

grow

College of Agricultural & Life Sciences
University of Wisconsin–Madison

ORGANICALLY GROWN

Welcome to the **UW Organic Collaborative**, the fruit of more than 100 years of research and cooperation on campus and across Wisconsin. *page 20*



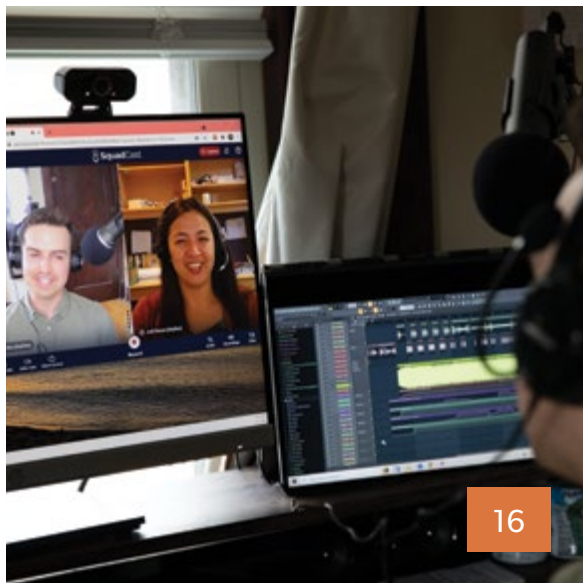
THE PODCASTERS OF CALS
IS THERE LIFE ON VENUS?
SCIENCE AS HOPE
DAIRY-BASED SPORTS DRINK



Students settle into their seats before the start of Biochemistry 501 Introduction to Biochemistry in historic room 125 of Agricultural Hall on the first day of the fall 2021 semester. Masks were required indoors at UW-Madison, and 93% of students and 95% of employees were fully vaccinated as of Oct. 4.

Photo by MICHAEL P. KING





16



20



28

Wisconsin's
Magazine for the
Agricultural and
Life Sciences

grow

VOLUME 15, ISSUE 1 | FALL 2021

FEATURES

16 The Podcasters of CALS

Academics step outside their traditional roles to take listeners behind the scenes of science and higher education.

BY NICOLE ETTER

20 Organically Grown at UW

More than 100 years of organic research and cooperation on campus — and across Wisconsin — are bearing fruit.

BY ANDERS GURDA MS'14

28 A Look Back on a Campaign for the Future

All Ways Forward set and exceeded lofty fundraising goals, bringing vital new resources to people, buildings, and programs throughout CALS.

BY NIK HAWKINS

DEPARTMENTS

2 Depth of Field

5 In Vivo

6 Front List Six reasons why life might exist on Venus

7 Class Act Naomi Moua MSx'21, cultural roots and nutrition

8 Natural Selections Dairy sports drink, food toxin solution, bee tracking app, the cranberry genome, flipped classroom

34 Living Science Todd Newman on the branding of science

36 Offshoots Two CALS alums serve and protect nature

38 High Yield Anonymous gift connects farmers and researchers

ON THE COVER Keo Corak MS'18, PhD'21 harvests carrots from an organic plot at West Madison Agricultural Research Station in October 2020. UW's agricultural research stations utilize 142 acres for organic experiments. See page 20. Photo by MICHAEL P. KING

Photos, from top, by MICHAEL P. KING, ANDERS GURDA, and JEFF MILLER



Photo by MICHAEL P. KING

DEAN KATE VANDENBOSCH

A Season of 'New'

This fall, we're taking some of the first hopeful steps on the path back to normal. With pandemic measures in place, students and faculty have returned for in-person classes, and we're witnessing the on-campus reunion of many staff who have been working remotely since March 2020. As we find ways to gather safely, there's a new, palpable sense of excitement on campus.

As the on-campus energy returns, we're taking some of the best things we learned during the pandemic and changing some of our old practices. Blended learning is taking on a more

prominent role in our instruction, and many students are asking for video advising appointments. This partly stems from our recent success with video chat and virtual learning technologies, through which we managed to maintain a strong community — and even strengthen ties with others beyond campus. I expect these versatile technologies will be a regular part of our work going forward, and we're navigating this new context in a thoughtful way.

That's some of what's new on campus. But you might also notice a new look for *Grow*. Since its launch in 2007, the magazine has delivered compelling stories of the college's people and discoveries, but it hasn't gone through any major changes. We felt it was time to modernize our flagship publication. Following a readership survey and extensive research, we've revamped everything from the masthead and typeface to the color palette and content structure. You'll still recognize the *Grow* you're familiar with, but there are a lot of new things to experience. And we hope it will be a *better* experience — one that conveys the exceptional contributions of CALS in new and exciting ways. Please read it (from cover to cover!) and let us know what you think.

I have one other "new thing" to mention, one of a more personal nature but with direct bearing on CALS. In September, I announced that I will be stepping down as dean in 2022. I have truly enjoyed serving in this post for the last decade, and I'm proud of everything the CALS community has accomplished — together — during my time here. You can read more about what we have achieved at go.wisc.edu/vandenbosch.

I'm making this decision now to give the Office of the Provost time to do a rigorous national search and help us work toward a smooth transition for my successor. We will keep you posted as that process continues. Meanwhile, I am as committed as ever to CALS and its mission.

My work here isn't done yet.

**“WE ARE
TAKING SOME OF
THE BEST THINGS
WE LEARNED . . .
AND CHANGING
SOME OF OUR
OLD PRACTICES.”**

EDITORIAL STAFF

Editor Nik Hawkins

Staff Writers Nicole Miller MS'06,
Caroline Schneider MS'11

Designer Janelle Jordan Naab

Photographer/Writer Michael P. King

Editorial Assistant/Writer
Jori Skalitzy BSX'22

CONTACT

136 Agricultural Hall, 1450 Linden Drive
Madison, WI 53706

Grow 608-890-3912, grow@cals.wisc.edu
grow.cals.wisc.edu

CALS 608-262-1251, info@cals.wisc.edu
cals.wisc.edu

©2021 Board of Regents of the University of Wisconsin



**College of
Agricultural & Life Sciences**
UNIVERSITY OF WISCONSIN-MADISON

Six Reasons Why Life Might Exist on Venus

BY JAIME CORDOVA

1. The ingredients for life are adrift in the Venusian clouds.

Life is primarily composed of six chemical elements: carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur. These elements are found in a variety of biological molecules, including DNA and RNA. Probes, landers, and balloons have found signatures of these elements in the planet's clouds, and they may be usable by life-forms.

2. Some terrestrial organisms, known as extremophiles, can survive in conditions akin to the Venusian clouds.

The surface of Venus is hellish, with temperatures as high as 890 °F (unlivable for all known terrestrial organisms) and crushing pressures reaching about 93 standard atmospheres (atm), equivalent to the pressure experienced at 3,000 feet below sea level on Earth. The clouds, however, are more hospitable, with temperatures ranging from 212 to -49 °F and pressures between 1.18 and 0.0336 atm. Here on Earth, microbial cells have been found dormant (not metabolically active but still alive) at temperatures as low as -49 °F. On the other end of the spectrum, some terrestrial archaea (single-cell organisms without nuclei) have been found to survive in temperatures as high as 251.6 °F.

3. In the ancient past, Venus may have been home to an ocean.

Today, the clouds of Venus hold very little water vapor. However, climate models show that the planet's surface likely boasted a shallow liquid water ocean for about 2 or 3 billion years after it formed and cooled. Any liquid water that may have existed is gone now, but its presence — a requirement for all known forms of life — means that life could have arisen on early Venus.

4. A vast number of microorganisms are still waiting to be discovered.

The clouds of Venus are composed primarily of sulfuric acid, with a caustic pH level of -1.5, so putative Venusian organisms would need to be polyextremophiles (able to thrive in multiple extremes) to survive these conditions. So far, a terrestrial polyextremophile that can survive in these conditions has not been found. But according to one estimate, 1 trillion species of microorganisms live on Earth, and more than 99% have yet to be discovered. This means that, even though we haven't found terrestrial life that could survive in the cloud conditions, its existence can't be ruled out.

5. Despite the harsh conditions, the metabolic processes necessary for life can still transpire on Venus.

Iron- and sulfur-based metabolism, still used by some terrestrial microbes today, are some of the most ancient forms of chemosynthesis, the use of energy stemming from inorganic chemical reactions. The presence of sulfur and iron in the Venusian clouds reveals another potential pathway for life. Photosynthesis is also possible on Venus because enough solar energy in the photosynthetic wavelength range reaches the clouds.

Looking for 6? Visit grow.cals.wisc.edu.
This one is out of this world . . .

Jaime Cordova is a Ph.D. candidate in genetics who works in the Genome Evolution Laboratory. He studies the bacterial response to varying levels of oxygen and how those responses evolve. As a Solar System Ambassador for NASA and the Jet Propulsion Laboratory, he communicates to the public about the science of space exploration missions and discoveries.

Photo illustration by
JANELLE JORDAN
NAAAB, istockphoto
.com/nono57,
Sergey Klapotov

NAOMI MOUA

From Farmers Market to Health Clinic

A childhood spent around wholesome food inspires and influences this master's student on her way to becoming a registered dietitian.

BY MAI ZONG VUE

For some first-year college students, keeping healthy habits can be a challenge. Stress, lack of exercise and sleep, and easy access to fast food can lead to weight gain — the classic “Freshmen 15.” But Naomi Moua MSx’21 never fell into that trap. She carried a health-conscious attitude into college, one that started long before she set foot on a campus.

Although her parents were not strict about nutrition, she developed her own healthy diet, primarily by reducing her junk food intake. “I stopped eating just bagels for lunch in high school, and I stopped eating doughnuts for breakfast after I went off to college,” says Moua, who is pursuing an online master’s degree in clinical nutrition at CALS.

She still makes careful choices about what she eats. But the source of her healthy habits can be traced further back, to her childhood and to the roots of her Hmong culture.

Many Hmong children live in the shadow of food insecurity, whether it’s a specter of the past or a reality of the present. Food insecurity was a common issue for most Hmong refugees living in camps in Thailand and during early U.S. resettlement. Some still face hunger today. Many members of the Hmong community supplement their food stores by gardening, and it’s an unspoken expectation for Hmong children to assist their parents with growing and selling at farmers markets.

From a young age, Moua has been helping her mother and sister manage a fresh produce stand at a farmers market in Green Bay. So, she grew up around

healthy food. And this weekly family side gig sparked Moua’s interest in nutritional sciences — and led to her ultimate career choice.

For many Hmong people of Moua’s parents’ generation, survival defines their relationship to food. But Moua’s interest extends beyond eat-to-live to how food affects human health. A key question continues to drive Moua: What is the science behind the food we eat? And she hopes to have the opportunity to delve into this question with members of the Hmong community and other underrepresented groups — to teach them why it’s important to balance their diets, and how.

The opportunity to share knowledge with others is one of the reasons Moua aspired to become a clinical dietitian (a registered dietitian who works in a health care setting) as early as her junior year of high school. “I had heard of Hmong doctors and nurses, but I had never heard of a Hmong clinical dietitian before then,” Moua says. “I decided I wanted to do it. Why not be the first?”

This goal steered Moua to the University of Wisconsin–Green Bay, where she earned a bachelor’s degree in human biology with an emphasis in dietetics and nutrition. Later, while pursuing her master’s program at CALS, Moua’s internship at Aspirus Riverview Hospital in central Wisconsin confirmed her passion and interest in the field. While walking rounds with doctors and nurses, she gained in-depth knowledge about human diseases and, with the guidance of a preceptor, taught patients about the

Naomi Moua, a student in the Online Master of Science in Clinical Nutrition program, helps a customer at her family’s booth at the Market on Military farmers market in Green Bay.

Photo by MICHAEL P. KING

relationships between their health and the foods they eat.

“We saw Naomi’s determination to achieve the RDN credential in her study of clinical nutrition in many domains — clinical, public health, and the food system — and in the time she spent in supervised experiential learning opportunities, from the school cafeteria to the ICU,” says **Cassandra Vanderwall**, director of the UW Health Integrated Graduate Program in Nutrition, who oversaw Moua’s internship. “Few have Naomi’s drive to serve, help, and honor, and I know this will take her far.”

Moua graduates in December 2021 with an eye toward working in a clinical setting or as a community nutrition educator or nutritionist for the federal Women, Infants, and Children program.

“I can’t wait to educate people about the different types of diseases and apply my knowledge and experiences in the real world, especially with underserved populations,” Moua says.

EXPLORE ONLINE

Learn more about the Online Master of Science in Clinical Nutrition program at go.wisc.edu/ms-clinical-nutrition.



A Dairy Venture into the World of Sports Drinks

GoodSport, developed in collaboration with the Center for Dairy Research, could turn the industry on its head.

BY SHELBY ANDERSON

When her son started playing baseball, Michelle McBride discovered an empty niche in the world of sports drinks.

“We didn’t want him drinking traditional sports drinks because they’re filled with artificial ingredients and too much sugar,” says McBride, an entrepreneur. “We tried some natural options, but he didn’t like the taste. And I learned that they provided no better hydration than plain water.”

So McBride studied up. She found solid evidence that milk is extremely effective at hydrating the human body. “When I saw that, I thought, ‘Wow! Milk is packed with electrolytes and all of these other nutrients — I really should be able to make a sports drink out of it,’” McBride says.

McBride enlisted the help of several experts, including an experienced sports nutrition scientist. She also started working with a lab in her home state to formulate prototypes using milk. But the taste wasn’t quite right. Following a suggestion that she seek out a dairy scientist, McBride contacted the Center for Dairy Research (CDR) and connected with **K.J. Burrington** BS’84, MS’87, who was dairy ingredients applications coordinator at the time, and **Vic Grassman**, manager of CDR’s business accelerator, the TURBO Program.

Burrington immediately knew McBride was on to something. But she also knew that using skim milk in the formulation would not provide the appearance, flavor, or mouthfeel of a typical sports drink. Instead, she suggested milk permeate.

Milk permeate is generated through ultrafiltration, where fat and protein are removed and used in other applications. The leftover milk permeate contains milk’s natural ingredients — essential vitamins, carbohydrates, and minerals such as calcium, magnesium, sodium, and potassium — as well as electrolytes and a clean flavor, all of which, Burrington says, make it a perfect candidate for a sports drink ingredient.

Using milk permeate, McBride and Burrington developed a lactose-free and shelf-stable sports drink that would come to be known as GoodSport.



Photo courtesy of MICHELLE MCBRIDE

DAIRY

SUSTAINABILITY

Some dairy companies dispose of milk permeate because they don’t have a market for it. Products like GoodSport help increase the value of milk permeate and improve sustainability in the dairy industry. Visit goodsport.com.

DAIRY

INNOVATION

The Center for Dairy Research gives companies access to scientific expertise, technical support, and education and helps them bring successful products utilizing dairy to the global marketplace. More at cdr.wisc.edu.

McBride was pleased with the look of it. Next was the taste test.

“I remember K.J. and I toasted cheers with our little sample cups, and then we tasted it,” McBride says. “Right away, I knew we had done it, and I literally cried tears of joy right there with K.J. in the lab. I was so happy.”

Independent research shows that GoodSport performs as well as it tastes. With support from Dairy Management, Inc., Penn State University studied GoodSport’s hydration efficacy by testing it against water and a traditional carbohydrate-based sports drink. The results, published in *Nutrients*, show that milk permeate’s natural combination of electrolytes and carbohydrates promotes the body’s ability to retain more fluid at a cellular level than its counterparts.

“They found that GoodSport stays in the body and provides hydration more than two hours after it’s consumed,” McBride says. “The results were significant. There’s real science that goes on behind hydration. It’s very important that you have the right type and level of electrolytes and the right balance of carbohydrates.”

Looking back on the product development phase, McBride says she is grateful that she connected with CDR. “We had help troubleshooting a ton of issues that will come up with any dairy project,” she says. “And any one of those issues can seem insurmountable if you’re trying to solve them by yourself.”

The Promise of Safe Food for Billions

A new product developed at CALS could help eliminate dangerous fungal toxins that afflict crops, animals, and humans worldwide.

BY JORI SKALITZKY BSX'22

Outside of agricultural and scientific circles, few people would hear the word “mycotoxin” and fully understand the reference. But they probably should. This menace just might be one of the biggest threats to our global food supply.

Although mycotoxins are garnering more attention today, not long ago they were severely understudied. As a senior at Seoul National University in 1985, **Jae-Hyuk Yu** MS'91, PhD'95 stumbled on mycotoxins in a microbiology class. But at the time no one in the microbiology department was investigating these fungal toxins, so he had to borrow books from a colleague in plant pathology.

“After I learned about this [toxin], especially aflatoxin, how big the problem is, how bad this toxin can be, I wanted to solve this problem,” Yu says. “That was my vision, starting from 1985.” Now a professor of bacteriology in the 22nd year of his faculty career, Yu believes he has finally come up with a solution.

Mycotoxins are toxic chemical compounds produced by certain species of molds (see “Five Things Everyone Should Know about Mycotoxins” in the spring 2019 issue of *Grow*). More than 300 different kinds of mycotoxins have been discovered, but only seven of them regularly contaminate food supplies.

The most problematic mycotoxins are aflatoxins, mainly produced by the molds *Aspergillus flavus* and *Aspergillus parasiticus*. “This toxin is the most potent carcinogen you can find in nature, 200 times more potent than benzo[a]pyrene, the main carcinogen in cigarette smoking,” Yu says. Aflatoxins, and mycotoxins in general, cause a wide variety of health issues, including suppressed immune responses, in utero developmental issues, genetic mutations, cancer, and

even death. No humans or animals are immune to aflatoxin toxicity.

Mycotoxin contamination is unavoidable and a constant threat to almost all grain and food crops. Aflatoxins can contaminate around 25% of the global food supply, and this will only get worse as the planet warms. The best preventative measure against consuming these toxins has been to dispose of the contaminated food, including milk. Until now.

Yu and his team, which includes research scientist **Ahmad Alshannaq** PhD'18 and food science Ph.D. student **Dasol Choi**, have created a product called D-Tox that can safely treat various foods contaminated with aflatoxins and another mycotoxin called patulin. Applied in a clear liquid form, D-Tox breaks down these toxic chemicals into non-harmful components. When boiled in D-Tox, aflatoxins and patulin are dismantled in a matter of 15–30 minutes. Food can also be soaked in D-Tox for 1–2 days to effectively destroy the toxins. Since D-Tox is derived from edible fungal

cultures, and because thorough testing has shown it to be completely nontoxic, Yu anticipates the product can be designated as GRAS (generally recognized as safe) by the U.S. Food and Drug Administration.

“Aflatoxin poses a significant risk to human health,” says **Joan Bennett**, a world-renowned aflatoxin expert and professor of plant pathology at Rutgers University. “Despite decades of research, there has been little progress on finding ways to mitigate aflatoxin contamination until D-Tox was developed.”

Yu's hope is to mass-produce and distribute D-Tox worldwide in various easy-to-use forms, including a tablet, and he's looking for partners and funders to work with his spin-off company, SkyAngel Bio. The product, he says, has the potential to protect more than 4.5 billion people from exposure to the harmful consequences of unmonitored levels of aflatoxins.

“I'm confident that this is at least one of the solutions that we can apply to reduce global aflatoxin contamination levels in human food,” Yu says, “so people can have a better and healthier life.”

Ahmad Alshannaq, left, and Dasol Choi demonstrate the use of D-Tox on corn inoculated with *Aspergillus flavus* in Jae-Hyuk Yu's lab in the Microbial Sciences Building.

Photo by MICHAEL P. KING



Bee-Spying Mission Seeks Operatives

Through the WiBee project, citizen scientists can use a mobile app to track Wisconsin's wild bees and gauge their pollination potential.

BY JOCELYN CAO BSX'21



Photo by JEREMY HEMBERGER

On any given summer day in Wisconsin, if the sun is shining, bees abound in fields, prairies, and woodlands, hard at work collecting pollen and nectar. And some of these beneficial insects are under close surveillance.

Growers, gardeners, researchers, and others are using WiBee: The Wisconsin Wild Bee App to track bees and their flower visitations. It's all part of a new

citizen science effort to observe and collect high-quality data on the abundance, diversity, and activity of wild bees in the state. A research team led by entomology professor **Claudio Gratton** launched WiBee last year with funding from Gwenyn Hill Farm and the Ira and Ineva Reilly Baldwin Wisconsin Idea Endowment.

"The project started with apple growers reaching out to the Gratton lab, asking whether they need honeybees on their property or if they could rely on wild bees instead," explains WiBee outreach specialist **Colleen Satyshur**. "It costs money to rent honeybee hives, and there's coordination involved, so [they wanted to know whether] they had enough wild bees around to pollinate their apples."

More than one-third of the planet's food crops depend on pollination, and bees are the most efficient pollinators in many cases. In Wisconsin, bees are essential to many of

FINDINGS

A SAFE WATER FUTURE REQUIRES ACTION TODAY

Ph.D. student Tracy Campbell MS'18 recently led an assessment of water quality goals for the Yahara River watershed using a modeling tool developed in the Department of Agronomy. The results: Phosphorous levels in waterways will keep rising if business as usual continues. However, **phosphorous and nitrate levels could be reduced by 50% if fertilizer application is also reduced by 50% and grassland cover is increased by 50%.** Under the most likely future climate scenario, these practices could yield water quality improvements in 50 years.

Photo by UW-MADISON WATER SUSTAINABILITY AND CLIMATE PROJECT



the state's fruit and vegetable crops, such as cranberries, cherries, melons, and squash.

Many growers in Wisconsin and elsewhere rely on European honeybees for pollination services. But the state has more than 400 species of native wild bees that may be able to help do the job. The extent to which they can help, however, is unknown.

Enter the WiBee project. Its goals are to collect the data needed to monitor trends in wild bee communities, share recommendations on pollination management, and eventually help bolster native bee populations.

"The app provides a tool for growers and farmers to track their own pollination and start to make evidence-based decisions depending on the pollination they are seeing on their own properties," Satyshur says. "And when the full data analysis is complete, we will have more specific recommendations."

The WiBee app collects bee visitation data through user surveys. For each five-minute survey, users watch bees as they visit flowers in a 3-by-3-foot area. Since bee behavior is highly influenced by time of day, weather, or even just a passing cloud, researchers need large quantities of data — including repeat surveys at the same locations — to develop pollination management recommendations.

"Bees fluctuate a lot between years, within a season, and among farms, so it is hard to get a simple view of what bee communities look like on farms with only casual observations," Gratton says. "This is like trying to predict if the tide is going in or out by looking at the waves on the shore for one minute. You need long-term, consistent data to see trends. This is one of the things that WiBee will help with as more and more observations are made."

Preliminary results from the project show that farms and orchards located near woodlands, wetlands, or urban development are likely to have more wild bee visits. When it comes to apple orchards, the researchers found a lot of variation — including some promising numbers.

FIVE WAYS TO HELP WILD BEES

- Download the WiBee app to learn about Wisconsin's wild bees and help collect data.
- Assess the "bee friendliness" of your property at pollinators.wisc.edu/habitat.
- Keep a part of your yard "messy." Dead wood or brush can provide habitat for cavity-nesting bees.
- Reduce use of wood mulch, which can block ground-nesting bees.
- Minimize pesticide use in your yard.

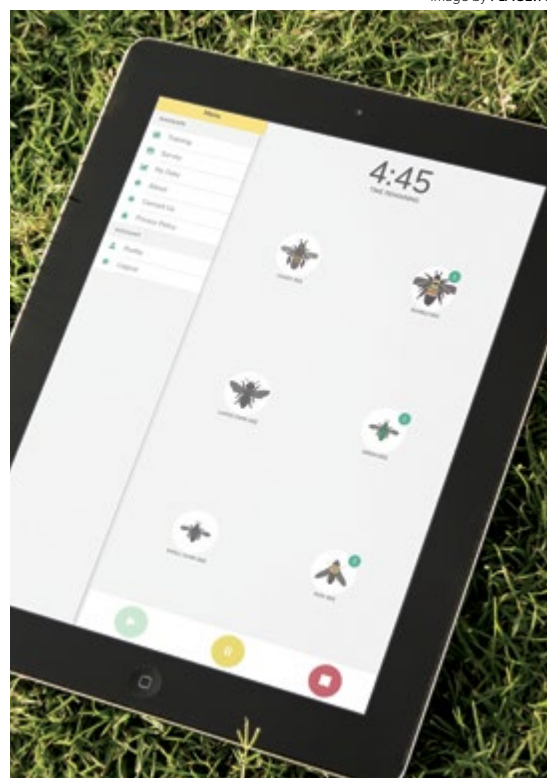
DOWNLOAD WiBEE

- Available for Android or iOS. More at pollinators.wisc.edu/wibee.

"Our data show that some orchards appear to have sufficient pollination from wild bees, according to the [established threshold]," Satyshur says.

In 2020, 116 app users conducted 891 surveys in total, and things are on track to at least double this amount in 2021. The most well-represented crop plants so far include apple, cranberry, and cucurbits. Wildflower and ornamental flower data have been coming in from Wisconsin Master Gardener Volunteers and other users. The project still needs more data of all kinds from around the state, Satyshur notes, particularly for berry crops and tomatoes, and she encourages interested individuals to download and try the app.

Image by PLACE.TO



BEES NEED CROP DIVERSITY

Bumble bees are vital pollinators for native plants and many food crops. But, according to a research team including Jeremy Hemberger BS'12, PhD'20 and entomology professor Claudio Gratton, **most native bumble bee species became rarer in Midwestern states** as crop diversity declined over the last 150 years. A wider range of crops could help bumble bees thrive.

Photo by ISTOCK.COM/ANDREY NIKITIN



TOUGH TALKS ABOUT TECH

Public understanding and acceptance of controversial technologies, such as human genome editing, won't come through one-way communication. Instead, it will take **collaborative efforts and thoughtful conversations tailored to people's values**, according to a paper published by life sciences communication professors Dominique Brossard and Dietram Scheufele and graduate student Nicole Krause.

These Scientists Have Sequenced the Cranberry Genome. Now They're Looking to Share It.

The aim is to create a resource that plant breeders can use to make the most of Wisconsin's famous red fruit crop.

BY CAROLINE SCHNEIDER MS'11

Juan Zalapa is building a library. But it doesn't house classic literature or thick textbooks. This one is all about cranberries. Zalapa's construction materials aren't what you would imagine either. Instead of wood for shelves, he's using chromosomes; rather than paper for pages, he's using genes. And the goal of the library will be to teach plant breeders and growers how to maximize the potential of this popular tart, red fruit.

Zalapa and his research team have become the first to sequence the cranberry genome. In other words, they have discovered the complete list and order of nucleotides in cranberry DNA — the blueprint of all the plant's genetic material. The genomes of many crops, such as corn, have been known for some time. But fruit crops, such as cranberry, have lagged. Wisconsin produces more than half of the world's cranberries, so improved breeding is important for the state's agricultural livelihood. Sequencing the fruit's genome is an important step toward producing redder, hardier, tastier cranberries.

The accomplishment took some time. Using a sophisticated machine in a lab, the team had to split the chromosomes into millions of shorter bits. Once those bits were sequenced, the researchers reassembled and organized them into the 12 complete chromosomes contained in the nuclei of cranberry cells. This is how Zalapa and his colleagues created a space for their cranberry library.

"Basically, the chromosomes are the bookshelves of our library," says Zalapa, a professor of horticulture and U.S. Department of Agriculture scientist. "The first thing we had to do when setting up the library was to build those bookshelves, the scaffold that holds the information."

The scaffold was built through a strong collaboration with the Mexican government, and most of the work was done by **Luis Diaz-Garcia** PhD'18, a former student in Zalapa's lab and now a scientist at the National Institute of Forestry, Agriculture and Livestock Research in Aguascalientes, Mexico.

In Mexico, producers and consumers are very interested in blueberries, a popular fruit. But few Mexican scientists study them, so the Mexican government supports students who study fruit crops abroad. Diaz-Garcia earned one of these presti-

Members of Juan Zalapa's lab harvest cranberries at Cranberry Creek Cranberries in Necedah, Wis., in 2020 as part of a nationwide research project on genes that control fruit traits.

Photos courtesy of JUAN ZALAPA



The samples gathered at Cranberry Creek Cranberries were collected in measures of one full cup per genotype.

gious scholarships to fund his cranberry research in the United States, which he calls the opportunity of a lifetime.

"I was very lucky to have Juan as a mentor," Diaz-Garcia says. "He created a great collaborative environment within the lab and externally with growers and the industry. We were able to publish research articles that are now the foundation for more research."

Those future projects will essentially stock the shelves in the cranberry library. The books will be the genes and traits associated with different areas of the chromosomes. And organizing and sharing those books will greatly benefit breeders as they look to improve cranberry and related fruits.

Traditional breeding involves the selection of better plants over time. Breeders may look for crops with higher yield, superior taste, or lower acidity, for instance. However, cranberries don't grow fruit immediately: It can take five to six years to yield a crop. But if breeders can look up the location of certain traits on a

chromosome and know which genes are linked to better fruit color, for example, they won't have to wait for fruit to develop to select the best plants. Instead, they can sample the leaves of seedlings and keep just those plants that contain the gene or genes they want.

"In simple terms," Diaz-Garcia explains, "a piece of a leaf can be used to predict if a cranberry fruit is going to be sweet or not, even before the plant produces fruit."

This ability will greatly speed up breeding and allow growers to choose precisely what traits they want in their fruits. One of the characteristics they are most interested in is anthocyanin content. Anthocyanin is an important chemical for human nutrition, and it gives cranberries their color. Sometimes color doesn't develop or develops at the wrong time; environmental cues can have a big impact on this process. An understanding of which genes affect how and when plants color, then, would be very useful for growers and breeders.

"What we're looking for are plants that are consistent in their color development, despite the elements," Zalapa says. "We can really try to understand how this color changes and hopefully put the right combinations of genes together to produce colors that are better for our growers here in Wisconsin and across the country."

The cranberry genome is already available online at vaccinium.org/crop/cranberry. Genes and traits will be added to the site after they are uncovered, giving breeders and researchers access to the complete cranberry library.

"This work can lead to the development and release of better-tasting varieties with higher fruit quality characteristics and improved adaptation to environmental stresses," Diaz-Garcia says. "All of that will be beneficial for the cranberry industry, growers, and consumers."

■ NUMBER CRUNCHING

Wisconsin is the number one cranberry-producing state in the U.S. Its farmers are responsible for bringing in 59% of the nation's crop. In 2020, they harvested 20,800 acres for a total of 4.64 million barrels and a production value of \$178.7 million. No wonder cranberries are Wisconsin's state fruit.



Photo by ISTOCK.COM/ANDREIRY BACHUK



Entomology professor Claudio Gratton, left, and Agronomy professor Randy Jackson teach portions of Agroecology 103 via recorded lectures like this one, which was created at Arlington Agricultural Research Station.

Photo by MICHAEL P. KING

Farms as Ecosystems

An agroecology course finds success in flipping the classroom (and student perceptions of agriculture) during the pandemic.

BY NICOLE MILLER MS'06

Have you ever wondered whether organic food is really worth the cost? Or pondered swapping out meat protein for plant protein, hoping it might yield some kind of benefit? Perhaps you've questioned whether we can find a way to feed 10 billion people by 2050 — and do it without harming the planet.

If so, you're not alone: These are the conundrums students and instructors take on in Agroecology 103. But the answers are never easy.

"We set up vexing societal problems around food and

agriculture and explore the solutions that have been enduring — considered more sustainable — and those that have not," says course co-creator and co-instructor **Randy Jackson**, a professor of agronomy.

Agroecology: An Introduction to the Ecology of Food and Agriculture teaches students to apply ecological principles to agricultural systems. They come away with an understanding of this overarching concept: that farms are ecosystems, and they exist within a broader landscape of social and ecological circumstances. The course has been popular from the start, with increasing enrollments since it was first offered in fall 2016.

In summer 2020, the instructional team overhauled the entire course experience as they prepared to offer it in an online-only format that fall. They poured a lot of energy into making the class as engaging as possible, meeting weekly in Madison's

FINDINGS

BIRDS OF A FEATHER FLOCK NORTH

Over the last several decades, North American bird species have slowly moved northward, and **recurring winter heat waves could speed up this geographic movement**.

And without time to gradually adapt, some birds may be more vulnerable to extremes. This is just one intriguing finding from a recent study, conducted by forest and wildlife ecology professor Ben Zuckerberg and his colleagues, that uses massive amounts of citizen science data and machine learning.

Photo by ISTOCK.COM/RAND22



DEER CROSSING DECLINE

When wolves come prowling, deer movements change, and herds thin out. This translated into a **24% drop in deer-vehicle collisions** in certain areas of Wisconsin, according to a study co-authored by agricultural and applied economics professor Dominic Parker. One benefit: Crash reductions can yield cost savings.

+ STUDY UP

Read more about research highlighted in Findings at news.cals.wisc.edu.

EXPLORE ONLINE

CALS offers undergraduate-level courses in agroecology as well as an interdisciplinary master's program in the field. More at agroecology.wisc.edu.

Westmorland Park as they designed the curriculum.

"We were planning for a virtual COVID semester at that point," says course teaching assistant **Ben Iuliano**, a Ph.D. student in integrative biology. "We used it as an opportunity not just to convert to a virtual format but to really update the content and reorganize it in a lot of cool ways."

For starters, the team decided to flip the classroom, dispensing with traditional lectures in favor of holding live group discussions and activities during class time. To make this work, they developed new course materials, including a series of videos created by Jackson and his faculty co-instructors, professors **Michael Bell** (community and environmental sociology) and **Claudio Gratton** (entomology).

The videos, often recorded in farm fields or prairie parcels, feature the professors explaining or demonstrating agroecological concepts. Some videos include interviews with other UW professors about topics related to their areas of expertise; a few feature more personal fare, such as a bread recipe or a song.

"We tried to develop videos that would be fun and challenging," says Jackson, "and that would provide good fodder for interesting discussions when we met online."

Their efforts seem to have paid off, as the course received high praise from students.

"You guys really made an effort to connect with the students, and I appreciate that," wrote one

student in a course evaluation after the fall 2020 semester. "Thursday live sessions felt as close to real school as I have gotten this semester. Mike's videos always made me smile, and the passion from everyone made me feel human again."

Students also worked on new pandemic-safe research projects, developed by Iuliano and his fellow teaching assistants. For a statewide citizen science effort, they counted wild bees — at home or in a nearby park — and then analyzed data and wrote a short research paper. For another project, students interviewed food system workers and used their answers to explore a research question. Each student also participated in a civic engagement activity, such as volunteering.

Back to in-person delivery this fall, the course maintains the flipped classroom format as well as the new videos and other materials. It's open to all majors, with no prerequisites. And it will continue to be an excellent opportunity for students to learn problem-solving skills they can take with them beyond college.

"We try to give students the tools to investigate and answer [the big] questions for themselves and to have the basic knowledge of our agricultural and food systems in order to make more informed decisions," says Iuliano. "A lot of students are surprised by what they learn, and the course changes a lot of opinions in both directions."

Agronomy professor Randy Jackson addresses students in Agroecology 103 on the first day of class in September 2021. Masks were required to be worn inside campus buildings at this time. Photo by ANDERS GURDA



■ FOLLOW-UP

GLOBAL HEALTH GAINS MOMENTUM

In the spring 2021 issue of *Grow*, writer **Nicole Miller MS'06** introduced readers to the new global health major, through which students explore how human health intersects with climate change, food systems, disease ecology, environmental health, economic development, and health care access.



Both a bioscience and public health major, it was created in response to student demand for more depth and background than what is offered through the global health certificate curriculum. As of this fall, 213 undergraduates have declared the global health major. The certificate remains popular as well, with 492 students pursuing that option.

Photo by UNSPLASH/BEN WHITE



The Podcasters of CALS

Academics step outside their traditional roles to take listeners behind the scenes of science and higher education.



Story by [NICOLE ETTER](#)

Photos by [MICHAEL P. KING](#)



In the car, at the gym, while folding laundry — people are tuning in to podcasts more than ever before. Since this portable form of entertainment first hit earbuds in 2004, listenership has climbed steadily. And it soared during the pandemic. An estimated 116 million people — 41% of Americans ages 12 and up — listen to podcasts monthly or more, according to a 2021 survey for the long-running digital media study, The Infinite Dial. Those who listen weekly fit in an average of eight episodes per week. Major companies, A-list celebrities, and advertisers are all clamoring for a piece of the growing podcast pie.

And the beauty of the platform: It's open to anyone with an idea, a computer, and a microphone. Meet two new podcasters from CALS who are using streaming audio to connect with new audiences and boost the signal on important issues.



Ben Rush, a Ph.D. student in the Department of Nutritional Sciences and creator and host of the podcast *Deeper Than Data with Ben Rush*, chats with assistant professor of biochemistry Judith Simcox during a recording session in his home in downtown Madison.

► The Humans Behind the Science

During the early months of the pandemic, as many turned to baking and jigsaw puzzles to pass the quarantine boredom, nutritional sciences doctoral student Ben Rush started experimenting with sound. It was a throwback to his high school days, when he dabbled in electronic music composition. Alone in his Madison apartment, he penned comedy scripts, recorded himself voicing characters, and created a couple of parody podcast episodes.

Then he read *Out on the Wire: The Storytelling Secrets of the New Masters of Radio* by Jessica Abel. The book helped him realize that a podcast was the perfect way to blend his scientific background, natural curiosity about people, digital audio experience, and goofy sense of humor — and put it all toward a higher purpose. “It just dawned on me that I have all of these skills that I could use . . . to change the world around something I’m really passionate about,” Rush says.

And his passion is sharing the human side of science. He quickly got to work creating the first few episodes of *Deeper Than Data with Ben Rush*, which launched in February 2021. His vision: to use open, honest storytelling to help graduate students and early-career scientists feel less alone, encourage faculty to embrace open and vulnerable leadership, and increase public trust in the scientific community.

Rush believes that open and honest conversations are what lead to true connection and understanding. In his podcast, he prompts guests to chat about their biggest failures, their meandering paths to success, and their first childhood crush, among a wide range of other topics. He talks to guests the same way he would friends, and he isn’t afraid to be the first one to admit something embarrassing.

“People aren’t looking for leaders on pedestals: They’re looking for people they can connect to,” Rush says. “We need to show the human side of scientists, to have the public see scientists as human.”

While the podcast delves into serious territory — from toxic professional relationships to defeating imposter syndrome — Rush embraces humor as a way to engage his audience and guests. He’s a big fan of Dan Pashman of the foodie podcast *The Sporkful*. “He used comedy and stupid jokes to just connect with people, and it worked,” Rush says. “And I could see it working in my own life.”

During the production process, he’ll edit in self-deprecating jokes to poke fun at something he said during the interview or add in a silly song. Rush ends each episode with an improv game, inspired by one of his favorite childhood shows, *Whose Line Is It Anyway?*, and the Improvisational Theater for Scientists course offered by UW internal medicine professor Amy Zelenski. So listeners get to hear what

a fashion-loving public health professor thinks an octopus should wear to an awards ceremony.

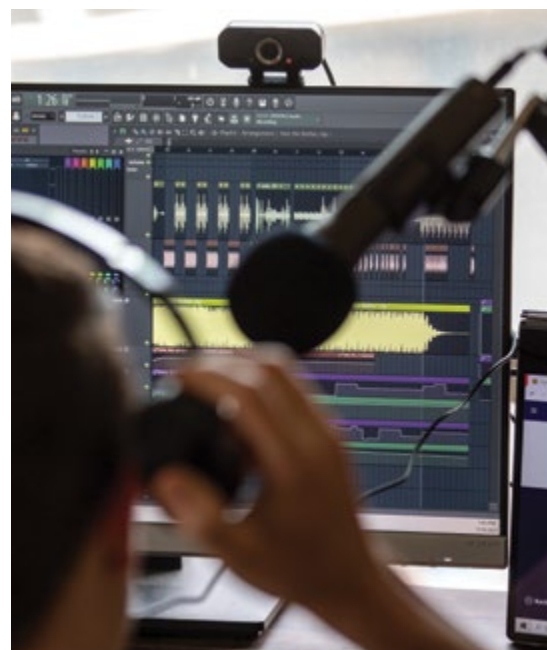
“I’ve been really amazed, especially for the improvised games, that everyone is willing to jump in,” Rush says. “It’s a lot of trust. I think people are intrigued to get a request where it’s not just about their research, it’s about who they are as a person.”

Rush carefully evaluates prospective guests to ensure a lively conversation. He often starts by researching faculty who have won teaching awards because he thinks they’ll see the value of his podcast, and then he’ll check out their social media to get a sense of their personality. He estimates he spends 10–13 hours creating each episode, from the prep work to the final production.

Several of Rush’s episodes have featured CALS faculty, including “Be Chill, Drink Coffee, and Destroy Godzilla” with Karthik Anantharaman, assistant professor of bacteriology; “Can We Get a Herd of Wallabies?” with Laura Hernandez, associate professor of animal and dairy sciences; “Discovering Amazing Places Randomly” with Amaya Atucha, associate professor of horticulture and fruit crop extension specialist; and “Purposeful Living and Mentorship” with Judith Simcox, assistant professor of biochemistry.

For the one-year anniversary of the podcast, Rush plans to air an interview with his boss, Adam Kuchnia, assistant professor of nutritional sciences. In Kuchnia’s lab, Rush conducts research on using imaging techniques to improve muscle health and quality. “I want to find out how it is to work with

Ben Rush prepares his audio and editing equipment before recording a podcast episode.



me,” Rush says. “I’m sure there are times when I’ve driven him crazy, and I’m curious what those are.”

Rush, who once dreamed of becoming secretary of the U.S. Department of Agriculture, plans to graduate in 2022 and is now considering a career in science communication. Early on, he consulted UW’s Discovery to Product program and the UW Small Business Development Center, which urged him to think big and beyond just a single podcast. And so he created *Deeper than Data* Media with a focus on “edutainment.”

His business concept is taking off: UW Connects recently hired *Deeper than Data* Media to create a bi-monthly podcast for the university’s series of public presentations called Badger Talks. Like the event, the podcast showcases people from departments across campus. To help with the expanded workload, Rush hired three friends from campus: nutritional sciences Ph.D. student Jevin Lortie, physiology graduate student Lauren Schrader, and postdoctoral fellow Julia Nepper.

Fran Puleo, who heads Badger Talks as assistant director of outreach programs at UW Connects, calls Rush an engaging storyteller who will help the program connect with younger audiences. “He is a master at casually, yet thoughtfully, presenting experts who provide thought-provoking insights on topics important to listeners,” she says.

“PODCAST” ORIGINS

The term “podcast,” a combination of “iPod” and “broadcast,” was coined in 2004 by journalist Ben Hammersley. In 2005, it was named Word of the Year by the New Oxford American Dictionary. Listeners today stream podcasts on a variety of smart phones, tablets, and other mobile devices, but the name has stuck.

Nan Enstad, professor of community and environmental sociology and cohost of the podcast *Collegeland*, works in her home recording studio — a closet — on the near east side of Madison.

Rush says he is energized by the creative freedom and entrepreneurial aspects of podcasting and is intrigued to see where it might take him next. The *Deeper Than Data with Ben Rush* podcast draws listeners from around the world — from students to early-career faculty to people with no connection to academia — and Rush is eager to keep building his audience. “I still can’t believe that the podcast has had as much success as it has,” he says. “It’s really been a fascinating ride, and I feel really lucky to be able to do it.”

► The Untold Stories of Higher Ed

Nan Enstad wasn’t a huge podcast listener before the pandemic. Sure, she occasionally enjoyed *Radio Lab*, *Dolly Parton’s America*, *Hidden America*, and *On Being with Krista Tippett*, but she wasn’t itching to grab the mic herself.

Then one day she was chatting with her friend, Lisa Levenstein, a UW grad who is an associate professor of history at the University of North Carolina at Greensboro.

“We were talking about how COVID was going to create this fiscal emergency for universities across the country after decades of funding cuts,” says Enstad, who is the Buttell-Sewell Professor of Community and Environmental Sociology. “We started



talking about how people don't really understand the importance of universities. There's a lot of criticism, and some is valid, and some is politically entrenched. There aren't a lot of media outlets that can take on the thorny issues that range across the landscape of higher education, and we wanted to bring out some of those stories and, in the process, examine how universities function and contribute to community."

But the duo didn't just want to write another academic paper. They wanted to get their stories directly into the ears of the public. "It wasn't a love of podcasts so much as it was a love of higher education," Enstad explains. "A podcast seemed like the right medium for us."

And so began *Collegeland*. Enstad and Levenstein started developing the concept in September 2020 and spent months brainstorming and planning. They hired Richelle Wilson, a UW graduate student with radio experience, to produce their first season. They also paid an artist to make their logo and cover art and contracted with a musician to create a theme song. By the time they launched in January 2021, they had three episodes ready to go.

"The wonderful thing about podcasting is it's an incredibly democratic form," Enstad says. "It's like TikTok — the skills it takes are pretty readily learnable. But we had never made a podcast before, so it was a super steep learning curve for all of us. In the midst of a pandemic, when it was Zoom after Zoom after Zoom and everything started to feel the same, it was super fun to be challenged in this way."

The podcast explores many dimensions of university life, which is reflected in episode titles such as "Tales of a Campus Housekeeper," "Why University Presses Matter," and "Food Insecurity on Campus." A few past guests have UW ties. Malia Jones, an associate scientist in health geography at the Applied Population Laboratory, kicked off the podcast's first episode, "Dear Pandemic." UW grad Deborah Fuller, a vaccinologist and professor of microbiology at the University of Washington, was spotlighted in "Inside a University Vaccine Lab." And Michael Dockry BS'94, PhD'12, professor of forestry at the University of Minnesota and member of Citizen Potawatomi Nation, was featured in the episode "Beyond the Land-Grab University."

Dockry, who has been a guest on other podcasts, didn't hesitate to accept the *Collegeland* invite. He says the medium offers a chance to connect with an audience that might not make it to campus for a lecture, which suits his goal of sharing the importance of tribal natural resources, sovereignty, and perspectives. He also sees *Collegeland* as an effective way to cut through the politicization of higher education.

"It gets down to the real stories and the real im-



TUNE IN

Ready to binge-listen? Find *Collegeland*, *Deeper Than Data* with Ben Rush, and the *Badger Talks Podcast* on Apple Podcasts, Spotify, Google Podcasts, and other streaming services or online at collegelandpod.com, deeperthandata.media, and badgertalks.wisc.edu.

A MASTER CLASS ON GREAT AUDIO

Long-time radio personality and professor emeritus Larry Meiller BS'67 MS'68 PhD'77 shares his on-air wisdom with life sciences communication students through LSC 360 Information Radio.

He also offers tips for any budding podcasters out there at go.wisc.edu/grow-podcast-tips.

pact that universities have, and I think, as a society, we've somewhat lost the understanding of how important these universities are," Dockry says. "There is a lot that needs to be changed with universities, and we're working through that, but hearing individual stories of transformation, of resilience, of change, of inspiration for overcoming obstacles — these are things that are happening every single day in universities, and we don't always hear about it."

Every conversation renews Enstad's own commitment to higher ed. "What I love about it is it's already transformed my sense of what a university is and what a university can be," she says. "There are people out there doing amazing work."

Beyond the interviews, Enstad and Levenstein bring their own experiences and viewpoints into the podcast, commenting on issues such as COVID-19 vaccine requirements and the challenges of teaching on Zoom.

The *Collegeland* team's goal now is to expand the amount of time, resources, and publicity they invest in the podcast. To help, they hired two new professional producers: Craig Eley and Jade Iseri-Ramos. The first 10-episode season was paid for with a grant from Wisconsin Humanities, and North Carolina Humanities and the Holtz Center for Science and Technology Studies will fund several episodes on efforts to redress climate change. They've also explored other sponsorship options for season two, which launched earlier this fall.

The podcast continues to spark new connections. Parts of their episode on food insecurity on college campuses were incorporated into the FairShare CSA Coalition's Routes to Roots self-guided farm tours, WORT-FM in Madison aired the episode featuring Dockry, and an episode titled "Every Campus a Refuge" about programs for immigrants prompted a connection between UW-Milwaukee and the University of North Carolina. Enstad hopes to continue to grow partnerships and *Collegeland's* reach — and ultimately persuade the public that universities are worthy of investment.

"We need to act now to save higher education," she says. "The time is now. The threats are serious, and we've lost so much already. We need to change course. The biggest challenge is trying to figure out how to carry that in the podcast in an entertaining and graceful and engaging way."

"We don't just want to write a manifesto. We want a creative space for questions and discussion. How do we make this a conversation that you might have in a department or over a beer? How do we make an art form that welcomes more people and that becomes, as good art and intellectual work does, a place to discover new possibilities?"

The conversation continues in season two. **g**



ORGANICALLY

➤➤ **grown at UW**



It's no secret that Wisconsin is a national leader in organic agriculture. The state boasts the second-highest number of organic farms in the U.S. and ranks third in total organic acres. Perhaps less understood is that UW has long been a quiet powerhouse in organic research, extension, and education; and this year, a dedicated group of faculty and staff are doing everything they can to remove "quiet" from that description.

Story by Anders Gurda MS'14



Multimedia storyteller Anders Gurda is a graduate of the agroecology program, co-founder of the Organic Grain Resource and Information Network, former director of the Pipeline Foods Farm Profit Program, owner of Windborne Media LLC, and currently outreach specialist for the UW Organic Collaborative. Here he tells the colorful tale of how decades of organic research and cooperation on campus — and across Wisconsin — are bearing fruit . . . and grain, and vegetables, and milk . . .

A field of cereal rye is roll-crimped, an organic weed-suppression method, as soybeans are planted at Arlington Agricultural Research Station. Photo by ANDERS GURDA

The College of Agricultural and Life Sciences, like many in the agricultural community, was slow to warm to organics. Organic methods represented a stark departure from the way things had been done for decades, and some viewed them as an untested and therefore problematic reaction to conventional farming.

“Thirty years ago, there was skepticism, if not hostility, with little to no support from the college,” says agronomy professor Bill Tracy. “Today, it’s a completely different landscape, and we have lots of big things happening in the organic world at UW.”

But this tale goes back even further. If the organic story at UW is one of a flywheel slowly gaining speed, the first turn happened more than a century ago. In 1909, the year the university’s fight song, “On, Wisconsin!,” was written, F.H. King, a professor in agricultural physics at UW, spent nine months travelling through China, Korea, and Japan. That trip prompted him to write his last book, *Farmers of Forty Centuries*, which was published two years later, right after his untimely death.

In the book, King clearly lays out many of the principles and practices of what would eventually be known as organic agriculture. He was fascinated by the Asian indigenous farming communities who

were able to continuously grow crops for 4,000 years while farms in the U.S. were losing productivity after less than a century. These traditional cultures inspired the pioneers of the modern organic movement. King’s contribution was skillfully importing and translating his observations of indigenous farming to Western audiences. His observations also reaffirmed some of the conclusions he had drawn from his stateside experiments.

“King countered myths, espoused by contemporaries in powerful positions, with careful research,” says Steve Ventura, professor emeritus of soil science and environmental studies. “As documented by another pioneering UW soil scientist, C.B. Tanner PhD’50, [King’s] findings highlighted the importance of manures and plant residues in maintaining soil fertility, a fundament of organic agriculture.”

Farmers of Forty Centuries eventually matured into the U.S. organic movement in the 1960s and 1970s. It’s still growing and evolving today.

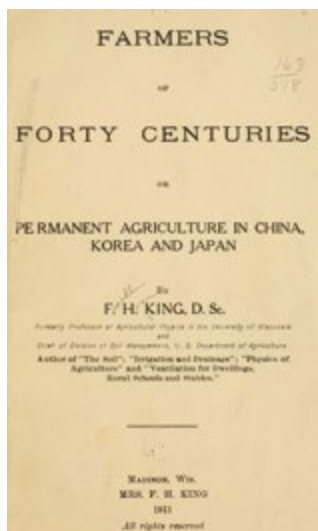
(Bottom left) A portrait of F.H. King, which was printed in the influential *Farmers of Forty Centuries*, and the title page from the book.

Images from BIODIVERSITY HERITAGE LIBRARY, contributed by LIBRARY OF CONGRESS.

Members of F.H. King Students for Sustainable Agriculture turn compost at their Eagle Heights farm on the UW campus.

Photo by ANDERS GURDA

King’s work altered the country’s agricultural landscape over time and also shaped the UW campus and community long after his death. After a period of dormancy, the next time anything significant hap-





Graduate student Keo Corak harvests carrots from an organic plot at West Madison Agricultural Research Station.

Photo by MICHAEL P. KING

with bales of data that have helped optimize organic grain and forage systems throughout the Midwest.

“WICST has been able to unequivocally prove that organic farms can feed the world with yields hitting 99% of conventional in two-thirds of the years studied,” says Gregg Sanford PhD’12, senior scientist and trial manager. “It’s also been the most profitable system, along with pasture, over the last 30 years.”

Sanford says WICST has also highlighted some of the challenges of organic farming, such as its reliance on soil tillage for weed control and the potential long-term negative impact this has on soil health and soil organic carbon. He sees the results coming out of WICST as both supportive of organics and a call to do better. “We’re going to need intelligent, complex, sexy rotations to address these challenges,” he says.

WICST wasn’t the only UW group incorporating organics into its work in the 1990s. The Center for Integrated Agricultural Systems (CIAS) was founded the same year. Although CIAS does not focus exclusively on organics, the center published its first organic article — “Organic Potatoes: They Can Be Grown, but Can They be Profitable?” — in 1992, before many organic markets were established.

Around the same time, the national winds were shifting as well: Organics blew like a cloud of non-GMO corn pollen from farms and kitchen tables to Washington, D.C., where the Organic Food Production Act was passed in the 1990 Farm Bill. The National Organic Program came into being 10 years later, and organic became an *officially* official labeling term, with statutory regulations enacted and enforced by the U.S. Department of Agriculture (USDA).

Some UW faculty and staff had been working at the liminal zones between agronomy, ecology, and sustainability for years, but as organic with a little “o” became “USDA Certified Organic,” an ever-growing group of campus researchers and affiliates joined the work of WICST and CIAS and began to focus on farmers — and others in the supply chain — who were working to grow the scale and productivity of organic agriculture. Wisconsin has organic farms of all types and sizes: corn, beans, and small grains; dairy and livestock; fruit, vegetable, and nut crops; mushrooms and maple syrup; and on and on, from less than an acre to several thousand acres. Equally diverse are those in the campus community working on organics, with home departments inside and outside CALS.



pened on the UW organic timeline was 70 years after *Farmers of Forty Centuries* hit shelves.

In the 1950s and 1960s, the Green Revolution brought new technologies aimed at rapidly increasing agricultural production, and it resulted in widespread farm consolidation and chemically intensive growing practices. In response, many farmers and a growing number of wary consumers began exploring alternatives. As often happens with the formation of movements, students got the ball (or perhaps the organic pumpkin) rolling at UW.

In 1979, King came back to campus — not the man this time, but his legacy, living on in the name of a new student group, F.H. King Students for Sustainable Agriculture. This student collaborative, which is still active on campus and managing the two-acre organic farm it started in the early 2000s, connects generations of UW’s agricultural innovators.

As organic agriculture grew in popularity throughout the country, the UW faculty caught up with their students. The Wisconsin Integrated Cropping Systems Trial (WICST) was established in 1989, largely the vision of late CALS agronomy professor Joshua Posner. It included organic rotations as part of a comparative, long-term cropping systems trial that’s still going strong today.

Organic farming systems often face two criticisms: They are not evidence-based, and they produce significantly lower yields than comparable conventional systems. WICST, and long-term cropping systems trials like it, have closed the evidence gap



“OUR ACTIVITIES ARE PROVIDING HELP FROM THE SOIL TO THE TOP OF SKYSCRAPERS; EVERYTHING PEOPLE INTERACT WITH CAN BENEFIT FROM ORGANIC AGRICULTURE.”

—ALFONSO MORALES

Today, the term “organic” really has two meanings. The first is following the rules of the USDA’s National Organic Program, whereby farmers (or researchers) must pass an inspection to use the “organic” label. The second is farming in alignment with the principles of organic agriculture. There’s overlap and interplay between the two. Even though organic certification is a very specific, regulated process, there are many farmers participating in UW organic research who may not be certified organic. Similarly, many farmers are certified organic and still farm conventionally on separate acres, just as faculty who work on organics also do research on and for conventional agriculture.

Though organic and conventional farming are sometimes portrayed as adversaries, they often peacefully co-exist on the landscape and in academia, interacting and learning from one another. Some UW programs, however, do emphasize organic production. Horticulture professor Julie Dawson runs the Urban and Regional Foods Systems Program, focused on everything from breeding organic vegetable and grain varieties to season extension for tomatoes to pioneering participatory research methods and statistics for organic breeding projects. In the Department of Plant Pathology, professor Erin Silva conducts field-scale research on tillage reduction strategies for organic row crops, cover crop

Summer employee Hannah Ryba picks bell peppers in the organic field used by the Department of Horticulture’s Seed to Kitchen Collaborative at Spooner Agricultural Research Station.

Photo by MICHAEL P. KING

integration, and organic livestock systems, among many other projects. But, Silva says, “whether a lab counts organic research and outreach as a major or very minor part of its overall program, the creation and support of diverse agricultural systems, which lead to healthier farms, farmers, and eaters, is recognized as a collective goal across our agricultural community.”

Organic experts on campus also agree that there is a profound need for research and education that specifically targets organic agriculture. Many of the tools in a conventional farmer’s tool kit are prohibited in or not well suited for organic farming. Similarly, varieties bred in conventional systems may not perform well on organic farms. This creates a constant need for increased investment and more dedicated expertise to optimize organic systems and help them thrive — agronomically, ecologically, economically, and socially.

“Taken together, we are fostering interconnected health — of people, places, and processes,” says Alfonso Morales, professor of food systems, marketplaces, and public policy in the UW Department of Planning and Landscape Architecture. “Our activities are providing help, from the soil to the top of skyscrapers; everything people interact with can benefit from organic agriculture.”

Since 1989, work in organic agriculture has slowly spread across campus — year by year, course by course, person by person — but the last few years have been truly transformational. The flywheel, now long-spinning, has been gaining momentum, and the group of faculty and staff committed to working in organics has grown and solidified.

In 2015, Clif Bar & Company and Organic Valley, with matching gifts from UW alumni John and Tashia Morgridge, provided funding for an endowed chair of organic plant breeding at UW. The first faculty member to fill the chair was agronomy's Bill Tracy. He worked with a team of graduate students (Adrienne Shelton MS'12 and Jared Zystro MS'08, PhD'19) to release UW's first plant variety bred specifically for organic systems, thanks to a partnership with organic farmers and the Organic Seed Alliance. Among the uniform plants and ears of hybrid corn, open-pollinated varieties like Tracy's have more variability in plant height and ear color, giving farmers more genetic wiggle room to improve them for their own systems, tastes, markets, or growing regions.

In 2016, UW faculty, staff, and partners, including local nonprofits and the UW Farm and Industry Short Course, formed OGRAIN, the Organic Grain Resource and Information Network. OGRAIN is a multifaceted program housed in the Department of Plant Pathology, managed by Silva, that provides education and a peer-learning community for organic grain growers throughout the country. And, in 2018, UW–Madison hosted Harvest of Ideas, a two-day forum exploring how education, research, and outreach on organic agriculture can support Wisconsin's communities, both human and ecological. That same year brought the country's first registered appren-

ticeship for organic vegetable production, founded in collaboration with the FairShare CSA Coalition, Dane County UW–Extension, and the Wisconsin Department of Workforce Development.

"Right now, it can be difficult for beginning farmers to articulate what they've learned in various internships and jobs," explains Dawson, who cofounded the apprenticeship program. "A formally recognized program tells employers and loan officers what graduates know how to do. We don't expect other skilled trades to learn their profession on their own, so it doesn't make sense for farmers to have to do so."

As these milestones clicked by, UW researchers and extension specialists were doing more and more work with the organic community statewide, nationally, and internationally. On-farm research, co-hosted field days, farmer-breeder-chef collaborations, conferences, industry collaborations, and much more. The flywheel was spinning fast, but all of this good organic work was happening in siloed departments, in individual labs, or via temporary partnerships. To Wisconsin's detriment, there was no cohesive program to aggregate, distill, and showcase everything on UW's growing organic menu.

There's a French culinary term, *mise en place*, which can be interpreted as "everything in its place." This means that every ingredient is prepared and set aside, one at a time, until all that's left to do is activate the alchemy of a chef's vision, tools, and raw ingredients. Imagine a well-seasoned pan encircled by bowls filled with grated cheese, diced onions, pats of butter, ground pepper, minced herbs. For decades, all of the disparate organic programs at UW were so many well-prepared ingredients, but scattered, kept separate.

Last year, the addition of a key ingredient finally brought that delicious moment when a French chef would say "*Commençons*," or "let's begin." It came in the form of an anonymous donation that provided the resources, direction, and inspiration the UW organic community needed to finally bring all of the ingredients together into a new, recognizable entrée.

First came the formation of the UW Organic Collaborative, a much-needed organizational home for the university's organic research, education, outreach, and organic-relevant programs. The co-organizers came from throughout CALS: In addition to Tracy, Morales, Ventura, Dawson, and Silva,

Dylan Bruce, a master's student in agroecology and a research assistant in the horticulture department, pulls weeds at West Madison Agricultural Research Station as part of a long-term organic carrot breeding project.

Photo by ANDERS GURDA



Photo by ANDERS GURDA

UW'S ORGANIC ACREAGE

Much of UW's organic agriculture research takes place on 142 acres, most of it certified, located on four agricultural research stations in different parts of Wisconsin.

Arlington Agricultural Research Station

- 80 acres
- No-till research, corn, soybeans, cover crops, Kernza, cereal grains, Wisconsin Integrated Cropping Systems Trial

West Madison Agricultural Research Station

- 30 acres
- Sweet corn, celery, tomatoes, potatoes, melons, beets, squash, peppers, carrots, wheat, barley, oats, alfalfa, soybeans, cover crops, winter rye

Spooner Agricultural Research Station

- 16 acres
- Vegetable trials, high tunnel, caterpillar tunnel, acres for seed-to-kitchen project, tomato breeding, squash, peppers, carrots, wheat, oats, Kernza
- Not certified but managed organically

Hancock Agricultural Research Station

- 16 acres
- No current research, but land has maintained its certification





John Wepking with his daughter, Lyda, at Meadowlark Organics.

Photo by JESSE PERKINS

COLLABORATE

Visit uworganic.wisc.edu to learn more or get involved.

OF COLLABORATIVES, WHEAT, AND WEPKINGS

The UW Organic Collaborative chose the word “collaborative” very purposefully. The group seeks to leverage the wisdom and innovation of the collective for the greatest good.

A confluence of characters working on one of the collaborative’s many fruitful partnerships includes CALS representatives (horticulture professor Julie Dawson, agronomy professor Lucia Gutierrez, and graduate student Pablo Sandro), a nonprofit organization (the Artisan Grain Collaborative, or AGC), and two organic farmers and flour millers (Halee and John Wepking of Meadowlark Organics and Meadowlark Community Mill). AGC and Meadowlark Organics are just two of the more than 50 public and private partners that affiliates of the UW Organic Collaborative have worked with over the years.

Gutierrez breeds organic cereals, such as spring and winter wheat, naked barley, and oat, at UW’s West Madison and Arlington research stations, with an eye toward producing cereals targeted for organic production in the Midwest. Gutierrez and Dawson have made great strides through their collaboration on hard red winter wheat, the most common wheat variation grown in the U.S., and they’ve been growing organic breeding lines of wheat on the Wepking’s farm for three years. They’re using that working organic farm as a real-life replicate while gathering data not only from the field but also from the farmers about their experience with the variety and its agronomic performance.

AGC executive director Alyssa Hartman is working to create a vibrant network of staple crop producers, processors, end users, and advocates all dedicated to diversifying the landscape in the Midwest. Under her leadership, AGC has also delivered Meadowlark wheat into the bakery and facilitated baking tests, most recently at AGC member Madison Sourdough. This has opened the door for culinary traits, not just yield and performance, to drive breeding decisions. All of these efforts seek to get more high-quality, organic, locally grown foods and beverages on people’s tables.

“Many of the food and beverage businesses that we work with want organic products,” Hartman says. “It’s at the top of the list as far as what the market is looking for in regional food systems.”

professors Brad Barham (agricultural and applied economics) and Shawn Steffan (USDA and entomology), along with a number of academic staff, have brought the vision of a cohesive organic collaborative to life.

With its own governance, social media presence, website, and growing number of faculty and staff associates (40 and counting), the collaborative is a cross-campus community that throws everything related to organic agriculture into a pot and stirs it until combined. Before last year, anyone interested in learning about what UW was up to with organics would have had to visit a half-dozen lab websites, read a handful of press releases from the last decade, and likely show up at a few events to put the pieces together. No longer.

“We are a dynamic group of scholars advancing basic and applied research that integrates different fields of study impacted by organics,” Morales says.

Next, 2020 brought a program manager and an outreach manager. A dedicated team of faculty and staff created the UW Organic Collaborative, and the two new staff members, Katie Peterman and this author, are supporting the group’s work and sharing it with the world.

“These new hires have allowed us to build critical connections, both internally and externally, and bring people together across multiple dis-

ciplines and multiple sectors of the industry,” Silva says. With new staff, the collaborative “will be able to bring more solutions to organic farmers, expand their markets, and promote entrepreneurship.”

Third came the allocation of five graduate student research grants. It can be a challenge to secure funds for graduate student positions and research projects dedicated to organics. Organic research



captures only a tiny fraction of all funding available through the USDA's two largest competitive agricultural research grants (just 0.2% of the Agriculture and Food Research Initiative pot and 1.85% of the Specialty Crop Research Initiative).

"By having dedicated organic funding, we can attract a very competitive pool of graduate students who are looking for meaningful opportunities in healthy food systems that are biologically interesting," Dawson says. "Organic fits that bill really well."

The first crop of graduate students funded through the UW Organic Collaborative, representing departments from across the college, started this fall and will make up the first cohort of organic agriculture scholars at UW. They will contribute to organic research and organic-related instruction as teaching assistants, and they will train to be the next generation of leaders in the field.

"I want my research to go somewhere and do something — to be applied," says Claire Benning, an agroecology graduate student who studies the benefits of cover crop mixtures in organic grain with soil science professor Matt Ruark. "And I want it to jump-start a career where I can keep making an impact in the ag world."

And, finally, CALS launched the nation's first in-person undergraduate certificate in organic agriculture, launched this fall. In the four decades since the founding of the F.H. King student group, interest in sustainable agriculture has only grown. Topics such as global food security, climate change, animal and human welfare, and farm-to-table supply chains are more relevant and widely discussed than ever before. The 15-credit certificate is available to students across campus and provides opportuni-

ties for undergraduates to not only understand the production and processing approaches that define organic agriculture but also gain insights into the organic industry — economics, policy, environmental stewardship, health, food systems, and beyond.

"The program prepares graduates to confidently pursue any of the growing number of job opportunities in organics, from the field to Washington, DC, to the public and private sectors," says Peterman, manager of the certificate program.

Much has changed in the 112 years since F.H. King returned from his global agricultural pilgrimage, but his eloquent case for evidence-based agricultural techniques, inspired by what he saw among indigenous peoples working on the other side of the world, is more important — and persuasive — than ever. Organic agriculture has become an inextricable part of the university's work just as it's become tightly woven into the patchwork of the state's farmland. The UW Organic Collaborative has matured from inspired but disconnected programs and people into something more recognizable, resilient, and impactful. With an innovative menu of offerings to share with agricultural communities and their allies in Wisconsin and around the world, the collaborative is looking for more partners to offer even more to a wider audience.

"We couldn't be more excited to be working cooperatively with others to build one of the strongest organic programs in the country," Peterman says. "Our power has always come from inspired and passionate people. This effort is no different, and we hope others will join us. Any agricultural system is made stronger through diversity, and the same is true for our growing organic community." **g**

(Bottom left)
Holsteins graze on one of the permanent pasture treatments for the Wisconsin Integrated Cropping Systems Trial at Arlington Agricultural Research Station.

Student workers with professor Julie Dawson's lab harvest tomatoes for a hoop house-field comparison research project at West Madison Agricultural Research Station.

Photos by ANDERS GURDA





A **LOOK BACK** ON

A **CAMPAIGN** FOR THE


FUTURE

W
**ALL WAYS
FORWARD**

ALLWAYSFORWARD.ORG/CALS

A sunset and lamppost illuminate an All Ways Forward banner on the front steps of Agricultural Hall in late fall 2017.

Photo by BEN VINCENT



All Ways Forward set and exceeded lofty fundraising goals, bringing vital new resources to people, buildings, and programs throughout CALS.

Story by NIK HAWKINS

In the fall of 2015, the University of Wisconsin–Madison set its sights on the future — and it set them high. The ambitious goal: raise \$3.2 billion by the end of the decade to ensure the university remains a world-class, world-changing institution. Dubbed “All Ways Forward,” it is the largest comprehensive fundraising campaign in UW’s history.

After several years of steady progress, the COVID-19 pandemic arrived and sucked the wind out of the university’s fundraising sails. But not for long. A one-year campaign extension and a sustained effort through complicated and chaotic times yielded strong results. So far, UW has raised more than \$4 billion — far surpassing the initial campaign goal — thanks to the generosity of 255,000 donors. And it’s not over yet. All Ways Forward continues through December 2021.

But why, you might ask, is all of this even necessary for a state institution? While it’s true that UW is a public university, fundraising has become more critical than ever to its mission. It’s a little-known fact that, in 2020–21, private grants and gifts accounted for a substantial 17% of UW’s budget, one of the largest pieces of the fiscal pie. That’s more than state revenue, more than federal financial aid, and just slightly below what the

university gathers in both tuition and federal grants.

Within this monetary milieu, the responsible stewardship of private funds continues to be a vital component of the university’s commitment to keeping college affordable for all students. It’s also vital to UW’s dedication to the Wisconsin Idea: Through collaboration and innovation, including efforts supported by private funds, the university generates a \$15 billion economic impact that resonates throughout the state.

Campaigns like All Ways Forward are clearly important, and they require unified effort from all corners of campus. Along with UW’s other schools and colleges, CALS set its own goals for the campaign. And, like the campus as a whole, CALS exceeded expectations. More than 13,000 donors have contributed close to \$170 million, well above the college’s \$150 million target. The influx of funds has gone a long way in strengthening CALS programs; but, just as important — and perhaps more difficult to quantify — it has established and energized the college’s partnerships with people and organizations beyond campus.

“Private financial support lets us do things we otherwise couldn’t do, whether that’s with facilities, faculty, students, or programs,” says CALS dean Kate VandenBosch. “And our goal-driven campaign also fostered relationships with donors and alumni. We learned about their goals and how they mesh with our own, and it forced us to sharpen our own vision and take it to the next level. This has established wonderful, long-lasting connections with our supporters.”

Six years seem to have gone by in a blink, but they are filled with big, abiding moments of generosity. Here are some of the gifts that have graced CALS during the campaign — and the stories of what they have helped the college achieve.



13,011
DONORS



4,866
ALUMNI DONORS



\$169,347,000
MILLION RAISED



\$19+ million
ABOVE TARGET

*Fundraising figures for CALS, as of Oct. 7, 2021.

TO START STUDENTS OFF RIGHT

The All Ways Forward campaign gathered financial support for many student-focused programs at CALS. Perhaps one of the most transformative initiatives in this

realm is the QuickStart program.

Launched in 2018, QuickStart is an early start program for incoming first-year students at CALS. It gives them an opportunity to earn credit before the official start of the fall semester, receive tailored academic and career planning, and participate in early networking opportunities with classmates and faculty. The program is designed to help students make the most of their college experiences and begin their careers (as the name implies) quicker.

"I honestly don't think I would have done as well in school if it wasn't for QuickStart," says Haley Trecker BS'21, who was part of the program's inaugural class. "There's a chance I would have even tried to back out of attending college right after high school — I was so terrified of going to such a large school. QuickStart prepared me in so many ways."



Haley Trecker

QuickStart's online course, Foundations, guides students as they examine their strengths, values, social identities, and academic and career interests. They also get a preview of advising, health, and academic resources on campus. Next, Quick-

Starters enjoy an early move into the residence halls; and, through orientation programs, they meet CALS researchers in labs, visit businesses related to the life sciences and agriculture, and learn to navigate the UW campus.

Trecker, who graduated early with a degree in biology and now works for biopharmaceutical company AbbVie, says QuickStart's early move-in, tours, and orientations put her at ease on the sprawling UW campus. She also credits the relationships she formed with others in the QuickStart cohort for making Madison seem smaller.

CALS raised \$107,000 for QuickStart during the campaign, much of it through campus-wide "day of giving" events, called Day of the Badger, in 2019 and 2021. The Wisconsin Agricultural and Life Sciences Alumni Association provided \$25,000 in seed funding for QuickStart scholarships and later matched gifts during Day of the Badger. This support is helping the program continue this year with 70 new QuickStart Scholars, bringing the total to more than 400 scholars over four years.

A generous donation from Chicago real estate developer Elzie Higginbottom BS'65 helped launch the CALS Agricultural Experience in 2019. The program brought 30 high school students from the Milwaukee and Chicago areas for an immersive visit to UW, where they visited wide-ranging campus locales and learned about topics from DNA to proteins to flavor perception and more.

Photo by MICHAEL P. KING



CALS QuickStart student Austin Vandertie poses for a portrait at his family's dairy farm in Brussels, Wis., in 2018. Photo by MICHAEL P. KING





TO BUILD FOR THE FUTURE

Comprehensive campaigns are designed to remove barriers to success — and blockades to greatness.

One underlying fundraising philosophy is this: The places where students, faculty, and staff work and learn should never hold them back. It resonates with many donors, who choose to direct their gifts to facilities.

By funding new buildings and remodeling projects, donors help address outdated structures and technologies and keep CALS shining among its peers. Not simply for prestige but for all the good that can be done — the discoveries made, the lives improved — when the college's people are outfitted with the best spaces and tools.

All Ways Forward saw the launch of two major building projects at CALS — the new Meat Science and Animal Biologics Discovery (MSABD) building and the ongoing Babcock Hall renovation and Center for Dairy Research addition. But a smaller yet still hugely impactful project also came to fruition during the campaign.

In northern Wisconsin, near Woodruff, UW's Kemp Natural Resources Station sits on the shores of Tomahawk Lake. It's a hub of research, teaching, and public outreach. Each year, the station hosts dozens of researchers and representatives from universities and state agencies; provides training for foresters and landowners; brings in school groups; and offers public educational events focused on forestry, wildlife, and fisheries.

Prior to 2016, Kemp's primary classroom and conference facility was a small space situated above an historic boathouse. It was only usable for part of the year, and its footprint minimized how many it could serve. But thanks to a generous in-kind gift from Mary Connor Pierce and her husband, Dudley Pierce, the station now houses the 4,500-square-foot Connor Forestry Center.

"It gives us increased capacity and year-round access, which are critical to what we do here," says professor Scott Bowe BS'92, Kemp's superintendent and a wood products extension specialist.

The center includes a lobby and gathering area, two classrooms (85- and 35-person capacity), a catering kitchen, an outdoor lake-view patio area (paid for by a Brittingham Wisconsin Trust Grant), and the latest in audiovisual equipment.

Bowe says the Connor Forestry Center allowed for more attendance at public outreach events, such as Fungi Fest and Wisconsin Insect Fest, during pre-pandemic times. "And it's a far better experience, and more effective, for our students and for the foresters who we train to teach landowners about sustainable forestry," he says.



Scott Bowe

CALS raised **\$33.5 million** for buildings and grounds projects during the All Ways Forward campaign.

The Connor Forestry Center expands capacity for public outreach events, such as Fungi Festival, at Kemp Natural Resources Station.

Photo courtesy of SCOTT BOWE

The Connor family has a long history with the forestry industry in Wisconsin and the Great Lakes region dating back to 1872. Mary Connor Pierce's mother, Mary Roddis Connor, was the first woman inducted into the Wisconsin Forestry Hall of Fame. The center's two classrooms are named in honor of Mary Connor Pierce's father, Gordon R. Connor, cofounder of what is now the Great Lakes Timber Professionals Association, and grandfather, William Duncan Connor, who is recognized for developing modern milling and forestry sustainability practices.

These forestry roots, and the confidence instilled by Bowe and his predecessor, Tom Steele, inspired Mary Connor Pierce and Dudley Pierce to make the gift. Mary is particularly enthused about the center being used for an on-site forestry operations course over spring break, which exposes students to selective cutting and forest management practices.

"It's important for forestry students to have hands-on experiences in the woods — boots-on-the-ground," she says. "They spend days in the forest — faculty and students are often on snowshoes! — and it's usually the students' first introduction to the Northwoods. My parents and grandfather would be very pleased with the Connor Forestry Center and the leadership at Kemp station."





The new Meat Science and Animal Biologics Discovery (MSABD) building opened in November 2020. This 67,250-square-foot, \$57.1 million facility frees the MSABD program from the confines and limitations of a building originally built in 1931 (see “The Future Holds No Limits for Meat Science at CALS” in the summer 2021 issue of *Grow*). Around 270 donors — individuals and businesses primarily in the state’s meat industry — covered more than \$20 million of the building’s price tag.

Photo by MICHAEL P. KING

TO RECRUIT THE BEST & BRIGHTEST

— and keep — the best teachers and scientists. Well before the All Ways Forward campaign began, UW was lagging far behind peer universities in terms of the endowment-funded awards it could offer faculty.

Endowed titles — offered as professorships, chairs, and distinguished chairs, depending on the level of funding — provide appreciation, resources, and professional status for highly productive UW faculty. They also help retain exceptional researchers and give the university additional tools for recruiting rising stars. A lack of these options hampered efforts to recruit and retain the brightest scholars.

In stepped John and Tashia Morgridge, two UW alums and longtime university supporters who offered to match gifts devoted to creating professorships and chairs. And in December 2020, two CALS alums, Chris BS’75 and Susan BS’76 Salm, took the Morgridges up on their offer and established the college’s first distinguished chair.

Chris, who holds master’s and doctoral degrees in meat and animal science and is CEO of biotech company Ab E Discovery, often tells a story from his childhood when he delivers speeches to business and technology groups. In grade school, Chris recalls preparing a macaroni art project as a Mother’s Day gift when the teacher challenged the class to



Chris Salm

think of something their mother needed — but before she even knew she needed it. He became enamored with the concept.

The Salms applied the same idea as they studied the CALS research environment. They saw a critical

UW faces stiff competition from research institutions across the globe that are looking to attract

- **\$25.6 million** raised for endowed titles
- **8** endowed chairs
- **7** endowed professorships

PLANNED AND ESTATE GIFTS

A significant portion of the money raised for CALS during the All Ways Forward campaign, around **\$28.3 million**, came from planned gifts.

need for significant cross-disciplinary research involving collaboration among scientists. This informed their creation of the Salm-Bray Distinguished Chair.

The chair, named for the late Robert Bray BS’40, PhD’49, who was instrumental in developing UW’s meat science program, provides salary support and flexible funds for a faculty member with a record of exceptional scholarship and cross-disciplinary collaboration. It specifically targets individuals working to improve human and animal health and agriculture by identifying and developing therapeutic, biological compounds derived from food animals or crops.

“Limited or restricted resources can prevent scientists from making the critical connections that lead to major breakthroughs,” says Susan. “When our personal circumstances allowed us to make this happen, we jumped at the chance. We treasure our years at UW–Madison, our years in Wisconsin, and our years in the ag industry, and we recognize the potential the university has to serve industry. We also feel the road goes both ways.”

During the All Ways Forward campaign, CALS has secured nearly \$24 million in donations to support 15 endowed chairs and professorships. The Salm-Bray Distinguished Chair will first be awarded in July 2022.

“With the new Meat Science and Animal Biologics Discovery Building now open and ready for business, the need to recruit, retain, and equip the best and brightest faculty in meat science, animal biologics, and food safety is absolutely critical,” says professor Kent Weigel MS’92, PhD’92, chair in the animal and dairy sciences department. “This distinguished chair will be a terrific tool for ensuring that CALS has the academic talent we need to become global leaders in these exciting fields of science.”



Susan Salm



TO MEET THE GREATEST NEEDS

Large gifts for endowed professorships, significant building

projects, and other major priorities make a massive and long-lasting impact on CALS. But sometimes the gift of flexibility is just as vital. And that means giving to the CALS Fund, which is a versatile pool of resources designed to help the college quickly adapt and respond to emerging needs. Even a little can go a long way with this fund; gifts of any size can add up to a major boon.

The CALS Fund supports a wide variety of efforts that expand opportunities for students and advance program quality. Examples include special programs for student organizations, scholarships and fellowships, hands-on labs and field courses, smaller-scale facilities improvements, lecture series, and recruitment and retention for top-notch academic talent.

During the All Ways Forward campaign, the college's supporters have given more than \$4 million to the CALS Fund. Donors like Tom Kennedy BS'68, MS'73, PhD'75 and Alex MS'78, PhD'83 and Susan MS'78 Woo were motivated to give by the strong connections they formed with CALS through catalyzing experiences as students.

Kennedy and his wife, Beverly, live on a farm just north of Lake Mendota. The property has been in the Kennedy family since 1890.



Tom Kennedy

"From high school on, my parents made it clear that a world-class educational institution within commuting distance was a gift and an opportunity," says Kennedy, who is managing principal of Eleven Bravo LLC, a veterinary medical pharmaceutical development company. "Supporting CALS lets us


return some small measure for the value received, stay connected to the university, and support the college's educational reach across the state, country, and globe."

Kennedy's roots are close to campus, but many CALS graduates have come from much farther afield. Alex Woo, a native of Hong Kong, says his time at CALS helped him launch a long and successful research and development career, which has included stints at PepsiCo, Kraft Foods, Starbucks, and Wrigley/Mars.

"I learned everything from UW-Madison, academically and culturally," says Woo, who now runs his own flavor technology firm, W2O Food Innovation. "The professors I had and friends I made taught me everything, everything. I feel I have been

taking for all these years, and it's time to give back to the places that made me."

Kennedy notes that state allocations are important but have long lead times and little flexibility; and while targeted gifts are also incredibly valuable, not all donors feel they have an adequate breadth of knowledge to decide where a gift should go. Discretionary dollars like the CALS Fund, on the other hand, can be directed to immediate priorities by the people most familiar with them.

Or, as Woo puts it, "I figure CALS knows how best to allocate the funds to the students, faculty, and college-wide issues that need it most." 



Alex Woo

Donors gave **\$4,111,954** to the CALS Fund during the All Ways Forward campaign.

All Ways Forward is not over yet. The campaign runs through the end of December 2021, so you still have a chance to contribute and make CALS an even better place.

Visit go.wisc.edu/awf-cals or contact Annie Louis at annie.louis@supportuw.org or 608-308-5523.

Photo by JEFF MILER



Hope as a Brand

For Todd Newman, this strong human emotion is the key to creating persuasive communication about science.

Interview by BRIANNA VAN MATRE BS'20, MSx'22



Photo by MICHAEL P. KING

Early in his doctoral studies, **Todd Newman** noticed a distinct gap between people's attitudes and their behaviors. At the time, he was studying the use of climate change communication to encourage pro-environmental actions. According to survey research he encountered, respondents generally held strong positive attitudes toward environmentally beneficial policies and behaviors. They also expressed a desire to take steps themselves, but follow-through was often lacking.

This recognition of a rift between how people think and act was a turning point for Newman. He shifted from a narrow focus on climate change communication to a broader look at science communication in general. He began to see that communication could be a tool for shaping actions in a way that is socially, environmentally, and economically responsible.

Now an assistant professor in the Department of Life Sciences Communication (LSC), Newman sees an opportunity for science communication to benefit from the marketing concept of branding. "Because it's people who make policies, it's people who vote for representatives, it's people who do and benefit from science," Newman says. "Individuals are the centerpiece to communities, institutions, and society."

Newman believes that understanding this centerpiece is an important first step toward understanding broader implications for the intersection of science and society. Accurate and effective science communication is vital because the quality of communication from scientists and experts affects how people feel about science, policies, and technologies — and, consequently, how likely they are to support them.

WHAT IS THE BRAND OF SCIENCE TODAY?

First, it is important to note what a brand is. A brand is an emotional reflex one has toward an entity, whether that be a company, like Pepsi, or an institution, like UW–Madison. It's built on experiences that accumulate into an emotion. I study a more complex phenomenon, the branding of science. Marketing research has shown how to shape and cultivate a brand to a specific consumer; however, scientists, and science in general, have not taken the time to reflect and utilize marketing research to brand science effectively. The grand question is, how will science proceed in creating a brand for itself?

WHAT MAKES CREATING A BRAND FOR SCIENCE DIFFICULT?

One challenge to branding science is its inconsistency. There are many different types of sciences in addition to science as a whole. It is nothing like McDonald's, where it looks and tastes the same no matter where you are in the world. Fortunately, branding can be applied to anything. In my ongoing research on the topic, I've conducted a series of studies asking how people think and feel when they

hear the word “science.” The results are clear: The emotion that the public most strongly associates with science is hope. I think science has intuitively recognized this but hasn’t necessarily used it for its branding advantage.

WHY IS BRANDING SCIENCE IMPORTANT IN THE PUBLIC SPHERE WHEN IT COMES TO NEW TECHNOLOGIES AND SCIENTIFIC CHALLENGES?

Science communication has shown, for a variety of scientific topics, that you must make the science relevant to what people care about for them to have positive opinions about it. For people, it’s more about what the science will be used for, not the actual science itself. The feeling of hope around science is created from what science can do and what problems it can solve. This feeling is a positive brand for science overall, and more research should be done on branding science with new technologies and scientific challenges. It is about the messages that scientists and science create and how they affect the perception of science. Since people already feel hopeful about science, this would be a good emotion to leverage in order to build a positive brand for science.

YOU COAUTHORED A BOOK, *BRAND*, A FEW YEARS AGO. CAN YOU TELL US ABOUT THE BOOK AND WHAT MOTIVATED YOU TO WRITE IT?

Science affects everyone in some way, so I think that’s one of the things that was illuminating for me. The point of the book was to put together a way for people interested in branding to draw connections for how it can impact science and politics. Brand is unique as it considers the constant changes of the media environment and how much that has affected branding and its connection to the audience. It also takes into account [the importance of] knowing your audience and using segmentation,

which is something that marketers do but also social scientists, like myself. Science — and aspects around science — are hard to segment: They don’t have clear lines and can be very broad by nature.

I wanted to write this book to educate about how branding can be used holistically. At the time, there wasn’t anything similar, nothing that walked the reader through how a brand is a kind of continuum going from something concrete — a product being sold at a store — to something more abstract, like how does the public feel about science. Our goal was to show the ways in which branding has been used across different entities in society and how best practices can be leveraged regardless of whether branding techniques were used by an individual, corporation, nation, or political party.

WHAT ARE SOME OF THE THINGS THAT YOU LOVE ABOUT THE LSC DEPARTMENT AND CALS?

One of the best parts are their camaraderie of shared interests. Everyone — colleagues, faculty, and students — can come together on projects, which is why I think we are as productive as we are.

I also appreciate the interdisciplinary opportunities CALS provides to work with many other science departments on campus. I feel fortunate to be a social scientist studying within CALS because I think the college understands the importance of interdisciplinary work. It allows us to continue to complete unique and interesting research with our collaborations. I really enjoy this interdisciplinary side of my work. It has allowed me to get some invitations to talk about the branding of science — for example, I’ve been able to talk on the radio and other media — which I love doing because I don’t think people normally consider it.

In *Brand* (Kendall Hunt Publishing Company, 2017), Todd Newman and his coauthor, DePaul University marketing professor **Bruce Newman**, present an original framework called the “Strategic Brand Focus,” which helps explain the complex relationship between the “3 C’s”: customer (audience), channel (ways to communicate to the audience), and competition (the development of a strategic position).

Book cover courtesy of the KENDALL HUNT PUBLISHING CO.



NEWMAN'S AREAS OF EXPERTISE

- Media representations of science and environmental issues and the impact on public opinion
- Strategic communication and branding related to the environment, science, and technology industries
- Public engagement activities of scientists, including communication training



EMILY PEDERSEN & HENRY BAUMAN

Guardians of Health, Safety, and the Environment

Two wildlife ecology grads serve and protect with the Wisconsin Department of Natural Resources.

Story and photos by MICHAEL P. KING

Emily Pedersen BS'11 and Henry Bauman BS'98 know just how quickly our water, air, and picturesque landscapes can be spoiled by human activity. But with years of experience and wildlife ecology degrees from CALS, they also know the sizable difference good people can make in protecting those natural resources.

As an environmental enforcement specialist at Wisconsin's Department of Natural Resources (DNR), Pedersen manages pollution and contamination cases statewide. Bauman, a DNR conservation warden, serves on the front lines in responding to such incidents and enforcing a vast array of public safety and environmental laws. Together, they and their colleagues provide a vital — often inconspicuous — layer of protection for habitats and public health and safety in every corner of the state.

Pedersen came to the UW–Madison

campus undecided, but that quickly changed after she took Introduction to Wildlife Ecology with faculty associate **Jim Berkelman**. She later completed an internship with the Student Conservation Association, which placed her with a DNR field crew that performed invasive plant management on state lands.

"I could feel a really good energy from the people I worked with," Pedersen recalls. "It solidified that I wanted to do something at DNR."

Pedersen started in customer service at the agency in 2011 and moved into environmental enforcement in 2015. From her Eau Claire office, she evaluates alleged violations of Wisconsin's environmental standards and collaborates with individuals and businesses to bring them back into compliance.

For Bauman, the itch to work for the DNR can be traced back to when a warden visited his Madison primary

Forest and wildlife ecology alumna Emily Pedersen, an environmental enforcement specialist for the Wisconsin Department of Natural Resources, discusses a disposal complaint with conservation warden Clayton Peters at the agency's service center in Eau Claire.

school with a trove of animal pelts and gear. While at UW–Madison, he was a field technician for wildlife toxicologist **Michael Meyer** PhD'89 (who had him climbing into osprey and bald eagle nests to study PCB and dioxin loads), and he served as a member of the Midwest Peregrine Falcon Recovery Team. Bauman intended to become a wildlife biologist, but after learning how rare and competitive those job opportunities could be, he retrained his sights on what he now considers the best of both worlds: conservation law enforcement.

During an internship with DNR warden **LuAnn Kuzma** BS'78, mentors encouraged Bauman to attend a law enforcement academy and apply for an upcoming temporary warden position. He got the job, and, in 1999, he was made full-time. He has held his post in Madison since 2011.

It's difficult to define the bounds of Bauman's duties. He works closely with environmental enforcement specialists like Pedersen, and he enforces wildlife and fish and game laws. You might also find him doing educational outreach at Fleet Farm's Kid's Fishing Day or patrolling Madison's lakes for intoxicated boaters. And as a credentialed state law enforcement officer, with watercraft and off-road vehicles that other police agencies might lack, it's common for him to assist on search and rescue efforts and on evidence recovery missions. He has been called to the state capitol to keep the peace at protests, and he has investigated assaults and homicides.

Then there are the bizarre calls for service: abandoned hamsters in Capital Springs State Recreation Area; a rattlesnake removed from Devil's Lake State Park that Bauman recovered from an apartment full of dozens of dangerous vipers and cobras; and landlords indirectly harming hawks by managing a rat infestation with poison rather than dealing with overflowing dumpsters.

"It all boils down to three things," says

Bauman. “Protecting the natural resources, protecting public safety, and educating the public.”

To that end, it's environmental cases — like those that Pedersen and Bauman encounter — that the agency increasingly gives high priority to preventing and containing.

“A huge part of our work is managing people [because] it's [human] activities that are having a tremendous impact,” says Bauman. “I can go out and catch people with a few too many fish or a few short fish all day, but one chemical spill or manure spill can wipe out an entire river, stream, or ecosystem in one event.”

Pedersen emphatically agrees. “I need to know environmental laws and statutes, but I have to be able to work with people.”

Whether the issue is lack of permits, improper disposal, or poor record-keeping, she uses the DNR's formal process to ensure fairness and incentivize voluntary compliance at early stages. The goal is to avoid more significant enforcement actions, such as orders, citations, or referrals to the Department of Justice for prosecution.

In 2015, the DNR conducted a focused enforcement effort on haulers of septage — wastewater from septic tanks, holding tanks, grease traps, and portable toilets — in the Eau Claire region. The following year, with instrumental help

from local wardens, Pedersen conducted a large-scale compliance audit of those businesses and found issues with improper landspreading of the waste, ranging from failure to mitigate pathogens to the spreading of septage in areas where it's not permitted.

Pedersen guided several businesses through the enforcement process and recalls, “A lot of them ended up opting to haul their waste to the wastewater treatment plant as a means of [compliant] disposal rather than landspreading.”

The results speak for themselves: From 2014 to 2020, the amount of septage disposed at the wastewater treatment plant in nearby Chippewa Falls increased from about 2 million gallons to more than 10.2 million gallons per year, very likely mitigating the damage some of that waste could have caused elsewhere.

“You don't realize what a luxury it is to have access to safe drinking water until you don't have it,” Pedersen says. “These are really important things that we deal with. I went into the wildlife ecology major because I loved wildlife, being outdoors, hiking, hunting, fishing, kayaking. If I truly want to make an impact and make sure that other people can enjoy those things as well, then this is the way to do it.”

Henry Bauman, a conservation warden with the Wisconsin Department of Natural Resources (DNR) and alumnus of the Department of Forest and Wildlife Ecology, poses for a portrait near the DNR Service Center and Nevin State Fish Hatchery in Fitchburg, Wis.



■ ENGAGE

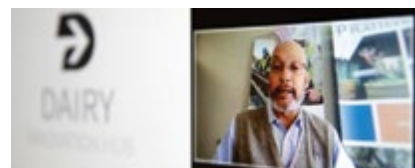


Photo by MICHAEL P. KING

DAIRY SUMMIT . . . DIGITALLY

The second annual Dairy Summit will be held on Nov. 17, 2021, in an all-virtual format. The free public event will showcase the latest research and outreach funded by the Dairy Innovation Hub, a state-funded, cooperative effort between UW–Madison, UW–Platteville, and UW–River Falls. The summit will also include a farmer panel discussion, faculty roundtable, and a virtual tour of dairy research facilities at CALS. More at go.wisc.edu/dairy-summit-2021.

■ ACCOLADES

WOLF PRIZE WINNER

Biochemistry alumna **Lynne Maquat** PhD'79, director of the Center for RNA Biology at the University of Rochester, has been awarded the 2021 Wolf Prize in Medicine. She was selected for the international prize for her discovery of a mechanism, known as nonsense mediated mRNA decay, or NMD, that destroys mutant mRNA in cells.

PARK SYSTEM OVERSEER

Steven Schmelzer BS'92, who earned his CALS degree in recreation resources management, was recently named the new parks director by the Wisconsin Department of Natural Resources. The Wisconsin State Park System boasts 49 parks, 15 forests, 44 biking trails, 500 boat launches, and more than 5,000 campsites.

SCIENCE AMBASSADOR

Sally Flis BS'02, MS'04, a Certified Crop Adviser and sustainable ag field manager with Nutrien Ag Solutions, has been chosen as the 2021-22 president-elect for the Council for Agricultural Science and Technology, an organization that informs decisions related to agriculture, food, and natural resources by sharing credible information based on science.

Anonymous Gift Strengthens Spooner Station's Connection to Farmers

By JORI SKALITZKY BSx'22

In the far northwestern corner of Wisconsin, you'll find UW's Spooner Agricultural Research Station (ARS). Specializing in agronomy and horticulture, the Spooner ARS staff serve local farmers, growers, and gardeners through education and outreach. And they've been doing this for a long time. Established in 1909, Spooner is the university's first agricultural research station. Now, thanks to a \$750,000 anonymous donation, their long-standing efforts will be getting a big boost.

The gift, divided over five years, will help the station purchase new equipment and supplies and hire a student intern to manage the Spooner Display Garden, which showcases both perennial and annual plants that can be grown in zone 3, one of the coldest growing zones in the United States. The bulk of the gift, however, will be used to support a new staff position for the station that will focus on a specific subset of the northern agricultural community.

The new research and farmer network coordinator will educate and organize Wisconsin farmers interested in sustainable and organic production practices. Much of this work will be achieved through a series of field days consisting of research and community-based activities.

"We want to bring stakeholders together — farmers, nonprofits, industry, research and teaching institutions, and community groups — to talk about a vision for a resilient farming system in northwest Wisconsin," says **Erin Silva**, an associate professor and extension specialist in plant pathology, who will supervise the coordinator.

GIVE TO CALS

To make a gift, visit supportuw.org/cals or contact Annie Louis at annie.louis@supportuw.org or 608-308-5523.

Silva works frequently with growers to incorporate research-based best practices into their farms, as does **Jane Anklam**, a Douglas County agriculture educator with the UW–Madison Division of Extension. Through these interactions, Silva and Anklam have noticed common issues that farmers face. This includes how to address soil health while dealing with a changing climate, how to understand market diversity for local food systems, and the overall health and well-being of farms.

The new coordinator will bring farmers and researchers together to try to solve these issues through collaborative research. And this research isn't confined to the station. It extends to working farms. These cooperative projects can be difficult to implement, Silva says, but with time and a station staffer to focus on them, they can be successful.

The research and farmer network coordinator begins as a part-time position, with the hope that it will become full-time for the full five years of the gift. The display garden internship and general station support will continue to be completely funded during this time frame.

"This is an exciting, timely, and forward-thinking process for our agriculture and rural communities in northern Wisconsin," Anklam says. "We are grateful for the opportunity to partner with our agriculture specialists at CALS for practical and thoughtful research at the Spooner station and on our local farms with local farmers. This is a fine example of the Wisconsin Idea in action."

The children's area of the display garden at the Spooner Agricultural Research Station. An anonymous \$750,000 gift allowed the station to hire a student intern to manage the display garden. Photo by MICHAEL P. KING





College of Agricultural & Life Sciences UNIVERSITY OF WISCONSIN-MADISON

WE ARE SO PROUD...

... to call you our alumni. Thank you, CALS spring 2021 grads, for your flexibility, your fortitude, and your grace under pressure. **Nothing can stop you now.**

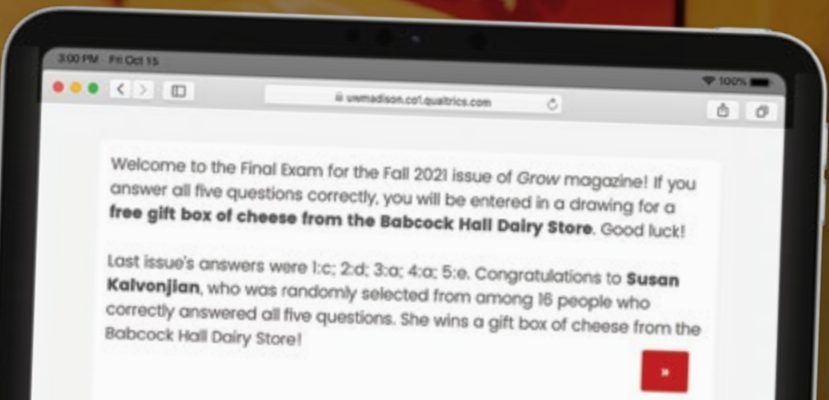
William Acheson Riley Achtemeier Zoe Adams Thomas Agnew Ahmad Alabboud Alkheder Nathan Albanito Taylor Alexander Numair Ali Jennifer Alonso Caccotta Nolan Amon Isabelle Anderson Neha Andhole Alex Araki Erin Ard Mitchell Armstrong Elinor Arndt Nikola Arsenijevic Madeline Arthur Elizabeth Asendorf Juan Astoriza Oyanguren Dhanya Attipetty William Awpe Alison Badger Sydney Baer Samantha Baker Tarek Baker Patricia Ballweg Angelyn Banach Clayton Barnes Katherine Bartelt Briana Bateman Tyler Beamon Shanaya Bedford Liam Beebe Jayden Behrendt Riley Bellin Shira Benau Samuel Bereket Elizabeth Berryman Margaret Beth Amay Bhat Cheng Bi Brandon Biese Tanner Bilstad Natalie Binversie Jacob Bishop Neil Biswas Andrew Bivier Corey Blant Lucas Bloss Hailey Boehmer Mitchell Boettner Jordan Bogaty Braden Bohman Nathan Bosch Claire Boschee Autumn Bosma Darius Bottorff Brooke Bowser Kathryn Boyce Mazdak Bradberry Scott Brainard Julio Bravo Zachary Breunig Jenna Broege Jenna Broege Courtney Bromberg Elizabeth Brown Sarah Brown Christine Brutus Hannah Buckley Kate Buettell Allicia Bulin Bobby Burgess Carina Bynum Wenrui Cai	Samantha Cailey Kiara Caldwell Mollie Cargill Alexis Carlson Anyia Carlson Cole Carter Laura Cash Eduardo Cenci Conner Chamernik Nancy Chang Thongzuo Chang Trishna Chathurvedula Ao Chen I-Chun Chen Kexin Chen Xingchen Chen Zhengyi Chen Kalli Choles Kher Yinh Chong Chun Kit Chow Ifunanya Chris-Ukah Christopher Chrisler Emma Chromy Madison Clark Kristen Coan Ashley Cofrin Jacob Cohen Riley Collins Sarah Conroy Lorenzo Contreras Lee Conway Devin Cooper Keo Corak David Costa Jacob Coulthurst Katie Craig Allicia Cran Johnathan Crandall Tehya Crego Katherine Cusack Clayton Custer Elizabeth D'Auria McKenzie Daanen Cassidy Dabbs Aramide Dada Clara Dahl Julia Damman Madeline Davis Brenna DeNamur Jacob Del Valle Lauren Delisi Joshua Deutschmann Askaharian Devananda Ronnie Dewberry Ava Dieck Amber Diederichs Michelle Ding Jessica Diol Laura Dirk Bennett Dirksmeyer Lauren Dirmberger Faith Dittmann Tsewang Dolkar Adrianna Donlevy Evan Dorsch Sarah Dougherty Lori Drake John Drew Marcella Drumright Holly DuBois Taylor Ducke Sean Duening	Teagan Duffy Claire Durant Hannah Dutcher Alexandra Dye Carolyn Dye Bradley Ebacher Joseph Eidman Jordan Eith Joseph Ekholm Adam El Hendy Gunnarsson Catherine Eldridge Jacklyn Elliott Sarah Emma Ethan Engdahl Maggie Engeseth Kevin England Luke Englebert Sarah Engstrom Alissa Enrickson Connor Fahey Madelyn Falk Rachel Farber Diana Fares Megan Fencil Jordan Fenner Kate Ferguson Elizabeth Hucker Bridget Hueffel Elizabeth Huettner Soren Hughes Isabella Huizar Madison Hummel Alexander Hurley Dania Hussain Abdullah Hussaini Jenna Hutchinson Janel Hutchison Brandon Incerro Kaitlin Indermuehle Amal Inuwa Takahiro Ishikuri Erik Iverson Leon'Quel Jackson Asha Jain Hallie Jensen Sarah Jensen Nathan Jessup Megan Jester Jing Ji Xueqi Jiang Yinuo Jin Alexander Johnson Ashley Johnson Emily Johnson Hunter Johnson Kristen Johnson Noah Johnson Nathan Lesnick Sophia Lenzmeier Tess Lemcke Nicole Lehtinen Nathan Lesnick Samantha Lettenberger Maxwell Levine Bryson Lewis Josephine Johnson Zachary Johnson Amelia Johnston Daniel Johnstone Kade Kaat Rachel Kabara Shelby Kaplan Luke Kastenson Kevin Kasun Irene Katana Michael Katzenberger Mackenzie Keen Danica Keisling Aislen Kelly Grant Kelly	Clairissa Kelso Zachary Kemmerer Dima Kenj Halabi DeAnthony Kess Hyunsuk Kim Yu Li Kim Dillon Kimmen Michael Kindschi Jacob Kirsch Tonnell Abigail Kisicki Elizabeth Kitslaar Lauren Klann Tanner Klann Katherine Klimpel Allison Klingelhofer Bailey Knick Danielle Knight Ellen Koch Jacqueline Koeller Sarah Kokko-Ludemann Apoorv Kondapelli Anna Koeft Emily Hoffins Ellie Hoffman Colin Hogendorn Bailey-Ann Hollatz Xiaocheng Huang Katharine Hubert Elizabeth Hucker Bridget Hueffel Elizabeth Huettner Soren Hughes Isabella Huizar Madison Hummel Alexander Hurley Dania Hussain Abdullah Hussaini Jenna Hutchinson Janel Hutchison Brandon Incerro Kaitlin Indermuehle Amal Inuwa Takahiro Ishikuri Erik Iverson Leon'Quel Jackson Asha Jain Hallie Jensen Sarah Jensen Nathan Jessup Megan Jester Jing Ji Xueqi Jiang Yinuo Jin Alexander Johnson Ashley Johnson Emily Johnson Hunter Johnson Kristen Johnson Noah Johnson Nathan Lesnick Sophia Lenzmeier Tess Lemcke Nicole Lehtinen Nathan Lesnick Samantha Lettenberger Maxwell Levine Bryson Lewis Josephine Johnson Zachary Johnson Amelia Johnston Daniel Johnstone Kade Kaat Rachel Kabara Shelby Kaplan Luke Kastenson Kevin Kasun Irene Katana Michael Katzenberger Mackenzie Keen Danica Keisling Aislen Kelly Grant Kelly	Ka Lor Heather Lorden Sierra Love Alyssa Luckey Isabella Ludwig Sophia Ly Dahui Ma Stella Ma Lakyn Maas Sofia Macchiavelli Giron Eric Machmueller Annika Madler Payton Magnin Mary Magnuson Sarah Malmberg Samantha Manecke Morgan Mann Audrey Marsh Margaret Marshall Steven Martell Abigail Martinson Chris Massey Taylor Mateyka Ashlyn Mattes Mary Mazzee Erin McCann Cade McClellan Courtney McDougal Bridget McFarland Daniel McGarry Jacob McInnis Emma McKeel William McKinley Ayren Mcgahee Jessica Mehre Charu Mehta Ana Paula Melo Da Silva Thomas Merz Cullan Meyer Taylor Meyer Peter Meyers Mia Micheletto Taylor Mielke Lukas Migliano Matthew Mikolajczak Frederick Mildenhall Jarret Miles-Kroening Carling Miller Elizabeth Miller Grace Miller Lily Miller Nathan Miller Takoda Millonig Grace Mitchell Joseph Mitchell Emily Mocero Lindsey Moderski William Moen Daka Mohamed Ayda Lyana Binti Mohd Ayob Nicholas Mohrdeick Peyton Molling Elizabeth Monette Mariana Montgomery Sarah Moore Ellen Morgan Grace Morley Angela Morrissey Aidan Morris	Elizabeth Morrow Bridget Motif Madeline Moureau Winnie Moy Colleen Muffler Carolyn Munley Gabriella Munoz Garrison Murphy Melina Murtos Holly Muth Lusayo Mwakatika Madelyn Nadolski Krista Nagel Michelle Naragon Madeline Nash Dylan Natrop Lilly Naumann Anna Navratil Aaron Nechuta Ashley Nelson Hunter Ries Julia Rinehart Matthew Isaac Rodriguez Laura Rodriguez Alvarez Tyler Ronk Courtney Roofe Alexander Rosiejka Benjamin Rozum Nicolas Rubio Bryce Rufener Connor Runde Samantha Ryan Mackinnley Rybolt Tuzhou Sa Albiona Sabani Jordan Sachs Caitlin O'Brien Emma O'Neill Lucas O'Neill Erik Ohman Sophia Oliva Jacob Olivares Timothy Ollmann Andrew Olp Joseph Olson Katheryn Opansky Daniel Osorio Mendez Sadie Ottow Sydney Ovsak Tessa Palmquist Alex Palubicki Rui Pan Geet Pandya Emma Pappano Raymon Parker Emma Patch Priyanka Patel Jenna Pavela Abigail Pawelski April Peterson Josephine Peterson Jaime Pham Paige Pichette Kayleigh Pignato Raymundo Pinedo David Pintens Nikita Piryani Madeleine Platten Rachel Pomazal Paige Pribble Gabriella Procopis John Pufunt Julia Pulokas Rebecca Pulvermacher Nickolaus Puster Adrienne Race Sydney Race Nicholas Raffa	Abbey Ragan Madison Raith Amanda Rajaram Caleb Randall Kristin Rankin James Ratty Elizabeth Read Jacob Rebholz Erin Reda Elise Reiche Micaela Reichert Kaitlin Reiman Elise Reinhardt Rochelle Reinke Annelise Resende Chelsea Reynolds Yeonsu Rhee Lina Riaz Alexandra Richards Frederick Rice Katie Ridler Hunter Ries Julia Rinehart Matthew Isaac Rodriguez Laura Rodriguez Alvarez Tyler Ronk Courtney Roofe Alexander Rosiejka Benjamin Rozum Nicolas Rubio Bryce Rufener Connor Runde Samantha Ryan Mackinnley Rybolt Tuzhou Sa Albiona Sabani Jordan Sachs Caitlin O'Brien Emma O'Neill Lucas O'Neill Erik Ohman Sophia Oliva Jacob Olivares Timothy Ollmann Andrew Olp Joseph Olson Katheryn Opansky Daniel Osorio Mendez Sadie Ottow Sydney Ovsak Tessa Palmquist Alex Palubicki Rui Pan Geet Pandya Emma Pappano Raymon Parker Emma Patch Priyanka Patel Jenna Pavela Abigail Pawelski April Peterson Josephine Peterson Jaime Pham Paige Pichette Kayleigh Pignato Raymundo Pinedo David Pintens Nikita Piryani Madeleine Platten Rachel Pomazal Paige Pribble Gabriella Procopis John Pufunt Julia Pulokas Rebecca Pulvermacher Nickolaus Puster Adrienne Race Sydney Race Nicholas Raffa	Smith Sinclair Parabjot Singh Haley Sisel Michelle Sivak Makayla Slaby Haley Slater Gerald Smith McKenna Smith Tanner Smith Wiley Smith Molly Sneller Ying Zhong John Soh Spencer Sondrol Isabella Sordci Claudia Spell Katrina Sprang Quentin Sprengelmeyer Kalavarshini Sriram Sarah Stanislowski Christopher Stapelman Sarah Starcevic Colin Steck Elisa Stegman Rachel Steiner Lindsey Steini Elizabeth Stephanie David Sternaman Annalisa Stevenson Daniel Stoehr Ahna Stoker Charles Storhoff Brant Strayer Gabrielle Strossner Krysta Stronck Hannah Stucke Reagan Stultz Claire Sun Zihan Sun Teresa Sundararajan Ava Sutter Jessica Swagel Josef Swanson Jocelyn Syssackda Tenzin Tadhay Sheila Talty Anusha Talwalkar Lin Wen Tan Lauren Tancer Chetan Teegala Conrad Telega Ya Hsin Teng Nicholas Tennessen Brittany Teunissen Houa Kong Meng Thao Johnny Thao Adam Theising Anna Thickens Rachel Thomas Colin Thomasgard Grace Thompson Kimberly Thompson John Thorstenson Schuyler Todd Carolyn Torres Kaori Torres Haley Trecker Jack Trzebiatowski Annabelle Tsao Elias Tsarovsky Margo Tucker Andrew Turunen Magdalena Twarowski Samuel Twohig Sarah Uhm Rupa Priyadarshini Umamaheswaran Megan Van Zante	Allison Vandenberg Jack Vandercar Conrad Vandiik Benton Veire Brooke Verfuert Catherine Vickerman Peter Victor Amelia Viegut Samantha Visintainer Timothy Von Seth Jacqueline Vondrak Sarah Wagman Dakota Wakeley Kevin Walczak Hannah Wallack Alexandra Walters Kangni Wang Kunlun Wang Yiding Wang Yuhan Wang Elise Warda Isabel Warner Julia Warren Matthew Waterman Abigail Watson Rachel Watlarek Lindsey Steel Elizabeth Stephanie David Sternaman Annalisa Stevenson Daniel Stoehr Ahna Stoker Charles Storhoff Brant Strayer Gabrielle Strossner Krysta Stronck Hannah Stucke Reagan Stultz Claire Sun Zihan Sun Teresa Sundararajan Ava Sutter Jessica Swagel Josef Swanson Jocelyn Syssackda Tenzin Tadhay Sheila Talty Anusha Talwalkar Lin Wen Tan Lauren Tancer Chetan Teegala Conrad Telega Ya Hsin Teng Nicholas Tennessen Brittany Teunissen Houa Kong Meng Thao Johnny Thao Adam Theising Anna Thickens Rachel Thomas Colin Thomasgard Grace Thompson Kimberly Thompson John Thorstenson Schuyler Todd Carolyn Torres Kaori Torres Haley Trecker Jack Trzebiatowski Annabelle Tsao Elias Tsarovsky Margo Tucker Andrew Turunen Magdalena Twarowski Samuel Twohig Sarah Uhm Rupa Priyadarshini Umamaheswaran Megan Van Zante
---	--	--	--	---	--	--	---	--

Photo by Bryce Richter | List of spring 2021 bachelor's, master's, and doctoral graduates as of Aug. 6, 2021

Feed Your Cheese Craving

You could win a gift box of cheese from the Babcock Hall Dairy Store if you ace our **Final Exam!**

Test your CALS knowledge at **grow.cals.wisc.edu**.





College of
Agricultural & Life Sciences
UNIVERSITY OF WISCONSIN-MADISON

136 Agricultural Hall
1450 Linden Drive
Madison, WI 53706

grow.cals.wisc.edu

Nonprofit
Organization
U.S. Postage

PAID
UMS

This paper design depicting a caribou in its natural environment, created by wildlife ecology master's student Anna Brose, is part of the Department of Forest and Wildlife Ecology's "Call for Art," held during the spring 2021 semester. Work submitted by 11 artists is on display on the first and second floors of Russell Laboratories.

Art by ANNA BROSE, arctichavenstudio.com

