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—Dr. Barbara Thiers, NYBG



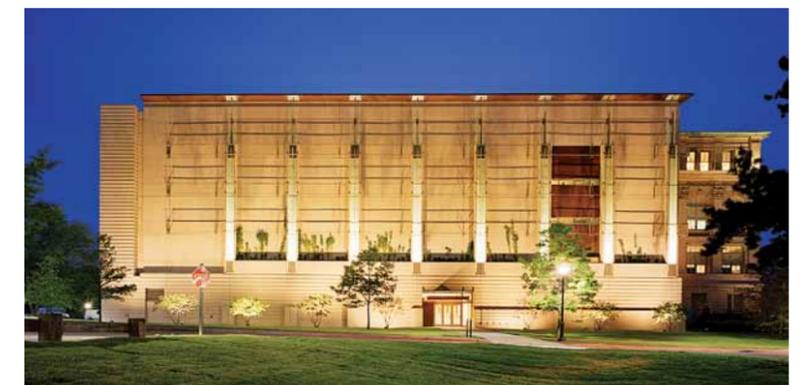
The iconic Enid A. Haupt Conservatory.

IN BLOOM

A Thriving Collaboration Between Taft and The New York Botanical Garden

By Debra Meyers

The end of the 19th century was a time of great innovation in both science and the arts. From the discovery of radioactivity and X-rays, to the publication of literary classics penned by the likes of Oscar Wilde, Rudyard Kipling, and Thomas Hardy, the 1890s brought scientific advancement and cultural evolution to new and lasting heights. It was in this age—this context—that Horace Dutton Taft began preparing young men for well-rounded lives of intellectual, artistic, and athletic achievement. Taft’s mission to “educate the whole boy” was the heart and soul of life at his school in Pelham Manor, New York.



The William and Lynda Steere Herbarium, the centerpiece of NYBG’s botanical research program, is the fourth largest herbarium in the world and the largest in the Western Hemisphere, with a collection of more than seven million preserved specimens, some of which were collected by Taft student interns. ROBERT BENSON

Around the same time, and not more than a few miles down the road, another visionary leader was laying the groundwork for what would, like Mr. Taft's School, become an iconic and enduring institution, "distinguished by the beauty of its landscape" and the "excellence of its programs."¹ Inspired by the Royal Botanic Gardens near London, England, Columbia University botanist Nathaniel Lord Britton and his wife, Elizabeth, led a public campaign to establish what would become The New York Botanical Garden (NYBG). In 1891, the Garden was chartered as a private, nonprofit corporation, on grounds owned by the city of New York.

Now, 125 years since their founding, Taft School and The New York Botanical Garden have risen in prominence and expanded their missions, while fulfilling the promise of their founders. They have also come together in a unique partnership that brings NYBG scientists to the Taft campus and opens Garden doors for Taft students to work and to learn.

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share and complement their efforts," says Taft Director of Planned Giving Paul Parvis. "It makes good sense for two organizations that are both very keen about opportunities in education to join forces."

Parvis came to Taft in the fall of 2010, after spending four and a half years as director of planned giving at The New York Botanical Garden. During that time, he not only came to know the scope of the science and the breadth of the educational resources that defined the Garden, but Parvis also came to know NYBG scientist Dr. Scott Mori. On their daily walks from the train station to the office, the two would talk about the Garden's reach in the community. With Parvis moving on to Taft and the daily walks nearing an end, the talk turned to expanding the Garden's

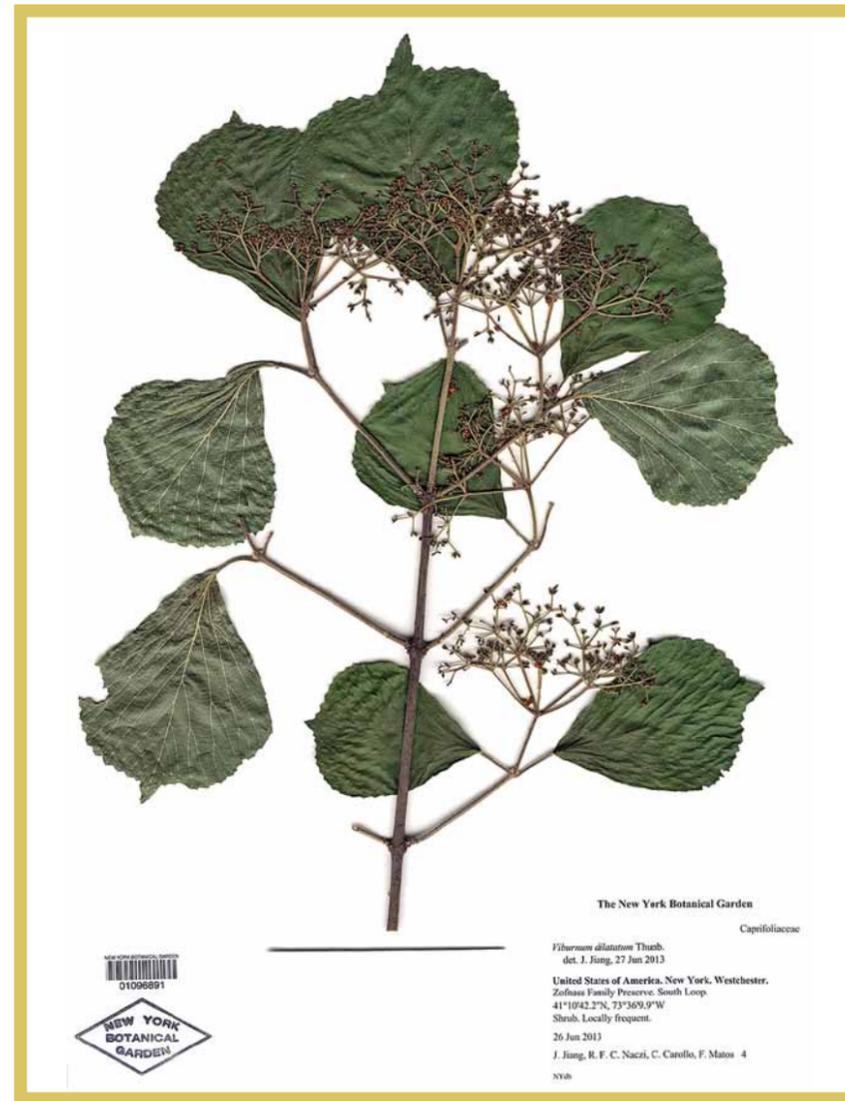
reach through a partnership between NYBG and Taft, and the short walk from the train station became a long journey toward a compelling collaboration.

"Even in those early conversations we had a fairly clear idea of what we thought the partnership should look like," explains Mori. "The components we envisioned are the components that are, for the most part, in place today."

Parvis and Mori talked about a lecture series at Taft featuring NYBG scientists. They envisioned regular lectures on topics that complemented work being done in Taft's classrooms, and an internship program that would allow Taft students to engage in real-world research at the Garden. They also talked about eco-travel programs led by NYBG experts. Before his



Natasha Batten '15 spent time working on several "mini projects," with the goal of understanding the genetic basis of fruit diversity. During the first summer, Batten focused on the structural elements of fruits using classical botanical techniques. Last summer she focused on the molecular side, which involved extracting DNA, cloning, subcloning, and sequence analysis. Batten, who is now studying chemical and biological engineering at MIT, believes that her time at NYBG will be important moving forward. "The experience gave me a good introduction to molecular genetics. Though the work was with plants, the principles are really universal and will extend to human biology," says Batten. "This experience has been an integral step in my academic and career path."



CAMILA JINGCHEN JIANG

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R. F. NACZI

From field to physical file, Camila Jiang '14 collected, processed, and created permanent records for more than 50 plant specimens during the summer of 2013. Herbarium records give Jiang sole credit for indentifying several specimens, including the *Viburnum dilatatum* (above), a perennial shrub in the Caprifoliaceae family. Opened in 2002, the Steere Herbarium is the largest in the Western Hemisphere, and is home to 7.3 million plant and fungi specimens, of which 2.3 million are currently digitized and searchable through the Virtual Herbarium system.

first day on the job at Taft, Parvis pitched the idea to Development Director Chris Latham. An enthusiastic Latham took it to Headmaster Willy MacMullen '78 and Science Department Head Jim Lehner.

"Everyone was wholeheartedly intrigued by the idea," says Parvis. "It bodes well for the school to be aligned with one of the best research and education institutions in the world. It demonstrates not only the tremendous opportunities available to Taft students, but also the esteemed position Taft enjoys in the larger community."

While Parvis worked to grow support

for the partnership at Taft, Mori was busy with legwork at the Garden. He spoke with his colleagues and supervisors, including the Garden's CEO and President Gregory Long. All agreed that it was an excellent concept.

"We were excited about the idea of a partnership with the Taft School because education is a primary commitment of our Science Division, in order to mold the next generation of plant scientists," says Dr. Barbara Thiers, the Garden's vice president for science administration. "Most of our educational activities involve students at the graduate level,

and so extending our outreach to high school students contributes to one of our core missions. Having the opportunity to work with thoughtful and creative young minds is inspiring to us.”

Between late 2010 and early 2012, Parvis and Mori worked in earnest to build a foundation and structure for the partnership. Meetings, site visits, and conference calls gave way to detailed proposals, action plans, and, finally, in February of 2012, the first event that cemented the pathway between Taft and the Garden: the debut of the scientific lecture series at Taft. Mori, then the Nathaniel Lord Britton Curator of Botany at The New York Botanical Garden, delivered the inaugural lecture.

Around the same time, science teacher Laura Monti '89 was working with a group of eight Taft students engaged in an independent, biomedical research tutorial.

“Because of our relationship with NYBG, I was able to tour the Garden a few months earlier with other Taft teachers,” explains Monti. “I thought my students would also appreciate seeing a modern lab doing leading edge research, especially from a different perspective than the biomedical angle they more commonly see.”

Monti arranged for the group to visit the Garden, where they had access to sights most of NYBG’s nearly one million visitors each year rarely get to see, including the William and Lynda Steere Herbarium and the molecular genetics lab in the Pfizer Plant Research Laboratory.

The seeds Parvis and Mori had sown were not only taking root, but beginning to grow, one bloom nurturing the next: Dr. Amy Litt was the tour guide for Monti’s group; Litt later traveled to Taft as a lecture series speaker. Inspired by what she heard during that lecture, Natasha Batten '15 wrote to Litt to inquire about internship opportunities at NYBG; Batten spent the next two summers interning at the Garden. And the synergistic growth continues. To date, Taft has hosted seven lectures featuring Garden scientists—now

sponsored by the Yerkes Family Botanical Art and Sciences Speakers Fund—with several more scheduled for the current academic year. In February of each year, Monti takes students to visit the Enid A. Haupt Conservatory and the Garden’s molecular labs, which is where Ezra Levy '15 met Dr. Damon Little, with whom he interned this past summer.

“The internship is both the most complex and most successful component of the partnership,” explains Mori, who,

along with Dr. Robert Naczi, the Arthur J. Cronquist Curator of North American Botany, mentored Taft’s first NYBG intern, Camila Jingchen Jiang '14.

Jiang spent the summer of 2013 helping to build a botanical inventory of plant life found at the Zofnass Family Preserve of the Westchester County Land Trust, near Bedford Hills, New York. Assigned to ferns, mosses, and lichens, Jiang not only collected and processed fertile specimens, but created a detailed and permanent

“THE PFIZER LAB IS A FANTASTIC PLACE TO WORK”

notes Ezra Levy '15. “There aren’t many labs in the world populated with a community of scientists so invested in both their work and the work of their mentees, be they graduate students or summer interns. I will be hard-pressed to find another lab so comfortable to work in, flooded with natural light, with a beautiful view over part of the Garden.

“I hope my time at the Garden will be useful not only for me but for other scientists who may benefit from my tidbit of work. The project should help improve some results collected in the field, as it would nearly eliminate the need for transporting lab materials, while collating the same data more quickly and just as effectively. As for me, there is no question that my internship this summer has helped to shape my notions of what I want to accomplish in college and in a career in the sciences. I am exceedingly grateful to Taft, The New York Botanical Garden, and everyone involved in their partnership for this opportunity.”



record of each new specimen she found, scanning and photographing the plants, recording GPS coordinates for the plant locations, and in some cases, mounting, barcoding, and labeling her finds. Jiang’s records live physically in the William and Lynda Steere Herbarium, and electronically in the C.V. Starr Virtual Herbarium. Like the 2.3 million digitized specimens housed in the Virtual Herbarium, Jiang’s specimens are searchable by scientists and others throughout the world.

Jiang’s successful internship solidified the program, opening doors for future interns. Natasha Batten '15 spent the past two summers working with Dr. Barbara Ambrose, associate curator of plant genomics, while Ezra Levy '15 was mentored by Cullman Associate Curator of Bioinformatics Dr. Damon Little. Batten’s research projects were designed to expand scientific knowledge of the molecular genetic basis for plant diversity. Levy hoped to improve

options for collecting plant samples. For seven weeks, Levy worked on devising a rapid DNA extractor for use by botanists in the field. Isolating plant DNA usually takes place in a laboratory, where equipment, like the centrifuges needed to separate DNA from tissue, is readily available. Preserving sensitive samples between field and lab may also require specialized treatment, like refrigeration. Levy’s work involved developing a buffer solution that would

Dr. Scott Mori, right, of The New York Botanical Garden, with artist Michael Rothman at Taft's Potter Gallery show, *Fields and Forests Afar: A New York Botanical Garden Scientific Expedition through Illustration*.



defer the need for that equipment in the field by allowing scientists to sample plant DNA at collection, and preserve its stability for later sequencing.

"I prepared solutions, tested them on plant samples, then recorded and interpreted the data," Levy explains. "I needed to consider how chemicals optimize the pH or the buffer-base of the solution, and how solutions affect plants of different varieties, textures, chemistries, or morphologies. It was an opportunity for exposure to real-world science—to effectively move beyond the classroom."

And Levy's work could have far-reaching implications for field researchers.

"Researchers are always trying to find a more efficient way to do our research," said Little. "The protocol that Ezra is developing will provide a faster and cheaper option."

Now in its third year, the partnership between Taft and The New York Botanical Garden has never been stronger, or had more support. Donors, including Headmaster Willy MacMullen '78, Linda and Andy Safran '71, and Sónia and John Batten 'P15 have generously supported the

internships. The Yerkes family has also established the Yerkes Family Botanical Art and Sciences Speakers Fund, which has sponsored all seven lectures to date, and which ensures the continuity and longevity of the program. And while the ecotourism component of the partnership envisioned by Parvis and Mori remains in development, new opportunities have been added to the mix, including an exhibition of botanical art in the Mark W. Potter '48 Gallery. Known for both the beauty and scientific accuracy of his work, artist Michael Rothman travels the world with NYBG scientists documenting their field discoveries. Taft's curated exhibition marked the first time Rothman's work was collectively shown.

There have also been changes. Mori has retired, turning the partnership reigns over to Naczi.

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—Dr. Robert Naczi, NYBG



Lecythis pisonis Pollination in French Guiana by Michael Rothman was commissioned by Dr. Scott Mori and exhibited in the artist's month-long show at Taft's Potter Gallery.

said Naczi. "It's a win-win scenario that we hope will continue."

It is that win-win scenario—the give and take of the program—that all involved recognize as the deepest value of the relationship.

"The true intent of the partnership is to give a new generation access to the science and the scientists, and in doing so, foster an interest in science; we hope to transfer, in some measure, these 'gifts' from one generation to the next," explains Parvis. "I think we have done that, and done it well." ■

Photography by Robert Falcetti and courtesy of The New York Botanical Garden



Taft's Paul Parvis with *Rain Forest Canopy in Central French Guiana*, which artist Michael Rothman gave to the Taft School after his 2012 exhibit in Potter Gallery; the print is now displayed in the Lady Ivy Kwok Wu Science and Mathematics Center.