Reflections on Being Director (2000–2016)

Michael Marcotrigiano

If you haven’t yet heard, I’ve decided to retire this year and will be finishing up at Smith on June 30. Just in case you think my tenure at Smith seems brief, it turns out that I will be a month shy of 16 years at Smith after a 17-year career as a faculty member at the University of Massachusetts. I’ve worked with three Smith presidents and an equal number of Facilities managers. Of all the directors of the Botanic Garden only the first two, William Ganong and Bill Campbell, spent more time at Smith. That being said, it seems like I just got here. It has been difficult to start clearing my office, discarding so much of what was once thought to be critical and now is either completed, never finished, or irrelevant. It brings back so many memories and makes me realize how fast time flies when you are having fun. That’s the paradox. Watch TV reruns all day for 16 years and it must seem like you’ve lived centuries — be the director of the Botanic Garden at Smith and you can’t believe how fast your life went by!

I think I’ve always had a job of one sort or another since high school, so I don’t know how to retire (or relax!). It is a bit more daunting thinking of no job than trying to find a new one. My plans are to do some landscape consulting and garden design, write some popular articles, and put my therapy dog to work, bringing him to children’s hospitals and nursing homes — payback for the 6 years he got away doing very little because we were too busy to take him to work. I’m hoping that the weeds in my garden will finally have something to worry about and that, even with more time, I can keep my now 48-aquarium fish breeding hobby to a 48-aquarium fish breeding hobby! It’s so tempting to add on another room. And there are so many gardens I’ve wanted to visit but never had the time. Travel time I never took. Now I will. I have probably spent more time with my staff than with my patient and supporting wife. Another peculiar fact of life that I want to begin to reverse.

Over the years, the more I learned about the legacy of the Botanic Garden, the more I realized what an honor it has been to be its director. What better than to work with plants and students in an institution as unique and endearing as Smith. Of course there were challenges. More than you can imagine. If I never see a large piece of construction equipment near a big tree or a snow storm cracking a tree limb in early October, I will die happy. But what’s a job without challenges?

It has been said, “Try to leave the Earth a better place than when you arrived.” I’m pretty convinced that, at least with regard to the Botanic Garden, I have. The list of accomplishments for our team is long — creating many exciting, well-produced exhibits, performing several garden renovations, improving an already well-respected plant collection, creating better policies, inventing more creative flower shows, hiring very qualified staff, beautifying campus, bringing in prominent speakers, making lots of happy donors, gaining a Level III Arboretum accreditation, etc. I believe we now have a well-respected living museum, not just a pretty place, although it is that too. I am confident that we have

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the most integrated and relevant college botanic garden in the country because we are so comprehensive. With a broadly trained staff and lots of imagination, we have been able to interpret our collections for a liberal arts audience, engaging students from fields as different as dance, engineering, art, and of course life sciences.

The most rewarding moments for me have been watching the influence we have on students and visitors. The classes we teach (Horticulture, Landscape Plants, and Economic Botany) generate an interest in plants even from those who did not know they had one. Being here for 16 years has allowed me to watch the career paths of many students. Nothing is more rewarding than getting a letter from a student (see inset below) who is in a career that resulted from her experiences at the Botanic Garden. Our students have gone on to professions that range from landscape historians to molecular biologists.

What we are is who we are, and I cannot be thankful enough for the collaboration, hard work, and competence of my staff. I have an “A” team here, each with a unique set of talents (and personalities!) that, when combined, create magic. To all our supporters I thank you. Without your morale-boosting compliments and financial gifts, we would never have developed such impressive plant collections or educational programs. I hope that you will give the new director (still to be determined) just as much support.

I want to especially thank President Kathleen McCartney and Provost Katherine Rowe for supporting us in so many ways since they arrived at Smith. They understand what we are and realize that our living museum is something the college should support and be proud of. I am confident that moving forward the Botanic Garden will continue to enrich the lives of students, alums, and the entire local community. This would be a good time to be starting out as director.

I could write more about my tenure here but I might get weepy. I have to get back to work. I have little time to finish up a list of unfinished projects. I just can’t help it. I like what I do! 😃

Thank you so much for waking me up to the botanical world! The way you and Gaby taught the Horticulture classes helped me really notice, see, and understand a whole universe that I had no idea about before. That knowledge has enriched my life in so many ways since then. Without that close look at the environment, I don’t think I would have continued in urban planning, architecture, and now land use law. Plus, I am still doing landscaping on the side and have really decked out my little house. … I’d also really like to thank you for taking an interest in my achievements and being so supportive during my time at Smith. Your support was really invaluable and I haven’t experienced that kind of sincere involvement in higher education before or since. Thank you!

Rachael Cain ’08
The renovation of Cutter-Ziskind, completed in 2014, included a landscape plan that called for a row of trees along the front of the complex along Elm Street. Triumph™ elms, Ulmus ‘Morton Glossy,’ were planted on Smith property behind a row of linden trees, Tilia cordata, currently serving as street trees on city property. Since the lindens are located under power lines, they are severely misshapen from pruning to keep the power lines clear, and many have structural issues that will likely be problematic in the future. We planted the elms in anticipation of a time when the lindens will need to be removed. By that time, the elms should be large enough to provide shade for the sidewalk and will be able to fill in as street trees along their namesake roadway.

At the Botanic Garden we have been having ongoing discussions about replanting street trees along Elm Street from College Hall to Kensington Avenue. The area has been suffering from the loss of many trees over the years. New trees would showcase Smith better, and as the trees get bigger over time, they would have a traffic calming effect (see Naderi, J.R., B.S. Kweon, and P. Meghalel. 2008. The Street Tree Effect and Driver Safety. ITE (Institute of Transportation Engineers) Journal 78, 2:69–73 online at www.naturewithin.info/Roadside/Tree&Driver ITE.pdf). Excessive speed of cars has been a longstanding issue along this section of Elm Street.

A number of trees in our nursery were of a size such that they needed to be transplanted, and they were mature enough to fit the bill for a street tree project. Moreover, they had been chosen for their adaptability to life on a street. Since this area along Elm Street is city property, we needed the city’s permission to plant there. Landscape Manager Jay Girard approached Northampton Tree Warden Richard Parasiliti, who is also the highway superintendent for the city’s Department of Public Works. Jay, a Northampton resident, has a long-standing relationship with Richard, having worked with him for years planting trees in the city as a member of the city tree commission. Richard was very enthusiastic about the idea.

Together with our director, Michael Marcotrigiano, they staked out where all the trees would go. It also involved contacting the gas company and changing some of the planting locations to avoid gas lines. Because of the worry over gas lines, all the holes were dug by hand. The trees were planted in April of 2015 and so far are doing well.

Additionally, last summer the college embarked on a project to improve accessibility and safety for pedestrians approaching the intersections of West and Elm Streets, in front of College Hall. Landscape architect Shavaun Towers ’71 worked on preliminary designs of the project, and particular care was taken to protect the existing trees, especially the large elm. To improve pedestrian safety, the design called for a widening of the sidewalk and creating a buffer zone between the new sidewalk and Elm Street. This allowed for the planting of...
Street Trees continued

Some Trees Planted along Elm Street

In front of 76 Elm Street

- Pyrus calleryana ‘Jaczam’ Jack® flowering pear (2)

From Campus Center to Park Annex

- Acer miyabei ‘JFS-KW3AMI’
- Rugged Ridge® maple
- Quercus velutina, black oak
- Ulmus davidiana var. japonica ‘JFS-Bieberich’
- Emerald Sunshine® elm
- Acer miyabei ‘Morton’
- State Street® Miyabe maple

In front of Park House

- Quercus bicolor ‘Bonnie and Mike’
- Beacon® swamp white oak
- Tilia cordata ‘Halka’
- Summer Sprite® littleleaf linden
- Zelkova serrata ‘JFS-KW1’
- City Sprite® zelkova

From 138 to 146 Elm Street

- Prunus virginiana ‘Canada Red Select’
- Canada Red Select chokecherry (2)
- Acer miyabei ‘JFS-KW3AMI’
- Rugged Ridge® maple
- Acer miyabei ‘Morton’
- State Street® miyabe maple

From 150 Elm to Tenney House

- Taxodium distichum ‘Fastigiata’
- Columnar bald cypress
- Zelkova serrata ‘JFS-KW1’
- City Sprite® zelkova
- Gleditsia triacanthos f. inermis ‘Ruby Lace’
- Ruby Lace thornless honey locust

In front of King and Scales Houses

- Carpinus betulus ‘JFS-KW1CB’
- Emerald Avenue® hornbeam (2)

(Continued from page 3) more street trees, so there are now three Shawnee Brave™ bald cypress, Taxodium distichum ‘Mickelson’ growing there. These are also on city property and were approved by the city under an agreement whereby we will maintain the trees. Additionally, all overhead utility lines were moved underground, no longer obstructing the view of College Hall from downtown. The project also involved refurbishing the historic Grécourt Gates.

Over time, we hope to continue to plant more trees along Elm Street, ensuring a tree-lined roadway for the future.

Smith College Is Now a Tree Campus USA

Smith has received national recognition for our campus, now officially designated as a Tree Campus USA. This program was launched in 2008 by the Arbor Day Foundation to honor colleges and universities for promoting healthy trees and engaging students and staff in the spirit of conservation.

As part of this program, a Campus Tree Committee was formed, consisting of Steve Moga (assistant professor of Landscape Studies), Karla Youngblood (Facilities Management operations director), Emma Kerr (campus sustainability coordinator), Taz Mueller ’18 (student), Robert Leverett (community representative), and Jay Girard (Botanic Garden landscape manager). The Botanic Garden worked with Facilities Management to produce a new campus tree care plan, providing guidelines for planting, maintaining, and removing trees, as well as protecting trees during the never-ending construction projects on campus. This builds on work that summer interns have done surveying tree health and evaluating tree hazards on campus.

Smith’s Arbor Day events focused on four trees on campus — the large American elm, Ulmus americana, on Chapin lawn; the dawn redwood, Metasequoia glyptostroboides, behind Neilson Library: the London plane tree, Platanus × acerifolia, next to the Brown Fine Arts Center; and the ginkgo, Ginkgo biloba, in the Systematics Garden. Students staffed tables at the tree sites to raise awareness about the root protection zone and issues related to soil compaction around tree roots, encouraging everyone to stay on paved paths and off the tree roots. Explanatory signage provided information about the trees and other interpretive panels were placed around campus to help raise awareness about the emerald ash borer, an encroaching pest with the potential to kill our ash trees. Additionally, Lea Sloan, vice president of communications and marketing for the nonprofit organization American Forests, was invited to speak about research that shows how trees and forests play an important role in our physical and emotional health.
Wet Dogs and Bird Flu

With the opening of the plant evolution mural, special attention has been brought to one group of plants that fills our conservatory walls. The basal angiosperms are those flowering plants with the longest lineages in geological time. Though some can be found on a well-appointed spice rack (read on), basal, not basil, refers to their foundational position in the evolution of angiosperms.

These are the earliest flowering plants, having evolved in the Early Cretaceous Period about 130 million years ago. In the family tree of flowering plants, the basal angiosperms are the families “closest to the ground” and all later branches of the ancestral flowering plants trace back to these.

These primitive angiosperms are not particularly common, with only a few hundred species being known, and they are not dominant over large expanses of land. But their importance for research in living collections is proven again and again (we have supplied Harvard researchers with basals), and living collections curators pass these among themselves, institution to institution, like rare talismans.

If one considers flowering plant evolution as an inverted pyramid, then the tip of that massive edifice of 500,000 different species is Amborella trichopoda, a rather nondescript tropical evergreen species from New Caledonia. Our specimen was acquired as a cutting from the University of Connecticut, which received their propagation material from the University of Massachusetts. Genetic analysis done in 1999 showed this species to be the most primitive flowering plant still inhabiting the earth.

All told we have about 15 families of basal angiosperms in the Lyman Conservatory, representing 23 genera. Some of the basal families are rare enough that they don’t seem to be in cultivation anywhere, for example, the Degeneriaceae of Fiji.

One particular species in our conservatory, Illicium mexicanum, has special resonance for me as I have collected it in the wild, propagated it, had it in the conservatory collections, where it was only short-lived, and acquired it once again this past spring. The Illiciaceae is a family of plants that has bounced around through the halls of plant taxonomy. The Angiosperm Phylogeny Group (APG III), a consortium of plant taxonomists, has “sunk” the family, long thought to be distinct, into the longer established Shisandraceae. I’ll miss it, along with other sunken families like the maple family, Aceraceae (now Sapindaceae), being used to a certain constellation of plant families.

Illicium as a genus is a biogeographic delight, as the 40 or so species have an interesting distribution pattern. They are predominantly found in tropical and subtropical southeast Asia. The Flora of China lists 28 species, which would seem to indicate that the center of diversity and possibly center of origin lie in southeast Asia (see efloras.org/florataxon.aspx?flora_id=2&taxon_id=116374).

A few species show up in the New World: in the southeastern United States (2 species), the Caribbean (3 species), and in the cloud forests of Mexico (1 species). Fossil remains in the New World include the extinct Illicium avitum from the Brandon Lignite of Vermont, 16.4–23.8 million years ago.

My personal history with the genus is a bit mixed and destructive. When I worked at the Arnold Arboretum we hardiness-tested dozens of southern collected Illicium floridanum seedlings. New England winter did not appeal and they all perished.

One Illicium species, however, was brought into cultivation by a collecting team I was on in 1990. Along with Texan...
nurseriesmen John Fairey and Carl Schoenfeld and Mexican botanist Eduardo Estrada, we collected at El Cielo Biosphere Reserve in Tamaulipas, Mexico. This may be my favorite collecting spot out of 30 plant collecting trips, a mountain with a soft, foggy climate coupled with incredible and interesting biodiversity. Included in the flora were genera more expected in the Appalachian Mountains or the southeast United States: Cornus, Taxus, Magnolia, Fagus, Hamamelis, Ostrya, Ilex, and Liquidambar. Illicium mexicanum was also found, 700 miles from its nearest relative, Illicium floridanum, in Louisiana. It presents a striking reddish maroon flower with a starburst of strap-like petals. This turned out a striking reddish maroon flower with a

Illicium floridanum, native to Mississippi, Florida, Alabama, and Louisiana, carries the common name wet dog bush. Seems you can’t keep a good wet dog scent down.

Recent research gives Illicium more importance than just a primitive botanical oddity. Illicium verum, known as Chinese star anise, is native to the forests of Fujian, Guangdong, Guangxi, Jiangxi, and Yunnan at an elevation of 200–1600 meters. The excellent spice website, Gernot Katzer’s Spice Pages, reports that I. verum yields the spice known in China as ba jiao, meaning eight corners, referring to the usual eight pointed star shape of the fruit. It is the woody pericarp of the fruit, not the seeds, that is ground into a spice powder.

It is used in combination with a number of other spices but most famously in five spice powder (wu xiang fen) along with cassia, cloves, fennel, and Sichuan pepper, all in equal measure. Indian cuisine uses the non-native in its famous spice mix, garam masala. The plant also has usage in traditional Chinese medicine, the pods as an antibiotic and in treating stomach and lower back pain.

Recent scares about influenza pandemics have brought new therapies to the fore. Tamiflu (oseltamivir phosphate) is one recent antiviral pharmaceutical that is used to attack influenza A and influenza B. The compound was developed in the 1990s and began to be marketed by Roche as a tool to fight various strains of flu including H5N1, bird flu. The medicine was derived from a compound, shikimic acid, found in the same pods used by chefs. Illicium verum became the go-to source of this precursor molecule, which caused shortages and ultimately led to a new biological source, genetically modified E. coli bacteria, which now produces the compound for us. Tamiflu remains a part of the world’s arsenal of medicines against influenza, though its usage and efficacy are still under scrutiny and debate.

What is without debate is that Illicium remains a genus appreciated by the botanically inclined, no doubt with more secrets and surprises left to reveal. or

### Basal Angiosperms in the Lyman Conservatory

- Amborellaceae (Amborella)
- Annonaceae (Annona, Artabotrys, Cananga, Mitrephora)
- Aristolochiaceae (Aristolochia, Asarum)
- Austrobaileyaceae (Austrobaileya)
- Cannellaceae (Canella)
- Chloranthaceae (Chloranthus, Sarcandra)
- Eupomatiaceae (Eupomatia)
- Hernandiaceae (Hernandia)
- Lauraceae (Cinnamomum, Laurus, Persea)
- Myristicaceae (Myristica)
- Magnoliaceae (Magnolia)
- Piperaceae (Piper, Peperomia)
- Saururaceae (Houttuynia, Saururus)
- Schisandraceae (Schisandra, Illicium)
- Winteraceae (Drimys, Pseudodrimys)
Ever since I started working as a curatorial assistant, the international seed exchange has been an aspect of the Botanic Garden that has fascinated me. Having worked with Manager of Living Collections Elaine Chittenden for the past three semesters, currently as curatorial intern, I’ve had the opportunity to experience the effort that goes into producing the annual Index Seminum (Latin for seed list). Exchanging seed is a long-standing tradition carried out by botanic gardens across the globe. It has enabled institutions to acquire diverse collections of plants, improving public display, education, research, and conservation of endangered species. Aware of the historical tradition behind the international seed exchange, I wondered when it actually began at Smith. This question directed me toward the Smith College Archives, where I began to rediscover the history of Smith’s Index Seminum.

The exchange of seed internationally can be traced back to the inception of the Botanic Garden. In 1894, William F. Ganong was appointed professor of botany and director of the Botanic Garden. Under his guidance and effort, the foundations were built and grew. Already an accomplished botanist, he had prior connections to Harvard University, where he received a degree in botany, and later served as instructor of botany, associated with the Harvard Botanic Garden. Records from his journal provide insight into the swift progress made in filling the new plant houses at Smith. Gifts of cuttings and plants from places including the Harvard Botanic Garden, the Arnold Arboretum (also belonging to Harvard), the Missouri Botanical Garden, and Massachusetts Agricultural College (now the University of Massachusetts) began to arrive right away. In his first year at Smith, Ganong informally sent requests for seed to 14 international institutions and received 214 packets of seed from the Royal Botanic Garden of Buitenzorg, Java. Ganong noted that this gift included plant species “of great biological and geographical interest.” These efforts provided plant material that set the foundations for the collection at Smith.

The academic year 1895–1896 marked the true beginning of the formal seed exchange at Smith. Ganong noted in his journal, “Late in December, Seed List No. 1 was completed and mailed to nearly 100 Gardens and individuals. All have responded promptly, the Gardens sending their Lists in return, from which several hundreds of kinds of seeds have been chosen and received.” This initial seed list contained 264 offerings collected at Smith. In its first year the exchange yielded over 1000 packets of seed from 21 institutions and individuals, 16 of whom were international. These international institutions ranged from Japan and Russia to Germany, Sweden, Italy, Spain, Denmark, France, England, and the Netherlands.

The following academic year of 1896–1897 saw the gift of 744 packets of seed from over 23 foreign botanical institutions, while approximately 1368 packets of seed were collected from Smith, cleaned, and sent out to various places per request. This exchange continued annually for the next six years until after 1902, when it was produced every three years or so. In a report to the trustees of the college dating from 1897, Ganong summed up the efforts of participating in the exchange, “By this system we are able at comparatively small expense to obtain an abundance of seeds of plants of great scientific interest which it would be impossible to obtain in any other way.”

The exchange became less frequent in the later years of Ganong’s term as director (he was here until 1932), although his journal continues to mention it into 1914 when “306 packets of seed were called for.” Although physical records within the Archives of a continuous seed exchange stop, mention of it continued to appear over the years suggesting its continuation. Another seed list was found from 1939, and a college news article from the 1940s mentions the international seed exchange as a beloved tradition by students who found excitement in germinating seed from across the globe. Evidence of the exchange begins to pick up again in the later 1950s into the 1960s, when seed lists appear in the archival record. A newspaper article from 1968 profiles Head Gardener William I. P. Campbell and his role in the international seed exchange. The article notes that Campbell continually supervised the exchange for the entirety of his post at Smith beginning in 1937, until his retirement in 1971. Campbell noted that in 1968 Smith sent out its list of 250 offerings to 75 of the 100 participating botanical institutions, and filled seed requests from places ranging from Japan to Switzerland to Australia. He also noted that nearly 3500 plants on campus at that time were attributed to the exchange. A list from 1973 is the first to drop the term Seed List and bear the title Index Seminum. Two years after

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in the arboretum and conservatory collections. As time progressed, many institutions became less interested in cultivated collections and instead preferred seeds that were wild collected. A 1983 article in the *Springfield Daily News* (a forerunner of *The Republican*, the current daily paper of Springfield, Massachusetts) profiles the international exchange under Director Gregory Armstrong. Under his term, the *Index Seminum* made a shift from cultivated offerings to a focus on wild collected seed of native flora. Popular items on the list that year included native wildflowers as well as seed from the alpine collection in the Rock Garden. The *Index Seminum* reached its peak of offerings around this time, ranging from 660 seed packets to over 1300 in 1995, and was sent to over 260 international institutions. The year 2000 marked a change in the format to one that is more consistent with today. Currently our offerings hover around 300 (327 in 2015–2016) and are presented in three parts: seed collected in the wild, seed collected from cultivated plants outdoors at the Botanic Garden, and seed collected from cultivated plants in the Lyman Conservatory. Also included are cultivated plants with known collection data.

Currently, our plant collection includes 634 living accessions that can be attributed to the seed exchange. Needless to say, the *Index Seminum* at Smith College, going back to the beginning of the Botanic Garden, has played an important part in the development of our collection. It continues as a flourishing annual occurrence, and it is nice to know that we are able to participate in a process that is crucial for many other botanical institutions.

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this, in the academic year 1975–1976, began the annual exchange that has carried over uninterrupted to the present day.

Over the 120 years that Smith has participated in the international exchange, the *Index Seminum* has undergone many changes. In the earlier days, seeds offered for exchange solely came from cultivated plants.

References

Grounds Subject Files, Box 263, *Plant Collections and Specialty Gardens*, Smith College Archives.


Smith College Dept. of Botany Records, Box 1241, *Lists of Seeds Collected*, Smith College Archives.

Smith College Dept. of Botany Records, Box 1241, *Annual Reports 1897*, Smith College Archives.


Horticulture student Annabella Boatwright, class of 2018, produced the chrysanthemum hybrid that won the most votes in last fall’s Chrysanthemum Show. It was during the Fall 2014 Horticulture class that Annabella learned and practiced her hybridizing techniques. Seed resulting from her cross was collected, germinated, and grown on to flowering, for display in the 2015 Fall Chrysanthemum Show.

It is a reddish orange spoon mum with a clear yellow center. Spoon types seem to be popular with our visiting public, as the winners for the last three years have all been spoons.

You can check out all the past student-bred mum hybrid winners dating back to 1920 in our online Chrysanthemum Hall of Fame on our website.

Photographs by Pamela Deeds ’08
Almost everyone is familiar with the phrase “sterile as a mule.” Mules are crosses between horses and donkeys. Why are they sterile? It turns out that horses and donkeys do not have the same basic chromosome number. Horses have 64 chromosomes (with sperm and egg cells having 32) and the donkey has 62 chromosomes (with sperm and egg cells having 31). When babies are born from these they have 63 chromosomes. This makes it impossible for the sperm or egg of a mule to have an even number of chromosomes and this is one reason their eggs and sperm do not develop to viable cells. Mules are a dead end. To make them you always need to start with a horse and a donkey. What does this have to do with irises? Well, Iris pseudacorus (yellow flag iris) is native to Asia and Europe, with a few populations in Africa, and has been grown for over a century as a water-loving ornamental garden plant. The problem is that it is a prolific seed producer and an aggressive plant that has escaped from cultivation in many regions to become an aquatic invasive species, now banned in many states. The little pond near the Lyman Plant House was bordered by this species for decades before I arrived at Smith and in time it appears to have escaped and established some colonies down the Mill River. In the fall of 2012, when the little pond next to Lyman was dredged, I made a decision to only replant it with native species (see Botanic Garden News Fall 2012, page 15). Excavation was needed to remove the I. pseudacorus as rhizome chunks can resprout. It has been a few years and we do not see any signs of resprouting of yellow flag iris. Since everyone loved the water iris I began looking for substitutes that were better behaved. One obvious addition is Iris versicolor (blue flag iris), which is native to the eastern United States and has purplish blue flowers and is found in wet soil. What else to add?

Iris ensata (Japanese water iris) has been domesticated for so long that they come in many colors, patterns, and shapes, but there is no good yellow flower type. Japanese hybridizers have been interested in crossing Iris ensata with other species (to make interspecific hybrids) that have yellow petals. Here is where the infamous Iris pseudacorus comes in. It is a vibrant yellow. So Japanese breeders starting trying to cross the two species. Some had success and new hybrids are now being released. It turns out the chromosome number of Iris ensata is 24 and most publications list Iris pseudacorus as 34 (a few list it as 38). This means that the hybrids between these, as with mules, have an odd chromosome number and they, like mules, turn out to be sterile! But unlike mules, iris can be vegetatively propagated (by rhizome division). Once you find a hybrid that you like, sterility is not an issue as you can give it a name and vegetatively propagate it.

Iris hybridizers were not the first to make mules. You can find mules of marigolds (Tagetes spp.) in many seed catalogs. These are made between the African marigold, Tagetes erecta, with 24 chromosomes and the French marigold, Tagetes patula, with 48 chromosomes. The hybrids are sterile and this is good for a few reasons. It’s not that marigolds are invasive but, by not having seed, these mule marigolds hold onto their flowers much longer. Seed development is a cue for a plant to get rid of energy-consuming petals, which are only there to attract pollinators and are therefore not necessary after seed set. Marigolds are annuals. If you grow mule marigold seed the plants will be sterile, not providing seed for next year. This benefits the company because they produce the mule seed and sell it to you. And of course there are seedless watermelons that are also sterile, but these were discussed in great detail in another article also in the Fall 2012 issue of the newsletter (see page 9).

This spring we will acquire and plant some iris mules near the little pond knowing that they will stay in a clump where they belong and not shed seeds that make their way into Paradise Pond. I can’t wait for the first bloom.

You can see or purchase pseudatas (hybrids of Iris pseudacorus and I. ensata) online at:
www.draycott-gardens.com/psframe.html
and
ensata.com/HTML/PlantPages/Pseudatas.htm
Part of the end of any year brings a tally of experiences or changes. Managing the conservatory collections is no different and I like to analyze what was brought into the collections anew during the last year and measure it for strengths and weaknesses. No two curators are alike, whether they manage institutional collections of rare books, art, animals, or plants. Having worked with curated plant collections for decades, I bring my own set of parameters to what makes a good accession for our conservatory.

Curation to me is a multiple phase process, one that is a sequence that each accession goes through. Informed selection is the vetting process that is applied prior to bringing in a new plant. What is it about this plant that might add value to a scientific, teaching collection? Thorough documentation creates as complete a record for the database as possible, so that nothing relies on the “institutional memory” of individual staff members. As our former director Kim Tripp used to love to point out, “You could get hit by a truck.” Morbid but true. Committed stewardship occurs once the plant has been propagated, potted up, and put in place in its permanent location. Unlike art pieces, this includes repagation should a plant get too big or start to fail. Interpretation with accurate labeling and signage gives more meaning to visitors and is what separates us from a homeowner’s garden. The final piece of curation, and the one managers have the most trouble with is ruthless deaccessioning. This means ridding the collection of old, less valuable accessions in order to make room for better, new material. Sentimental attachments formed over decades of care have no place here and curators have to work within the limits of space and staff time and try to avoid an overly expanded collection.

The factors I seek in a new addition to the conservatories can fall into a set of categories which act as filters to sharpen choices:

- **Utility**: Is the plant economically important somewhere on the planet for food, spice, medicine or some other purpose?
- **Rarity**: Is the plant listed in one of the categories of assessed endangered status on the IUCN (International Union for Conservation of Nature) Redlist or federal lists of rare and endangered plants?
- **Documentation**: Does the plant come from a documented institutional collection with accompanying data?
- **Teaching potential**: Does the plant illustrate some important lesson for our students in the fields of botany, ecology or horticulture?
- **Research potential**: Is the plant a current research subject or have that potential in the future?
- **Diversity**: Does the plant represent a new family or genera in the collections?
- **Provenance**: Is there information that ties the plant to a particular collector and locale in the world? This is important to researchers who often prefer this level of documented validity to their research.
- **Outreach**: Is there something novel or beautiful about the plant so that it enhances the visitor experience? As a plant lover, I think every plant has beauty, but the general public often seizes on the biggest and brightest of leaves and flowers.

As for 2015, we added 172 new accessions to the Conservatory; 101 were from institutional collections, 45 were listed on the IUCN Redlist, 33 had wild source data, and 21 were new food, spice, or medicinal plants. Three new families, the Proteaceae, Velloziaceae, and Rapateaceae, were added. Time for some ruthless deaccessioning.

*Osa pulchra* in the Show House, a rarity in cultivation as well as in its native range in Costa Rica and Panama.
What’s New in the World of Elms?

Michael Marcotrigiano

When I was a child growing up in Brooklyn, I remember the horrible sight of 25 consecutive blocks of American elms, *Ulmus americana*, which were near death from Dutch elm disease (DED), being cut down in what was a tree hugger’s equivalent of a baby seal hunt. I guess I took for granted the cathedral-like green arch stretching from Avenue A to Avenue Z on Ocean Parkway. Like my ears or my eyes I assumed they were always there, never once thinking that they might go away some day — at least not all at once. This scenario was played out again and again across the eastern half of the United States, where American elm is native and was used, often in monoculture, as an urban street tree. DED arrived around 1930 by accident, from European logs imported for woodworking. The fungus, which plugs up the water-conducting vessels in the tree, causes desiccation. Eventually, as the fungus spreads from limb to limb, the tree dies. DED is “Dutch,” not because the causal organism originated in the Netherlands (it is almost assuredly Asian in origin), but because the early researchers on the pathogen were seven Dutch women scientists. The fungus is not very host-specific. All species of elms in the United States and Europe can succumb to it, while most Asian elm species can resist it.

Once here, the pathogen was not easy to contain because a vector, the European bark beetle, came along with it. Without the beetles the fungus cannot move from tree to tree. The spores from the fungus hitchhike on the beetles which, when chewing on the tree twigs, inadvertently infect the tree. By 1960 over 40 million elms had succumbed to the disease in the United States. It cost billions of dollars to clean up the mess and changed how most urban foresters thought about shade trees. Monocultures, even of native trees, were not immune to annihilation. A lesson learned the hard way.

I’ve always had a fondness for elms so I was thrilled when Thomas J. Campanella, this year’s Bulb Show speaker, agreed to be the last speaker I would bring to Smith before I retired. He is author of the engaging *Republic of Shade: New England and the American Elm*. He drove from Cornell University to give his talk, meet with our students, tour our campus, and engage our enthusiastic followers. Campanella’s research is in urbanism and he explained the role the American elm played in the transition to city life for country folk. Americans had a love affair with the American elm, one which ended in a big way when disease ripped out the trees along with the souls of urbanites. It’s amazing how one tree species influenced the lives of so many people. To learn more, I highly recommend reading his book.

It was no mistake that Thomas was the speaker. This semester was one with a teaching-free sabbatical for me, and a year before, likely fueled by my need to come to grips with my childhood nightmare of urban deforestation, I decided to research elm improvement and write a review article that was recently submitted to the journal *Arboriculture & Urban Forestry*. For this newsletter, I thought I’d touch on some of the highlights of my research.

First of all, DED is not gone. It’s just not as obvious following the decimation of so many elm populations. All American and European elm species can still contract it. But there are options to living in an elm-free world. Two tactics researchers have taken are to isolate those American elms that are more tolerant of DED or to breed DED-tolerant elm species to make them more attractive. To some extent both tactics have been successful. Massive screening of American elm seedlings, following intentional DED infection, has isolated some tolerant (not resistant) American elms. From the USDA National Arboretum comes ‘Valley Forge,’ ‘New Harmony,’ and ‘Jefferson’ (not bred but a discovered survivor). ‘Princeton’ is an older cultivar that is still considered somewhat DED tolerant. More recent releases, which have yet to be a part of vigorous resistance trials, are ‘Lewis & Clark’ (marketed as Prairie Expedition®), ‘St. Croix’ (from Minnesota), and ‘UASNZ’ (found in New Orleans and marketed as Creole Queen™).

The genus *Ulmus* contains about 40 recognized species, most of them in Asia. So another strategy is to look at the DED-resistant Asian elm species and see if any are suitable landscape plants for the United States. I’d say the most success with this tactic comes from the Morton Arboretum in Illinois, which has introduced some very nice elms. ‘Morton’ (marketed as Accolade®) is a large Asian selection from *Ulmus davidiana*, which when pruned properly most resembles the American elm. ‘Morton Glossy’ (marketed as Triumph™) is an extremely rugged elm having in its pedigree *U. pumila*, the ugly but adaptable Siberian elm. Its outline is more like a sugar maple than an American elm, but it has typical elm leaves and

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Elms continued

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bright green foliage. The National Arboretum has released ‘Frontier,’ a smaller elm that is a cross of a European and an Asian species and is the only elm that often displays red fall color. For those liking medium-sized elms, there are many selections of the lovely Chinese elm, Ulmus parvifolia. I find ‘Emer II’ (marketed as Allee®) one of the most attractive with its cinnamon flaky bark but also like the canopy shape of ‘Dynasty.’

It’s unfortunate that many of these elms are difficult to find in nurseries. I think marketing and education may need to pick up a bit before they become more commonplace.

Ideally, breeders would like to cross the disease resistance of Asian elms into the American elm to attain a hybrid that looks like American elm. Interestingly, it had long been noted that American elms have 56 chromosomes (tetraploids) but all other elm species have 28 chromosomes (diploids). This was thought to be a major factor that eliminated the possibility of making fertile hybrids between Asian and American elms. But remarkably, in 2011, it was reported that many populations of American elm in the south central United States have 28 chromosomes. The “56” assumption was an artifact of the seed collection source of early elm research, which was centered in the northeast and north central states. It remains to be seen if recently collected American elms with 28 chromosomes will allow more hybrids to be made, but even in a worst case scenario using them for genetic research should be easier, since they have much less DNA to analyze.

Another field of study is DED resistance mechanisms. Why are some species resistant and others so susceptible? This is a very long and complex story, but it appears that susceptible species and clones are slow to react and let the pathogen take a foothold before their defenses kick in. In the more tolerant elms, such as ‘Valley Forge,’ the reaction time to wall off the fungus is quicker as is the production of many biochemicals that inhibit the fungus. This is why the newer American elms are called tolerant, not resistant, as they can be infected (especially if stressed) but can also recover with minimal damage.

Because fungi have a much quicker life cycle than trees and are much simpler from a genetic standpoint, a vigorous field of research is in studying the DED fungus. The two species of fungi that cause DED have had their genome sequenced, and advanced studies on gene expression have been published with more underway. Certain genes have been isolated from the fungus, one of which is key to its spread as it makes the fungus more hydrophobic, allowing it to survive longer in dry conditions. Another known gene codes for an enzyme that dissolves the plant cell walls, allowing the fungus to spread more quickly. By understanding the fungus and how it works it will be easier to defend against it, either by focusing breeding strategies, or with newly developed fungicides.

As part of my research, I did a thorough survey of elm species and cultivars that are still present in the United States. I felt that this list would be useful for elm researchers that desire to study or breed new elms. The list is too long for this newsletter. I was surprised that although the elm holdings in commerce are quite restricted, botanic gardens, universities, and the National Arboretum have vast collections of elm species, even if they are not disease resistant. It will be interesting to see if these collections become part of research or breeding efforts with the recently discovered diploid American elms.

Only a few research groups, largely in Europe and Canada, are still actively working on DED. Most U.S. programs begun under political pressure initiated by traumatized citizens that watched their cities become deforested have gone away as researchers retire and the civil problems in cities became the focus of attention. In addition, some of the focus on DED in the United States is now diverted to equally troubling exotic pests, e.g., emerald ash borers, hemlock wooly adelgid, and Asian longhorned beetle. Yet, elm research is at a different level now largely because advances in DNA technology have made it affordable to sequence things “less important” than the human genome. The methodology has been developed to genetically engineer elms but this is in its infancy and will, of course, be controversial. Will those opposed to GMOs (genetically modified organisms) still be opposed if the GMO tree is native and the fungus thwarted is exotic?

At Smith College we still have a few giant American elms remaining. Most notable may be the one on the Chapin lawn and the one in front of College Hall. It is not by chance that they are alive. We, like many, take preventative measures to prevent the initiation of DED. Every second year the trees are injected with a costly prophylactic fungicide that thwarts the growth of any germinating DED spores. On the rare occasion that we see one limb showing symptoms of DED our arborists investigate it and, if it is DED, the limb is amputated well down from the infection site. We have planted a few of the resistant American elms (like ‘Valley Forge’) that have shown the capacity to recover if infected but are still not resistant. We also have a wide variety of elms that are not American elms but rather have Asian lineage and are resistant to DED. While none of these match the graceful arching habit of an American elm, they have other redeeming traits that make them worthy additions to the college landscape. Green Street is the epicenter of our Asian elm collection.

A group of elm researchers, current and retired, will be meeting in October in Ohio to share their thoughts and hopefully develop some new collaborations. I’m hoping to attend this meeting. Elm breeding and research has had its ups and downs because the life cycle of the tree is so long that a dedicated government venture, not an individual’s career effort, is needed to keep progress moving at a steady pace. But it appears that a new generation of researchers, armed with more genetic and physiological knowledge, are about to embark on the next phase of research to bring back the American elm. I hope so. I miss the street tree of my youth.
Life is amazing—in terms of how seemingly unrelated things eventually connect together, and how an English assignment as a first-year Smith student led me to a marvelous adventure, crossing boundaries of time and space.

I stepped into the lives of the Roys family through that First-Year Seminar writing assignment, which asked us to research and study a chosen person’s life at our age. In the Sophia Smith Collection, under the category of China, I found the perfect candidate for the assignment. Mabel Milham was a Smith student in the class of 1900. After graduation and newly married, she went to China as an educational missionary with her husband Charles K. Roys, who worked as a doctor. They stayed in China for over ten years until Charles became ill and they returned the States. As a first-year student who just left my home in China, I found it warm and exciting to meet someone who had been there, especially when that person was a Smith alum and had lived there a century ago. Around that time, I was also overwhelmed by the formidable uncertainties faced in life, such as what to select as my major and what to do after college, so delving into Mabel Milham Roys’ life via her correspondence and albums was both an escape and a cure.

One day Karen Kukil, the associate curator of special collections at the Sophia Smith Collection, knowing that I had been researching Mabel Roys, told me that years ago there was an exhibition at the Botanic Garden of Smith College on Elizabeth Roys, the older daughter of the Roys family! Was that her — the young girl in a white dress, sitting on the lawn with her sisters — in one of the most captivating photos in the album? Yes, I guess so. But what did she do and why would there be an exhibition on her?

After handing in my paper on Mabel, I shifted my interest to her daughter Elizabeth. She was born in Weifang (Weisien), a small city nowadays but a thriving center back then in northeastern China. Elizabeth spent most of her childhood there and entered Smith College in 1924. She took her junior year abroad back to Asia to visit gardens while her mother checked on the missions after her father had died. Developed from her travel notes, the exhibition at the Botanic Garden featured her visits to these gardens. When I walked into the Botanic Garden in search of these notes, I was warmly received by Madelaine Zadik, the manager of education and outreach, who later became my year-long education/exhibition intern supervisor. At that time, I had absolutely no idea that in the following year I would visit the Botanic Garden so frequently and

work on Elizabeth’s notes so intensively as a volunteer, and then as a student employee. Madelaine handed me boxes containing five delicate notebooks with a strong scent of old paper. Each notebook carried detailed records of Elizabeth’s visits including photographs and her reflections on these Asian gardens’ function and cultural values. Carefully turning the pages of the notebooks, I found myself peeking through a window into the lives and secrets of gardens and people almost ninety years ago. What I saw in the notebooks was both familiar and distant, beautiful and mysterious. A bold and ambitious idea gradually took shape in my mind: how about visiting some of the Chinese gardens in Elizabeth’s notebooks during the coming winter break?

And the first questions were, where are the gardens and do they still exist?

Stay tuned for Part II in the Fall 2016 Botanic Garden News, when Lydia finds her way in the Roys’ footsteps in China.
A paper that Horticulture student Claudia Stoll ’18 wrote on how landscape architect James Rose’s theories can be used for urban greenspaces was just accepted for the Fábios Conference on Landscape and Greenway Planning in Budapest, Hungary (see page 11 of the Spring 2015 issue of Botanic Garden News for her article on Rose). Additionally, she received a scholarship from the University of Massachusetts that will pay for all conference expenses, and her paper will be published as part of the conference proceedings.

After graduating in January, Jacqueline Maasch ’16J began her new job as a diagnostic technician at the Laboratory for Molecular Medicine in Cambridge, Massachusetts. As a work-study student, Jacqueline was a greenhouse assistant in the Lyman Conservatory from fall 2013 to spring 2015, after taking two semesters of horticulture. In the summer of 2014 she completed a Summer Undergraduate Research Fellowship at the Botanic Garden under the supervision of Rob Nicholson. See her articles in past issues of Botanic Garden News: Spring 2015 (p. 14), Spring 2014 (p. 9), and Fall 2013 (p. 9). Jacqueline’s first job after Smith is through Partners HealthCare Personalized Medicine and the Center for Human Genetic Research at Massachusetts General Hospital. She is responsible for extracting, quantifying, and sequencing DNA, as well as analyzing sequences for the presence of variants. However, Jacqueline has not abandoned her love of plants and ultimately hopes to use her skills in molecular genetics to study and conserve the plant world.

Former Botanic Garden summer intern (2014) and outdoor garden assistant (2014/15) Jessie Blum ’15 began working as an intern at the Tower Hill Botanic Garden in Boylston, Massachusetts, last summer after graduating from Smith. It was such a good match that they offered her a permanent position at the end of the summer. She was mostly working outdoors, but began doing indoor horticulture in September. Just recently, she passed her pesticide license exam. With a coworker having left in March, she will have sole responsibility for the conservatory collection. Tower Hill has been a good experience for Jessie, who says, “I’ve definitely been learning a lot.”

Since leaving Smith, former Botanic Garden STRIDE scholar Jenna Zukswert ’13 has been working on a master of science degree in forestry at the University of British Columbia. Her research focused on leaf litter decomposition, exploring the role of plant functional traits. She’ll be completing that this semester and then is moving back to Massachusetts, having been offered the Living Collections Fellowship at Harvard’s Arnold Arboretum. She’s looking forward to this opportunity and said, “So I’ll be moving to Boston sometime soon, this summer! My STRIDE work has definitely helped prepare me for this. I’m so excited!”

Jessa Finch ’12, former intern at the Botanic Garden, has advanced to PhD candidacy in plant biology and conservation at Northwestern University and the Chicago Botanic Garden. Building on her honors thesis in Jesse Bellemare’s lab at Smith, Jessa continues to investigate dormancy break and germination, but within a different system, the milkweeds, Asclepias spp. Milkweeds have immense landscape value, both as a nectar source for insect pollinators and as the obligate host plant of specialist herbivores, including the monarch butterfly. Jessa’s dissertation seeks to determine the extent to which differences in gene flow influence environmental tolerance ranges, and hence, sensitivity to changes in climate. Results have implications for forecasting species responses to climate change, as well as seed sourcing for restoration. In response to increased pollinator-focused habitat restoration in cities, Jessa is also investigating the capacity of milkweed in cities to support monarchs and the potential of urban milkweed ecotypes for habitat restoration. In August 2015, Jessa joined the EPA-funded project CONNECT: Community + Climate + Action, which utilizes an asset-based approach to educate communities about climate change and initiate climate action.

After her internship at the Royal Botanic Gardens at Kew, Elizabeth McCarthy ’06 knew she wanted to continue with the kind of research she began at Kew. After graduating from Smith, she returned to London, where she completed a PhD in 2011 and then took a postdoctoral position at the New York Botanical Garden. She is currently doing another postdoc at the University of California, Riverside, as her boss from NYBG got a job there at the beginning of 2015 and brought Elizabeth with her. Now developing her own research project, she is back to working on Nicotiana floral evolution and polyploidy, which she did for her PhD, but she says, “It all started during my Kew internship!”

Since graduating from Smith, Betsy Anderson ’04 has dived headfirst into the fields of landscape history and landscape architecture. While a senior at Smith she served as the Cary MacRae McDaniel Exhibition Intern and post-graduation continued to work on curating an exhibit based on the Asian garden notebooks of Elizabeth K. Roys ’28.

Betsy Anderson, class of 2004, is currently a landscape architect for the National Park Service.

(Student and Alumnae Updates)

Madelaine Zadik

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Updates continued

which she had been cataloging as an intern. Betsy reported on these experiences in the Spring 2004 (p. 4) and Fall 2004 (p. 5) issues of Botanic Garden News. (Also see p. 13 of this issue to read about plans by Liuhui Zhang ‘18 to revisit some of Roy’s Chinese gardens). Betsy’s post-Smith career has included a position as garden historian for Edith Wharton’s c. 1901 estate in western Massachusetts, a landscape history fellowship with the U.K. National Trust’s Plant Conservation Programme, and three years as a residential landscape designer for a sustainability-focused Seattle design-build firm. In 2014 she received a master of landscape architecture from the University of Washington and is currently a landscape architect for the National Park Service. Serving in the NPS Pacific West Regional Office in Seattle, she provides technical support in design and planning to parks in Washington, Oregon, Idaho, Nevada, California, Hawai’i, and the Pacific Islands.

Landscape architect Cornelia Hahn Oberlander ’44 was awarded the 2015 Margolese National Design for Living Prize for her impact on Canadian cities. The prize recognizes Cornelia as one of the world’s leading landscape architects who, over the past 60 years, has collaborated with internationally acclaimed architects on a wide range of projects around the world. She devoted her early professional years to designing landscapes for low-cost housing projects and playgrounds throughout Canada. She has also designed the iconic landscapes of the UBC Museum of Anthropology, Robson Square in Vancouver, and Ottawa’s National Gallery. Praised for her landscape designs as “breathtaking, poetic, unforgettable, charged with meaning, and above all, modernist,” the jury said, “She is, quite frankly, a national treasure.”

In Memoriam:
Noemi Collazo ’16

The Botanic Garden experienced a heartbreaking loss with the death of our beloved student Noemi Collazo, Smith class of 2016, on December 18, 2015. Noemi was a major force at the Botanic Garden throughout her four years at Smith, touching all of us along the way. She took our Horticulture and Economic Botany courses, worked as a work-study student both in the Lyman Conservatory and outdoors, and was a Botanic Garden summer intern in 2013.

The Botanic Garden was a sanctuary and a source of joy for Noemi and we all basked in the glow of her bright light. Noemi knew how to work hard and was our reliable, competent, cheerful coworker as well as being an engaged and thoughtful student. Her spirit will live on here in our hearts and in our plant collection, which she so deeply touched, and in the newly created Noemi Collazo Memorial Internship Fund (funded by the Friends of the Botanic Garden), which will support student engagement at the Botanic Garden.
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