Orchidelirium at Smith

Karen Yu ’16 is a STRIDE scholar who has worked with me since 2012 on educational projects and exhibitions at the Botanic Garden. As a first year, Karen learned about the workings of the Botanic Garden, our plant collections, and our various educational activities, including exhibit production. The plan was that by the end of her two-year STRIDE placement, she would produce an exhibit of her own. She had to hit the ground running, as the exhibit *Botanical Printing: Artful Collaborations on Paper and Cloth* opened just a month and a half after her arrival. Karen wrote label copy and press releases, learned mounting techniques, helped design the gallery layout with our modular walls, and learned how to use our unique hanging system in the Church Exhibition Gallery. For our next exhibit, *From Petals to Paper: Poetic Inspiration from Flowers*, Karen was involved in the many months of planning leading up to the installation in March 2013.

When given a choice of possible exhibit topics for her own project, Karen chose to use a collection of orchid prints by artist Florence Helen Woolward to create an exhibit that would help illuminate the world of orchids for the visiting public. The prints are from *Thesaurus Woolwardiae, Orchids of the Marquis of Lothian*, which contained reproductions of 60 of Woolward’s orchid paintings. Woolward produced an impressive body of work, especially considering that she was never formally trained in either art or botany. There was much to explore in putting together materials for this exhibition. Karen researched the biology of orchids, the history of orchid collecting in the 19th century, Florence Woolward’s life, and the Botanic Garden’s orchid collection, distilling the information into clear, concise text for the interpretive panels in the exhibit. She put together a slide show of orchid flowers from our collection and selected orchid specimens from the Smith College herbarium to feature in the exhibit.

Without a doubt, orchids are surrounded by an aura of intrigue, and people are passionate about these plants. The exhibition provides visitors the opportunity to explore beyond the beauty of the artwork on display and delve deeper into this fascinating family of plants. *Thesaurus Woolwardiae: Orchid Paintings by Florence Woolward* will be on display into January of next year. Karen has much to be proud of.
Rhododendron Transplants from Maine

Over the years our director Michael Marcotrigiano discussed his desire to see a more diverse collection of rhododendrons in the landscape. I had come across Eastern Plant Specialties (EPS) online offering “Big Specimen Rhodos” from their nursery in Maine, and noted in the Botanic Garden’s plant source records that we had purchased plants from EPS back in the 1980s. During a 2011 vacation to Maine, I happened to visit EPS. This was just over a year after their nursery had been devastated by severe straight-line winds (locally considered a small tornado). I was amazed by the remnants of the destruction and to learn that 75 mature white pine and oak trees had been knocked down like toothpicks, resulting in “decades of work destroyed in 5 minutes and countless plant losses,” according to owner Mark Stavish. Yet, in the nursery there remained many great plants, including large specimens, that had been spared by the storm.

In October of 2012 Dave DeLucia, a friend and member of the Connecticut chapter of the American Rhododendron Society, volunteered to assist with plant selection and accompanied me on a day trip to EPS in Georgetown, Maine. We selected 23 rhododendron species and hybrid cultivars, ranging in height from under 3 inches, the dwarf ‘Yaku Macho’ (a seedling of the better known ‘Yaku Fairy’) selected for the Rock Garden, to an 8 foot tall ‘Merley Cream,’ planted at the President’s Residence.

Our director, Landscape Manager Jay Girard, and I reviewed and prioritized potential locations, and all were planted by the end of May 2013. Smaller plants went into the nursery until they reach a large enough size to be placed in the campus landscape. Below is a guide to some of the plants to be seen on campus, along with bloom time and bloom color.

**Mary Maples Dunn Garden**

- *R. maximum × calophyllum* — midseason, white with dark blotch
- *R. ‘Mist Maiden’* — early midseason, starts pink, fades white
- *R. ‘Judy Spillane’* — late midseason, light pink
- *R. ‘Saint Michel’* — midseason, white, frilly edges
- *R. ‘Percy Wiseman’* — midseason, peachy (salmon) pink
- *R. ‘Dexter’s Purple’* — midseason, light clear violet
- *R. ‘Scintillation’ × williamsianum* — early midseason, rose pink to light pink
- *R. ‘Louise Winkler’* — early midseason, clear to medium pink

**West of President’s Residence**

- *R. ‘Merley Cream’* — midseason, white with yellow blotch
- *R. ‘Minas Grand Pre’* — mid to late season, pink
- *R. ‘Wyandanch Pink’* — midseason, mauve or rose pink

**Rock Garden**

- *R. keiskei ‘Yaku Macho’* — early, pale yellow

**South of Conference Center (Formerly the Smith College Club)**

- *R. ‘Parker’s Pink’* — midseason, purple-red fading to white
- *R. ‘Mark’s Yellow’* — early midseason, clear yellow with dark yellow throat
- *R. ‘Ben Moseley’* — midseason, purplish pink with dark spotting

**West Side of Sabin-Reed**

- *R. ‘Normandy’* — midseason, clear pink
- *R. ‘Besse Howells’* — early midseason, deep purplish-red with a deep red blotch
- *R. ‘Palomino’* — mid to late, white with yellow blotch
- *R. ‘Mark’s White’* — mid late, lavender blush, opening to white
As director I am often asked, “What is your favorite plant?” My response: “I have many.” But if forced to choose, a top contender would be the carnivorous Venus flytrap, *Dionaea muscipula*. It so amazed Charles Darwin that he called the species “one of the most wonderful in the world.”1 It is difficult to comprehend what small successful steps would be necessary for a leaf to evolve into a fast-acting trap (a “snap trap”). DNA sequencing and anatomical studies make it clear that the sundews, *Drosera* species, are the flytrap’s closest relatives. Sundews trap insects on gooey hairs which, with slow curling, engulf or bend onto the insect and digest it. Ecologists have modeled the steps needed for a plant to evolve from a sticky surface to a snap trap and hypothesize that this is an ecological advancement because it allows larger prey to be trapped using less energy.2 With no fossil intermediates, we may never know the exact stages that led to such a highly modified leaf.

So many scientists have been fascinated by this plant’s adaptation that one can be overwhelmed trying to read all the literature published about it. Interestingly, with more modern technology available, much research has been recently published even 140 years after Darwin began primitive experiments with the flytrap. Here is a summary of what we now know, but be aware that in many cases scientists are still debating the facts and the research continues.3

Venus flytraps are not from another planet or exotic land but instead exist in the wild in a limited range from southern North Carolina to northern South Carolina, in areas of wet sandy peat that are devoid of soil nutrients.4 How they got their common and scientific name has something to do with love, but investigating this unearthed some very interesting facts. The genus name *Dionaea* is derived from the god Dione (Aphrodite’s mother), and the species name *muscipula* is a reference to eating mice (which Venus flytraps cannot do). If you want to know more you need to research it yourself since the details about the name choice are so lurid I cannot mention them here. Apparently early taxonomists were not as saintly as one might think.

Although the flytrap does not catch mice, it is carnivorous, as are several lesser known plants, such as pitcher plants and sundews. Molecular investigations demonstrate that carnivory in plants evolved independently six times during evolution. Yet, only one time in the history of life on Earth did the rapid snap traps of Venus flytrap and its water cousin *Aldrovanda* evolve, and that was about 65 million years ago.2

Although Venus flytraps are flowering plants, their flowers are small. They do attract insect pollinators, which is ironic since they also lure other insects to trap. They need to trap insects since insects are a source of needed nitrogen and other minerals. Nitrogen, present in most soils, is used by plants to synthesize their own protein. However, with carnivorous plants their “meat eating” adaptation allows them to live in nutrient-poor soils. Instead of roots absorbing the nitrogen, the modified leaf catches insects and digests them as a source of protein. To attract insects, the traps display a bright color on the inside surface and also produce leaf nectar, but until recently little was known about any chemical allure. European researchers discovered that the traps release volatile organic compounds (VOCs) to lure insects.5 Using fruit flies, they performed olfactory choice bioassays to determine that there is indeed something attractive about flytraps. Chemical analyses indicated that over 60 VOCs were emitted by the traps, predominately when they were in the light. Many of the VOCs have strong chemical similarity to scents found in fruits and flowers, even though traps are modified leaves.

Inside the trap are six modified leaf hairs, three on each side. If an insect touches one hair nothing happens (this is hypothesized as an adaptation to prevent rain drops or a piece of debris from unnecessarily setting off the trap). If another hair is contacted within twenty seconds, the trap will quickly shut. The initial touch stimulus activates mechanosensitive ion channels, causing the movement of ions and generating electric potentials that move along the surface of the leaf.6 In fact, researchers were able to close the traps without stimulating the hairs at all, by setting up an artificial electrical current where the trap halves join. After stimulation, movement of positively charged potassium ions causes a change in water content.

scaling up movements and speed from the cellular to the organ level in plants, nature’s consummate hydraulic engineers, shows how controlling elastic instabilities in geometrically slender objects provides an alternative to the more common muscle-powered movements in animals.” This report is not the end of the story, as others have argued this theory is too simplistic and does not explain the slow opening of previously closed traps.

Once the trap closes firmly, it develops what is often called a stomach — a seal that allows the trap to begin producing digestive fluids that cannot leak out. Analysis of the digestive fluids synthesized by the leaf (trap) yielded a surprisingly large array of chemicals, even those that help digest chitin, the outer covering on most hard-bodied insects. Even more surprising is that the most dominant proteins were pathogen-related, suggesting that digestive fluids may have evolved from a defense-related chemical system that existed in the progenitors of the flytrap. After the prey is digested, the trap slowly opens to await its next victim. Individual traps are functional for a few captures after which younger ones take over the role of killer.

Looking at the array of functions that have evolved in the flytrap one must be amazed. It is so specialized and so interesting that one would think it would be held in the highest esteem. Yet, Venus flytraps are endangered in the wild because of land development, fire suppression by humans (they do best when natural fires kill many competing plants), and poorly enforced laws against poaching. With tens of thousands of Venus flytraps raised in captivity and with their ease of propagation by seed or tissue culture, they are likely to avoid extinction unless humans themselves become extinct. But captive populations do not evolve naturally and are no substitute for plants adapting to their changing environment using the genetic diversity that exists in large populations. The Venus flytrap’s questionable future is another sad commentary on our apathy toward nature. Without more aggressive conservation efforts Venus flytraps may soon be seen only in florists’ shops and garden centers and never again in the habitat where they evolved.”

References
**How to Grow Venus Flytraps**

Dan Babineau

One of the biggest misconceptions people have is that Venus flytraps are tropical plants, when in reality they are hardy perennial bog plants endemic to North and South Carolina. Replicating their natural growing conditions is crucial for growing healthy specimens. To meet their cultural requirements, one must provide a low pH, nutrient-poor media, high humidity and temperature, full sun, wet roots (but well drained), and a dormant period.

The rhizome should be planted root side down so the top is flush with the media. Straight peat moss or long fiber sphagnum moss will do the trick, although amending it with perlite or sand provides more drainage and oxygen to the roots, and reduces compaction over time. Venus flytraps grow best outdoors in full sun, although it is possible to grow them indoors under fluorescent lighting or a sunny south facing windowsill. Keeping the pot in a water tray an inch deep imitates bog conditions and keeps roots wet. DO NOT fertilize flytraps. They have evolved to acquire nutrients from small insects. Fertilizer can burn their sensitive roots.

Once the growing season is over, plants need a dormant winter period. In their natural habitat they’re actually still growing during this time, just very slowly. They reduce their leaves to a small rosette but are still photosynthesizing. When I overwinter them outside (in Orange, Massachusetts), I bury the plant with a thick layer of leaves to prevent wind and cold temperatures from freezing the rhizome. If growing indoors, a north-facing windowsill or porch with temperatures between 32° and 50°F should be adequate. While dormant, remove the water tray and let the media dry out between waterings or the roots will rot. Some people have success over-wintering them in a refrigerator (not the freezer); just put the pot in a plastic bag and make sure it doesn’t dry out.

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**New Greenhouse Assistant**

Madelaine Zadik

As mentioned in the last newsletter, staff changes at the Botanic Garden resulted in an open position in the Lyman Conservatory. It’s been many a decade since we conducted a national search to fill a greenhouse position. Fortunately, we had an excellent pool of candidates. Dan Babineau officially joined the Botanic Garden staff as Greenhouse Assistant in November 2013. He came to us from Black Jungle, a commercial tropical greenhouse in Turners Falls, Massachusetts, where he had been the greenhouse manager for three years. When asked why he applied for this job, Dan said that after having worked in retail he was intrigued by academia as well as the opportunities for learning from the much more expansive plant collection here. He is excited to be working in a botanical garden with an educational mission, and he’s delighted to be surrounded by mature plant specimens, many of which are planted inground and situated in a conservatory “landscape.” That’s very different from small plants laid out in rows in a production facility.

At his previous job, Dan was also responsible for growing thousands of carnivorous plants outdoors in an area next to the greenhouses: not only Venus flytraps, but also pitcher plants (*Sarracenia* spp.), sundews (*Drosera* spp.), trigger plants (*Stylidium* spp.), and bladderworts (*Utricularia* spp.). In the greenhouses he grew tropical pitcher plants (*Nepenthes* spp.) and butterworts (*Pinguicula* spp.). When Black Jungle got some of the more unusual cultivars of Venus flytrap, Dan started growing them at home, where he also cultivates many houseplants and nurtures a hobby of miniature terraria.

Dan has a B.S. in Plant, Soil, and Insect Sciences from the University of Massachusetts, Amherst. His first year there he volunteered at the Durfee Conservatory. When he applied for a job at Black Jungle to work with animals, the owners saw that he had volunteered at Durfee and they suggested that he might be more suited to a job in their greenhouses. He attributes getting that first greenhouse job to his volunteer work, and says if he hadn’t done that volunteering, he probably wouldn’t be in this position at Smith today.
Art in the Landscape: Celebrating the Oak

With the installation in the fall of 2013 of a wonderful display of larger-than-life acorns, Marta Rudolph AC ’14 became the third generation of her family to develop close connections with the Botanic Garden. Her daughter Lex Beach ’02 took the horticulture class in 2000, and Lex’s son Lukas (Marta’s grandson) had his beautiful watercolor of the Spring Bulb Show on display at the Botanic Garden in 2009, when he was a kindergartner at the Campus School and participated in a botanical study with Smith students in an Education and Child Study class.

Last fall, Marta was a student in Professor Lynne Yamamoto’s sculpture class, ARS 274, Projects in Installation. The assignment was to choose a site on campus, reflect on the physical characteristics, present use or history of the site, and create a work provoked by this research and reflection.

After being assigned to come up with a site-specific installation on campus, Marta Rudolph wandered around seeking inspiration. She first noted that of the six sculptures identified on the campus walking tour, five were by men and the only one by a woman was unlabeled. She also marveled at the arcane layout of the paths between buildings, designed (as she and most Smithies know) to force women to take a circuitous route between buildings as a form of exercise. She decided to toy with these ideas by taking up the cause of another marginalized group on campus, the squirrels, who were also not consulted about a significant redesign of their landscape, nor acknowledged.

From the sculpture brochure Marta created:

Marta Rudolph
(American, 1951- )
A Quercus Tale, 2013
Paper Mache
Commissioned by the Squirrels of Seelye Green. SCMA Collection: SC2012:53

After being assigned to come up with a site-specific installation on campus, Marta Rudolph wandered around seeking inspiration. She first noted that of the six sculptures identified on the campus walking tour, five were by men and the only one by a woman was unlabeled. She also marveled at the arcane layout of the paths between buildings, designed (as she and most Smithies know) to force women to take a circuitous route between buildings as a form of exercise. She decided to toy with these ideas by taking up the cause of another marginalized group on campus, the squirrels, who were also not consulted about a significant redesign of their landscape, nor acknowledged.

Marta described some of her process in developing her plan for the installation:

As I spent time in this area I realized that the creatures that seem to be particularly enjoying this space are the myriad of squirrels that are gathering a huge variety of acorns for their winter stores. I saw several different kinds of acorns on the ground, which led me to read the botanical labels on the trees. There are five different kinds of oak trees (and acorns) and it is like a squirrel’s farmer’s market. I wish I had had a video camera of the squirrels’ activities: eating, chasing, climbing, foraging, digging, and storing.
One of the first things that students in the Smith College Museums Concentration learn about the Botanic Garden is that we are a living museum of plants native to New England and ecosystems around the globe, and that our goals are education, research, display, and conservation. This is a perfect entryway for them into the world of botanical gardens.

Several years ago Smith College instituted a series of concentrations as a way of enabling students to combine intellectual and practical experiences around a particular area of interest. Students can pursue a concentration alongside a minor or a second major. The Museums Concentration gives students a foundation in the history of museums and their role in modern culture. Most museums concentrators (as the students are called) never thought of botanical gardens as museums. The students often have no concept of living museums; in fact many say they’ve never been to one, even though I’m willing to bet they’ve visited a zoo. Indeed, we are able to open their eyes and give them a new perspective on what constitutes a museum.

The concentrators take an introductory course, History and Critical Issues of Museums (MUX 118), which examines institutions that shape knowledge and understanding through collection, preservation, interpretation, and display. Students study different types of museums, using the Smith College Museum of Art and the Botanic Garden as case studies. They study how academic museums are different from public museums. For the past three years, our director, Michael Marcotrigiano, has instructed students on the operations of the Botanic Garden, helping them better understand how we document, manage, and display our plant collections, as well as how we interpret them to the public. They learn about our educational programming and our efforts in research and conservation. Thus they learn that the Botanic Garden functions as any other museum.

Students are required to complete two internships or other practical experiences, plus an independent research project that synthesizes their academic and hands-on work, culminating in what is called a capstone project. Internships at the Botanic Garden are a wonderful opportunity for concentrators to gain practical experience. So far two museums concentrators have been education/exhibition interns at the Botanic Garden: Sabrina Montenigro ’13 and Ceilidh Galloway-Kane ’11. They developed interpretive and exhibit materials for our Church Exhibition Gallery, Lyman Conservatory, and outdoor garden areas. They worked on signage and brochures for the collections and exhibitions, as well as curriculum materials. The students researched, wrote text, designed, and followed through production of materials. They gained experience working on publicity, writing press releases, and producing posters. Additionally, they learned to give tours of our greenhouses for school groups.

Ceilidh Galloway-Kane ’11 decided to design her capstone project so that she could combine her love of plants and art, stating, “For my Museums Concentration capstone project, I wanted to apply my experiences teaching art and botany as well as curating an exhibit.” The capstone project, entitled Experiencing Plants through Art: An Investigation of the Importance of Early Childhood Art Education and Alternative Interdisciplinary Teaching Methods, culminated in an exhibition in our gallery. That exhibit is now online at www.smith.edu/garden/exhibits/exp-plants-through-art/slideshow.

Students in last fall’s MUX 118 were required to write a short paper based on a visit to a local museum. They were to discuss how the early history of collecting and museums is reflected in what they saw and experienced, as well as what is different about the modern museum compared to those early institutions. Of the 68 students in the class, 42 chose to write about the Botanic Garden. Here are some excerpts of what they observed.

The Smith College Botanic Garden is very much a modern product of the long evolution of museums. In particular, the careful scientific sorting and organization of its collections and the blend of education and entertainment the garden represents are very modern features of museums. Influenced by the works of people such as P.T. Barnum and Carl Linnaeus alike, this particular combination of features reflects the culmination of the lengthy and varied evolution of museums.

Alexandra Jackson ’14

The system and prominence of classification and organization at the Smith Botanic Garden reflects both the museum’s (Continued on page 8)
Arbor Day of Service

Childs Park, once part of an estate, was bequeathed by Annie Childs as a place for quiet reflection in Northampton. The private 40-acre park is open to the public and run by a foundation, but unfortunately little funding is available for maintenance. As a lifelong resident of Northampton, Jay Girard, Botanic Garden landscape manager and a certified arborist, spent many hours enjoying the park, calling it a nice retreat in the heart of the city. In recent years, however, he has become increasingly concerned about the state of the park’s trees.

Traditionally, the director of the Botanic Garden serves as a director of the Childs Park Foundation, Inc. Current director Michael Marcotrigiano was also concerned about the situation at Childs Park. As he and Girard were discussing the park’s needs for tree care, Girard mentioned that two organizations he belongs to, the International Society of Arboriculture and the Massachusetts Arborists Association, encourage members to volunteer a work day on Arbor Day. The two came up with a plan to celebrate Arbor Day by organizing a day of service for Childs Park for April 25, 2014.

After contacting David Murphy, president of the Childs Park Foundation, Girard recruited C.L. Frank & Company Tree Service to cosponsor the event with the Smith College Botanic Garden. Several other tree companies and arborists helped with much needed tree work for the park, together donating an estimated $25–30,000 worth of labor: LashCo Tree Service in South Hadley, Lyndon Tree Care of Northampton, Northern Arboriculture from Merrimack, New Hampshire, Dostal Tree Service in Florence, Larkin Tree Service in Southampton, ArborTech Tree Services of East Longmeadow, Race Mountain Tree Services in Sheffield, and Eric Reynolds from the Massachusetts Department of Conservation and Recreation. Many thanks to all these people for helping this beautiful park remain a safe place to enjoy quiet reflection for many years to come.

Museums Concentrators cont’d

On a foundational level, this modern plant house is much more organized in a methodical scientific manner than early cabinets of curiosities, which were a mixed conglomeration of natural specimens, dried plants, books, manuscripts, and paintings. However, as Paola Bertucci described in her lecture, this classification wouldn’t have come to be without the Linnaean taxonomic classification system of naming organisms based on their genus and species, which started to develop in the 18th century Enlightenment museums. The Enlightenment thought of separating humanism and natural knowledge brought about the redefining of museums, developing aspects of the modern plant house that exist today.

Clara Rosebrock ’16

My favorite path to the plant houses is through the door across from the administrative offices, which leads to the oh-so-elegantly named Camellia Corridor. Walking through this wide glass hallway speaks volumes about the Smith College Botanic Garden’s goals, values, and relation with past collections and museums. Just by walking through the Lyman Plant House and Conservatory, not only does one encounter an abundance of interesting and exotic plants from abroad and at home, but the audience, especially those Smith students, alumnae, and professors who often visit the museum, feel a personal and historical connection to the museum, which enhances their experience and ability to appreciate the plant life. The Botanic Garden of Smith College understands what the modern museumgoer is seeking, just as the early museums did.

Emily Gallagher ’16

The garden serves an aesthetic purpose without imposing a context upon the plants because it organizes itself in a natural way based on temperature and the original environments of each plant. This proves that the museum can be both educational and a place meant for pure enjoyment.

Katrina Kagan ’17

The early history of collecting is at first obviously represented in the crowded, aesthetic nature of each greenhouse. However, there are also departures from the origin of museums, as is to be expected due to the passage of time. There are still major educational goals, but there are also far more modern and scientific aspects of this collection. These points and more create a unique environment in which the beginnings as well as the evolution of collecting can be seen.

Emily Gallagher ’16

Saraphina Masters ’17

(Continued from page 7)

Danae Metaxa-Kakavouli (exchange student from Brown, class of 2015)

dedication to situating its artifacts in a broader context in order to produce resonance in its visitors, and its origins in the Enlightenment tradition.

Christine Beaubrun ’12
Notes from the Field: Gaining new perspectives on plant biodiversity conservation

Jacqueline Maasch '15

A semester ago, I could often be found sowing seeds in the warmth of Lyman Conservatory. I now find myself hiking the cloud forests of Costa Rica and Nicaragua; I observe epiphytic bromeliads, orchids, and ferns growing not from hangers, but on living trees. Here, plants that I have only before seen in cultivation are free, wild, abundant — even ordinary.

This new environment is proving to be fertile ground for my education on biodiversity conservation. As I study tropical ecology and natural resource management in the national parks, nature reserves, and farmlands of Central America, I am gaining a deeper awareness of the forces driving global species loss. In the process, I have been prompted to refine my vision of rare and endangered species protection.

As anthropogenic threats to biodiversity grow in magnitude and complexity, their effects are becoming increasingly difficult to assess and mitigate. Even greater in complexity are the ecosystems these threats impact. Moreover, environmental stressors (e.g., land conversion, pollution, and species invasions) rarely if ever occur in isolation, and evidence indicates that coinciding environmental changes (e.g., climate change and emerging pathogens) can amplify each other’s individual effects on species survival. Such environmental synergisms have the potential to accelerate population declines, and even to trigger cascades of extinctions and coextinctions — that is to say, extinctions caused by the loss of affiliated species, such as the loss of both a flowering plant and its pollinator. Scientists are still working to understand these processes, which only begin to explain the current, largely unchecked biodiversity crisis so deemed the “sixth mass extinction.”

In the face of this crisis, we must be prepared to do more than simply advocate the existence value of plant biodiversity. Unfortunately, this argument will not be persuasive enough — neither politically nor economically — to halt large-scale species loss. Perhaps any number of economic arguments will prove able to precipitate needed change: plants provide essential services, and who can know what plant might facilitate the next pharmaceutical breakthrough, or lend a favorable trait to the next stress-tolerant cultivar? Perhaps ecological arguments will gain traction as processes like environmental synergisms, cascade effects, and coextinctions become more widely understood. Regardless, it will only become increasingly important for scientists to demonstrate the effects of human activities on biodiversity and to communicate this information broadly. Public education remains of the utmost urgency, as does a proactive, precautionary, evidence-based policy approach.

As I pass the halfway point of my semester abroad, I look forward to furthering my own contribution to biodiversity conservation as a summer undergraduate research fellow at the Botanic Garden. This project will expand our collection of rare and endangered plants and build populations from which genetic material can be distributed to other institutions. Below are brief profiles of three species that I am currently working with: Euphorbia mayurnathanii, a succulent extinct in the wild; Cupressus atlantica, a critically endangered conifer; and Osa pulchra, a rare shrub with great ornamental potential. Both E. mayurnathanii and C. atlantica are on the Red List of Threatened Species of the International Union for Conservation of Nature (IUCN).

Cupressus atlantica, Cupressaceae
IUCN Red List status: Critically endangered

Cupressus atlantica, the Moroccan cypress, is endemic to eight sites in the Oued n’Fiss Valley, south of Marakech, Morocco. It is the second endangered African cypress species to enter the Lyman Conservatory collection (the even rarer C. dupreziana can be found in the Cool Temperate House). The IUCN estimates that a single population of at least 6,650 individuals of C. atlantica exists in the wild, of which most are at least a century old. Our stock was grown from wild-collected seed sent to us by Alistair Griffiths, now head of science at the Royal Horticultural Society in the United Kingdom.

Of the species I am working with, I have certainly had the most face time with C. atlantica. Following the recommendations of a study on C. atlantica seed dormancy and germination, I scarified (abraded) hundreds of seeds by hand with sandpaper. I then soaked these for 3 to 5 days in water. Our germination rate, though low, was satisfactory given that the seeds had been stored for a number of years.

My propagation efforts have to date produced 87 individuals from 14 different seed parents. This summer we will attempt to identify recipient institutions that can grow these seedlings outdoors. Seedlings will be distributed in sets of six to ensure a sufficiently diverse genetic base for future seed production. One set of seedlings will remain at the Botanic Garden.

(Continued on page 10)
**Notes from the Field continued**

### Osa pulchra, Rubiaceae

**IUCN Red List status: Not listed**

The sole member of its genus, this tropical flowering shrub is extremely rare in the wild and in cultivation. Its white, trumpet-shaped flowers recall those of the much-celebrated *Brugmansia*; its glossy foliage resembles that of a more famous Rubiaceae species, the coffee plant. Fewer than 30 individuals are known to exist in two disjunct populations in Costa Rica. Due to their proximity to human habitation, however, it is debated whether their occurrence is in fact natural.7 The discovery of *O. pulchra* in Bocas del Toro, Panama, in 2007 may represent the first known native population.8

Our current stock of *O. pulchra* consists of 20 individuals of distinct genotypes. These were grown from seed obtained from Dylan Hannon, curator of tropical collections at the Huntington Botanical Gardens. We recently received another mature fruit from the Huntington, though seed has not yet germinated.

The goals of my project at the Botanic Garden include connecting our work with that of other botanical institutions, as well as supporting research and conservation within a species’ native range. To this end, I have had the opportunity to connect with institutions in Costa Rica on building a genetically diverse *ex situ* population of *O. pulchra*. Our current stock of this species will be sent to Las Cruces Biological Station at the Wilson Botanical Garden in San Vito, the Lankester Botanical Garden in Cartago, and a private home garden in Heredia.8

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### Euphorbia mayurnathanii, Euphorbiaceae

**IUCN Red List status: Extinct in the wild**

This succulent is one of only two species grown at the Botanic Garden that are extinct in the wild (the other is *Franklinia alatamaha*, found outdoors in the Rock Garden). Once endemic to India’s Palghat Gap, *E. mayurnathanii* is believed to have been a remnant of the region’s drier past.4 With a rather unassuming appearance, *E. mayurnathanii* fails to evoke the same curiosity as its more ornamental relatives, which include the comparatively showy *E. obesa* and *E. crenulata*.

Cuttings of lateral growth were taken from a single individual growing in our succulent house. Propagating *E. mayurnathanii* was interesting in that, like many of its relatives, it secretes a toxic sap when wounded (I was very careful to wear gloves and wash my hands thoroughly when finished). The Botanic Garden has a long-term goal of producing 100 rooted cuttings of *E. mayurnathanii* for the Huntington Botanical Gardens in San Marino, California, from whom we received the mother plant. In the future, this propagation project could potentially fit into the Huntington’s International Succulent Introductions, a distribution program for new and rare succulents.9

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**References**

In 2006, among the 32 students in my horticulture class, sat Lindsey French, a sustainable design major at Smith. Over 400 students and 8 years later someone taps on my shoulder following a lecture in landscape studies that I was attending. It was Lindsey, back at Smith to teach ARS 361: Interactive Digital Multimedia for Professor John Slepian, who is on a sabbatical leave. We talked briefly and later an email from Lindsey to me contained, “So much of what I’m interested in now was sparked by things I was introduced to in your class!” This led to a lunch where I discovered one more example of the impact the Botanic Garden has in a liberal arts college. The following is an edited interview with Lindsey.

Michael (M): So you left the tranquility of Northampton to head to the windy city. What was that all about?

Lindsey (L): I headed to Chicago to pursue a career in the arts. I attended the School of the Art Institute of Chicago (SAIC), where I received my MFA in studio arts, within the Art and Technology Studies Department. After graduate school, I remained in Chicago to teach at SAIC and to develop my studio practice. I taught a handful of classes at the school, including a class I proposed called Sensing the Landscape, a studio combining the tools and technologies of new media with landscape theory and history.

M: Tell me what your art is about and where it fits in today’s art scene.

L: My art explores the tensions and possibilities between technology and nature. I’m interested in finding the slippages between these two ideas that seem inherently separate, but are actually complex and related in surprising ways. I see my practice as an opportunity to participate in a cultural dialogue, ideally offering new ways of thinking about our relationships with the natural world.

Like many contemporary artists, I work across disciplines in a research-based practice. The work itself operates across several media; I don’t limit myself to materials, but I let the concept drive its material expression. I work with sculpture, performance, sound, photography, and live plants, usually some combination of these media. I usually use some kind of digital technology in the work.

I’m interested in using technological mediation to discover new ways of understanding the natural world. Sometimes the technology is an elaborate excuse to spend a really long time outside; other times, it operates as mediator in an impossible conversation. I’m curious about the relationship between our networks of communication, and networks of communication between plants and fungi. Mycelium networks and rhizomes are like the original Internet. There’s a general cultural fear of how the Internet is changing how we communicate, but I’m fascinated by how similar it is to the ways that plants and organisms communicate.

M: What type of training did you need to get to take such an integrated approach to art?

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L: I think my liberal arts training combined with a graduate degree in studio art led me to this research-based art practice. My undergraduate education was all about making connections across disciplines, and learning good research practices. I’m not afraid to dive into scientific literature, or consider literary references, or dig through dense texts on linguistics theory when working on an art piece. Cultural themes play out across disciplines, and with a liberal arts education I feel prepared to approach a variety of fields not as an expert in that field, but with a confidence to do the research that supports my work.

M: How does your curiosity about the biological world play into your artistic thought process?

L: My interest in the biological world drives a lot of my work. I’m so fascinated by the hidden complexities of the living world and I look for connections that confirm our place within the natural world. I often feature live plants in pieces, because I like the way that a plant can be seen as both active and passive. We see plants as active organisms, but they can also fade into the background as ‘just’ another piece of the landscape. Lots of people have really interesting relationships with their houseplants. They stand in as a kind of symbol of nature, but a domesticated nature, kind of like pets. Some people develop an affinity for their plants, and I think reconsidering that relationship can be an interesting gateway to think about the agency of the natural world.

I like finding ways for plants to reveal hidden or surprising aspects of the landscape, whether that’s tiny sounds, or minute vibrations, or glimpses of poetry.

M: Do you have examples of other artists using a similar approach to their art? What makes their work attractive to you?

L: Artists like Natalie Jeremijenko and Nina Katchadourian are particularly interesting to me because they create experiences that allow us to think about the world in new ways. Jeremikenko approaches her art practice as if each piece is an experiment, and she incorporates ideas from biochemistry, neuroscience, and engineering into her approach of the work. Both communicate complex ideas in compelling and public ways. I’m also influenced by artists like John Slepian and Ken Goldberg. They both have been working with these ideas about nature and technology, and the experiences I’ve had of their work have prompted me to think differently about art, nature, and the role of technology.

M: What particularly inspired you in the horticulture class, leading to your comment about your art being “sparked” by the course?

L: The horticulture class revealed a whole new world to me about plants! The first time I learned about plant communication was in your class, when you described the ways that, when attacked, plants will release certain chemicals to warn neighboring plants of predators. This discussion in particular stayed with me, and led to more and more research into plant communication and plant sensation. I was interested in the biology of plants, but I was also interested in the many ways that we understand plants culturally. These complex and fascinating bodies of knowledge were so interesting to me, and really changed the way that I understood the world around me.
Display of Conservatory Wood

In 2004, a couple of years after the renovation of the Lyman Conservatory, the Botanic Garden embarked on a redesign of the Cool Temperate House. Originally built in 1981, with narrow paths and a large center bed, this greenhouse is now organized into geographic regions, to display plants from the “four corners of the world,” featuring Asia, Africa, Latin America, and Australia and New Zealand. Many of the trees in this greenhouse had grown quite large, and it was not possible to transplant all of them. Some of the larger trees had to be taken down.

We gave the wood of many of the eliminated trees and also prunings from other trees to local wood turner Ken Ertel, who transformed them into beautiful bowls, platters, goblets, vases, and boxes. This spring we put the objects in our display case for the public to see during the Spring Bulb Show. However, we had lost contact with Ken and were not able to let him know that his artistry was being featured in our exhibition gallery. Fortunately, he came by to see the Spring Bulb Show and discovered his work on view. He was totally thrilled.

Some of the pieces are made from rare species such as the Saharan cypress, *Cupressus dupreziana*. You are unlikely to see anything made from this wood anywhere else. We should mention that we still have this tree in our collection; it was pruned, not eliminated. Other species featured in the wood display included:

- *Eriobotrya japonica*, loquat or Japanese medlar, from China and Japan
- *Ceratonia siliqua*, carob or St. John’s bread, from the Mediterranean region
- *Crinodendron patagua*, white lantern tree, from Chile
- *Brachychiton acerifolius*, flame tree, from Australia.

Plant Spirals on Display in Ohio

If you live in Ohio, you have a rare opportunity to see one of the Botanic Garden’s exhibits at Fellows Riverside Gardens in Youngstown. For this rental we did not have to pack up the exhibit and ship it out, as we developed a new method of traveling our exhibits. We simply provide digital files to the renting venue, and they refabricate the exhibit on their end. This arrangement is great for us as we don’t have to store the exhibit. For the borrowing institution, the fabrication costs are less than for shipping, so it is a win–win situation.

For those of you who may not remember, *Plant Spirals: Beauty You Can Count On* was our inaugural exhibit in 2002 in our new Church Exhibition Gallery, created as part of the Lyman Plant House renovation.

Since then we’ve produced over 20 different exhibits, several of which have traveled to museums and gardens around the country and beyond. *Plant Spirals* was a collaboration with Smith mathematics professors Chris Golé and Pau Atela. Several years ago they arranged for the exhibit to be displayed in Geneva and Genoa, so this is the first time that it is being shown elsewhere in English!

If you want to see the exhibit in Ohio, it will be on display there through June 8.
The Latest Inductee to the Chrysanthemum Hall of Fame

Each year when the public votes on their favorite student hybrid at the annual Fall Chrysanthemum Show, we count the votes and declare a winner. In 2013, the mum with the most votes was hybridized by Elsie Eastman ’16 in the horticulture class in the fall of 2012. Seed was collected, germinated, and grown on to produce flowers for last fall’s show.

The winner is a spoon mum, with ray flowers displaying petals that begin as a bright yellow at the center around the disk flowers and fade into an orangy bronze color toward the tips. It is the newest addition to the Chrysanthemum Hall of Fame, which is viewable online at www.smith.edu/garden/exhibits/alumnunexhibit/mumalumshall.html, where you can see student-bred mum hybrids dating back to 1920.

Alumnae Updates

Several of our past summer interns have gone on to apply what they learned here in a variety of settings.

As a Smith Botanic Garden intern in the summer of 2010, Rebecca Sandall ’12 worked on a brochure about economically important plants in the Lyman Conservatory collection. She continues to enthusiastically pursue a life with plants. This spring she began a 12 month production internship in the Chicago Botanic Garden’s greenhouses and nurseries.

Brittany Dixon ’13, a 2012 summer intern at the Botanic Garden, began working at Pressley Associates Landscape Architects in September of 2013. Here’s what she had to say about that: “I’m really enjoying my new position! I’m getting exposed to all steps of the design process, as well as learning what it is like to run a landscape architecture firm in Boston or anywhere for that matter. The firm is well established so it’s quite amazing to be walking around downtown Boston and seeing work that my boss did in the 1970s as well as our current/recent projects. … At the firm I do a bit of everything like marketing, office management, as well as assist principals on a variety of public and private projects. I work closely with designers and a team of interns using AutoCAD, Photoshop, and InDesign to help complete phases of our projects. I’m also responsible for preparing project proposals, which are necessary for acquiring new jobs. My summer at the Botanic Garden increased my plant knowledge, which is proving to be super helpful in all aspects of my job from maintaining the office plants to understanding the layout of a future bed.”

Elizabeth Anne Esposito ’13 was a 2011 summer intern at the Botanic Garden. She is now working as an assistant planner at the Central Connecticut Regional Planning Agency. She told us, “I have been working on a bunch of projects including an urban tree planting plan for the city of New Britain, a food access study, and overseeing the start of a mobile farmer’s market. I’m using the GIS skills I started cultivating (haha) as a BG intern to create maps. Recently I have done several for hazard mitigation for some area towns. I’m also planning a 50-mile bike ride from Farmington, Connecticut, to Northampton on the day before Ivy Day that is open to whoever wants to ride. I’m hoping we can raise a little money for the Smith Fund with it too. I can’t wait to see the new systematics beds in the springtime!”

Robin Bennett Hunter ’08, Kew intern in 2007, is finishing up her first year in a masters program in Environmental Management at the University of San Francisco. She’s focusing on restoration ecology, and her thesis research is investigating a nonchemical method of controlling an invasive plant in restored reaches of the San Joaquin River near Fresno, California.
The Botanic Garden of Smith College holds two popular plant shows each year — a spring bulb show and a fall chrysanthemum show. Our Chrysanthemum Show traces a tradition of over a century, the earliest record being a student newspaper article from 1910. Long traditions of chrysanthemum shows can be found across the country, held at gardens such as the New York Botanical Garden, Phipps Conservatory and Botanical Gardens, and Longwood Gardens. Each show requires much planning, preparation, and many hands working behind the scenes.

Chrysanthemums, known botanically as *Dendranthema × grandiflora*, originated in China, having been referenced in written records in 500 B.C.E. By Korea played a large part in the horticulture and transmission of chrysanthemums, introducing their own breeds to Japan by the 4th century C.E. It was in Japan that selective breeding began, which continues to this day. Although mums arrived in Europe in the 17th century, they only became established after 1789. By the early 19th century chrysanthemums were found in cottage yards all throughout Europe.

In China, Korea, and Japan, chrysanthemums were beloved of the nobility and of philosophers such as Confucius and the influential poet Tao Yuanming. The chrysanthemum represents honesty, one of the four pillars of the Confucian spirit. Chrysanthemums were reserved for the highest honors. For example, in Japan, Chrysanthemums became the national seal and are closely associated with the emperor, who sits on the Chrysanthemum Throne. The late emperor Daigo instituted the Imperial Chrysanthemum Show in 910 C.E., a tradition that continues to this day.

The love of chrysanthemums provided a lasting connection between many gardens in America into the 20th and 21st centuries. In 2003 our chrysanthemum show drew inspiration from Denis Miller Bunker’s 1888 painting, *Chrysanthemums*. This painting was of the chrysanthemums at the Gardner summer residence, and is currently on display at the Isabella Stewart Gardner Museum. But where do all of these chrysanthemums come from?

There are few large-scale suppliers of chrysanthemums in the United States today. Of these, King’s Mums in Oregon is one of the most well-known. They are a 40 year old family business which grew from a hobby of collecting exotic chrysanthemums to housing one of the most extensive collections in the country. In 2008, Mr. King retired at 88 and passed the business over to Kim and Ray Gray. Today, King’s Mums supplies over 200 cultivars to home and professional growers nationwide and are a significant source for many major exhibitions. The Botanic Garden of Smith College has also used King’s Mums as a main supplier for the past decade.

This year, King’s Mums suffered a crop failure. As they write on their website, “The nursery business is not for the faint-hearted as things do not always go as planned.” Indeed, it is often required of us to expect the unexpected. This year Smith College was fortunate to have had space for overwintering chrysanthemums from the previous show, which is not something we always do and not something most other gardens do. Many gardens that rely on King’s Mums for purchasing cuttings for their annual displays are having a tough time this year. Fortunately, our choice to overwinter as many mums as we did led to our having a surplus. Moreover, the plants are traditional varieties that are not patented or trademarked. As such, we had the ability to make our cultivars available to other botanic gardens in need, and have provided over 1000 cuttings to the Phipps Conservatory and Botanical Gardens in Pittsburgh, the New York Botanical Garden in the Bronx, and the Isabella Stewart Gardner Museum in Boston. Additionally, the New York Botanical Garden’s list of cultivars that they overwintered had hardly any overlap with our stock, so we are also getting cuttings from them. In an interesting turn of events, King’s Mums was also happy to receive cuttings from our stock. They were quite grateful, saying, “This will help us a great deal in rebuilding the lost cultivars.”

In the aftermath of this year’s crop failure, many gardens may have to think twice about which plants they keep over the winter and which plants they don’t. This year has been a reminder to us not to take for granted that what was available this year will be available the next. Perhaps, at least for a time, many more horticulturists will hold on to their plants. Plants are living organisms, susceptible to pests and diseases. Maybe putting all your mums in one basket is a mistake. **Marisal Dobbins ’15, greenhouse assistant at the Botanic Garden, is an East Asian Studies major with a South Asian concentration. She is deeply invested in the environment and plans to continue learning about ecology and environmental issues while participating in the outdoors community.**

References
You are invited to join
The Friends of the Botanic Garden of Smith College

ALL MEMBERS RECEIVE
- A complimentary copy of Celebrating a Century: The Botanic Garden of Smith College, by C. John Burk
- Botanic Garden News, our newsletter and calendar of events, twice a year
- Members only hours at the Bulb and Chrysanthemum Shows — 9:00 to 10:00 am daily
  Fall Chrysanthemum Show: November 1 – November 16, 2014; Spring Bulb Show March 7 – March 22, 2015
- Free admission and discounts at over 250 other gardens around the country
- A 10% discount on Botanic Garden merchandise
- Free audio tours of the Lyman Conservatory
- Invitations to show previews and receptions

Members at the contributor level and above receive: A screensaver with images of the Botanic Garden and our collections

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