



THE BOTANIC GARDEN  
OF SMITH COLLEGE

# Botanic Garden News

SPRING 2011

## New Landscape Manager

Madelaine Zadik



Photograph by Madelaine Zadik

Jay Girard

We are delighted to announce a new addition to the Botanic Garden. Thanks to a recent bequest to the Botanic Garden, we were fortunate to be able to add the staff position of Landscape Manager. Following a national search that attracted fifty applicants, we hired Jay Girard. His main responsibility is to oversee all the landscape plantings that fall under the jurisdiction of the Botanic Garden — maintaining a large, diversified botanical collection and an aesthetic campus landscape. This includes supervising our outdoor garden staff, arranging work assignments with

2010 he was one of five team leaders to receive an award given for dedicated work, consistency, expert advice, and leadership in the field. Of the ninety working in the program at the USDA, he is the only person to have gotten the award two years in a row. Last year as part of the USDA program, Jay taught environmental science in the Worcester public schools.

Jay is proud of the fact that he went back to school later in life to complete his bachelor's degree. It sparked an interest in learning more and prompted a trip to Japan to study design and pruning techniques. In particular, Jay was very taken with the work of Landscape Architect Fumiaki Takano, whose projects include the amazing Tokachi Ecology Park in Hokkaido.

Jay says that another reason he is excited about working at Smith's Botanic Garden is the quality of the plant collections. While other colleges are reducing their gardens and collections, Smith has demonstrated a commitment to the landscape, and the Botanic Garden still boasts a diverse botanical collection. Jay was sorry to hear that we lost the cedar of Lebanon last year, which was one of his favorite trees on campus, but he looks forward to having a hand in replacing some of the trees we have lost. He wants to work on continuing to increase the diversity of our collections, guaranteeing a beautiful and educational landscape for years to come. ☪

Summer Internship Coordinator Gaby Immerman, and working closely with Chief Arborist John Berryhill to ensure the health of campus trees.

While the position may be new, Jay is no stranger to the Botanic Garden. His first day of work on April 18 was actually a return to a place to which he has very strong connections. Jay grew up in Northampton and spent much time on the Smith campus. His first job at age 15 was landscaping for Smith Psychology Professor Elsa Israel, who lived in what is now Garrison Hall. From 1980 to 1988, Jay worked as the Botanic Garden's pruner-propagator under Directors Gregory Armstrong and Richard Munson, becoming quite knowledgeable about our woody plant collection. In 1999, he became involved with the Botanic Garden as a volunteer, giving tours of the Lyman Conservatory as well as the Campus Arboretum to visiting school groups and other volunteers. Because of his long-standing involvement with the Botanic Garden, Jay says that he feels an intimate relationship with the campus and that Smith feels like home.

In addition to his knowledge of the Smith campus, Jay brings a wealth of experience to this position. He has a B.S. in Urban Forestry and is a certified arborist. For the last 35 years he has worked for educational institutions, in the tree industry, and most recently for the U.S. Department of Agriculture on the Asian Longhorned Beetle Eradication Program in Worcester, Massachusetts. (See page 2 for a beetle update.) He was one of the first seven people hired in the program to spearhead the survey, regulatory, and eradication protocols for the invasive pest. In



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#### *Botanic Garden News*

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# Asian Longhorned Beetle Update

Madelaine Zadik

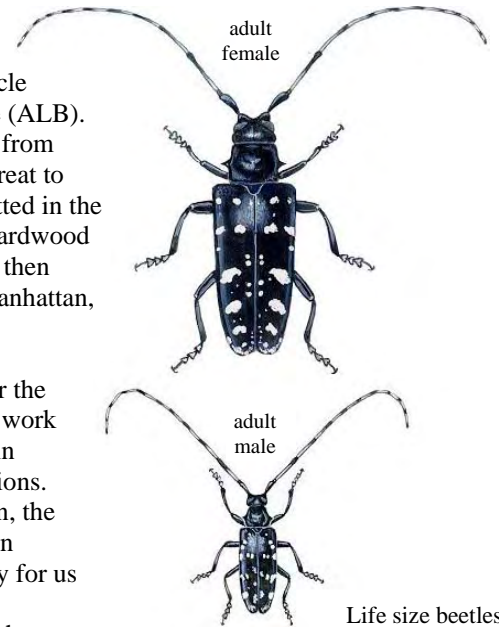
In the spring 2001 issue of the newsletter, we featured an article about the Asian longhorned beetle (ALB). This pest, accidentally introduced from northeast Asia, is a tremendous threat to American forests. It was first spotted in the United States in 1996, attacking hardwood trees in Brooklyn, New York, and then spread to Long Island, Queens, Manhattan, and New Jersey.

While I was chatting with new Landscape Manager Jay Girard for the page one article, we discussed his work for the ALB eradication program in Worcester and I had a lot of questions. When that 2001 article was written, the beetles were not yet known to be in Massachusetts, so it seemed timely for us to do an update.

According to Jay, outbreaks of the beetle in Chicago and Toronto were successfully eradicated, and in parts of New York and New Jersey they are close to being eradicated. However, more recently in 2008, the beetle was discovered in the Worcester area (although it had probably been there for quite some time). As Worcester was a factory town, the beetles probably arrived in wooden pallets. Along with massive tree removals, there is also an extensive replanting project, with a goal of replanting 15,000 trees by 2012. However, within the quarantine area surveys are still finding pockets of previously unnoticed infestations.

In July of 2010 the beetle was discovered in the Boston area, across the street from the Arnold Arboretum. This naturally was of great concern. The good news is that it seemed to be a rather confined infestation. The beetles are relatively sedentary and don't fly long distances, so it takes a while for them to spread. As a result, if an infestation is found early, it is possible to eradicate the beetles with tree removals, proper disposal, chemical treatment, and intensive detection activities. Staff at the Arnold Arboretum are now doing soil treatments with a systemic pesticide that has been found to be effective in other areas. However, this treatment kills only feeding adults and the first larval stage of the insects. It is not effective against larger larvae or eggs.

Jay says that he will be keeping his eyes open to make sure that no infestation at Smith goes undetected. Considering the potential damage this pest could cause, it is good to see that in the ten years since that newsletter article, the major detection and eradication efforts have been fairly successful. The Asian longhorned beetle has not devastated American forests as we had feared it might. However, we must continue to be vigilant in watching out for ALB and taking action as soon as there are any sightings. ☞



Life size beetles



Asian longhorned beetle exit holes  
Photograph by Dennis Haugen  
USDA Forest Service, Bugwood.org

# Developing Leaf Personalities

Gaby Immerman and Michael Marcotrigiano

For the past several years, we have been running a playful yet highly instructive demonstration in the horticulture laboratory (BIO 123), which involves experiments with plant photosynthesis. The bean print experiment, sometimes winkingly referred to as the *Shroud of Phaseolus*, literally develops an image on the leaf of a bean seedling, *Phaseolus vulgaris*. The results are visually and artistically striking, but also provide an unforgettable illustration for students. It demonstrates the remarkable processes underpinning photosynthesis, the hugely important reaction by which plants use the energy of light to convert carbon dioxide and water into food. The first product is a sugar but some of the sugar that is synthesized is converted into starch for later use. The list of complex reactions is all very boring in comparison to this memorable demonstration of it in the lab.

The bean print experiment is based on procedures that were first published by Carol Reiss and detailed in her lab manual, *Experiments in Plant Physiology* (Prentice-Hall, 1994). A bean plant is put in the dark for 24 hours. This expends its food reserves and the leaves become depleted of starch.

A negative is attached to a jar of water. With the leaf still attached to the plant, the leaf is positioned to rest against the negative and then securely held from behind by plastic mesh. The entire ensemble is held to the jar with rubber bands.

The light-starved bean plant is then exposed to bright light for 2 hours. The next step is to “develop” the image in a process that in many ways mimics the standard bath series of darkroom photographic development. The leaf is snipped from the plant and dropped into boiling water. This kills the leaf quickly, stopping all biochemical reactions. Next, the leaf is moved to a bath of boiling ethanol (alcohol). The leaf leaks its chlorophyll into the hot ethanol



President Obama’s likeness generated by relative starch accumulation in bean leaf cells during photosynthesis. The leaf acts like photographic paper — after exposure to light through the Obama image negative it is “developed” with iodine.



Setup for leaf exposure, showing the positioning of the light-deprived leaf with the image negative on a jar of water, secured with a plastic mesh and rubber bands



“Developing” the image with iodine

Photographs by Pamela Dods '08

(chlorophyll is soluble in ethanol) and the leaf is “cleared” — rendered limp, soggy, translucent, and permeable to added chemicals. Finally, the leaf is carefully transferred into an iodine solution. Iodine binds to starch and a sepia tone develops where starch is present.

Why and how does this work? In depriving our bean plant of light for 24 hours, we force the leaf into a state of carbohydrate depletion as the plant uses stored starch to maintain its metabolic processes in the absence of light. With the intense light re-exposure, the plant begins to photosynthesize rapidly, replenishing levels

of starch throughout the leaf, with the exception of the cells blocked by dark parts of the photo negative. The plant is so light-sensitive that on a cell-by-cell basis, starch is produced either vigorously, weakly, or not at all. The cells, therefore, are analogous to the pixels in a modern digital image, each cell accumulating starch in direct relationship with the amount of light it received. Cell size being infinitesimal, the resolution of the resultant image is truly remarkable! It’s as if each cell is saying “Yes We Can.”

We were introduced to the bean print technique by plant physiologist and Smith College Professor Emeritus Phil Reid. Phil used the technique to develop a photograph of his young children playing on a swing set, and the individual rings of the chain were visible on the framed print. When properly fixed and dried, the images are also very long-lived — when we first saw the leaf on Phil’s office wall, the children in the photos were already married and had children of their own. ☞

# My Path Through the Botanic Garden

Ceilidh Galloway-Kane '11

It might seem a little strange at first that an art history major would be so involved in the Smith College Botanic Garden. However, my interest in plants stems way back before my time at Smith to growing up around my grandmother and aunt's nursery in Vermont. In Vermont I was surrounded by more nature and plant life than is probably healthy for an adolescent. Even so, part of what drew me to Smith initially was the arboretum and the incredible Victorian style conservatory.

My three-year stint at the Botanic Garden started when I nervously began my sophomore year as the education and outreach exhibition assistant to Madelaine Zadik. That year I helped Madelaine design and install the exhibition in the Church Gallery for the 2008 Fall Chrysanthemum Show (see [www.smith.edu/garden/exhibits/celebratingasianculture/exhibitphotos.html](http://www.smith.edu/garden/exhibits/celebratingasianculture/exhibitphotos.html)) as well as the *Tulipmania* exhibition for the 2009 Spring Bulb Show. My experiences helping with the mechanics of exhibitions, talking with artists and botanists, working with the Art Museum, and critically thinking about what makes an exhibit interesting and informative shaped what became my senior museums concentration capstone project in spring 2011.

With the help of the Museum Education Department, my professors, and the lovely Botanic Garden staff, I was able to organize and plan for the 2011 spring exhibit in the Church Exhibition Gallery at the Lyman Plant House. This show, *Experiencing Plants through Art*, has been a year in the making and developed and changed throughout the production and planning process. I talked with many different area schools and teachers about how an art class like this could fit into their curriculum. I was lucky enough to have the opportunity to teach at Homework House in Holyoke as well as plan and teach a Smith College January interterm class. I am grateful to the Smith Art Department for funding my project with the Elizabeth Schroder Hoxie '69 Memorial Fund grant.

*Experiencing Plants through Art* is a project I had begun contemplating and forming in 2010. I wanted to bring together my skills and experiences at both the Botanic Garden and Smith College Museum of Art (where I am a Student Museum Educator) into some form of educational exhibit. My idea for the project

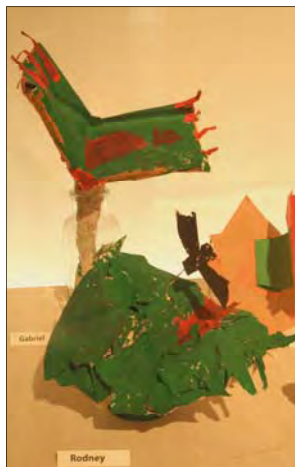
Graduating senior Ceilidh Galloway-Kane is an art history major with a museums concentration. Over the past four years she has worked with both the Smith College Botanic Garden and Museum of Art, leading tours, developing educational materials, installing exhibitions, and helping out wherever needed. She has taken full advantage of what Smith offers by interning at the Smithsonian program, teaching interterm classes, and taking other classes through the Five Colleges. She will greatly miss the campus, the gardens, and everyone at Smith.



Ceilidh with her exhibit, *Experiencing Plants through Art*

was to teach a class on plants and why they are important. The method would be exploring horticulture and botany through artistic media.

In January 2011, I taught the Homework House afterschool program for three weeks as well as the Smith interterm class for one week. It was an incredible experience for me as a teacher to go from teaching peers to teaching 11- to 13-year-olds all in one day. In both classes I worked with the students on building a community and a place to ask questions, as well as work with individual strengths. The Holyoke class was especially difficult to organize and teach because I never knew how the students would be on any given day. Some days they would be extremely focused and all work together on finishing a project and some days the only thing I could convince the students to do was play freeze tag. My experiences teaching in both instances taught me how to be a more responsible, resourceful, and better teacher. I learned to never underestimate children, to always be honest, and to be prepared for anything. This class also confirmed for me the importance of art education.



Papier maché Venus flytraps by Homework House students

I always felt uncomfortable with the mantra "College is the best time of your life," but my time at Smith has proved to be invaluable. This is the case because of the incredible support and resources that Smith provides for its students. I was able to create a final project that encompassed pieces of all of the skills I have developed from internships and classes during my undergraduate career. This exhibit will be on display through September, giving everyone time to go explore the greenhouses and the plants that inspired the wonderful paintings and sculptures that my students created. ☘

# The Ants Go Marching On

Lois Bangiolo '11

Growing up, I loved to play with “helicopters,” the winged maple seeds that covered the courtyard in which I played with my neighborhood friends. These, and the prickly burrs that would get stuck in my socks during hikes at Girl Scout camp, were the seeds I pictured whenever we talked about seed dispersal in school. I never thought about ants, and how important the tiny insects are in seed dispersal. Last summer, after I returned from my internship at the Smithsonian, I started my thesis research with Professor Jesse Bellemare, assistant professor of biology, and it is all about ants.

It was long thought that about 3,000 plant species depended on ants to disperse their seeds, but now it is estimated that the actual number is over three times that (Lengyel et al. 2010).

Plants typically have evolved mechanisms for seed dispersal because the ability to distribute their seeds across a wider area increases the range of a species, thus giving a better chance of survival (Fenner & Thompson 2005). The winged maple seeds I mentioned earlier are an example of seed that is dispersed by wind, and those annoying prickly burrs are designed to attach to the fur coats of mammals.

Ant-dispersed seeds have a unique feature, the elaiosome, a lipid-filled sac on the outside of the seed. (Lipids are a group of compounds that include fats, oils, and waxes.) The lipids attract ants, which then pick up the seed and carry it back to their nests (Rico-Gray & Oliveira 2007). The ants and plants whose seeds bear an elaiosome have a mutualistic relationship—the ants use the elaiosome to feed their larvae, without damaging the seed itself, and the plants get their seeds dispersed.

Seed dispersal by ants, called myrmecochory, is most commonly found in two biomes, the dry shrublands of South Africa and Australia, and the one we are very familiar with here at Smith, the temperate deciduous forest (Beattie 1985).

The temperate deciduous forest biome stretches across eastern North America, and is also found in Europe and eastern Asia. More than 55 million years ago, these continents were once all connected in the landmass Laurasia (Lomolino et al. 2010). What is interesting is that despite millions of years of physical separation, these areas still appear very similar in the structure of the forest and the types of plants found there. Some species, notably members of the genus *Trillium*, are virtually indistinguishable by sight, though found on different continents.

Myrmecochory is thought to have evolved in South Africa and Australia and is a good example of “survival of the fittest.” The more ant attractive seeds that were dragged underground by the ants were protected from the frequent fires sweeping across the dry lands, while those without that trait did not survive (Beattie 1985).

However, this explanation does not work as well for the much wetter temperate deciduous forest, so Professor Bellemare and I have proposed an alternative hypothesis: plants of temperate deciduous forests evolved myrmecochory in conjunction with other features that enabled them to take advantage of a unique, beneficial niche, that of the forest in early spring.

In early spring, light, water, and nutrients are all highly available, as the forest canopy has not yet developed. To fully take advantage of this niche,

Lois Bangiolo is a biology major completing her honors thesis with Professor Jesse Bellemare. Last summer, she participated in the internship at the Smithsonian Institution offered through the Smith Botanic Garden. This spring she was the curatorial intern at the Smith Botanic Garden, and she will be heading off to London this summer to intern at the Royal Botanic Gardens at Kew, also organized through the Smith Botanic Garden. Lois plans to attend medical school.



*Dicentra cucullaria*, Dutchman’s breeches, growing in Conway, MA, and its seed, displaying the characteristic lipid-filled elaiosomes.

however, the plants that occupy it, which are known as spring ephemerals, must be fast-growing, and thus are limited in terms of how tall they can grow. This short stature limits the dispersal mechanisms dependent on height, and thus ant dispersal provides a useful and practical means of dispersal.

The advances in molecular biology have been a boon to ecological and evolutionary research. DNA sequencing allows researchers to

reconstruct evolutionary relationships among plant species (which are shown on a phylogenetic tree) by looking at genetic similarities and differences. I have combined the work of legions of researchers, who have sequenced and built a tree of a plant family, genus, or order, to construct a phylogenetic tree that includes the entire 319 species that I am investigating. These species, from the three regions of temperate deciduous forest, were derived from an extensive literature search of the dispersal modes of plants, as well as drawing upon Professor Bellemare’s knowledge of the herbaceous plants of North American forests.

(Continued on page 6)

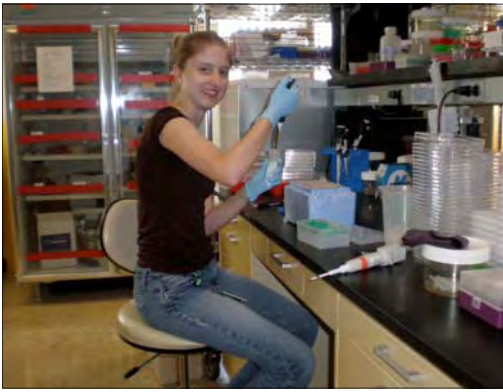


*Claytonia caroliniana*, spring beauty, a New England spring ephemeral that is ant-dispersed

## My Summer at the Smithsonian

Lois Bangiolo '11

Photographs by Adriana Mendoza



Lois in the Laboratory of Analytical Biology at the Smithsonian's Museum Support Center

## Ants *continued*

(Continued from page 5)

With this phylogenetic tree, I can more accurately perform statistical analyses that will tell me if there is a correlation between plant height, flowering time, and seed dispersal by ants. Without the phylogenetic tree, I would receive a biased result: the test would count, for example, ant dispersal found in all members of the same genus as separate evolutions of the trait, whereas the phylogenetic tree shows that there was likely only one evolution of the trait, since the species, as members of the same genus, share an evolutionary history.

In fact, the statistical results have shown a very strong correlation between ant seed dispersal, plant height, and spring flowering, which provides excellent support that the long-noted high frequency of ant-dispersed plants in the temperate deciduous forest is the result of repeated, convergent evolution of this trait, mostly likely linked to plant exploitation of the spring ephemeral niche — exactly what we proposed! ☞

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In the summer of 2010, I participated in an internship at the Department of Botany at the Smithsonian Institution in Washington, D.C. I worked in the laboratory of Dr. W. John Kress, research botanist at the National Museum of Natural History, and newly named director of the Consortium for Understanding and Sustaining a Biodiverse Planet, as well as this year's speaker for the opening of the Botanic Garden's Spring Bulb Show.

I spent most of my time doing molecular work in the Laboratory of Analytical Biology at the Museum Support Center, in Suitland, Maryland. Specifically, I helped with the Plant DNA Barcoding project, working with Dr. Dave Erickson. The purpose of the project is to create an online DNA barcode library, with short standardized DNA sequences serving as the "barcode" by which to identify plant species.

The process of DNA barcoding begins by procuring a hole-punched size piece of plant material (usually from the leaf), upon which DNA extraction is performed. Once the DNA is isolated, polymerase chain reaction (PCR) can be performed, a process used to amplify the DNA sequence of interest. The PCR product is then sequenced to produce the barcode sequence.

The leaf samples I worked with were from the Smithsonian Environmental Research Center (SERC), which is located near the Chesapeake Bay. It contains one of the 40 research plots of the Smithsonian Global Earth Observatories (SIGEO), which are maintained to study forest dynamics. Unlike with animals, there is no one standard DNA region that has been selected for barcoding, thus I sequenced three regions, the plastid gene *rbcl*, the intergenic spacer *trnH-psbA*, and the plastid gene *matK*. Using the program Geneious, I edited and aligned the raw sequence data, which I then used to reconstruct a phylogenetic tree for the plant community of SERC.

I also was able to participate in the Smithsonian Folklife Festival, held every summer on the National Mall. We had a booth where we showcased the LeafID app being developed for the iPhone in collaboration with Columbia University and the University of Maryland. By taking a photo of a tree leaf, this app will present a list of possible species that the specimen might be. The app also contains pictures of the tree, its leaves, and its fruit, and a description.

Part of the development of the LeafID app is to amass images of the tree leaves, which are fed through the program's algorithm to refine its ability to distinguish distinct species. Thus, we spent several days at the National Arboretum and the National Zoo tracking down tree species and photographing their leaves.

I had an excellent experience working at the Smithsonian. In addition to all I learned about botanical research, I was able to go on several behind-the-scenes tours, including tours of the paleontology, fish, wood, mammals, and anthropology collections, which were specially arranged for interns at the Smithsonian.

I am very thankful to the Botanic Garden of Smith College and the generous donor, Dee Bates, for providing me with this opportunity, and to all of the members of Dr. Kress' lab group, who were extremely helpful throughout my internship. ☞



Lois demonstrating the LeafID iPhone app

# Conserving World Flora

Madeline Zadik

**B**otanic gardens around the world serve as guardians and advocates for the plant world. At Smith we take this role seriously, and it is part of the Botanic Garden's mission to foster education about the science, beauty, and importance of the plant kingdom. Plant collections, displays, exhibitions, and research projects are vital components for teaching about conservation and sustainability issues. Additionally, we work with other botanical institutions and scientists around the world in advancing species conservation projects.

With habitat destruction and degradation becoming a larger issue, a new International Botanic Gardens Ecological Restoration Initiative is developing a global alliance of botanic gardens for ecological restoration. They have identified long-term goals that include having 75% of threatened plant species in *ex situ* collections (outside of the native habitat) and at least 20% available for recovery and restoration programs.

One area where the Smith Botanic Garden is engaging in important conservation work is with rare and endangered species. The last issue of the newsletter featured conservation work with *Torreya taxifolia*, stinking cedar, by Conservatory Manager Rob Nicholson. Such projects provide student interns with hands-on work for learning about real conservation issues and ensure an awareness for the future of how we can work on these critical issues. In the Lyman Conservatory as well as in our outdoor collections, we are growing and displaying plants that are threatened in the wild.

Among the many different plants at the Lyman Conservatory there are several that are on the "Red List." The International Union for Conservation of Nature (IUCN) Red List of Threatened Species identifies particular species at risk of extinction. The cloud forest maple, *Acer skutchii*, in the Cool Temperate House could at first glance be mistaken for our native sugar maple *A. saccharum*. However, it grows in the high elevations of Mexico and Guatemala. Biologists have discovered only four populations in Mexico and one in Guatemala. Years ago Rob Nicholson collected seed for the Arnold Arboretum; the tree growing here is from one of these seeds. It has yet to flower and set seed, but when it does, it will allow for distribution via our seed list.

Another extremely rare tree in the Cool Temperate House is the Saharan cypress, *Cupressus dupreziana*. It is a native of a dry, mountainous region in the central Sahara Desert in southeast Algeria. Fewer than 200 trees are left in the wild and they are not reproducing well in their native habitat. In 1985 Rob Nicholson collected seed in the Tassili n'Ajjer, a high plateau in the Sahara, and was able to grow four trees. With Smith student Bibiana Garcia-Bailo '00, he conducted propagation trials and the data obtained provided valuable insight on the most effective propagation methods for *C. dupreziana*. That enabled distribution to other botanical gardens for study and preservation purposes. We have distributed hundreds of rooted cuttings as far as Israel and Kuwait, and just received a request from the Dharma Vana Arboretum in Andhra Pradesh, India.

The catkin yew, *Amentotaxus formosana*, in the Fern House and the plum yew, *A. yunnanensis*, in the Cool Temperate House are native to Southeast Asia, mainly China, Taiwan, Vietnam, and northeast India. As members of the yew family, the Taxaceae, they have yewlike leaves, which are larger and are notable for the beautiful white stripes on the underside. Not only is the catkin yew on the Red List, but it is also extremely rare in cultivation. Rob Nicholson collected *A. formosana* in Taiwan and *A. yunnanensis* in northern Vietnam, the latter being its first introduction into cultivation. Cuttings were rooted and distributed to scientists studying the complex genetics and evolution of the gymnosperms.

Wollemi pine, *Wollemia nobilis*, in the Cool Temperate House was known only from fossil records until 1994, when it was discovered in a remote area in New South Wales, Australia. With less than 100 trees known to exist in the wild, it is now the focus of extensive research to safeguard its survival and is becoming



*Amentotaxus* fossil

a dramatic comeback story in natural history.

Among the several threatened and endangered native plants growing in the Rock Garden are goldenseal, *Hydrastis canadensis*; small yellow ladyslipper, *Cypripedium calceolus* var. *parviflorum*; broad waterleaf, *Hydrophyllum canadense*, and hairy beard-tongue, *Penstemon hirsutus*.

Outdoors in the Campus Arboretum we are able to showcase a number of trees that are no longer in abundance in the wild. The Ben Franklin tree, *Franklinia alatamaha*, was discovered by botanists John and William Bartram in 1765, growing along the Altamaha River in coastal Georgia (when the species was named a spelling error occurred). The trees disappeared within a few decades, and no others were ever found in the wild. All cultivated trees are probably descended from those the Bartrams collected. Fossils of the dawn redwood, *Metasequoia glyptostroboides*, were found in rocks of the Eocene epoch (54–35 million years ago). It was thought to be extinct until the 1940s, when Chinese botanists found a small grove in China's Sichuan province. Today the species is still critically endangered in the wild. Our specimen was grown from seed collected from those trees in China and was planted on campus in 1948.

It is through our participation in international seed exchanges, and through the exchanges of plant material with other gardens, that we are able to grow a variety of threatened and endangered plants and enable other gardens to do so as well. Botanic gardens worldwide are working to help preserve the earth's biodiversity through genetic research and conservation programs. We are proud to be a part of this international network and do our part to shelter threatened species and to educate the next generation about this important issue.

## Muriel Kohn Pokross '34 (1913–2011) and the Kew Internship

Paula Deitz '59

I have a vivid memory of meeting Muriel Pokross for the first time at Smith in 1959. It was on Ivy Day during graduation festivities for my class. My dear friend and classmate Joan Pokross introduced me to her mother, who was also on campus to celebrate her 25th class reunion. Muriel was a vivacious and charming brunette dressed in a crisp white shirtdress for the rituals of the day, and she represented to us the ideal of what we aspired to become as women. I immediately felt I had made a new friend.

Fast forward fifty years. In May 2009, Joan Pokross Curhan, Muriel Pokross, and I arranged to meet at Lyman Conservatory for a tour of the glasshouses during Joan's and my 50th class reunion, and Muriel's 75th. As if no time had passed, there was Muriel, as energetic and pretty as ever, full of enthusiasm for the Botanic Garden and its horticultural displays. We were also marking the sixteenth summer of the Muriel Kohn Pokross '34 Travel/Internship Fund that had been established on Muriel's 80th birthday by her family to send two students for ten weeks of botanical research with scientists at the Royal Botanic Gardens, Kew, England. We were joined on this occasion by three other generous supporters of this program, 1959 classmates Marcia Early Brocklebank and Claire Davidson Peppiatt, who reside in England, and Donna Kargman Donaghy.

The Botanic Garden of Smith College had



Muriel Pokross in the Ivy Day Alumnae Parade for her 75th reunion  
Photograph by Cecilia Moncayo

an earlier connection to Kew through its head gardener Edward J. Canning, who had been both trained and employed at the Royal Botanic Gardens. Having been instrumental in designing the rock garden at Kew, at Smith, in 1896, he designed on a slope near Lyman Plant House one of the first rock gardens in America with plants native to alpine regions all over the world and other rock dwelling species. Other gardeners trained at Kew followed him over the years.

Shortly after Smith College president Mary Maples Dunn invited Susan Cohen '62 and myself to become the founding co-chairs of the Friends of the Botanic Garden of Smith College in 1992, we had discussions with Botanic Garden Curator Susan P. McGlew '83 about future projects. In response, she handed me a two-page printed description of the Micropropagation Unit at Kew, signed by Dr. Michael F. Fay, and expressed the desire to place a Smith student intern in Dr. Fay's impressive program.

I began corresponding with Dr. Fay, and we met at Kew on June 14, 1993. At first he told me there was no student intern program as such in his department and that he engaged no more than one student. But at the end of that memorable visit walking across the garden, he agreed to accept a student summer intern from Smith. As I understand it, during one of our several subsequent trans-Atlantic telephone conversations, his American colleague Dr. Mark Chase (who now heads Kew's Jodrell Laboratory) overheard Dr. Fay discussing the Smith internship. When he heard "Smith College" and "student intern," he said to Dr. Fay, "Do you know how lucky you are?" And he expressed the desire to engage a Smith student as well for DNA research in his plant taxonomy laboratory.

Shortly thereafter, Joan Curhan contacted me about her family's wish to make a gift to Smith in honor of her mother's 80th birthday, and I told her about the new Kew intern program. Muriel had spent her Junior Year Abroad in Paris and often said that the experience opened up a whole new world to her and that she considered that year, learning to understand the life and culture of another country, the most valuable of her college career. But also, Muriel was a keen gardener once she and her husband David, following his service during World War II, settled into their home on Rutledge Road in Belmont, Massachusetts, where they lived the rest of their lives. (David R. Pokross, an attorney, died in 2003.) Joan especially recalls the double border along the front walk of her parents' house with its seasonal plantings of pansies, followed by tulips and peonies. At the rear of the house, graduated terraces were landscaped intermittently with shrubs and later with flowers planted by Joan. Muriel inspired in Joan a great love of gardening and flower arranging, which has since been passed along to Muriel's granddaughter, Jenifer. Also, visits to Lyman Conservatory had greatly enriched her years at Smith, a special love that she passed on to Joan, who found it an equally peaceful retreat.

Considering Muriel's enthusiasm for the benefits of studies abroad and her own devotion to horticulture, the Pokross family decided to

(Continued on page 9)



2009 Commencement/Reunion weekend at the Lyman Plant House  
Muriel Pokross '34 with 2008 Kew Intern Christina Dragon '09

## Muriel Pokross *continued*

initiate an endowment to provide travel and living stipends for the Kew interns and surprised her with the Muriel Kohn Pokross '34 Travel/Internship Fund at her 80th birthday dinner on Cape Cod. Thus, each summer, from 1994 to the present, two Smith students have been selected from a pool of applicants for this challenging learning opportunity of working with Michael Fay, Mark Chase, and Felix Forest on micropropagation and DNA research. Now they focus exclusively on the latter, reclassifying plants by comparing DNA sequences, revising the system that Carl Linnaeus devised in the eighteenth century, which was based on floral features.

When on several occasions during these years the results of the Kew experiments have been published in scientific journals, the names of the relevant Kew interns are listed as co-authors, and Smith's Pokross Fund is acknowledged along with Kew sources as one of the funders of the project (see [www.smith.edu/garden/Academics/Kew-papers.html](http://www.smith.edu/garden/Academics/Kew-papers.html) for a list of papers). By generously mentoring these students in the methodologies of scientific research and making them partners with full responsibility for their assignments, the Kew scientists have inspired many of them to seek professions in the botanical sciences and related fields, widening their horizons. Their care of and concern for the students as they become integrated into the Kew family have made the experience a life-changing event with an international scope, including colleagues from other countries with whom they will remain connected throughout their future careers.

This ongoing support from the Pokross family capped a long and generous philanthropic tradition with a special emphasis on education and on assisting immigrants from abroad. In the late 1930s, they helped Jews escape from the Nazis in Vienna, and, with her proficiency in French, Muriel helped many Haitians with the complexities of life in the States. After receiving her master's degree in education at Boston University, Muriel pursued her advocacy for the hearing impaired by helping them reach their full potential and teaching others techniques for communicating with them. But no story about Muriel is as captivating as the one about her efforts to persuade Boston's public television station to be pioneers in captioning their programs for the hearing impaired. Evidently, she and Smith classmate Julia Child showed up at the station at the same time, and in her own words:

*While I was waiting to speak with the manager, Julia was ahead of me, armed with a frying pan and a dozen eggs. Her ability to cook eggs in many different ways convinced them to put on her program "The French Chef." I was next after Julia to try and convince the producer of the merits of captioning as an aid to the hearing impaired. Julia supported my campaign and agreed to caption her program. Needless to say, Julia's program was a huge success, and this contributed in no small way to the fact that captioning is now used universally.*

Muriel Pokross' vitality and the vision of her family have been an inspiration throughout these past years as the Kew intern program has become integral to the Botanic Garden and biological sciences at Smith. Under the excellent direction of Michael Marcotrigiano, the garden's director, and Madelaine Zadik, manager of education and outreach, who also oversees the new complex visa requirements—and with the always gracious hospitality of the Smith College Club of Great Britain—the Kew interns will carry on in memory of Muriel Pokross and her life lived in understanding the merits of expanding lives on an international scale. ☪

Muriel Pokross died on March 16, 2011. It was her wish that memorial donations be made to the Muriel Kohn Pokross '34 Travel/Internship Fund at Smith College.

## Thoughts on My Kew Internship

Elizabeth McCarthy '06



After graduating from Smith, I started a Ph.D. joint with Queen Mary, University of London, Kew

Gardens, and the Natural History Museum, London. My doctoral project is on plant floral evolution, focusing specifically on the effects of polyploidy (duplication of chromosome sets) on molecular, morphological, and floral color evolution. Having gotten a postdoc position, I will be moving to start work at the New York Botanical Garden, where I will research the functional divergence of ancient floral development gene duplicates and how those differences in function have affected the evolution of floral form.

The Kew internship shaped my scientific career. I had done research at Smith before starting the internship, but never as a full-time job. During my time at Kew, I realized, "Yes! This is what I want to be doing for the rest of my life!" I fell in love not only with the beauty of Kew Gardens and London, but also with the genus *Nicotiana* (tobacco relatives) with which I was working. I enjoyed the research so much that I started looking for a way to go back to Kew to continue research on *Nicotiana*. Through my contacts at Kew, I found Professor Andrew Leitch, who collaborated with Kew scientists on *Nicotiana* research for many years, and he agreed to take me on as a Ph.D. student.

My stay at Kew as a Smith intern opened the door to many opportunities. It provided me with experience and the confidence to complete my honors thesis at Smith. It led to my acceptance in the Ph.D. program at Queen Mary, where I developed a passion for floral evolution, which I plan to pursue throughout my research career. Pretty much my whole internship stands out for me: the research, the people, and the place, which together created an unforgettable and life-changing experience.

As you can see, the Kew internship means a lot to me. And, because I was in London for four years during my graduate studies, I got to meet the next generations of Kew Smithies, which was also wonderful! ☪

## More Thoughts from Past Kew Interns

I was honored and thrilled to be one of the first two Smith students selected for the Kew internship in 1994. Being at the world's finest botanic garden and plant research center, working with scientists and post-doctoral students was an amazing experience that I will always treasure. I am forever grateful to Muriel Pokross, her daughter Joan Curhan, their families, and Paula Dietz who came up with the idea and arranged with Kew scientists to make it happen, and all the people who generously contributed to the endowment fund that made it possible. I remember meeting Muriel to help her celebrate her 80th birthday with a luncheon in one of the Smith College greenhouses. Later I tried to explain philanthropy to my eight-year-old daughter and why someone would want a birthday present not for herself but to endow a legacy to benefit Smith College students she would never know.

1994 Kew Intern Diane Bowman '96 AC

The internship definitely influenced my future. During my time at Kew I became more involved with plant research at the molecular level, and realized how broad the field of plant science could be. Just being in a lab like the Jodrell was eye opening in that I hadn't imagined so many people from different backgrounds would unite together to learn about and conserve plants! Though I had always had a love for flora, this internship cemented it. It awakened my international awareness. I became much more interested in international matters, especially pertaining to conservation of wild lands and agriculture. After my next internship at the California Academy of Science in their botany department, I was sure I was destined for a career in the plant sciences. Now I have narrowed it down to plant pathology, hopefully focusing on international agriculture.

2009 Kew Intern AJ Campbell '11

I am currently a Ph.D. student at Indiana University, studying evolutionary genomics. I have continued on in the field of genetics/biology, and the internship was one of the experiences I had at Smith that led me to pursue this field. I had a wonderful time going abroad and meeting scientists from another part of the world.

2003 Kew Intern Casey McGrath '05

The whole experience stands out. To be able to get up in the morning, walk through my neighborhood along the Thames, cross into the gate of Kew and have this amazing botanical garden available to me for free was incredible. I had a great roommate, Gargi Abdelnour, with whom I still keep in touch, and we explored the garden and the city of London together. We met a great group of scientists and friends — who welcomed us into their labs, and also their homes. It is an experience that I will always treasure.

1996 Kew Intern Mary K. Parent '98

I was a biology major and chemistry minor. Though I did not pursue the sciences after Smith (I went into IT consulting and eventually financial services), the Kew internship absolutely influenced my life. It was a once-in-a-lifetime opportunity. Not many science majors have the option to study abroad while in college since their academic focus is on the sciences and not foreign languages. To this day, I am grateful for the opportunity to have studied at Kew. Living and studying in a foreign country "opened my eyes" to the world beyond the sciences, Smith, and the US. I did have the opportunity to publish the results of my research in the *American Journal of Botany*, one of my proudest accomplishments! I wrote the paper with Tony Cox (the scientist with whom I studied), though I don't believe he is at Kew still today. When I discuss my overall Smith experience with peers, alumnae, or potential Smith applicants, the Kew internship is always one of the things I highlight.

1996 Kew Intern Danielle Gargi Abdelnour '97

I am a busy freelance writer and editor, working primarily on science publications. The internship gave me a good view into the workings of a botanical lab and good training in bench technique. It brought me to a unique part of the world, among people who were passionate about their subject. The experience demystified the laboratory culture and reinforced my interest in international collaborations. I recall the beauty of Kew... the high-spirited friendliness of my workmates... the extreme heat of that summer... a particular field trip for lilies... pubs along the Thames... trying to keep my lab notebook in order... my kind landlady (a niece of the Antarctic explorer Shackleton).

1995 Kew Intern Jean Zimmer '99 AC

I loved my experience at Kew Gardens. It was a highlight of my undergraduate career. I currently work as a prenatal genetic counselor at Massachusetts General Hospital. The internship allowed me to discover how much I love genetics and research. After graduating from Smith, I got a job in a Harvard genetics research lab. The man who hired me for that position brought me in for an interview because of where I graduated from and also because he was intrigued by my Kew internship and wanted to hear more about it. Since graduating from Smith and working in the research lab, I have gone on to earn my master's degree in Genetic Counseling from Brandeis University. In addition, I have worked as a research coordinator. I still have hanging on a wall in my house a framed picture of the tulip I worked on while at Kew. I know that I wouldn't be doing what I am today without that internship.

1998 Kew Intern Penelope Stranc Roberts '99

The internship definitely had a huge impact on me and after graduating from Smith I went directly to Yale University. I decided to pursue plant biology largely because of my positive experience at Kew. In 2008, I got my Ph.D. from Yale in Molecular, Cellular and Developmental Biology, followed by a post-doctoral position at the University of Maryland in Dr. Zhongchi Liu's lab, working on flower development in *Arabidopsis* and confocal microscopy and transformation of strawberry fruits and flowers.

2001 Kew Intern Chloe Diamond Mara '02

# A Sticky Situation

Michael Marcotrigiano

Last fall, our *Pisonia* tree, located in the Cool Temperate House, flowered for the first time. Ours is one of over a dozen species in the genus, and there is considerable confusion concerning the authenticity of some species names and identities. It is not uncommon for a genus with many similar looking species to have taxonomists debating their classification. Oftentimes plants in cultivation are misidentified and mislabeled, and thus they are marketed in the trade under several names. That being said, it is likely that our plant is either *Pisonia umbellifera* or *P. grandis*.

The pisonias are in the family Nyctaginaceae, the same family that contains the old-fashioned annual four o'clock flower and bougainvillea. The genus *Pisonia*, made up entirely of woody shrubs and trees, is widespread in semi-tropical to tropical regions of the Indo-Pacific and tropical America.

Our flowering *Pisonia* eventually set seed. At one point our conservatory manager, Rob Nicholson, lured us from our offices to show us the stickiest fruit any of us had ever seen. It is not the seed proper that makes the glue; rather it is the remains of the sepals, also known as the calyx, which persists on the fruit of *Pisonia* and exudes the sticky resin. Usually flower sepals are greenish and outside the flower petals, but in this case the sepals actually look like petals and there are no actual petals.

One would assume that this glue has a purpose, so it was time for some research. If you ever feel that your area of interest is too narrow, rest assured it is not. There is a scientist somewhere who has spent his or her life studying seed glue. So, not surprised, I found some solid research papers from which to learn.

Most of us are familiar with the more common forms of seed dispersal. For example, there is the wind dispersal of seeds such as maples, dandelions, and poplar. (Also see the fall 2007 newsletter article on seed dispersal mechanisms as well as the article on page 5 of this issue about ant dispersal of seed.) We know that animals that eat nutritious fruit like mulberries

and crabapples disperse the seeds in their droppings or drop them when eating the fruit's flesh. The adhesion of seeds to animals as a means of dispersal is not something that is as intuitive. The term for it, epizoochory, was new to me even though my dog often comes in with burdock or another awled seed stuck to his fur. When all the known plant species that use adhesion are listed, by far, it is hooks rather than glues that are the means of adherence. The Pacific islands show a disproportionately large number of species where seed adhesion is the mode of seed dispersal. Perhaps this is not a surprise, since traveling island to island requires a strategy for long-distance transport over water.

Animals get no benefit from adhesive fruit, unlike edible sweet or nutritious nuts. While adhesion can serve as one method of seed dispersal (the animal eventually chews or scratches them off), it turns out that in several species the adhesive awns (spiny bristles) and mucilage primarily function to anchor seeds so that the first root can penetrate the soil. In a small number of plants the hooks and barbs are antipredator devices, which develop on the fruits of species where the seed is consumed and digested. It's no fun swallowing an armed or sticky fruit, so the seeds of such species are generally spared. As *Pisonia* are woody



*Pisonia* fruit sticks to anything



Tiny pale greenish yellow *Pisonia* flowers

Photographs by Madelaine Zadik

shrubs and highly branched trees that are havens for island-hopping birds, it has been proposed and largely accepted that the glue has something to do with seed dispersal by birds. In theory, the fruits stick on birds and the birds travel away from the parent plant and disperse the seed when it is preened off their plumage, the feather falls out, or the bird eventually dies.

With fruit adherence species, fruit attaches to any suitable animate or inanimate object, so there is no one bird species that has coevolved to disseminate seed of a particular plant species. The lack of specificity with seed adherence dispersal is universal. In North America, 25 bird species have been observed in fruit entanglement situations, with the most common "enemy" being burdock (*Arctium minus*). While fruit/animal adherence specificity does not occur, with the larger species like *Pisonia grandis*, there are a limited number of bird species that engage in the somewhat risky business of building their nests on *Pisonia* limbs and, therefore, they become the most probable candidates for adhesion.

To all of us at the Botanic Garden, the copious amount of *Pisonia* glue seemed like overkill, and indeed, in many cases it is. We will spare you the gruesome images of birds glued to fruit masses in a futile effort to free themselves. *Pisonia* drops its fruit clusters intact, which can contain up to 200 seeds. Therefore, seeds remain closely spaced in large numbers, making the adherence of large seed numbers to a

(Continued on page 12)

## Sticky *continued*

(Continued from page 11)

single bird a possible scenario.

The fact that many birds are found trapped and flightless entwined in a gluey mass, eventually dying, has led ecologists to ask some obvious questions, and natives to call many in the genus “catchbirdtrees.” If having sticky fruits/seeds helps you disseminate your offspring, how would that work if the bird is dead rather than flying to another island? Or is the rotting bird carcass a major source of nutrients for the new seedlings? Why else would you kill your mode of transportation?

Discussing research details is beyond the scope of a newsletter article, but in summary, experiments and observations have led to the conclusion that the theory that the carcass somehow benefits seedlings is not plausible. Crabs and animals clean the bird carcasses long before they decompose. Experiments where carcasses were protected from scavengers so that seeds could germinate near them showed no benefit to the seedlings. The seedlings actually underperformed those in control plots where there were no carcasses. It appears that the entanglement and mortality of some birds are just negative side-effects of the evolution of seed designed to stick firmly to feathers. Without a significant impact on bird

populations the importance of stickiness outweighs the negative of bird death in a Darwinian scenario. While it is disturbing to see the dead birds, when the entire bird population is estimated, the percentage of bird fatalities is very low. This may explain the persistence of the copious glue through evolution. While birds die, not enough of them die to negatively impact seed dispersal. Yet, with a few island bird species that produce many young, seed entanglement is the leading cause of death in the young and inexperienced birds (the teen drivers of the bird world!).

When we uncover something new to us, like *Pisonia* biology, it reminds us of the value of having a diverse and extensive plant collection for teaching at Smith. We now have another “wow” story to tell our students and visitors. Learning from the plant, rather than the book, is always more effective. I remember my early years as a biology major becoming increasingly interested in the interaction between plants and animals. I did lots of reading. Now, just when I thought I had a grasp on things, another captivating and surprising story unfolds. It’s the kind of reading that keeps me glued to my seat — quirky facts that stick in my mind. Puns intended. ☞

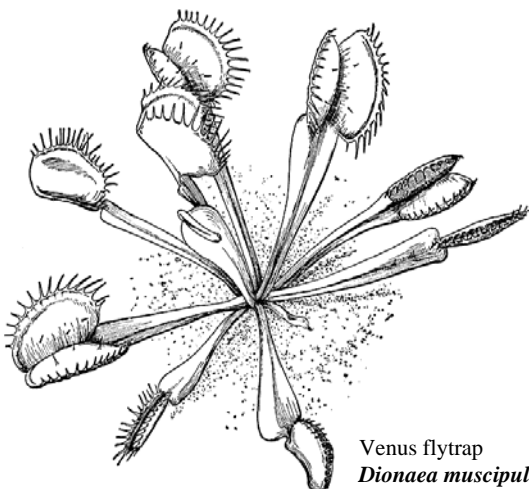
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## Botanical Tidbits

Michael Marcotrigiano

Plants have some curious traits, and we thought you would be interested in some unusual plant facts. The botanical world is rather amazing and there is always more to discover.



Venus flytrap  
*Dionaea muscipula*

- ◆ You might think that the Venus flytrap is native to some exotic tropical ecosystem. While it has been introduced and succeeds in other countries, it is native only to North and South Carolina, specifically within a 60-mile radius of Wilmington, North Carolina. Fire suppression and competition with plants not normally growing in its ecosystem are threatening its survival in the wild.
- ◆ A mycorrhiza is a symbiotic association between a fungus and the roots of a vascular plant. The fungus invades the root system and gets a continuous supply of carbohydrates from the plant while providing the plant with minerals it has extracted from the soil with its large network of mycelium (threadlike mass). In many plant species this relationship is critical to plant survival.
- ◆ Each plant root tip is capped by a specific group of cells (the root cap) that not only protects the dividing root cells but contains special structures that assist in the sensing of gravity. In experiments where the cap is carefully removed the end result is a root that grows without a sense of direction.

# News in Brief

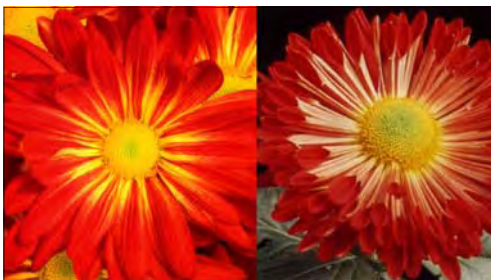
## New Student Guide to Lyman



This spring the Botanic Garden's Cary MacRae McDaniel Education/Exhibition Intern Lenora Walter '11 created a new full color guide to the Lyman Conservatory. The guide is intended to be a fun exploration of the greenhouses, but it also touches on the importance of plants to humans. At the same time it helps visitors find their way around the various greenhouses and features some of the more noteworthy specimens. It includes a scavenger hunt and some thought provoking questions. We'll be posting it on our website shortly, just in case you don't get a chance to visit. It will help you explore our plant collections from a distance. Thank you, Lenora! ☞

## Chrysanthemum Hybrid Winner

In the century-old Smith College tradition, each fall horticulture students hybridize chrysanthemums during the Fall Chrysanthemum Show and the following year the visiting public votes on their favorites. Last fall the hybrid that garnered the most votes was one produced by Hannah Pearce '12. The parent mums of the winning cross were the cultivars 'Fire Island' (♀) and 'Redwing' (♂).



'Fire Island' (above left) is an intense red and yellow striped bicolor daisy and 'Redwing' (above right) is a spoon with bronze tubular florets that stand out perfectly flat with dark crimson tips. The cross between the two resulted in a striking reddish bronze spoon. ☞

## Director to Speak in Belmont, MA

From time to time, members of the Botanic Garden staff have the opportunity to make presentations for Smith Clubs in various locales. On May 25, the Botanic Garden's director, Michael Marcotrigiano, will be speaking at the Belmont, Massachusetts Smith Club. He will be discussing *The Smith College Botanic Garden: Past, Present, and Future*. The meeting will be held at Brookhaven at Lexington. For more information contact Angela Olszewski '85. ☞



## Flowering Times

Students in the spring horticulture class have a fun assignment called the Order of Bloom Walk. Beginning mid-semester they observe and record the expansion and opening of flower buds on a weekly tour of about 50 campus trees and shrubs. This has given us data of spring's progression over the years, and we are now working with Smith's Spatial Analysis Lab to feed the information into a Geographic Information System (GIS) with GPS readings for all the plants. This will enable us to better track the blooming data, which should prove quite interesting.

Last year was an extremely early year for flowering, with lilacs in bloom the last week of April. This year, however, everything was about two to three weeks behind the norm. Usually, when students start with their observations in mid-March, *Daphne mezereum*, February daphne, and *Corylopsis gotoana*, winter hazel, are in full bloom, but this year their buds were still just enlarging the first week in April. ☞

## New Signage

On your next visit to the Lyman Conservatory, stop in the Cool Temperate House. Reading our new interpretive sign should help you better understand the plant collection on display here. ☞

**Cool Temperate House**  
Plants from the Four Corners of the World

THE BOTANIC GARDEN OF SMITH COLLEGE

Geographically, temperate climate zones exist at latitudes between the equator and the poles. These zones are also affected by altitude, bodies of water, and wind currents. Temperate regions may occur outside these latitudes. Plants in this greenhouse are from a variety of cool temperate regions, including high altitude deserts and cloud forests, as well as Mediterranean climates with cool, wet winters and hot, dry summers. These plants do not require warm, tropical conditions but they cannot survive our winters outdoors. This greenhouse is kept 20°F above freezing in the winter.

Our plant collection also includes rare and endangered species, plants with only small populations remaining in the wild. Four such plants are growing here: the *Yucca elata*, a native to the central Sahara Desert; the *Blauwe roos*, a rare shrub; a close relative of the New England sugar maple but from the cloud forests of Mexico and Guatemala; the *Yucca elata*; and *Amorpha canescens*, native to China and Vietnam, and the *Wollemia nobilis*, from a remote area in New South Wales, Australia. Botanic gardens worldwide help preserve the earth's biodiversity through genetic research and conservation programs.

Built in 1911 and redesigned in 2004, the COOL TEMPERATE HOUSE is divided into four geographic regions: Asia, Latin America, Africa, and Australasia/Oceania. Each section features ecologically important plants from that area, which are surrounded by native organisms in Africa, introduced to from Latin America, and in the Australasia/Oceania section, plants from South America. Other plants to look for include fig, olive, and the olive paper plant.

# A Chocolate Success Story

Elaine Chittenden

In 2009 our chocolate tree, *Theobroma cacao* in the center bed of Palm House had the most abundant fruit set ever noted by the Botanic Garden staff. Some of the seed was distributed internationally to 14 botanical institutions via the *Index Seminum* (international seed exchange). It was also used in classroom projects, namely making chocolate in BIO 103: Economic Botany — Plants and Human Affairs



Mature and developing cacao pods on our tree in 2009

Photograph by Pamela Dods '08

Photograph by Pamela Dods '08



Students in plant biology laboratory making chocolate from our cacao "beans," which is a fairly involved process involving many steps including fermenting, drying, roasting, grinding, blending and more.

and in BIO 263:Plant Biology Laboratory).

Over the last 10 years, there had been no successful attempts to produce additional plants from seed of our only cacao specimen (originally obtained from the Brooklyn Botanic Garden in 1931). Consequently, I asked then Curatorial Intern Claire Nadeau '10 if she would be interested in a seed germination project. She began with online research, looking for a germination protocol for cacao seeds. Armed with that information, she was able to successfully germinate the seeds. She also documented her work in a detailed report, so we have the information for future reference.



Cacao pods cut open reveal the seed inside

Photograph by Michael Marcotrigiano

The tangible results of Claire's work — 20 one-year-old plants approximately 8.5" tall — were distributed this spring to botanical institutions within the continental United States. Lois Bangiolo '11, the current curatorial intern, tracked, packed, and mailed the requests. The six institutions receiving plants were: the Department of Biological Sciences at Emporia State University in Kansas, W. J. Beal Botanical Garden at Michigan State University, Morris County Park Commission in New Jersey, Cornell Plantations in Ithaca, New York, the Department of Anthropology at Washington University in St. Louis, and the H. P. Rawlings Conservatory and Botanic Gardens in Baltimore, Maryland.

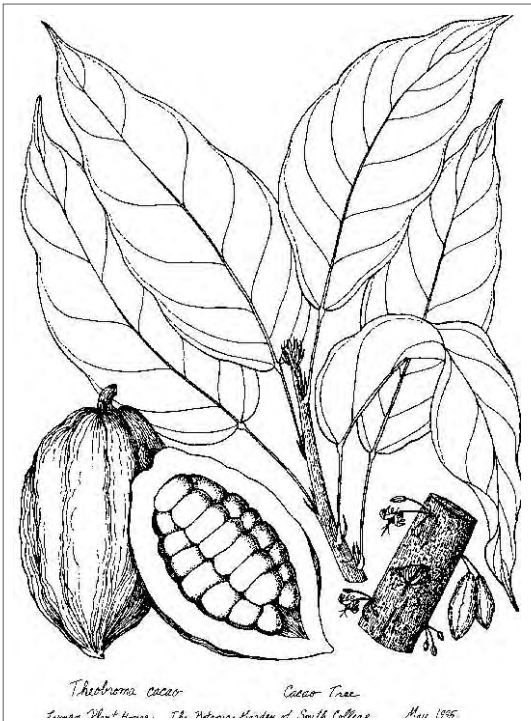
We will be sure to save one or two to keep as insurance plants for the large specimen, which hopefully will continue to age gracefully and produce enough seed for exchange in the future.

☞



One of the cacao seedlings

Photograph by Madelaine Zadik



*Theobroma cacao* by Pamela See '73 available at the Botanic Garden in a limited signed edition print as well a few that are hand colored by the artist

## Local Connections

*Pamela Dods AC '08*

In the fall of 2010, Northampton High School art teacher Sheryl Jaffe called me to arrange a tour and at least one follow-up visit to the Botanic Garden for her ceramics class students. Their mission was to draw and photograph plants as inspiration for a ceramic tile mural. Jaffe came up with the project as a way for students in Ceramics I and II to work together on a group piece.

We set it up so that on their first trip Botanic Garden Intern Ceilidh Galloway-Kane '11 gave the group a brief introduction and orientation to the Lyman Conservatory. Afterwards, the students explored on their own, sketching and photographing plants that captured their interest. The group returned a couple weeks later to spend more time gathering inspiration for their piece.

Time passed, and many school groups came and went since Northampton High's visits last fall. So I was surprised when I received an invitation this March to the pizza party celebrating the completion of the *Jungla Tile Mural*. Even with Sheryl's description of the project, I couldn't imagine how the finished piece would look. When I finally saw it, I was so impressed I started snapping pictures trying to capture just how creative and wonderful the tile mural is.

The students and teacher agreed that the Palm House felt like being in the jungle, and they wanted to bring that feeling into the classroom. Since they had five native Spanish speakers in the class, it was natural to go from jungle to *jungla* (jungle in Spanish). Blue lines wind through and connect the various elements of the mural and at the same time divide the piece into sections



*Jungla Tile Mural*  
produced by Northampton High School ceramics classes



Emma Jenkins-Sullivan (l) and Maureen O'Reilly (r) with mock-up of the mural

Photographs by Pamela Dods '08

created by different students. During the process, decisions such as the color of the background and whether or not to glaze the border were decided on by the entire group. In the end, the background was left the natural color of the clay and the border went unglazed.

It was truly gratifying to meet the students and see how engaged they were with this project. I now have a deeper understanding of the importance of these Botanic Garden tours and visits. Last year I arranged for guided tours for thirty-three K-12 classes, and another sixty-five groups came and toured on their own, for a total of 2400 students. It is great to see how our botanic garden tours enhance education for local school groups. ☺

## Curricular Connections

*Madelaine Zadik*

As part of the Curricular Enhancement Program, the Botanic Garden staff often give lectures to the classes of participating faculty. This semester, Director Michael Marcotrigiano gave lectures to James Middlebrook's class, *Introduction to Architecture: Language and Craft* (ARS 285) about plant form and function as well as plants as design elements in the landscape. The students in the class worked on making connections between form and function by studying one plant or flower in detail. They reinterpreted its spatial language by examining and researching underlying principles of plant form. Students analyzed the spatial character and built models to abstractly re-present the flower according to this visual language. These forms were then used in the design of a pavilion. The students' work is on display in the Church Exhibition Gallery through September 2011. Visitors can see photos of the plants, the models, and pavilion designs. ☺



Images from Michael Marcotrigiano's lecture on plant form and function, showing similarities between the beehive ginger (l) and *Urban Cactus* housing project (r) in Rotterdam by UCX Architects

Ginger photograph by Yvonne Baur.  
*Urban Cactus* photo by UCX Architects

# Botanic Garden News

The Botanic Garden of Smith College  
Northampton, MA 01063



*Margaret P. Holden 1991*

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- ◆ *Botanic Garden News*, our newsletter and calendar of events, twice a year
- ◆ Admission to members-only hours at the Spring Bulb Show — 9:00 am to 10:00 am daily during the show
- ◆ Free admission and discounts at 200+ gardens around the country
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