded a prestigious National Science Foundation Graduate Research Fellowship. Using tools such as ecological niche modeling, molecular phylogenetics, and population genetics, Jessica’s research into the systematics and evolution of lichens investigated how rare lichens of the southern Appalachians and Mid-Atlantic Coastal Plain of the U.S. would be impacted by climate change. She successfully defended her thesis, “Lichen Conservation in Eastern North America,” in April 2017, and has begun post-doctoral research at the Swiss Federal Institute for Forest, Snow and Landscape Research WSL, where she will study the population genetics of rare lichens in European floodplain forests in connection with the impacts of local hydroelectric power production.



Dr. Jessica Allen examines lichens and mosses on the surface of a rock.

Girls Who Code



Graduate Student Cecilia Zumajo explains computational algorithms that she is developing to understand seed evolution.

On July 21, 2017, Dr. Barbara A. Ambrose welcomed a group of 20 teens, ages 16–17, from Girls Who Code, a nonprofit dedicated to closing the gender gap in technology. NYBG corporate partner Bank of America hosted the group for a Summer Immersion Program and brought them to the Garden for a hands-on lesson on how technology has advanced plant research and conservation and enabled NYBG to digitally share important information about plant biodiversity with other scientists worldwide.

The all-female Science team—including Genomics Laboratory Manager Tynisha Smalls, Laboratory Technician Samantha Frangos, Graduate Student Cecilia Zumajo, and Undergraduate Intern Cynthia Hyuck—led the group on a tour of the Plant Research Laboratory, talked with them about science careers, and offered insight into what it is like to work at a premier research institution.

The teens then engaged in hands-on activities to understand DNA and the role of genomics in studying plant diversity, including Polymerase Chain Reaction (PCR), structure and function of DNA and RNA, visualization of whole genome sequence data, and use of the computer code for analyzing transcriptome data. They loaded a gel with PCR products that were separated and then visualized at the end of the visit, when they took home a picture of the DNA bands that they saw on the gel.



Girls Who Code participants prepare to load DNA into a gel.