

SCIENTIA

A publication for College of Science and Health alumni



Students prepare to release an experiment-laden high-altitude balloon into the atmosphere. Read more on page 4.

Photo credit: Micki Burto

Fall 2015

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Prairie Prep

By Kelsey Schagemann

Long before Illinois stepped into the national limelight as one of the top producers of corn, the state boasted a different claim to fame. “We’re still known as ‘the prairie state’ even though 99.9 percent of Illinois prairies have been lost to agriculture and urbanization,” explains Lecturer Sarah Richardson. “Prairie is our heritage.”

Thanks to the efforts of Richardson, CSH students and a collaborative partnership with the Chicago Park District, Indiana University and the Missouri Department of Conservation, a small prairie on the South Side of Chicago is making a comeback. “The goal is to create 100 acres of connected savannas, woodlands and prairies,” says Richardson. Advocates of the Burnham Wildlife Corridor hope it will eventually attract and support migrating birds looking for fuel for their journey in the form of native berries and insects. “Turf grass alone won’t sustain these birds,” Richardson notes. “Plus, turf grass needs a lot of water and fertilizer, which can be time-consuming and expensive.”

The interconnectedness of the ecosystem means prairie restoration isn’t as simple as throwing down some seeds and waiting for the plants to grow. In fact, Richardson’s

project originated from a surprising source. “People normally think of fungi as harmful to plants, but mycorrhizal fungi are beneficial,” Richardson says. “They grow in the roots of plants and provide phosphorus in exchange for carbon.” This type of fungi can also help plants survive droughts.

Richardson’s multiyear project—the full results of which are forthcoming in the peer-reviewed journal *Ecosphere*—explored whether mycorrhizal fungi could improve the growth, survival or reproduction efforts of prairie plants. Students worked on various related questions as well. For example, Stephanie Hughes (CSH ’11) researched the relationship between mycorrhizal fungi and plant storage of carbon and nitrogen, hypothesizing that prairies could act as a “carbon sink,” sequestering carbon and potentially slowing global warming.

While Hughes found that fungi did not affect carbon storage either positively or negatively in the short term, she still called the project a success. “The planting days were the most exciting and fulfilling aspects of the study,” she recalls. “Regardless of my experiment, simply knowing that we had added this amazing ecosystem to Chicago’s lakefront was so rewarding.”

Fellow researcher Isaiah Cole (CSH ’12) wholeheartedly agrees. “I like hands-on activities, so my favorite parts of the project included installing the plants and coming back later to take measurements and observe the progress of the restoration,” he says. Only

a day after the team put more than 1,500 plants into the ground—on one of the hottest days in 2010 no less—they discovered that their gray-headed coneflowers were being attacked by sod webworms. Cole immediately began collecting data on the damage levels and comparing whether plants inoculated with local mycorrhizal fungi fared better or worse than those inoculated with the more widely available commercial mycorrhizal fungi.

In the end, when it came to herbivory damage from sod webworms, the plant’s location in the plot site mattered more than the type of fungi supporting it. Overall, however, Richardson determined that plants “survived better and grew larger” when inoculated with the native mycorrhizal fungi. “This is important because commercial inoculum is being sold as a product that will increase the success of prairie restoration,” Richardson says. “The reality is more complicated.”

Five years after the initial planting, the Burnham Centennial Prairie is thriving. “There are birds and butterflies flitting through the flowers,” Richardson notes, and Hughes even spotted a coyote. Meanwhile, the Audubon Chicago Region and the Chicago Park District are conducting a long-term study on bird diversity at the site. “Projects like this are bringing nature back to Chicago,” Hughes affirms. “It’s great for the entire community—people, birds, insects and wildlife.”

Chicago Wildsounds Listens for Ecosystem Health

By Jamie Sokolik

There’s a message in a bird’s song. The crash of waves, a torrential downpour and the wind rustling through the leaves of a tree tell stories as well. These sounds are nature’s way of talking to you, and according to the DePaul student group Chicago Wildsounds (CWS), they’ve got a lot to say. CWS practices soundscape ecology, a relatively new field that uses the sounds of a habitat or ecosystem to assess its overall health. The group takes recordings along the Chicago lakefront, and listens in on the natural (geophony), animal (biophony) and human (anthrophony) sounds.

“It’s our job as soundscape ecologists to listen to what the sonic environment is telling us,” says CWS co-founder Jonathan Eiseman (CSH ’13), a senior sound technician in the department of biological sciences at Western Michigan University. He is one of several former members who are now interested in soundscape ecology as a career. “Our findings are a historical archive. In another hundred years, these recordings will objectively convey an aural history of Chicago’s biodiversity in the early part of the century.”

Current CWS members record at Montrose Point Bird Sanctuary and South Pond in Lincoln Park. Both are managed habitats, meaning ecologists control everything from vegetation to

wildlife. The group has recording boxes at the sites that switch on every hour on the hour for 10 minutes.

“I think it’s among the first fairly complete, long-term recordings at the lakeshore,” says CWS faculty advisor Liam Heneghan, professor and department chair for environmental science and studies. “The recordings reflect that Chicago is an urban center with a lot of biodiversity. The hum of traffic on Lake Shore Drive is a constant in the background, but squeezed between the heavens and the earth is this cloud of ecological sounds.”

The group not only collects data from the soundscapes; they’ve also created a searchable database of recordings that they use to engage the university and the larger Chicago community in a discussion about sound and the environment. CWS regularly leads soundwalks through some of their recording sites, and earlier this year they participated in a collaborative exhibit at the DePaul Art Museum called “Rooted in Soil.”

“Part of being an ecologist is raising awareness of environmental issues,” says CWS co-founder Veronica Jachowski (CSH ’15). “CWS makes the topic fun, approachable and relevant, and that’s what makes it exciting.”



Photo credit: Jamie Moncrief/DePaul University

Up, Up and Away

By Kelsey Schagemann

On an overcast day last spring, Hannah Ward (LAS '15) slipped on a pair of latex gloves and carefully held the sides of a giant, deflated balloon as her classmates pumped the loose bag full of helium. Wind whipped the students' hair into a frenzy, and the piercing crescendo of a tornado siren rose and fell in the distance, but nothing could distract the team from their intense concentration. The balloon had to stay off the ground. If it didn't, there was a good chance its fragile latex sides would tear, and weeks of preparation would vanish into thin air—much like the balloon itself was about to do.

Ward, who minored in environmental science and studies, wasn't familiar with high-altitude ballooning before she enrolled in Associate Professor Bernhard Beck-Winchatz's course, but now she's a convert. "This class made me curious about topics I had never considered, even though they're part of my daily life," she says. For example, like many of her classmates, Ward didn't realize that the National Weather Service launches hundreds of balloons into the air each day. While high-altitude balloons aren't a new invention, they're still relatively rare in university settings.

For the past six years, Beck-Winchatz and his colleague, Associate Professor Mark Potosnak (see page 8), have led the charge in bringing high-altitude ballooning to DePaul students. "The balloon is just the platform," Beck-Winchatz explains. "It's a way to get many different types of experiments into an interesting environment." That interesting environment is 100,000 feet above Earth—or three times higher than the elevation of a commercial airplane.

As the atmospheric pressure drops, the balloon expands until it bursts, at which point it floats gently back to the ground on a parachute. Cody Sabo, an environmental science and studies major, worked on a project last year to trigger an early-release mechanism that would shorten the balloon's flight time. This idea came to him after partnering with Potosnak on an experiment to measure ozone uptake by plants. Each launch day, the team released a balloon to measure the concentration of ozone in the morning and then again in the afternoon; the difference indicated the amount of ozone inadvertently absorbed by crops during photosynthesis.

"These experiments are effective, but not very efficient," Sabo explains, noting that all of the necessary data are obtained during the

first 6,000 meters of the flight. "The early-release mechanism would reduce flight time and distance traveled, which would allow us to perform more flights and gather additional data on launch day."

As Sabo's project evolved, he appreciated the opportunity to learn new skills in coding and electronic prototyping. Beck-Winchatz says ballooning's multidisciplinary approach prepares students for future careers, not to mention life in general. "I like giving students an interesting problem and letting them figure out the science they need to solve it," he says. "It's more relevant, realistic and exciting that way."

Ward experienced this for herself as her team set out to test the effectiveness of solar panels at different altitudes. "First we had to construct the payload [cargo box] from insulation foam," she recalls. "Then we had to attach the solar panels and thermometers to the different sides of the payload and connect them to a data logger." The challenges went beyond those of a "typical" science experiment as Ward found herself sawing, drilling and soldering her project together.

She was anxious on launch day, obsessively checking her team's experiment and crossing her fingers in hopes that nothing would go wrong. Fortunately, the balloon launched successfully, and the students tracked its progress as it rose up and above the sprawling cornfields of central Illinois, collecting data, recording coordinates and inspiring the young scientists on the ground.

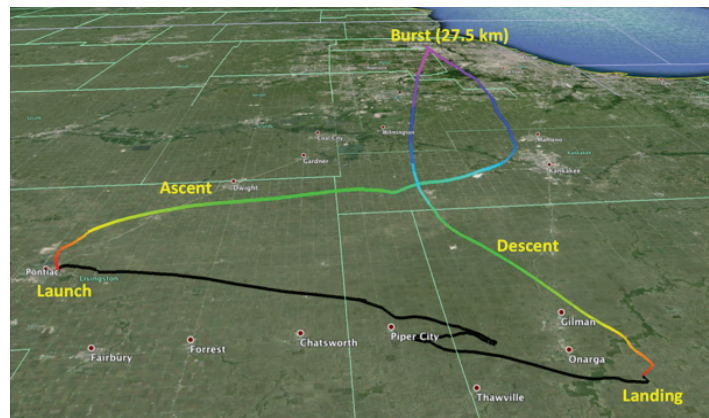


Photo credit: Christine Aguila



Photo credit: Christine Aguila



Photo credit: Mark Potosnak

Fulbright Travelogue:

Health Care in Fortaleza, Brazil

Earlier this year, Assistant Professor Jessica Jerome received a Fulbright U.S. Scholar Award to study health care councils in Fortaleza, Brazil. The councils are one component of the country's universal health care system, and they're intended to give citizens a voice in health care decisions, priorities and resources. Jerome's travel diary below offers an inside look at the opportunities and challenges facing health care councils and the citizens they serve.



July 9

Arrived in Fortaleza, Brazil. Fortaleza, a city of 2.5 million in the northeastern state of Ceará, is a particularly exciting place to study the health care councils because Ceará was one of the first states in the region to implement the universal health care system. The region's impoverished rural and urban populations are the system's target beneficiaries, and the city itself has been the testing ground for several new programs.

July 13

Today I attended a daylong State Health Care Council meeting at the Secretaria de Estado de Saúde (pictured below) for representatives from across Ceará. Many of the representatives voiced their displeasure about the lack of medications at various health clinics and an absence of funding for doctors' salaries during the last two months. Tension was also high due to growing fears that Brazil's president and high-level National Congress members had absconded with billions of dollars of taxpayer money that should have been earmarked for the health care system.



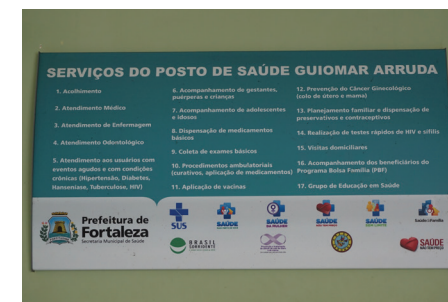
As the day wore on, the tone of the meeting grew angrier, ultimately culminating in cries to take the council members' concerns to the Secretary of Health himself. After heated discussion, council members stormed out of the room and headed to the Secretary of Health's office to confront him. As an American, it was quite striking to see this expression of political passion coupled with direct action!

July 20

This week I began visiting local health posts, which are unlike any clinics I know of in Chicago. The local health posts are federally mandated preventive health care units embedded in residential neighborhoods. Their services include vaccinations, prenatal visits, annual checkups, dental care and emergent health issues. A *posto* staff will typically include three to five general practitioners, two pediatricians, five dentists, several mental health specialists and 20 or more community health workers. The community health workers, often local residents, are each assigned their own micro area in the *posto's* purview, and they make daily house calls to inquire after residents' health care needs and provide information about upcoming services.



This is a good example of the size and scale of a typical health post in Fortaleza. The low-slung, unadorned cinderblock building blends seamlessly with surrounding residential and commercial buildings.



This plaque in the reception area of a health post lists the many services available. The slogan in the bottom right corner next to the heart icon translates as "health has no price." This sentiment was expressed repeatedly and vigorously by almost all of the health care workers I encountered during my time in Fortaleza, reflecting the idealism that permeates Brazil's health care system, if not its practical reality.

July 25

Health posts can be found in each and every municipality throughout the state of Ceará, and today, on the way to one of Ceará's many beaches, I happened to catch sight of this tiny town's health post (pictured below). The banners advertise free HIV testing and dengue fever information and screening. Explicit promotion of public health is common in Brazil and is not typically perceived as an intrusion of the state into private affairs.



July 27

This week I attended a series of local health council meetings in the low-income communities along Fortaleza's eastern coastline. I first lived and worked in this area in 1999 and 2000, when I was conducting dissertation research on rural-urban migration and traditional medicinal plant usage. I have visited many times since then, and the changes have been extraordinary to witness. Well-paved, bustling roads have replaced cobblestone streets and dirt paths. An extensive public bus system now connects residents to the city center, and a growing middle class supports commercial and educational ventures in the area.



Changes to the community have not been uniform, however, as this photo (bottom middle) illustrates. On the left is a more traditional, family-owned *lanches* (small restaurant), with handmade advertising, operating according to the informal rules of its local owners. On the right is a new *academia* (gym), one of the first of its kind in the neighborhood. As residents have become wealthier and better educated, their health care expectations and needs have grown as well.

July 28

At the local health council meeting I attended today, an older woman expressed her indignation at having to wait a month and a half to secure a dentist appointment for her husband, who had a bad toothache. She asked the health council president, "What are we supposed to do? Make the appointments when we're healthy, just in case we get sick?"

The president assured her that he would bring everyone's concerns to the next municipal meeting, where he would attempt to secure funds for an additional dentist at the post. Incidents like this one somewhat tempered the exuberance I had felt upon my initial visits to the local health posts, which seemed extraordinarily well-equipped for being small clinics in impoverished areas of the city. That said, the resident's indignation can also be understood as an embodied manifestation of the ideal expressed by the Brazilian constitution that citizens are deserving of health care and that it is the responsibility of the state to provide it.

Aug. 9

Already time to leave! I feel lucky to have been able to come back to Brazil. I'm already looking forward to next summer, when I hope to conduct follow-up research to find out whether and how the different councils were able to realize their priorities for the year.

NEW COURSE EXPLORES

the POPE'S ENCYCLICAL on the ENVIRONMENT

This fall, Associate Professor Mark Potosnak is teaching a course on Pope Francis' recent encyclical on the environment. The 180-page encyclical, "On Care for Our Common Home," generated much interest among Catholics and non-Catholics alike when it was released in June. In this interview, Potosnak discusses the importance of this document and shares insights into his course.

What were the main themes of the encyclical?

The encyclical on the environment boils down to a few simple messages. First, the science is settled: the Earth is warming, and humans almost certainly are responsible for climate change. Next, the encyclical explains why this is an important issue for Catholics. The pope emphasizes that caring for God's creation is a core Catholic value. Of course, this care is not unique to the Catholic faith, and the pope emphasized this as a common point with other religions. Climate change is also a moral issue. Although the poor suffer the effects of climate change most severely, the relatively affluent are the ones primarily responsible for the greenhouse gas emissions causing climate change. A final message is that we need to turn away from our culture of consumption.

Why is Pope Francis' stance on climate change important? How is it different from previous statements from the Catholic Church?

Since so many people have come to see individuals' views on climate change as a political litmus test, the pope is creating an opportunity to recast the conversation. Teaching that climate change should be considered within a moral framework puts the conversation on a new level. That said, this is not a new view for the church. The encyclical relies on previous teachings, especially from the two previous popes and from bishops' groups around the world. What is new is the primacy of the issue: climate change and care for the environment is now thrust forward for Catholics and others interested in the pope's message.

What are the course objectives?

I want the students to examine the encyclical from a variety of perspectives. There is obviously the religious dimension to consider, but the pope addressed the encyclical to all people and there are ways to approach the document apart from its religious impact. Science is difficult to communicate under the best of circumstances, and climate change is particularly tricky. The climate system is complex, and the media has often struggled to explain scientific consensus and uncertainty. In this course,

we're asking, "How does the encyclical approach these problems of climate change communication?"

During the past 10 years, I've had the opportunity to teach students the science of climate change at DePaul and several other institutions. Many students were fascinated by the material, but through formal and informal feedback, I realized students wanted to know more about the issue beyond the science. The idea of this yearning was reinforced when I read some recent studies in communication and cultural cognition. Communication specialists suggest that appealing to morals and religion is one way to persuade climate change skeptics. Like many of the problems my CSH colleagues work on, climate change requires an interdisciplinary approach.

We're also exploring questions raised by the moral framework specified in the encyclical. Are there any climate change solutions that are particularly in line with the framework? Are there any proposed solutions that would work against the framework? For example, developed countries are responsible for a large quantity of greenhouse gases currently in the atmosphere, so how much burden of reduction should be placed on developing countries like India and China? I'm also making sure there is intellectual space in the class for students to suggest and follow up their own lines of inquiry.

A "SCENT-SATIONAL" CAREER IN THE FLAVOR AND FRAGRANCE INDUSTRY

By Kelsey Schagemann

What memories surface when you smell freshly baked cookies? How do your taste buds react to a sour gummy candy? The team at Bell Flavors & Fragrances understands better than most the evocative power of scent and taste. "We make flavors and fragrances from apple to watermelon—basically anything you can imagine," says Noreen Lally (CSH '76, MS '83), who has worked in the industry for nearly 40 years.

All these delicious flavors and luscious fragrances must meet stringent standards. As Bell's director of regulatory affairs, Lally ensures that the company's products are aligned with government-dictated policies. "Our industry is highly regulated, especially on the flavors side, where we have to meet natural and synthetic labeling requirements," she notes. Lally explains that consumers today are more knowledgeable about the food they're eating and the products they're using than ever before. "People are educated about GMOs; they know how to read an ingredients label," Lally says. "They're very concerned about nutrition."

When the FDA pulled trans fat from its "generally recognized as safe" category in June, Lally got right to work. "This is a huge issue for us, and it starts with removing trans fat from all of our flavors," she says. "The big box companies that buy those flavors from us will be reformulating their products as well." Being flexible to changing regulations and policies is critical in Lally's profession. In 2013, her team faced a major challenge when the Occupational Safety and Health Administration adopted a new standard for hazard communication. "We had to reformat the safety data sheets for all the chemicals we use," she explains. "That's an example of a ruling that isn't necessarily food- or fragrance-related, but it still falls under our umbrella of responsibility."

Lally's chemistry background makes her job easier. Recently, a shipment from Bell's Northbrook, Ill., facility was held up in China. "Even though we meet all the labeling requirements, sometimes a customs officer will be concerned or confused about something," Lally says. "In that particular case, I had to write a one-page explanation of how this product was made and what its final use will be." Prior to entering the regulatory affairs field, Lally spent more than two decades as a chemist for Wrigley and International Flavors and Fragrances. Those experiences helped Lally refine the skills she acquired at DePaul as a physics undergraduate and a chemistry graduate student.

Working "on the bench" and in technical management gave Lally a broader perspective that she relies on to this day. "A client may request a lemon fragrance for a candle, and then depending on the product line, they may also want to apply that same aroma to a lotion," she says. "But you can't just pour the fragrance into the lotion. You have to reformulate it." Overall, it's the daily variety that keeps Lally engaged and interested in her work. "I confront different issues every day, even every hour, and I rely on my chemistry background to solve those problems," she notes. "When I was in school, I didn't know this world existed, but I'm glad this door opened for me."



Take Five with Noreen Lally

Favorite flavor:

Mango

Favorite fragrance:

Citrus blends, especially tangerine

Best advice:

Ask questions.

Memorable science experiment:

In an organic chemistry lab, I remember synthesizing the chemical that's the active component in banana flavor.

Favorite DePaul memory:

I loved that the professors were approachable. They always held office hours where you could just pop in, and they were always very interested in you as a person and as a student.



Photo credit: Jamie Moncrief/DePaul University

Peter J. Stang (CSH '63, DHL '15), a renowned organic chemist and the 2011 recipient of the National Medal of Science, delivered the commencement address at the joint ceremony for graduates of CSH and the College of Liberal Arts and Social Sciences (LAS) in June. Lucy Rinehart, LAS interim dean, hoods Stang as DePaul's President, the Rev. Dennis H. Holtschneider, C.M., looks on.



On Sept. 30, Vincent de Paul Professor of Biological Sciences **Dorothy Kozlowski** met with alumni and friends in Oak Brook, Ill., to discuss her research on traumatic brain injuries and the rehabilitation process.

New Faculty

CSH welcomed 11 **new tenure-track professors** this fall:

- Sarah Bockting-Conrad in mathematical sciences
- Desale Habtzghi in mathematical sciences
- Jessica Jerome in health sciences (see page 6)
- Sheila Krogh-Jespersen in psychology
- Hung-Chih Ku (CSH '05) in mathematical sciences
- Goran Kuljanin in psychology
- Elizabeth Moxley in nursing
- Stefanos Orfanos (MBA '15) in mathematical sciences
- Ida Salusky in psychology
- Susan Tran in psychology
- Jessica Vogt in environmental science and studies

Bravo! Bravo!

- Assistant Professor **Karl Liechty** received the Gábor Szegő Prize from the Society for Industrial and Applied Mathematics for his outstanding research contributions in statistical physics.
- La Raza newspaper presented Assistant Professor **Elizabeth Florez** with the Mujeres Destacadas (Prominent Women) award in the health category for her volunteer work with the American Heart Association.
- The American Psychological Association (APA) honored Professor **Leonard Jason** with a Distinguished Professional Contribution Award at the APA's 2015 Annual Convention in August.
- The Albert Schweitzer Fellowship named Master's Entry to Nursing Practice student **Mary Clare Houlihan** to its 2015-16 class of Chicago Schweitzer Fellows. Houlihan plans to implement a series of workshops for cancer survivors through the Gilda's Club Satellite Program at Rush Cancer Center.
- Twenty-two CSH students presented posters at the **Chicago Area Undergraduate Research Symposium** on April 11. Majors represented included biological sciences, chemistry, environmental science and studies, and psychology.

PAYING TRIBUTE

From lab equipment to scholarships to textbooks, CSH students appreciate the myriad ways DePaul alumni and friends support their education. Here are the grateful words of a few of those students.

"I wouldn't have been able to attend my dream college if it weren't for your generous scholarships. Thank you!"

–Elizabeth Green, health sciences

"Thank you for not letting financial hardship stop a student from achieving higher education! Thank you for all your support and encouragement."

–Viviana Castellano, health sciences

"Thank you for supporting DePaul students! You gave me the ability to learn and work toward building a healthy and adaptable society."

–Kat Heyn, chemistry

"Your generosity helps create strong academic programs. I can't imagine a better place to be living out my career goals."

–Jamie Goddinott, psychology

"Your support has provided me with an outstanding and affordable education that will help me go far in life. I'm so incredibly appreciative."

–Amanda Weinper, psychology

"You may not know it, but you're allowing me to work hard in college and push myself. Thanks to your gifts, I am the first in my family to go to college. You're making my dream come true."

–Jasmine L. Hernandez, biology

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We welcome your story ideas, questions and comments. Please contact Kelsey Schagemann at (312) 362-6368 or kschagem@depaul.edu.

Office of Alumni Relations

alumni.depaul.edu
(800) 437-1898

College of Science and Health

csh.depaul.edu

Editor-in-Chief

Kelsey Schagemann

Editorial Contributors

Kelsey Schagemann
Jamie Sokolik

Designer

Courtney Yoelin (LAS MA '14)

**DEPAUL
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DePaul University
Office of Advancement
1 E. Jackson Blvd.
Chicago, IL 60604-2201

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