



Fronds and Folioles

News from the Conservatory & Botanical Collection at the College of Biological Sciences



Forays with flora

The Conservatory's Botany Bus returns to local schools after pandemic-driven hiatus.

On the screen, is a picture of two red pine cones. One is open, the scales on the other are tightly shut. A group of children, who have just been asked why they think the two cones are different, stare at the screen, some with their noses scrunched up. Finally, a young girl tentatively raises her hand. "Do they open up to let all the seeds out when they're ready?" She grins at finding out she's right, and the boy next to her cheers.

A few minutes later, another student nearly jumps out of his seat as he recognizes another plant on the screen. "That's the smelly one!" he

calls out in excitement, belatedly remembering to raise his hand. He's right. In fact the plant, known as the "corpse flower" or *Amorphophallus titanum*, smells like rotting meat when it blooms.

This was the scene at Webster Elementary on a cold day earlier this winter. The Conservatory's Botany Bus came to the school in Northeast Minneapolis full of plants and materials to teach third-graders there about plant biomes, adaptations and diseases.

The Botany Bus conveys plants and educational materials that provide a "tour" of the Conservatory biomes to

local elementary schools. Education and outreach are important to the Conservatory's mission. Before the onset of COVID-19, the Conservatory welcomed about 50 K-12 students annually.

Lisa Philander, the Conservatory's curator, recalls hosting similar tours back when she was a student worker. "A lasting memory for me is a young student, tugging at my sleeve, begging me for more seeds at the end of a tour. It reminds me of myself and how a plant nerd is created."

Despite the positive impact, the bottom line is that transporting children for field trips is costly for



CURATOR'S NOTE

Reconnecting

After not working together for over a year, it has been great fun to have students and volunteers back in the greenhouse. It was quite strange returning to the office and resuming a normal work life, but always a pleasure to spend more time teaching and learning about plants. We have dedicated a great deal of time to cleaning the greenhouse, dealing with pest infestations, and repotting plants that got out of control. We have been pruning plants rapidly growing in the biome displays, giving careful thought to shaping them into lasting forms for the future.

We have an excellent group of students this year, with two graduate students in the mix. With only one student returning after the pandemic, a long training period was anticipated. In the end, this may be the most dedicated, organized and anticipatory group we have had the pleasure to work with to date. They particularly enjoyed the Botany Bus event.

Our award-winning orchids were in full bloom in early January, unfortunately a bit early for the Como Orchid show, which took place at the end of January at the Como Conservatory. We still brought some of our orchids to the show, but the show stoppers were just past their peak.

On Valentine's Day, we will turn up the heat and make spring come early for our plants. It would be lovely to see you at the greenhouse!

Lisa Philander, Curator
CBS Conservatory & Botanical Collection



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A living fossil

The Conservatory added a Wollemi pine, long thought extinct, to the collection this fall.

A Wollemi pine (*Wollemia nobilis*) made its way to St. Paul this past November. The genus *Wollemia*, of the family *Araucariaceae*, has only this one species. It is a lone member of an evolutionary line dating back to the Jurassic era, previously thought to have been extinct for two million years.

In August of 1994, while on a hike with friends in the Wollemi National Park near Sydney, Australia, David Noble encountered an unfamiliar pine. As a botanist working for the New South Wales National Parks & Wildlife Service, Noble knew this plant was unique. The trees resembled fragments from fossil evidence, but botanists never cataloged it living before.

It was thought to have survived many ice age events thanks to a waxy coating that forms during its dormant period, an adaptation that protects growing tips through the coldest periods of time. This, coupled with the protection and now temperate climate of the deep gorge where the population was discovered, likely allowed a few plants to remain. These trees have since reproduced through cloning, leaving the remaining population absent of genetic diversity.

The remaining wild population includes about a hundred plants, half of which are juvenile. The growth rate of the wild Wollemi pine is slow, so keeping these young plants alive is critical. This past year, during the Australian wildfires, firefighters spent a great deal of time protecting these trees from extinction.

We are thrilled to have *Wollemia nobilis* join our Conservatory collection and are eager to share its story, while participating in the conservation of this critically endangered species.

The scientific name takes its cue from the Australian Aboriginal language. Wollemi means “look around you, keep your eyes open and watch out.” Perhaps our *Wollemia nobilis* will be an inspiration for us all to “Start seeing plants!” You never know what you might discover.

– BETSY CUSTIS

Betsy Custis works as a conservatory assistant and is pursuing a Master of Professional Studies in Horticulture. She will complete her studies in 2024.

While the Wollemi pine in the collection is much smaller (now just standing just under one foot), here a mature tree is seen in the wild. They can grow up to 130 feet tall.

FIRST PERSON

Reflections from a student worker

Jack Larson looks back on three years tending to plants at the Conservatory.

As a soon-to-be-graduate from the plant science program at the University of Minnesota, I often look back and reflect on the experiences that shaped my path. Like many first-year students, I had no idea what I wanted to do when I started college. I knew that I cared about protecting the environment, had an interest in conducting scientific research and had a passion for trying new things. This led me to start volunteering at the old Conservatory facility as an excited and nervous freshman. Three years later, I am about to finish my work at the new facility as an excited and nervous senior.

Throughout my educational and career experiences in college, few things have shaped my curiosity into tangible excitement like working for the CBS Conservatory.

I have always had a fascination with plants, well before I decided to focus my education around them. I have fond memories of helping my mom in the garden and going on hikes with my dad, and slightly less fond memories of getting poison ivy while camping as a young kid. For a first year student eager to nurture an interest in plants, the CBS Conservatory was a dream come true. I had never been to a conservatory that fostered so much plant diversity and had a goal of showcasing millions of years of natural selection and convergent evolution at work. The plants in the collection all have a unique story, and they have provided me with a space to learn about their fascinating survival strategies that make them such crucial members of our ecosystems.

The ability to work in such a special setting is something I try not to take for granted. I am forever grateful that Lisa Philander and Angie Koebler, the operators of this fantastic place, gave me the opportunity to experience it. Since being hired, they have taught me about plant care, the intricacies of convergent evolution, and the passion for preserving and showcasing rare plants. This job has not only refined my plant-care skills, but shown me the importance of educating the public on how crucial seeing and understanding the roles of plants is. Most important, it has shown me how rewarding it is to work with plants and the people who love them.

It is hard to put into words how much the CBS Conservatory and Botanical Collection has done for me and countless others. – JACK LARSON

Jack Larson is a senior who has worked in the Conservatory for the past three years.



Partner in plants

Friends Board member Lara Lau-Schommer finds a natural fit between her 9-5 job and board service.

Lara Lau-Schommer is a member of the Friends Board and works as the education and outreach director for the Minnesota State Horticultural Society (MSHS). She joined the Conservatory's board in March 2019. The missions of MSHS and the CBS Conservatory & Botanical Collection overlap, which makes her work on the board a natural fit. Both strive to engage diverse audiences with diverse plants. We recently caught up with Lara to learn more about her role on the board.



WHAT HAVE YOU GAINED FROM YOUR WORK ON THE BOARD?

The ongoing pandemic has challenged all of us, including the Friends Board, MSHS and the CBS Conservatory. Despite these challenges and the pushback of the grand opening, I'm deeply grateful for the opportunity to be on the board. I'm constantly inspired by fellow board members. Everyone cares deeply about the environment and the world around them. It's rewarding to bounce ideas off of each other and look to the future.

DO YOU HAVE A FAVORITE ROOM AT THE CBS CONSERVATORY?

I love all of the rooms, but I spend most of my time in the Ancient Rainforest room. The space lends itself to freedom of mind, and visiting is a way to travel back in

time. It's an amazing experience to walk right up to a living dinosaur of a plant, the *Amborella trichopoda*, which was the first plant to produce flowers 160 million years ago. I feel humbled and lucky to have access to a living museum, and I can't wait to watch the room evolve as its specimens continue to grow and teach us their wisdom.

WHAT ARE YOU MOST EXCITED ABOUT RIGHT NOW?

I am excited about a botanical cocktail course I am developing with Conservatory staff. We plan to introduce participants to the basics of growing plants that lend themselves to cocktail concoctions, whether on a balcony, stoop or backyard. And then explore some classic and creative botanical cocktail recipes. We expect this course to be quite popular among younger members and are eager to gather in-person for instruction and taste tests.

*"It's an amazing experience to walk right up to a living dinosaur of a plant, the *Amborella trichopoda*, which was the first plant to produce flowers 160 million years ago."*

Amborella trichopoda

schools. Enter the Botany Bus. In 2019, the Botany Bus debuted at Maple Grove’s STEM magnet school, Weaver Lake Elementary, and Annunciation Catholic School in Minneapolis. Despite great success, it was put on hold due to COVID-19. December’s visit marked the triumphant return of the Botany Bus.

During the visit, Conservatory staff and members of Professor Fumiaki Katagiri’s plant immunity lab, led 30 students through three stations. Originally planned to last an hour, students had so many questions the session actually lasted an hour and a half. Students learned about plant biomes and adaptations in a presentation with live plants, then played a guessing game with plant forms, adaptations and life cycles. Finally, they donned their own lab coats, gloves and goggles to do some real science by infecting plants with a bacterium used to study plant immunity. The classes kept the plants and over the following days monitored the plant symptoms as the bacteria caused leaves to develop brown spots.

Given strong interest from teachers, Botany Bus is looking toward the future. Currently, the program focuses on engaging third graders, since this is when the U.S. curricula introduces evolutionary adaptations in plants and animals. Plants often get the short end of the stick in this lesson compared to animals, thanks to “plant blindness,” or the mistaken belief that plants are uninteresting. However, Webster Elementary asked us to adapt the program to reach more grade levels.

The Botany Bus is an excellent opportunity for University researchers to connect with students. Several researchers are interested in co-developing curriculum.

We’re eager to see more students find joy in learning about amazing plants, from the red pines in their backyard to the corpse flowers half a world away. Staffing continues to challenge capacity, but we’re hopeful to expand the staff and volunteer base to reach more schools in the Twin Cities. –ALEX CRUM



VOLUNTEER POV

As a Botany Bus volunteer myself, it is hard to overstate how meaningful it was to see the students excited to learn about plants. If this program had existed to visit my school when I was younger, I might have saved a lot of time, money and heartache trying to find my passion. I hope some of the students who asked me a million questions about how Venus Flytraps close and why they need to eat bugs go on to study carnivorous plants in the future, or at least just get a little more excited about the plants they see in their daily lives.

Alex Crum is a PhD candidate in Ya Yang’s Lab. She has worked at the Conservatory as a conservatory assistant since June 2020.



INTERESTED IN SUPPORTING THE BOTANY BUS?

Help transport plants and people. With your support, we can invite students who participated in Botany Bus program to come meet plants under the glass. If you’re interested, please contact John Curry at jcurry@umn.edu or 612-624-4770.

Colorful findings

Diverse collection drives researchers to study colored nectar in plants, with implications for food and textile industries.

It's pretty unusual for a scientist to identify a specific day that changed the course of their research, but Clay Carter is an exception. "May 2, 2016 was the day I met that plant," says Carter, a professor in Plant and Microbial Biology.

Nesocodon mauritianus is a rare plant endemic to Mauritius that produces red nectar to attract geckos, it's primary pollinators. Over the next couple of years, Carter and colleagues discovered what made the nectar red and how the plant created it. They recently published the findings in *Proceedings of the National Academy of Sciences*.

The research has direct applications. According to the U.S. Food and Drug Administration, industry currently relies heavily on non-natural color additives. Red is a notoriously hard color to source for products, from candy to clothing, and beyond. The University of Minnesota has applied for a patent for the process for synthesizing nesocodin – the key compound used to produce red nectar – and associated non-natural derivatives.

These findings also set the groundwork for continuing research efforts, including one that is funded by a \$1.3M award from the National Science Foundation, where the team is exploring more colored nectars. Read more about the latest publication at z.umn.edu/copycat-red-nectar. – CLAIRE WILSON



Leah Hallet, an undergraduate student majoring in Plant and Microbial Biology, has spent hours searching for plants producing colored nectar in the Conservatory. Read more at z.umn.edu/colorful-quest.



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Make a plan to see plants!

While we're still closed for walk-ins, we're excited to welcome folks who schedule a tour. Warm up with us this winter. Sign up > z.umn.edu/CBS-conservatory-tour

