



UMaine Today

CREATIVITY AND ACHIEVEMENT AT THE UNIVERSITY OF MAINE

SPRING/SUMMER 2019

Now showing

**Student artists
learn how to go public**



Let's go dancing! Dor Saar (leaping), teammates and fans celebrate the Black Bears' 68–48 win over the University of Hartford on March 15 in the America East Championship. For the second-straight season, and ninth overall, UMaine took part in March Madness. While No. 3 North Carolina State bounced the 25–7 Black Bears out of the NCAA Women's Basketball Tournament, two-time league Coach of the Year Amy Vachon is projected to return three starters, including Blanca Millan, the league Player of the Year and Defensive Player of the Year. Go Blue!

Photograph by Holland Haverkamp



THANK YOU for reading this edition of *UMaine Today*. We love to share the stories of our students, faculty, staff and alumni, and this magazine is one of the best ways we have to let people know the exciting pursuits that take place all around us. Our subtitle, “Creativity and Achievement at the University of Maine,” is so apropos again in this issue, starting with the cover artwork, *Eduardo*, by senior Madison Suniga, that points to a feature on teaching career success for student artists.

Articles highlight how UMaine researchers are working to find solutions for state, national and global challenges, such as working on a pest management program for wild blueberry growers, improving rural education in Down East Maine or studying the transmission of mosquito-borne diseases.

A pervading theme throughout all of the research is that of collaboration — faculty working with students, faculty and students working with communities, researchers partnering with colleagues at other universities or the National Institutes of Health. Those combined efforts help to accelerate finding solutions and provide extraordinary learning opportunities for both graduate and undergraduate students.

UMaine Today is a celebration of great dedication and outstanding individuals — like Philip Silver, music professor/historian, or 97-year-old Hazel Goodwin, 4-H volunteer extraordinaire, or 15 UMaine nursing students who traveled to Costa Rica offering medical services to underserved residents. Please take time to discover how the University of Maine community is creating and achieving in 2019. Every story is special. If you are like me and two issues per year are not enough, find more informative and revealing stories year-round on Facebook (University of Maine) and Twitter (@UMaine).

Your comments and reactions are always welcome, as well as your suggestions for improvement. You can reach me at president@umaine.edu.

Joan Ferrini-Mundy
President



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The senior studio art capstone course taught by James Linehan prepares students for careers as artists. An exhibition, featuring works created throughout the students' time in college, is the final exam. Students are in charge of all aspects of the show, from selecting and hanging the pieces to organizing an opening reception. This year's class of nine artists produced "Collective Ground," an exhibit featuring more than 70 pieces.

20 **Lost and found** ▶

James Simon, Leone Sinigaglia and Bernhard Sekles were three of the composers silenced by the Holocaust. The research of pianist and professor Phillip Silver is dedicated to rediscovering their works and introducing them to modern audiences — and the cultural repertoire.

26 **A wild story** ▶

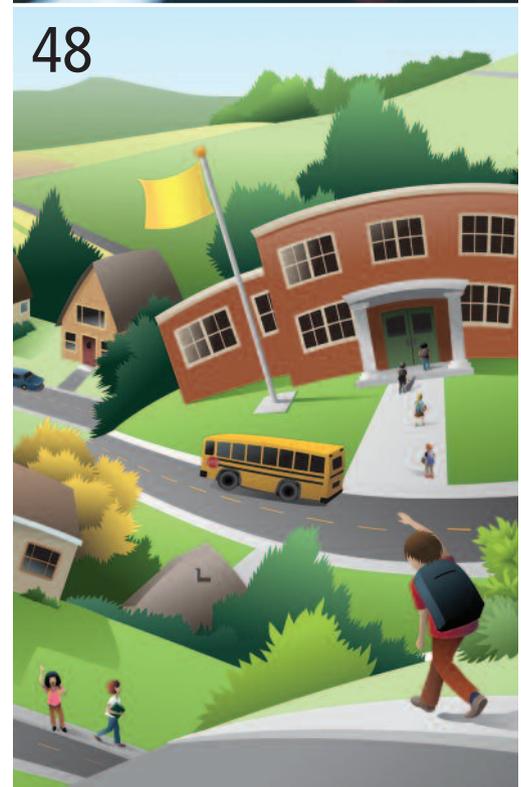
Maine wild blueberry growers and university experts are united in the stewardship of the state's native crop. For more than a century, UMaine wild blueberry research is driven by the needs of growers and producers. The goal is to keep the crop healthy and competitive, and to keep growers in business with increased productivity.

40 **The edge**

The Foster Center for Student Innovation offers programs to meet the entrepreneurial needs of UMaine community members and to contribute to the economy. The center, which is home to the Innovation Engineering program, aims to help students, faculty and staff develop a mindset and skills for creating, testing and achieving ideas. Many students have started businesses with guidance and resources offered by the university. *UMaine Today* interviewed three alumni who have achieved success.

48 **Transforming rural education**

In Down East Maine, faculty from the University of Maine and Colby College are partnering with an innovative, education-focused local nonprofit to bring the latest equity- and trauma-informed practices to area schools. This unique research-practice collaboration seeks to address some of the serious issues facing rural communities, including poverty, substance abuse and family violence, by strengthening communal bonds and raising students' voices.



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On the cover

Eduardo, 2018 by University of Maine student Madison Suniga, from West Boylston, Massachusetts. The painting was one of more than 70 pieces featured in "Collective Ground," a senior studio art exhibit at Lord Hall Gallery in December and January. More on page 10.



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umainetoday.umaine.edu

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THE GOAL is to develop proxies for quantifying iron availability under present and future ocean acidification conditions, and learn more about how ocean acidification-induced changes in iron chemistry affect phytoplankton production and the composition of the phytoplankton community — critical factors that will affect food webs and fisheries productivity, according to the researchers.

THE EFFECT of ongoing ocean acidification on iron availability to phytoplankton in the eastern North Pacific is the focus of a three-year, more than \$954,000 National Science Foundation collaborative research grant to the University of Maine, University of Washington and University of South Florida. Much of the biological production in the global ocean is limited by this iron availability, and it's uncertain whether ocean acidification will lead to decreases in ocean productivity.

One of the outcomes from ocean acidification will be changes in the availability of iron to marine phytoplankton, the grasses of the sea that support the marine food web and account for more than half of ocean biomass. Like humans, phytoplankton require iron to grow, but much of the iron dissolved in seawater is bound with organic molecules in ways that limit ability to phytoplankton.

UMaine School of Marine Sciences professor Mark Wells will lead the project, including a major research cruise in 2020, in collaboration with Charles Trick from Western University and Kristen Buck from the University of South Florida. Joining them will be Shigenobu Takeda of the University of Nagasaki, and graduate and undergraduate students from the four universities.

The international collaboration also will feature educational outreach to the public, with Maine K–12 students and teachers engaged in learning opportunities during and after the research cruise.

Ocean acidification is caused by increasing atmospheric carbon dioxide from fossil fuel burning. Carbon dioxide dissolves from the atmosphere into the surface ocean and reacts with seawater to form acid, causing lower seawater pH. This acidification already can be measured, but it will be greatly magnified by the end of the century.

“Understanding the effect of ocean acidification on the iron cycle is a critical unknown in global biogeochemical models, and their projections of climate change effects on the ocean system over the next century,” note the researchers. ■

Food groups

BALUNKESWAR NAYAK is leading an initiative to strengthen food science majors' understanding of science and engineering by replacing lecture-centered instruction with active-learning strategies.

The University of Maine associate professor of food processing is directing a multi-university project to boost math knowledge and problem-solving skills of food science majors for careers in food processing, food engineering and food manufacturing.

Nayak says critical objectives are to improve their knowledge about safety relating to food recalls, traceability issues due to globalization, new import and export regulations, and workforce preparedness.

Food science students — the next-generation workforce in industry, regulatory and nongovernment agencies — “should understand the big picture of sustainability in food processing, preservation and distribution,” says Nayak.

In the United States, more than 1.5 million people work at 26,000 food companies. The food and beverage industry faces complex demands, including consumers who want healthier foods, an increasing number of food safety regulations, and concern for socioeconomic and environmental impacts of food production and manufacturing.

To meet these demands, food science majors need a solid STEM background, and the ability to craft innovative ideas and solutions.

To help make that happen, UMaine will utilize more than \$367,000 of a \$747,328 award from the U.S. Department of Agriculture National Institute of Food and Agriculture Higher Education Challenge Program for a collaborative project that concludes in 2022.

The team includes Susan McKay, founding director of the Maine Center for Research in STEM Education (RiSE Center), and a UMaine professor of physics and astronomy; and professors at five other land grant universities. ■

THE TEAM will develop a learning model that incorporates group discussions and teamwork among students — in and out of the classroom — at six land grant universities. Students in different regions of the country will interact and share information about their local food systems and conditions. The model also will provide students with chances to intersect with the food industry to experience real-time emerging challenges, as well as to network globally and learn about career opportunities.



Balunkeswar Nayak

Transmission and tourism



A TEAM of University of Maine researchers has been awarded \$1.5 million from the National Science Foundation to examine the relationships among the spread of mosquito-transmitted diseases, perceptions of mosquito-borne disease risk and human travel, including domestic and international tourism.

The five-year project, “Coupled Dynamics of Tourism and Mosquito-Borne Disease Transmission in the Americas,” is led by Allison Gardner, an assistant professor of arthropod vector biology, and Sandra De Urioste-Stone, an assistant professor of nature-based tourism.

The project aims to understand the role of human mobility in the dispersal of mosquito-borne viruses across a range of spatial scales. The team also will look at how infectious disease outbreaks influence the travel decisions of individuals and marketing strategies of tourism businesses, as well as how changes in human mobility in response to epidemics and marketing might alter outbreak paths — a potential feedback between natural and human components of the system.

Travel of infected humans has the potential to spark global epidemics of mosquito-borne diseases, according to the researchers, who cite outbreaks in the Americas following the first detection of chikungunya and Zika viruses in 2013 and 2015, respectively.

“Human activities already have led to the globalization of many important disease-vector mosquitoes,” Gardner says. “The range expansion of these mosquito species, combined with a degree of human connectivity unprecedented in human history, has created a landscape that greatly facilitates the emergence and re-emergence of arthropod-borne viruses.”

Using the introduction and spread of Zika and chikungunya in the Americas as case studies, the project will generate new scientific understanding of the coupled dynamics of mosquito-borne disease transmission and tourism.

Other study researchers are Brandon Lieberthal, a postdoc in UMaine’s School of Biology and Ecology; and Brian Allan, Shaowen Wang, Aiman Soliman and Andrew Mackay at the University of Illinois at Urbana-Champaign. ■

“

It is important to understand **how humans select and use diverse information** to make travel and business decisions that might have **an effect on disease transmission.**”

Sandra De Urioste-Stone

Recipes for success

EXPLORING THE intersections of food and politics is the focus of a new University of Maine research collaborative inspired by the recipe collection of Margaret Chase Smith.

The Margaret Chase Smith Recipe Research Collaborative formed in fall 2018 to support an interdisciplinary group of students and faculty interested in examining the role of recipes and cooking in politics and public life, as well as issues related to history, gender and the environment.

The group was started by Rachel Snell, a lecturer in the Honors College, and Amy Blackstone, a professor in the Department of Sociology and Margaret Chase Smith Policy Center, after they recognized food as a common area of research within their respective fields.

In material and symbolic ways, women have used food as a tool of self-expression, community building, political persuasion and resistance, as well as to negotiate the complicated terrain of femininity and domesticity within the public sphere, according to the researchers.

Studies by faculty and students examine the ways women have used food to communicate, leverage influence, and challenge perceptions and expectations. A major goal of the group is to catalog, test and update Smith's recipes, creating a database for future research projects and a published collection. ■

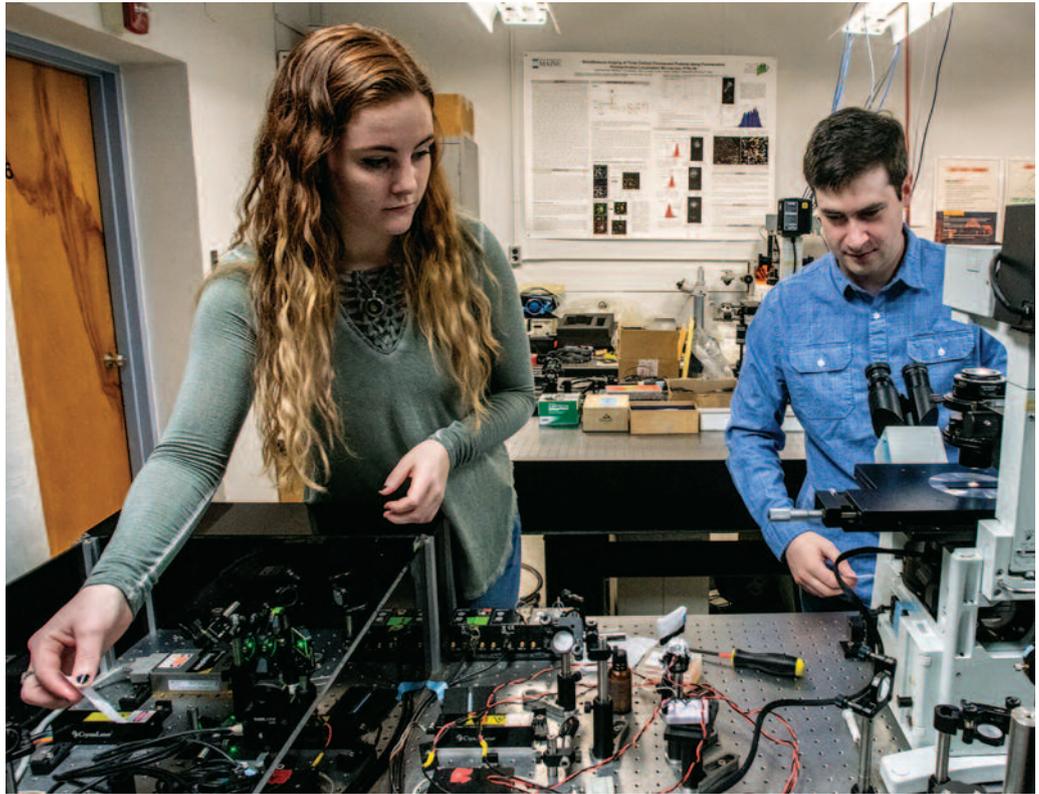
“

Her recipes suggest how she combined her public and private personas, and how **the balance of the two contributed to her success as a political leader.**”

Rachel Snell



Sen. Margaret Chase Smith tends coals at the lobster and clam bake area built on her lawn in Skowhegan for President Dwight D. Eisenhower's visit in 1955. Courtesy of Margaret Chase Smith Library



Physics Ph.D. students Jaquin Wallace and Matthew Parent are research team members in the Hess Lab.

Flu-fighting **discovery**

ACCORDING TO the Centers for Disease Control and Prevention, hemagglutinin (HA) allows a flu virus to enter a healthy cell and acts as an antigen that can trigger an immune response that protects the host from reinfection by the same flu strain. PIP2 controls a large number of cellular functions through signaling pathways it can modulate. During flu infection, manipulation of such signaling pathways by the virus can allow it to suppress innate immune responses, keep infected cells alive, and increase the rate of assembly and escape of new viral particles.

THE CONNECTION between an influenza virus surface protein and a host cell lipid has been discovered by University of Maine and National Institutes of Health researchers. Confirmation of direct interaction between the protein and lipid could lead to new antiviral therapies.

The UMaine-led research team is testing a hypothesis that a certain region within the protein hemagglutinin (HA) — its cytoplasmic tail — could be the site of interaction with the host cell lipid PIP2. Because of the stability of the HA tail, there is potential for a targeted treatment that could continue to work, despite the frequent mutations of other parts of HA, according to the scientists, who reported their discovery in *Biophysical Journal*.

“Our findings show for the first time a connection between the influenza virus surface protein HA (the H in H1N1) and the host cell lipid PIP2,” says UMaine professor of physics Samuel Hess, the team’s lead scientist. “With further single-molecule microscopy experiments, we are now testing the hypothesis that a certain region within HA could be the site of interaction with PIP2.”

Using confocal and super-resolution microscopy, the latter a patented technology developed by Hess, the researchers imaged HA and PIP2 in several living cell types and observed that they sometimes occupied the same regions in the plasma membrane defining the cell exterior. HA and PIP2 also were observed affecting each other’s motions. ■

Sea biscuits

ANGELA MYRACLE'S research is going to the dogs. Or, more accurately, for the dogs. As a scientist with Maine EPSCoR's Sustainable Ecological Aquaculture Network (SEANET), Myracle looks for innovations in aquaculture.

And when the assistant professor of human nutrition at the University of Maine spied dog treats at a local supermarket that were made with lobster from Iceland, she thought, "What about dog biscuits made with green crabs from Maine?"

If the novel idea becomes a market reality, Myracle says it could be a win-win situation — creation of a value-added product from a bycatch and removing the invasive from the environment.

But would the treats pass the sniff test? Would pups find that dog biscuits made with green crabs are a treat?

Fergus, Nala, Myst, Ruby and Emerald did.

Myracle says the unofficial favorite of area canine taste-testers was the green crab and whole wheat biscuit. They wolfed it down, she says.

The green crab and oat biscuit was runner-up. As for the green crab and rice biscuit, one pooch spit it out.

Myracle and undergraduate Anna Smestad, a human nutrition and pre-med major from Corinna, Maine, cook about 10–15 crabs — shell and all — for up to 90 minutes, then mash them. That is mixed with whole wheat flour and baked to make the treats. ■

VORACIOUS GREEN crabs are decimating Maine's clam population, threatening the livelihoods of clambers, and clogging lobster traps. Female green crabs lay about 185,000 eggs a year, according to Fisheries and Oceans Canada. And one green crab reportedly can devour 40 half-inch clams in a single day. These invasives could be to blame, at least in part, for the decrease in Maine's soft-shell clam harvest. According to the Department of Marine Resources, the harvest has plummeted from 9.3 million meat pounds in 2015, to 7.3 million pounds in 2016 to 1.4 million pounds in 2017. If a business entrepreneur cooked up natural, nutritious green crab treats for dogs, UMaine food scientist Angela Myracle says people who earn their living on the sea and mudflats might be incentivized to harvest green crabs as bycatch to earn additional money, which would help remove green crabs from the environment.



Being an artist





Professional course prepares students to curate art — and a successful career

By Elyse Catalina / Photographs by Adam Küykendall

THANKS TO the digital revolution, it's a great time to be an artist, says James Linehan, professor of art at the University of Maine.

“An artist can sit in the middle of the woods somewhere, and as long as the UPS truck and the internet reach them, they can (have) a perfectly good career, and that wasn't the case 20 years ago,” says Linehan, who leads the senior capstone for studio art majors.

The class is meant to serve as a bridge between school and the rest of life, according to Linehan, who has taught Studio Professional Practice for 22 years.

Linehan says the class aims to prepare students to attend graduate school or become independent artists.

“The course answers the question, ‘OK big shot, you got your bachelor's degree in art, now what?’” Linehan says. “We go over a lot of things related to how to function as an artist after you graduate.”

And like all capstones, it puts students' years of university academic experience to the test.

Students discuss careers, write a resume, develop an artist statement and create a presentation packet, which is needed when applying to graduate school or for a job in the arts.

A senior art exhibition, featuring works created throughout the students' college careers, is the final exam.

The students are in charge of all aspects of the show, including selecting the pieces; matting, framing and hanging the art; positioning the lights; organizing an opening reception; and promoting the exhibit.

“The one thing I would hope they learned is to respect themselves as artists,” Linehan says.

Being an artist





Self-Portrait by Maya Silver, acrylic/canvas, 2017



The Forest and The Flock by Abigail Annis, woodblock print, 2018



Experience by Mary Manley, oil/canvas, 2018

"The art needs to be the star, not the frame," professor James Linehan says of making art look professional. Using a \$25 hand tool, he demonstrates how to cut mats following two standards: "The old carpenter's rule of measure twice, cut once, and always use a fresh blade."

Being an artist



Night by Mea Clark, digital painting, 2018

Exhibitions can take months or years to plan, says James Linehan. By teaching how a show comes together — from hanging art on a centerline of 58 inches off the ground to providing music and food for the opening reception — students learn how to approach galleries about their work.



Eduardo by Madison Suniga, oil/canvas, 2018



Natural Limbs: The Woman by Deborah Heyden, wood sculpture, 2017

Being an artist



Internal Scream of Humanity surrounded by *Suite of Intaglio Prints* by Liam Reading, intaglio print, watercolor and acrylic, 2017-18





I.S. by Maya Silver, charcoal/paper, 2015–18



Chicken Run by Deborah Heyden, oil/canvas, 2018

The exhibit, "Collective Ground," featured the work of Abigail Annis, Gabrielle Bock, Mea Clark, Ariel Goos, Deborah Heyden, Mary Manley, Liam Reading, Maya Silver and Madison Suniga. More than 70 pieces, including paintings, drawings, prints, digital paintings/prints and sculptures, were on display at Lord Hall Gallery in December and January.

Care without borders

Students gain a worldview while providing nursing treatment in Costa Rica

MAYA NAISBITT doesn't speak Spanish, but that didn't get in the way of providing clinical care in Costa Rica as part of a trip offered through the University of Maine School of Nursing.

Connecting with others without knowing the native language was her favorite part, she says.

"The trip did highlight to me the importance of cultural competence and global health," says Naisbitt, a senior from Blue Hill, Maine, who first went to Costa Rica in 2017 and returned to the Central American country over winter break.

In total, 15 UMaine nursing students made the January trip to offer medical services to underserved residents. They performed assessments, provided care, developed leadership skills and brought medical supplies.

A volunteer trip hosted by the student group UMaine Nursing International has been offered annually since 2012, with trips to Costa Rica, Belize and Panama. School of Nursing lecturers Nilda Cravens and Susan Tardiff alternate as leaders.

The mission of UMaine Nursing International is for students to develop global awareness, build cultural competence and grow as people as they journey into the nursing profession.

This is the first year the trip was offered as part of a fall semester course, led by Cravens.

This year, the students held three clinics and saw about 45 patients. Through fundraising, they brought \$1,000 worth of medical supplies. The students also hosted an afternoon of games and arts and crafts that attracted about 40 people, mostly children.

"We want (the students) to understand diverse cultures and to be able to work effectively with a diverse population," Cravens says, adding the students get to work with an international health care team. ■



UMaine nursing students, clockwise from left, Logan Molt, Laura Roberts, Kristen Freeman, Abigail Biegel, Hannah Duffy and Katelyn Ford pose with their last patient of the day at a clinic in Costa Rica. The Nicaraguan refugee, here with his daughter and niece, recently fled his country because of civil unrest.



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Wind Instrument Quintette from the State Opera of Berlin
 (Piano: James Simon)

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James Simon



ÜBER SEINE LETZTEN ERFOLGE

ALS PIANIST

UND KOMPONIST

SCHREIBEN DIE FÜHRENDEN ZEITUNGEN

ER IST EINER DER WENIGEN BERUFENEN

BERLINER TAGEBLATT

THE LEADING NEWSPAPERS COMMENTING ON HIS LATEST SUCCESS

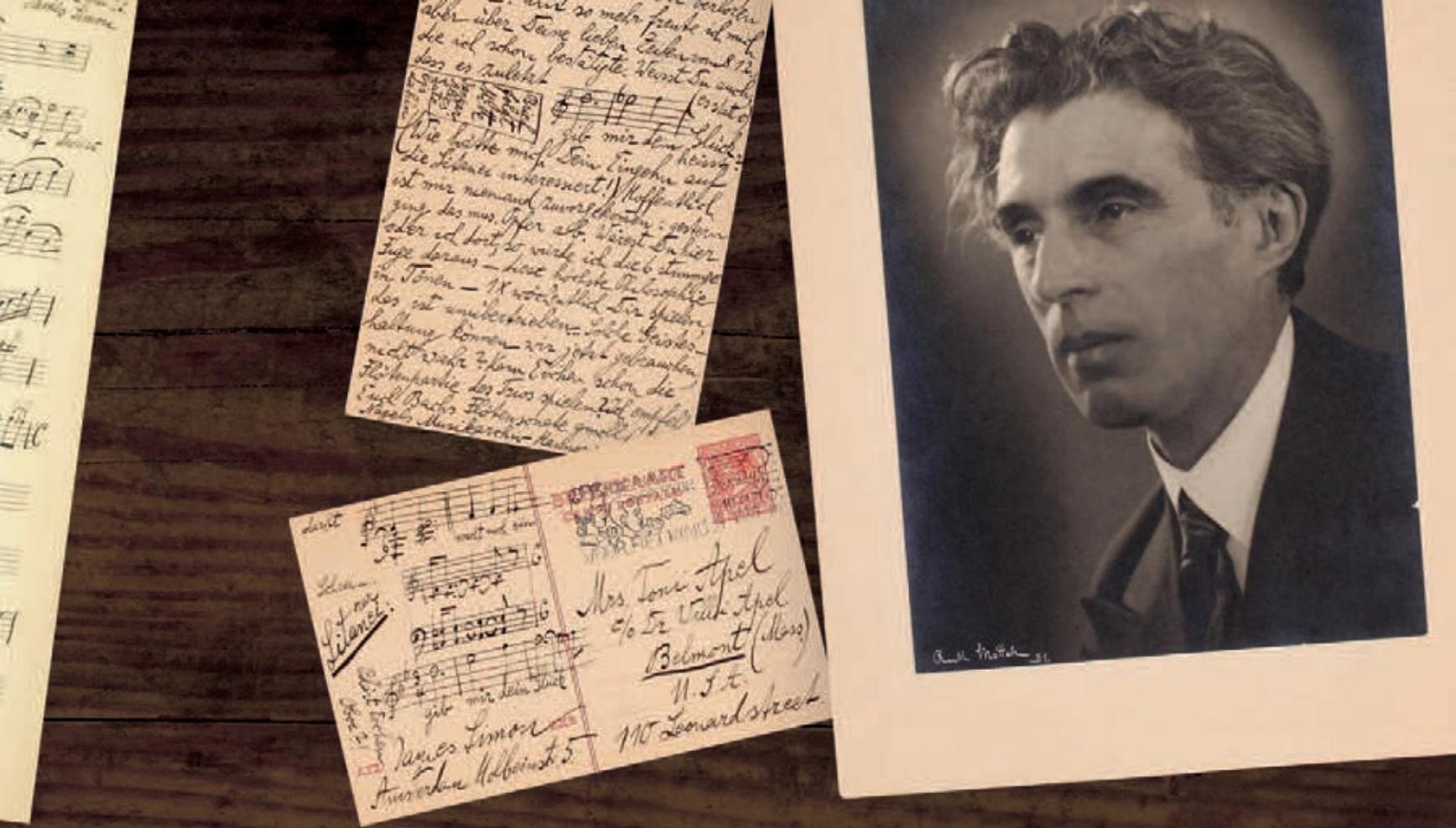
AS A PIANIST AND A COMPOSER STATE

HE IS ONE OF THE FEW CHOSEN ONES

BERLINER TAGEBLATT

Violoncell alleine

24. 12. 1920
 James Simon



Lost and found

Phillip Silver defies history to reclaim 'thwarted voices'

By Cleo Barker

HE SAT on a tattered suitcase as he scribbled notes on a scrap of paper, occasionally gazing off into the distance as if to capture and clarify the sounds only he could hear. He was seemingly oblivious to the sea of humanity swirling around him — and to his impending fate.

James Simon was doing what he loved — composing music, despite being held at Terezín concentration camp.

Then the train arrived to take the acclaimed German-Jewish composer to Auschwitz.

“There’s an old Jewish expression about how each life is equivalent to a world,” says Phillip Silver, a University

of Maine professor of music, piano and musicology, whose research for the past 20 years has focused on reclaiming the works of composers, including Simon, who were exiled or killed in the Holocaust.

Each composer, each artist, has his or her own perspective on reality, his or her own way of perceiving sounds and organizing material, says Silver. “To discover in detail a new individual in this manner is very, very exciting. It just expands one’s awareness of what is possible.”

Silver says Simon was a romantic who “didn’t live in his own time” and was much more at home in the 19th century in his musical tastes. Born in 1880 in Berlin, he was well-

James Simon archival documents courtesy of the Leo Baeck Institute, New York

Lost and found

to-do, well educated and a talented pianist, as well as a prolific composer and musicologist.

Despite numerous opportunities to flee persecution, Simon refused to permanently leave his homeland, though he did go to the Netherlands in the 1930s to escape Nazi oppression in Germany and continue composing, Silver says. Simon created works that sometimes communicated the inhumanity of the times, including “Aphorism Three,” which was composed in 1941 when the Nazis began to apply restrictions on the Jewish population in the Netherlands.

In spring 1944, Simon was sent to a concentration camp at Terezín in what is now the Czech Republic. Many academics, musicians and artists



There's this longing right now, this great search going on to try to find them. But we don't entertain much hope.”

Phillip Silver

were held there before being sent elsewhere to their deaths. While at Terezín, Simon continued to compose, perform and give lectures until he was transported to Auschwitz in October.

“There's a chain that links all human beings. We can experience what other people feel. Simon speaks to us directly,” Silver says. “He's honest, and the music is honest.”

However, much of Simon's music has yet to be found. Silver and other researchers have compiled many references to Simon and his works, including citations in newspapers during the years he resided in Amsterdam. Yet many of the compositions mentioned are still lost, seeming to exist in no other form than a passing mention on a faded page.

“There's this longing right now, this great search going on to try to find them. But we don't entertain much hope,” says Silver.

TWO DECADES ago, David Bloch, head of the musicology department at Tel Aviv University, introduced Silver to the music written at Terezín. It wasn't until five years later that Silver heard a piece by one of the composers, Viktor Ullmann, on BBC Radio 3 and knew he had to help prevent such works from being lost to the ages.

“It was exquisite. And I said to myself, ‘It has to be

French — it sounds as if (composer Achille-Claude) Debussy is the ghost in the back of this music.’ And then the announcer came on and said, ‘This is the third quartet by Viktor Ullmann; this work was written in Terezín concentration camp.’ And suddenly, everything that David had taught me, it all collided.”

Today, Silver is a musician, artist, teacher, historian and self-described “responsible citizen of the world.” His research focuses on “thwarted voices,” those of composers who were exiled or murdered in the Holocaust and whose music was silenced or lost as a result. Silver is dedicated to rediscovering these composers and their music, and bringing them to modern audiences.

Silver's worldwide quest has taken him to museums and libraries. Unexpected sources include the archives of the great singer Marian Anderson, who had songs written for her by Simon.

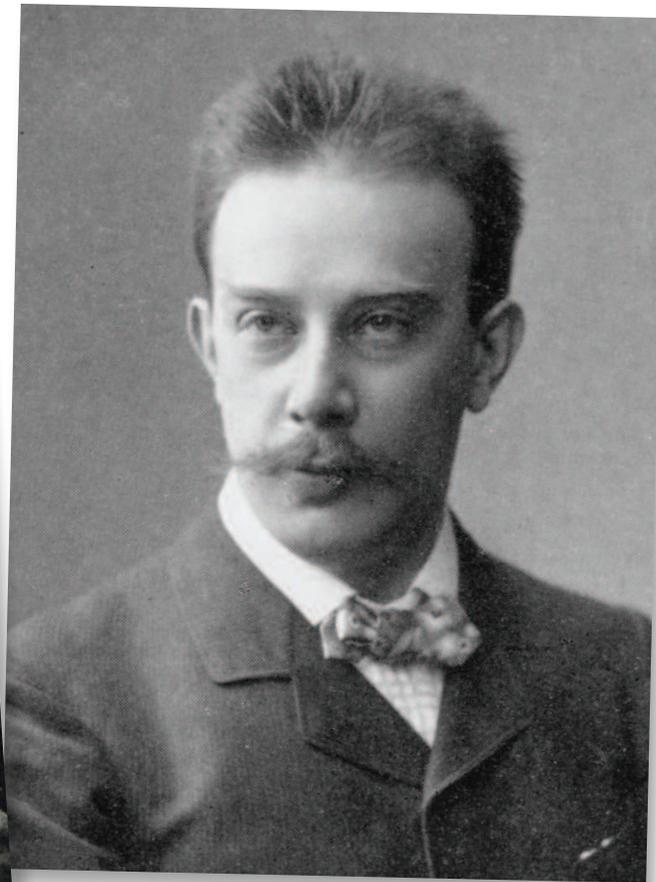
“If any works were published, attempts were made to destroy the plates and to destroy any known copies. A desire was basically put into place by the Nazis to write these figures out of history,” says Silver. “My work is to undo that. If you don't like (the music), don't listen to it. But it's there. It is only justice to allow audiences to decide on whether a work is valid. Not politics.”

The rediscovery process is a long one. Silver says finding the music, while exciting, can be the most challenging part of his research. A lead can lie dormant for months or even years before a development points him, and others doing this same work, to another discovery.

Take the Italian-Jewish composer Leone Sinigaglia. Silver saw a mention of his name in the Israel Philharmonic archives. Initially, all Silver could learn was that Sinigaglia had written a book about mountain climbing in the Dolomites, and had been a student of Czech composer Antonín Dvořák.

For years, those remained the only threads until Silver obtained a copy of Sonata Op. 41, a major cello-piano work by Sinigaglia, located in the archives of German publisher Breitkopf & Härtel.

“I was shocked by just how accessible and how beautiful it was,” says Silver. “The atmosphere evoked was one of such unbelievable longing and sadness. And I was just lost



UMaine professor of music Phillip Silver has recovered and recorded lost works of Italian-Jewish composer Leone Sinigaglia, left, and German-Jewish composer Bernhard Sekles, whom historians credit with the birth of jazz as an academic subject.

Lebrecht Music & Arts / Alamy Stock Photo; ullstein bild Dtl./ullstein bild/Getty Images

in that piece. Immediately it became the core of my discovery of this composer and this interest in finding other works by him.”

After several years of research, Silver now knows that Sinigaglia was born in 1868 in Turin and traveled extensively during his nearly 40-year career, living in Vienna for several years. Sinigaglia was sensitive and shy, with a lively sense of humor.

“He became an ethnomusicologist, uncovering some of the folk materials of his own country,” says Silver. “Sinigaglia’s musical language was deeply rooted in late 19th-century Romanticism and it made no concession to contemporary musical developments.

“The most memorable characteristics of Sinigaglia’s music are its strong melodic elements and a sophisticated

use of harmonic materials,” says Silver. “There is lyricism, passion, playfulness, tragedy and joie de vivre in his music.”

In 1944 when he was in his late 70s, Sinigaglia was nearly sent to Auschwitz. During his arrest, he had a heart attack and died.

In his time, Sinigaglia became known to the wider musical world through his Violin Concerto Op. 20, the only concerto he wrote, Silver says. And his “Sonata for Cello and Piano,” composed in the 1920s, was not a comment on the times so much as an expression of the composer.

“It reflects a type of sadness that comes from the recognition that one’s life is not proceeding in the direction one would like,” says Silver. “He had a tremendous talent, and it just was not really recognized.”



Hunt finds 'capacity to connect' through piano

THE PIANO captivated Kimberly Hunt 12 years ago, and today she continues to be inspired by its potential to distill and express human experience.

"The ability of the piano to tell a story with emotion and feeling intrigues me," says Hunt, a University of Maine sophomore from Corea, Maine. "The piano and music have a wonderful capacity to connect with listeners."

Hunt studied at the Conservatory of Music in San Francisco, California before continuing her musical education at the Hayes School of Music in Boone, North Carolina.

The piano performance major came to UMaine to develop mastery in solo, chamber and solo orchestral piano, as well as composition. She studies under pianist and professor of music Phillip Silver.

"He has inspired me to approach each performance as its own special journey, both for myself and the audience. This gives freedom for the performance to develop its own unique and special characteristics," Hunt says.

She also enjoys kayaking, reading, writing, painting and exploring Maine's forests and coasts.

"Maine is my home and I intend to live here," Hunt says. "Maine people and its landscape provide a wonderful setting for family and life."

FROM THE recovered works of Sinigaglia and others of this era, Silver selects which to stage "purely on a performance basis."

"I thought that I was going to be doing this and primarily focusing on music as a historical document," says Silver. "The biggest surprise (was) the immense talent of these individuals. And what a loss it was that they were all murdered."

When he performs these recovered works for the public, Silver says audiences often ask why they haven't heard the music before.

His answer? They were not allowed.

"It is possible, though we cannot prove it, that the entire history of the second half of the 20th-century musical development was altered artificially by the suppression of the music of these composers," Silver says. "We have various elements that make up a musical language and musical direction. And if you remove a huge body of work from that, you're left with something else."

Discoveries of composers and their works also can yield other significant contributions to the music world. Historians credit German-Jewish Bernhard Sekles, for instance, with the birth of jazz as an academic subject.

Born in Frankfurt am Main, Sekles was a teacher, administrator, composer and director of the conservatory Hochschule für Musik Mainz in Germany in the late 1920s and early 1930s.

Sekles' work draws on traditional musical elements while infusing the compositions with jazz to improve on rhythm and composition, says Silver, who has recorded chamber works of both Sekles and Sinigaglia on the Toccata Classics label in London with his wife, cellist Noreen Silver; and viola and violin player Solomia Soroka.

In 1928, Sekles established both an opera school as part of the Hochschule and the first academic course in jazz studies, which proved controversial.

"He faced an onslaught of attacks from the right wing," says Silver. "Jazz was a very contentious subject in Germany and Austria."

Pressure mounted for Sekles to be removed or to abandon his teaching. But he remained steadfast, and infused his compositions with the same spirit, creating interesting,

quirky and imaginative music that “does things that are just completely unexpected,” Silver says.

Eventually, Sekles was forced out of his position and driven into poverty, Silver says.

“He lost all of his money, he lost his house and was forced to live in a garret in an old building. It was not good for his health. He lived for about a year and then succumbed (to tuberculosis). And the Nazis, of course, banned his works and no one ever heard of him.”

RUDOLF KAREL also firmly stood for his beliefs in music and society. Born in 1880 in Pilsen in what is now the Czech Republic, his musical career encompassed studies with Dvořák and Josef Klička.

“He wrote an astonishing variety of music in different styles. His early works were quite severe,” says Silver. “The later works become very melodic, very romantic in many respects.”

The first non-Jewish composer in Silver’s research purview, Karel was part of the Prague resistance, participating in activism through music and other forms of expression. As a result, the Nazis arrested and interned him at Pankrác Prison. In 1945, Karel was transferred to Terezín, where he died a month later.

Among his works are “Three Hairs of the Wise Old Man,” a five-act fairy tale opera, and a nonet that was incomplete at the time of his death. František Hertzl posthumously completed the work, which is now Karel’s most performed piece.

Both works were composed on odd scraps of paper Karel found in the camp, including toilet paper.

“The second movement of the (nonet) is so hauntingly beautiful that I just find that time is suspended whenever I hear it,” says Silver. “It immediately initiated a necessity for me to know more about him and what he’s done.”

In recent years, Silver has worked with other musicians to bring works of these rediscovered composers to the public. Collaboration has allowed for larger undertakings such as “Hours of Freedom: The Story of the Terezín Composer,” a multimedia project produced by the Defiant Requiem Foundation that is dedicated to bringing back the music of composers who were silenced by the Holocaust.

Silver and his colleagues have performed “Hours of Freedom” in the United States and abroad, including performances in Prague and Jerusalem and, most recently, in November 2018 at Carnegie Hall.

In addition to Defiant Requiem, Silver is a member of the International Centre for Suppressed Music in London, and of *musica reanimata* in Berlin. The work is both rewarding and emotionally demanding.

“Once you get past the feeling that we’re doing something right, we’re undoing an injustice, we have to come face-to-face with the injustice. Once you get to that point, if you have any feelings at all, you’re going to be affected by it,” he says.

Silver says his work as an artist also has been influenced by this research.

“Music is the highest form of human endeavor,” says Silver. “It is capable of expressing things that no other medium is capable of. It does not involve conceptuality, it involves a direct experience. And, therefore, I’ve become maybe more of an ideologue in that respect.”

The Silver Duo, comprising Phillip and Noreen Silver, has performed throughout the United States and in the Czech Republic, Germany, Israel and the United Kingdom.

In March 2018 in Amsterdam, Phillip Silver played Simon’s works, including a sextet for wind instruments and piano that had not been performed for almost a century.

“I’m going to do this as long as I can breathe,” he says. “The kindest thing would be if somebody still listens to (the music), if someone realizes that the works of a few of these composers that I’ve delved into were worth retaining, that their music has something to say.

“Just as we listen to music written 200 years ago, 300, 400 years ago, why not add one more composer? Or even one work by a composer? We’ll have done something to broaden the cultural tapestry of human endeavor,” says Silver. ■



Once you get past the feeling that we’re doing something right, we’re undoing an injustice, **we have to come face-to-face with the injustice.**”

Phillip Silver

A top-down view of four rectangular trays, each filled to the brim with fresh, dark blue blueberries. The berries are interspersed with small green leaves and some dried floral parts. The trays are arranged in a 2x2 grid, and the entire scene is set against a dark, textured wooden background.

A wild story



**Maine wild blueberry growers
and university experts are
united in stewardship of the
state's native crop**

By Margaret Nagle

Photographs by Holland Haverkamp

A wild story



Lily Calderwood, University of Maine Cooperative Extension wild blueberry specialist and assistant professor of horticulture, leads an integrated pest management outreach program for growers. UMaine Extension offers multiple field days from April through July featuring university experts sharing the latest research and best practices related to growing and harvesting wild blueberries. The events also are important networking opportunities for the state's growers.

VACCINIUM ANGUSTIFOLIUM is a survivor. It perseveres in the Down East Maine landscape until conditions are right for it to truly prosper.

The same can be said of the dedicated growers who manage the native fruit crop better known as the Maine wild blueberry.

Growers know that all crops have their challenges. There are “ups and downs,” says David Yarborough, University of Maine Cooperative Extension wild blueberry specialist for the past 40 years. Weed, insect and disease pests limit their production each season. The bounty is largely dependent on nature, having enough sunshine, rainfall, favorable temperatures and good pollination.

And for this crop, an inch of rain each week makes all the difference in berry size — a make-or-break factor for growers who are paid by the pound. Volatile markets and imports of other wild and cultivated blueberries also affect their value.

But as a native plant, management — not planting or breeding — is the key to successful wild blueberry production. Today’s blueberry plants are growing from age-old rhizome systems just below the soil surface. Berries typically are fully ripe in a three-week window in August, making the single, overarching harvest intense.

“In the spring, everyone wants to know what the crop will be like this year. My response: Tell me what the weather will be like,” Yarborough says.

With so many wild cards, the legacy crop has survived and thrived with the help of the state and the University of Maine, the only research university in the United States with a focus on wild blueberries.

“UMaine’s wild blueberry research is driven by the needs of growers and producers,” says Yarborough. “The tradition in Maine is to keep the crop healthy and that means reducing the inputs of pesticides and herbicides — minimizing what we need — and being very efficient to remain competitive with cultivated blueberries. Growers are very proud of their heritage in increasing production.”

Cultivated, or highbush, blueberries are a different species of blueberries and more well known. They have been bred for a larger size, uniform taste and color; are grown worldwide;

and are available fresh year-round due to thicker, shelf-stable skin.

The research and education partnership between UMaine and Maine wild blueberry growers has been in place for more than a century. The state’s native crop is that important. And Maine’s land grant university has a mission to ensure the success of this and other traditional industries critical to the state’s economy.

Through the decades, support for growers in the state’s wild blueberry industry has included research to develop best practices in cultivation — pruning, pollination, fertilization, soil acidification, irrigation and propagation. It has focused on pest management that controls destructive insects,

University of Maine Cooperative Extension wild blueberry expert David Yarborough and grower Shannon Lion discuss an aerial photo of Sunkhaze Wild Blueberry Farm in Township 32 — 347 acres, nearly half of which are flat, naturally rock-free barrens high on an esker.



A wild story



The same climate changes that have given Maine growers additional days in their growing season and warmer temperatures to produce more berries on less land have been an even bigger bonus for Canadian growers.

diseases and weeds; and harvesting — improvements in field conditions and mechanized equipment. That information is shared through annual events, including wild blueberry conferences and field days for growers.

UMaine research also has focused on product development, and the health and nutritional benefits of this antioxidant-rich fruit.

And throughout the three vital seasons for growers, those same UMaine researchers and Extension specialists are a just call away.

The Wild Blueberry Commission of Maine, based at the university, also serves the more than 500 growers and processors in the state. Created by the state Legislature in 1945, the commission champions the native crop, and the UMaine research and Cooperative Extension outreach efforts are behind its sustainability and success.

That includes Maine wild blueberry promotion that

will open more markets and encourage value-added products that will keep growers viable and in business.

At a time when their numbers have never been lower.

“This is a diverse group of Mainers who are growing a unique, hardy crop,” says Lily Calderwood, UMaine Extension’s new wild blueberry specialist, who came to Maine last year to succeed Yarborough when he retires in April 2019.

“These growers — from small family farms to large international companies — have a range of needs, all of which are trying to manage a working landscape. And all are very in touch with the land.”

JUDY BERRY’S earliest memories of wild blueberries involve her parents.

When her father saw blueberries growing in a field in Dresden in the 1950s, he cleared 23 acres of trees to have a crop to sell, along with strawberries.

“Back then, you didn’t fertilize. You didn’t use sulfur. You didn’t do soil samples and you didn’t hire bees,” says Judy, who inherited that barren and others from her mother. “You took your chances.”

But blueberry fields were everywhere then. Judy and other area children raked from the oceanside barrens in Georgetown to acres in Dresden on Blinn Hill and in Cameron Field.

By the time responsibility for managing the family blueberry crop fell to Judy’s mother, the economic viability of the industry was shifting. For several seasons, the money her mother had to pay in her final years for the local blueberry company’s hand rakers outstripped the price paid for the berries.

“She ended up owing the blueberry company year after year,” says Judy, 84, who retired three decades ago and took up wild blueberry growing as a passionate hobby. “We’ve come a long way, and that’s why I hate to give it up. But there’s no money in them.”

Still. Again. But not always.

In recent years, Judy and her husband Elmer have seen their berries, grown on 35 acres, go from \$1.05 to 20 cents per pound, leaving them earning 7.5 cents a pound after paying 12.5 cents a pound for mechanical raking.

Three seasons ago, their 23-acre barren yielded a whopping 72 tons of berries. In 2014, the fields were awash with blossoms until a late frost killed all but 6 tons of their crop.

Growing wild blueberries has taught them perseverance, determination and to “just keep on plugging” to overcome hardship, the couple says.

“When I was a young fellow, people had 2 or 5 or 10 acres,” Elmer says. “A field went wild and you got what you could get out of it. People supplemented their incomes (selling blueberries) when they retired, but that’s going by

now. (Today) 4 or 5 acres of blueberries are not worth bothering with with the expense. Harvesters cost a lot of money. Blueberries have such a short season, and when they’re ready, you’ve got to rake or you lose — they start shrinking, and we sell by the pound.”

For wild blueberry growers like Judy and Elmer, who celebrated their 66th wedding anniversary last fall, the economic realities inform how they manage their crop to remain viable. They apply a self-sustaining model to wild blueberry growing, reinvesting only what they make in profit.

For Judy and Elmer Berry of Dresden, wild blueberries have long been part of their lives. The retired couple manages the native crop as a passionate, self-sustaining hobby, being sure to reinvest only what is made in profit. They are unabashed workaholics when it comes to their barrens, but note that “playing in the blueberries” has kept them young.



A wild story



Highland Blueberry Farm in Stockton Springs has been certified organic since 2002. Four years later, with the help of three Maine Technology Institute seed grants, Highland Organics introduced the first organic whole plant wild blueberry tea. The wild leaf, and fruit and leaf teas are available in tins, by the ounce and pound, and in hand-filled tea bags prepared on the farm for sale online and in the retail shop. In addition, dried fruit products include Blueberry Barque Chips and blueberry powder. Theresa Gaffney (pictured at right) says the crimson leaves of the wild blueberry plants in the fall sparked her interest in exploring value-added products.

That determines if purchases for the next crop — fertilizer, sulfur, wood chips, bees, weed control products — can be made. Over the decades, profitable crop years allowed for the purchase of four tractors and two flail mowers. It also meant that getting the fields in the top condition they are today — including boulder removal to allow for mechanical harvests — took a lifetime, Elmer says.

Elmer's mechanical genius has kept their machinery ever-ready.

Judy has the eye of an eagle when it comes to spotting invaders in her barrens. She can not only spy a weed yards away, but also can usually name it before she even gets close enough for positive identification. With the detail of a military historian, she recounts her battles with sedge, blue toadflax, bunch grass and bracken fern.

The couple's trusted, longtime allies: Yarborough, who connected them to educational resources; and Paul Sweetland, manager of Coastal Blueberry Service in Union and a UMaine alumnus, who has been just a call away for the Berrys for years and regularly drops by for a barren walk.

The result: their wild blueberries are so happy and healthy they are "halfway up your shin" in height and produce big berries.

"They've given us a lot of satisfaction in the way they turned out," Elmer says. "There are a lot of good memories, but you never forget the hard work that went into it. Blueberries have given us a lot of good and bad," Elmer says.

Judy admits the pair are unabashed workaholics when it comes to their wild blueberry barrens. But "playing in the blueberries" has kept them young.

"I often think what my father would think if he saw the fields in the shape they're in now. I look at the fields and wonder what will become of them. Nobody is going to put the time in, but it will be a fact I have to face," says Judy. "It's kind of heartbreaking (to think that) all that's out there will come up to bushes eventually."

LAST SUMMER, Shannon Lion left a voicemail on Yarborough's office phone. She and her husband Steven had a weed in their blueberry barrens that they couldn't identify. Could she drop the plant by next time she came to town so Yarborough could take a look?



A wild story





At Sunkhaze Wild Blueberry Farm, wild blueberries are hand-raked for fresh-pack sales and for a Maine winery. Noella Thibeault is among the longtime workers on the farm who has been spending the harvests with the Lions since 1986, sorting blueberries on the conveyor in the fresh pack building.

“We have new weeds annually,” says Shannon. “A lot of weed (seeds) I bring in on my pickup truck, I swear.”

The mystery invader seems particularly alien in the pristine setting of Sunkhaze Wild Blueberry Farm in Township 32 — 347 acres, nearly half of which are flat, naturally rock-free barrens high on a sand and gravel ridge, or esker, next to Sunkhaze Stream.

The 8 miles of open fields, cleared first by a wildfire in the 1920s, also sit atop an aquifer. The result is what many consider some of the state’s best wild blueberries for their size and flavor.

Unlike most Maine wild blueberry growers, the Lions live on their barrens. They also live off the grid, only buying a generator a few years ago to keep a small freezer operating in their fresh pack building.

“We spend a lot of money on blueberries, but not a lot on life,” jokes Shannon, who serves on the advisory board of the Wild Blueberry Commission of Maine. “We’ve never taken a vacation off the farm. Both of us traveled quite a bit (when we were young). The only thing stranger than that is we have no refrigerator.

“It’s a beautiful life, like heaven on Earth because both of us want to be here,” says Shannon. “We always knew what we wanted to have, and we have it now. It would be the worst place in the world if we didn’t want to be here with one other person. Sometimes you don’t see anyone (else) out here for months at a time, and you have to be comfortable with that.”

What is plentiful is the wildlife, including black bears, prompting installation of a solar-powered electric fence

A wild story



With two harvesters operating 14 hours a day in the fields for up to three weeks, the Lions bring in their crop at Sunkhaze Blueberry Farm with the help of about eight workers — longtime employees, and their spouses and children.

around the beehives they rent to accommodate the other critical partners in their blueberry business — pollinators.

It has taken the Lions nearly a half-century to bring their fields, purchased in 1974, to their current production levels. In the early years, Shannon had a job off the farm to help with expenses.

“It was a long time before the farm made money,” Steven says. “For many years, to break even and make payments was doing good.”

Wild blueberries are the Lions’ primary crop — hand-raked for fresh-pack sales and for a Maine winery, and machine harvested for Wyman’s of Maine frozen fruit sales. For two decades, they also have been sustainably harvesting blueberry sod for the ornamental landscape market.

The crop diversification provided the flexibility to pay in May, June and July for the fertilizer and other expenses needed for the fields that would be harvested the following

year, rather than having to get a loan and wait for the final year-end, per-pound price, reflected in the check from the processing company.

Another milestone for the Lions, as for many Maine wild blueberry growers, was the switch from hand raking to mechanical harvesting by the late 1990s. The quality of the Lions’ rock-free barrens spurred their mortgage company to suggest the investment in a harvester. The expense ran counter to the Lions’ frugal nature, but it was time.

The days were quickly disappearing when a large field crew “just showed up to rake,” usually camping on the farm to get the crop in during the three-week harvest window. As most private growers who were in business in the late 1990s will attest, it was difficult to meet the needs of what was increasingly an untrained, seasonal workforce in a rural setting, in addition to harvesting a quality crop.

Today, with two harvesters operating 14 hours a day in

the fields for up to three weeks, the Lions bring in their crop with the help of about eight workers — longtime employees, and their spouses and children.”They come back every year, taking time off from their jobs,” says Shannon of the Sunkhaze workers who are more like family than employees.

A few weeks after the harvest is in, the multitudes of blueberry clones take on varied hues of scarlet. The Lions mow the barrens for plant health and weed control once the leaves fall off later in the season. The switch from burning to mowing fields was a big milestone for Maine wild blueberry growers, including the Lions.

But it also added a wrinkle in the ongoing battle for weed control. Shannon says they have noted the weed pressure — battles through the years with woody weeds and milkweed, in particular — after switching to flail mowing. Burning the barrens killed the weed seeds.

“We’re just lucky to have people like Dave (Yarborough) and (UMaine entomologist) Frank (Drummond), the bug guy,” Shannon says. “(I always) get a call back when I have a question, and I always have questions. We’re not on the internet and don’t do computers. It’s nicer to call Dave and get the answers.”

IN 2004, when Theresa Gaffney started wondering aloud whether a byproduct from her family’s organic wild blueberry fields — the leaves — had any value, she was met with healthy skepticism.

“I got some strange looks,” she says. “I even had someone say, ‘You do know it’s about the fruit, right?’”

“I did know it was about the fruit, but I also realized it could be more, that there was an opportunity for a second harvest that could be made into a viable business.”

Gaffney got into the wild crop when she “married a man with a blueberry farm” in 1999. Together, Tom and Theresa transitioned the 25-acre Highland Blueberry Farm in Stockton Springs to a certified organic business in 2002, selling fresh and frozen fruit to 350 wholesale customers.

They thought about ways to use blueberries in value-added products — from baked goods to jams. They also considered collaborating on a juice.

But it was the crimson leaves of the wild blueberry plants

in the fall that piqued Theresa’s curiosity. She began talking to UMaine food scientists, including graduate student Kristi Crow, who was researching environmentally friendly treatments for disinfecting post-harvest berries.

Crow also was a National Science Foundation Graduate Teaching Fellow in K–12, working with local high school teachers to incorporate food chemistry experiments into their curricula. In a high school chemistry class at Hampden Academy, Crow led students in tests of the antioxidant content of the Gaffneys’ organic wild blueberry leaves.

The initial findings astonished everyone: The organic leaves had even higher antioxidant levels than the fruit.

Two years and three Maine Technology Institute seed grants later, Highland Organics introduced the first organic whole plant wild blueberry tea.

“We wanted to be the first to put out a real, pure blueberry tea made with just the fruit and the leaves,” says Theresa. “We brought it to (the Maine Organic Farmers and Gardeners Association) Common Ground (Country) Fair in 2008 (and) walked away after three days saying, ‘OK, I think

For two decades, the Lions have been sustainably harvesting blueberry sod for the ornamental landscape market. The crop diversification has provided additional income.



Wild blueberries 101

- Maine's 44,000 acres of wild blueberries grow naturally in forests, fields and barrens, from the Down East coast to the southwest corner of the state.
- The native crop thrives in naturally acidic, low fertility soils.
- Several species of wild blueberries are found in Maine. The most abundant: *angustifolium*.
- Blueberry plants send out underground stems called rhizomes that grow near the soil surface, periodically sending up new stems. Roots develop on the rhizomes as they grow.
- The original plant, with its spreading rhizome system, is referred to as a clone. Each clone is genetically different from neighboring plants. Clones vary in size, and the area they cover is related to their age. Typically, there are about 109 clones per acre.
- The complex mixture of clones gives wild blueberries their rich diversity of flavors.
- Average yield is nearly 5,000 pounds per acre, but fields with dense stands of productive clones and more intensive management could potentially have double that production.
- Wild blueberries are grown on a two-year production cycle. Each year, half of a grower's land is managed to encourage vegetative growth and the other half is prepared for a wild blueberry harvest in August.
- Maine is the world's largest producer of wild blueberries. Maine produces 10 percent of all blueberries in North America, including wild and cultivated.

Source: University of Maine Cooperative Extension

Illustration by Hattie Stiles

this is what we're going to do with our lives' because we sold out. It was pretty exciting and life changing to have the experience."

Today, Highland Organics' wild leaf, and fruit and leaf teas are available in tins, by the ounce and pound, and in hand-filled tea bags. Dried fruit products include Blueberry Barque Chips and blueberry powder.

The demonstrated diversification with a value-added product provides inspiration to others.

"Now other people are looking at (blueberry leaf harvest) as a possible second income from their blueberry fields," she says. "(And) I want to share with people what I'm doing. I really believe in the small organic farmer."

The Gaffneys are mindful of the people tied to the family's wild blueberry farm, including their five children and their friends who had summer jobs in the fields. Today, Highland Organics' three part-time employees fill tea orders by hand, and two seasonal workers help bring in the crop.

The organic wild blueberry fields of Highland Blueberry Farm are a living laboratory for UMaine scientists, including graduate students conducting research in entomology. And through the years, the Gaffneys have tapped multiple UMaine experts, not only food scientists advising on product development and nutrition labels, and biologists focusing on the multifaceted healthy ecosystem, but also engineers helping to develop a prototype leaf-drying technology.

Theresa's most recent questions to Yarborough have focused on the effects of three years of drought on the health of the wild blueberry plants.

"It's a very important working relationship," Theresa says. "We're not lone rangers. We need everybody who can bring knowledge and understanding to the table.

"I really believe that we can work together in this industry to make some positive improvements and continue the great work," she says.

"Maine is farmer-ready. I think we can learn from everybody to grow the industry in a way that's going to be beneficial not only for the grower (and) the processor, (but also) the consumer, our neighbors, our families (and) our lifestyle. It's a good opportunity and we (will) miss out if we don't come together to figure out how to keep doing what Maine does best." ■



Spring sunrise at Great Pond Mountain Farm, Orland, Maine.

The edge

Courses, internships and incubators foster student innovation in Maine and beyond

By Elyse Catalina / Photographs by Adam Küykendall

WHEN BRIANNA Hughes was pursuing a master's degree in food science and human nutrition at the University of Maine, she heard about a program at the Foster Center for Student Innovation that would give her an edge in the professional world.

The initiative, Innovation Engineering, transforms the seemingly random art of idea creation into a repeatable, systematic science. At UMaine, students from any major can learn the innovation process — from identifying problems to making their ideas a reality — in the classroom through real-world, hands-on experience.

Students can pursue an undergraduate minor or certificate, or a graduate certificate in Innovation Engineering.

Hughes earned a graduate certificate at UMaine and then went on to earn an Innovation Engineering Black Belt through a mastery course offered at Eureka! Ranch, an Ohio-based company that uses the Innovation Engineering principles to provide training and consulting services to corporate clients.

The company, led by UMaine alumnus Doug Hall, partnered with the university to create the Innovation Engineering academic curriculum, which is being licensed by other colleges and universities across the country. In fall 2019, the University of Houston will begin offering the

program to students in its College of Technology.

Even though Hughes' main goal in pursuing Innovation Engineering was to take her food science education to another level, working with students from a variety of majors was an added benefit.

"The diversity of the classroom made my time at the Foster Center so much richer and prepared me for the cross-functionality of teams today," she says. "You get a richness of thought and they challenge you to think differently than when you're only working with people that are in your exact same discipline."

Hughes works as an innovation R&D manager at Ocean Spray Cranberries in Massachusetts. Her team of product developers is tasked with finding unique ways to transform cranberries into value-added products.

"We are responsible for developing products that delight our current consumers, as well as new products for more niche or up-and-coming markets," Hughes says. "Innovation Engineering plays a foundational role in my approach to those challenges."

Hughes says her Innovation Engineering education enhanced her training as a food scientist and allowed her to systematically think outside of her area of expertise to connect consumer insights to real solutions.

Innovation Engineering is the foundation of several



UMaine alumna Brianna Hughes, who earned a master's in 2010 and a Ph.D. in 2014, says her Innovation Engineering education enhanced her training as a food scientist. Today, she works as an innovation R&D manager at Ocean Spray Cranberries in Massachusetts. Her team of product developers finds unique ways to transform cranberries into value-added products.

programs the Foster Center offers to meet the entrepreneurial needs of UMaine community members, and to contribute to the economy in Maine and beyond. The center helps students, faculty and staff develop a mindset and skill set for creating, testing and achieving ideas.

The center, established in 2006 and named after UMaine alumni Bion and Dorain H. Foster, provides free business coaching to anyone with an entrepreneurial idea, runs a student business incubator, offers academic courses in Innovation Engineering and manages the Innovate for Maine Fellows internship program.

More than 1,000 UMaine students have taken advantage of the center's business counseling services. Annually, upward of 100 students, faculty and staff seek the Foster Center's entrepreneurial assistance.

For students looking to earn course credit while starting a company, StartUp Lab, a new accelerator course, was piloted in spring 2018.

The curriculum, based on Innovation Engineering principles, helps students build and test a business model while working with community mentors in opportunities beyond the classroom.

UMAINE RESEARCH teams also can immerse themselves in the Innovation Engineering process through two of the Foster Center's newest commercialization initiatives — I-Corps and the Maine Innovation, Research and Technology Accelerator (MIRTA). These programs are designed to speed up the process for moving research and technologies out of the lab for use by the public.

"The goal is to significantly advance research innovation to marketable new products and services that will impact the Maine economy," says Renee Kelly, UMaine assistant vice president for innovation and economic development. "The faculty, staff and student teams developed plans to either start new companies or to partner with existing Maine companies to bring these innovations to market."

Nine projects have been part of the first two MIRTA

cohorts, including Healthy Hives, a beehive activity monitoring system, and Neuright, a medical device for early detection and diagnosis of peripheral neuropathy, a result of damage to peripheral nerves. The faculty and students involved in both projects are starting new Maine-based companies.

Based on the Foster Center's track record of supporting entrepreneurs developing new technologies, the National Science Foundation (NSF) in 2018 selected UMaine as Maine's first I-Corps Site.



Today's businesses are changing exponentially and **Innovation Engineering will train you to be an agile thinker** with cross-functional breadth."

Brianna Hughes

The I-Corps program was designed by NSF to help academic researchers identify valuable product opportunities, and gain entrepreneurship skills through training and guidance from established businesspeople and mentors. Participants spend six weeks in the program. Stipends of up to \$3,000 per team are available to interview potential customers and develop a basic prototype.

In addition to the academic offerings and programs designed to move research out of the lab and into the market, the center also focuses heavily on workforce development. The Innovate for Maine Fellows program, which began in 2012, strives to match the best and brightest Maine college students with the state's fastest-growing companies.

To date, the center has served 181 companies, with 187 fellows representing 33 colleges and universities.

The goal of the Innovate for Maine program is to provide interns with a large network, an understanding of the state's economy, and a foundational knowledge of Innovation Engineering through a weeklong boot camp experience.

"The most rewarding thing I hear from interns is that they just had no idea about all the opportunity there is in Maine," says Angela McCue, Foster Center innovation outreach manager. "They actually see that Maine is a really great place to live, work and play."

NATE WILDES, who graduated with a political science degree and Innovation Engineering minor in 2012, was a



Nate Wildes, co-founder of Flight Deck Brewing in Brunswick and executive director of Live and Work in Maine, describes Innovation Engineering as a systematic approach to creativity. The 2012 UMaine grad says the Foster Center was “that perfect concentration of a huge crosscut of majors, of backgrounds, of individuals all studying the same program, but all coming at it from different angles. Diversity of interest and diversity of background was what made my time so enjoyable.”

Eureka! Ranch intern. Upon graduation, he was offered a full-time job at the firm, where he worked for two years before returning to Maine.

“(Innovation Engineering) gave me a toolkit to apply to whatever I wanted to do next,” says Wildes, who is co-founder of Flight Deck Brewing in Brunswick and executive director of Live and Work in Maine, an initiative promoting the state as a career destination.

Wildes says he uses Innovation Engineering every day, whether it’s applying it to product creation in developing new beers, or optimizing the marketing message for promoting opportunities in Maine.

“Innovation Engineering has been a crucial tool in

helping us find that balance between quality of life, quality of business and having a good time at work,” says Wildes, who names the Foster Center as the main reason he attended UMaine.

Hughes and Wildes encourage current and future students to explore programs at the Foster Center and consider an education in Innovation Engineering.

“Today’s businesses are changing exponentially and Innovation Engineering will train you to be an agile thinker with cross-functional breadth,” Hughes says. “The value of those two skills alone will help you drive change in your future organizations and contribute actionable solutions to real problems facing your industry.”



MANY UMAINE students have started businesses with guidance and resources offered by the university, including at the Foster Center for Student Innovation. *UMaine Today* interviewed three alumni who have achieved success.

CHARLES FRIEDMAN, FLOWFOLD

CHARLES FRIEDMAN founded Flowfold, a minimalist outdoor gear company, in 2010 while pursuing a civil engineering degree.

The Gorham, Maine company now has seven employees. Flowfold makes wallets, travel bags, backpacks and dog leashes for everyday adventures using recycled materials such as sailcloth and climbing rope.

“As an engineering student, I did not have much business classwork,” says Friedman, who credits the Foster Center with giving him an education in entrepreneurship. “The biggest message from the innovation center for me is just how important it is to always try new ideas and never stop innovating because it keeps you way ahead of your competition.”

Biggest eureka moment: When I was teaching kiteboarding in North Carolina, I met one of the leading sailboat sail designers in the world who introduced me to automated cutting technology that has been one of the main differentiators in Flowfold’s manufacturing processes.

What it takes to start a business in Maine: You have to have a lot of perseverance. It will take a long time, and patience will be your biggest virtue.

What you know now that you wish you had known from the start: How powerful word-of-mouth marketing is these days, especially with the benefits of the internet and social media.

Advice for student entrepreneurs: Ask for help when you need it and don’t be afraid to admit you don’t know something.

What’s next? We have a ton of new products in our research and development pipeline. Our new facility is buzzing with innovation.

RYAN BEAUMONT, MOBILITY TECHNOLOGIES

RYAN BEAUMONT, CEO of Mobility Technologies, earned a bachelor's degree in mechanical engineering in 2004 and a master's in 2007.

While pursuing his master's degree, Beaumont started R.M. Beaumont Corp., based in Brunswick, Maine, which provides engineering services and commercialization support to firms around the state.

In 2016, Beaumont was contacted by Vince Caccese, one of his former mechanical engineering professors, who told him about an opportunity to become a commercialization partner with UMaine for the Afari, an all-terrain walking aid that helps people exercise independently. Many Afari users have had a stroke or are living with conditions such as Parkinson's disease or multiple sclerosis.

Mobility Technologies was formed to sell the Afari, which was invented at UMaine by professors Liz DePoy and Stephen Gilson, and engineered by Caccese. Gilson's design of Afari led to its selection for the Cooper Hewitt, Smithsonian Design Museum's "Access+Ability" exhibition in New York City; DePoy wrote the successful grants that supported development of Afari technology.

The company has partnered with the Foster Center's Innovate for Maine internship program.

"We've had two interns from this program who were both highly qualified and eager to be a part of a startup," Beaumont says. "Their training in innovation has given us more focus on solving problems for our customers."

Biggest eureka moment: Originally the Afari was just a consulting gig for me. But after a year, I realized, "Hey, there's a real opportunity here and I could be driving it." In 2017, we received so many positive testimonials from our customers, and it was a much-needed validation of years of hard work.

What it takes to start a business in Maine: It is pretty easy to start a business in Maine because there are so many resources available. We've benefited from the help of several mentors.

What you know now that you wish you had known from the start: You have to be comfortable hearing "No" many times and in many different ways. It isn't bad — it helps to carve your path.

Advice for student entrepreneurs: Often what you think are the biggest problems are not. Seek advice from your team and mentors. Learn how to ask questions and listen.

What's next? I'd like to get involved with artificial intelligence in a future venture.





SOREN HANSEN, SEA & REEF AQUACULTURE

SOREN HANSEN, who earned a master's degree in marine biology in 2003 and a Ph.D. in 2016, founded Sea & Reef Aquaculture in 2003 because of his love for coral reefs and his desire to protect marine ecosystems.

Sea & Reef Aquaculture, based in a 12,000-square-foot business incubator at UMaine's Center for Cooperative Aquaculture in Franklin, Maine, aims to reduce fishing pressure on the world's coral reefs by providing aquarium hobbyists with 100 percent captive-bred marine ornamental fish.

Sea & Reef cultures more than 60 species and color morphs of clownfish, dottybacks and cardinalfish, including several unique "designer clownfish" strains. The company, which has 10 full-time employees, sells wholesale to pet stores nationwide and exports fish to overseas markets.

As a student, Hansen's early business help came from the Target Technology Center, now the UpStart Center for Entrepreneurship; his academic adviser David Townsend, professor of oceanography; and Jake Ward, vice president for innovation and economic development.

"This help was instrumental in learning how to start a business and navigate the hurdles that all startups face," says Hansen, whose company has employed several student interns through the Foster Center's Innovate for Maine program.

"We continue to collaborate with the academic world of UMaine by doing shared projects with researchers and sponsoring marine science summer interns," Hansen says.

Biggest eureka moment: 'Hey, we can raise tropical fish in Maine.' The original plan was to establish the company in Hawaii. However, an

opportunity arose to develop the company in Maine through R&D at the University of Maine. We were able to take advantage of aquaculture knowledge and infrastructure already established in Maine. Furthermore, we developed methods to overcome the challenge of raising tropical fish in a cold climate.

What it takes to start a business in Maine: It takes grit, like any other place. Maine has a lot of resources available and many people who are willing to help propel new businesses. Any aspiring entrepreneurs should be aware of this and get connected.

What you know now that you wish you had known from the start: That you need twice the time and three times the money to accomplish each milestone of your project. I also wish I would have had a better idea of the struggles and sacrifices that come with starting your own business. The world has a way of glorifying being an entrepreneur. However, few people realize how difficult it is. Now that the company has grown, I am pleased I persevered, but young people need to know that it is not all glory.

Advice for student entrepreneurs: Make sure you have a solid business plan before going to the next step of securing funding and building your business.

What's next? Our next phase is to secure a permanent home for Sea & Reef. I plan to continue expanding the company by taking market share and developing more captive-bred fish species. The last few years we have started to export fish. That is an area I will focus more on in the future. I like the idea of giving back to Maine by growing a company that employs people in Maine while exporting almost 100 percent of our product out of the state and country. That brings money into the state, while creating jobs here. ■ Photos courtesy of Soren Hansen





‘She makes sure everyone is loved’

Hazel Goodwin recognized with national 4-H volunteer award

IN 1961, when Hazel Goodwin volunteered to lead the Four Leaf Clover 4-H Club, the departing mentor had one stipulation for the club’s assistant: Stick with it.

Goodwin, now 97, has done that. And then some. She’s been running or helping with the 101-year-old Shapleigh club since 1954. It’s estimated she has nurtured and taught life skills to about 1,250 children in six-plus decades.

In 2018, in recognition of her contributions, Goodwin was presented with the National 4-H Council’s Salute to Excellence Outstanding Lifetime Volunteer Award. She was Maine’s nominee for the honor after she earned the University of Maine Cooperative Extension’s 2017 4-H Salute to Excellence Outstanding Volunteer Achievement Award.

In 1931, Goodwin (then Hazel Sanborn) was 9 when she joined the Four Leaf Clover Club to cook, sew, play games, sing songs and make friends. One of those friends, Roland Goodwin, became her husband in 1945.

Sally Farrell, a 4-H youth development professional, says Goodwin’s impact on York County youth is incalculable. “She makes sure everyone is loved and everyone is included.” ■



Transforming rural education

Unique research-practice partnership affirms synergy of schools and community well-being

By Casey Kelly

IT'S 7:45 a.m. on a cold, cloudless Monday in late March, and students file into Down East Maine's Milbridge Elementary School. They shed their winter coats, boots and backpacks, and head to the gymnasium for an all-school assembly.

Several students are already eating breakfast in the gym, which doubles as the school cafeteria. More than 70 percent of the approximately 115 Milbridge students preK–6 qualify for free and reduced-price meals.

Milbridge was one of three rural elementary schools in Washington County, along with Jonesport and Charlotte, chosen for the pilot year of the TREE (Transforming Rural Experience in Education) program, launched in January 2018.

TREE, a division of the nonprofit Cobscook Community Learning Center (CCLC) in Trescott Township, is a unique research-practice partnership between on-the-ground educators, and faculty from the University of Maine and Colby College.

The partners are tackling some of the most challenging issues facing schools nationwide. Washington County, one of Maine's most rural and impoverished areas, is their laboratory.

The county, about the geographic size of Delaware and Rhode Island combined, is home to roughly 32,000 people. The poverty rate is 18 percent, compared to 12 percent for New England. The childhood poverty rate is even more stark — 30 percent versus 14 percent regionwide.

Much of the economy is based on seasonal jobs: agriculture, including blueberries and Christmas wreaths; marine industries; and tourism.

Transforming rural education



“If you were to sit in our gym and watch a school concert, you would see parents and grandparents in the audience who also attended this same school,” says Brittany Ray, who worked as a teacher and counselor in Washington County for more than 20 years, and was Maine Teacher of the Year in 2007. Her ancestors started a sardine canning business, the L. Ray Packing Co., in Milbridge, three generations before she was born.

Ray became TREE director in 2016. Fundamentally, TREE provides support to schools so teachers can teach and students can learn.

And it does more than that. For teachers and principals engrossed in lesson planning, meeting state standards, classroom dynamics and student behavior, it provides the latest equity- and trauma-informed practices to serve youth.

TREE assists students and families dealing daily with financial, logistical, and mental and physical health issues, including poverty and opioid abuse.

It also provides hope to shrinking rural communities experiencing the loss of traditional economic and institutional bases. It does this not by imposing changes on schools and communities from outside, but by gathering local input and building the supports that each school or community needs.

“Schools are the heart of rural communities,” says Catharine Biddle, UMaine assistant professor of educational leadership and a TREE collaborator. “You’ve got families that have gone to the schools for generations. They host community events. Sports teams are a big rallying point.”

When local schools suffer, the entire community suffers. “We like to think that we’re practicing regenerative ecology,” Biddle says. “If you nurture the school, it spreads outward. The school is healthier and the community is healthier.”

Milbridge Elementary principal Maria White has deep roots in Washington County. Her mother grew up in South Addison, about 30 minutes down the coast, and her father grew up in Harrington, the next town over. He was superintendent for 15 years into the 1990s.

White knew she also wanted to teach in the small towns where she grew up. Today, she is a principal, and teaches fifth-grade reading, and fifth- and sixth-grade health and social studies.

“I like getting to know the students and watching them grow, get excited about things,” she says.

TREE assists students and families dealing daily with financial, logistical, and mental and physical health issues, including poverty and opioid abuse. It also provides hope to shrinking rural communities experiencing the loss of traditional economic and institutional bases. It does this not by imposing changes on schools and communities from outside, but by gathering local input and building the supports that each school or community needs.

AS THE students take their seats for the Monday morning assembly, one of many community-building activities at Milbridge Elementary becomes evident: Older students sit next to younger children — sixth-graders with kindergarteners, fifth-graders next to first-graders, and so on.

“Generally speaking, the older children will rise to expectations, and they — most of the time — are pretty good role models for the younger ones,” White says.

Since January 2018 when the TREE program started at Milbridge Elementary, each week has begun with a fun, interactive schoolwide activity that reinforces positive behavior and classroom learning objectives.

This day, one student from each grade comes to the front of the gym to lead a series of math exercises. Younger students do simple tasks, like arranging numbers written on whiteboards in order from lowest to highest. Older children tackle addition, subtraction, multiplication and division.

Educators hope to bolster math concepts before students and teachers embark on state-required testing.

Testing anxiety is a challenge for children and educators in Washington County. Poverty is another. Add to that substance abuse by adults in some of the students’ lives, lack of access to mental health services and health care, a flagging economy, isolation and, for minority and Native communities, racism. These can make a toxic cocktail of stress and trauma that impedes learning and healthy development.

Ray points to a landmark Centers for Disease Control and Prevention-led study of adverse childhood experiences (ACEs) that indicated young children’s cognitive development and overall health can be negatively affected by physical or emotional abuse and neglect, exposure to domestic violence or substance abuse in the home, and parental separation or divorce. Consequences later in life can include engaging in risky behavior and chronic health issues — even early death.

The TREE model addresses trauma and poverty in rural schools and communities in four overarching ways. First, it looks to improve access to health and wellness resources, including having a mental health counselor in schools to engage with children and families.

Second, a resource coach, trained in the latest poverty- and trauma-informed practices, acts as an extra staff member in the school. In the morning, the resource coach might jump into the classroom and teach a lesson; in the afternoon, he or she might be a mediator for a parent and teacher.

TREE also provides professional development for all Maine teachers and principals regarding strategies and practices for schools affected by trauma and poverty.

Lastly, the program emphasizes student voice and empowerment. TREE’s research-practice partnership seeks input of students and actively involves them in the transformation of their educational experience.

Transforming rural education

Ray says it's about creating supportive environments that recognize children bring more to school than their homework. And schools need to meet children where they are so they can achieve academic success.

This model of student and community well-being support was inspired by interviews and focus groups involving hundreds of Washington County residents, led by Ray and researchers from UMaine and Colby.

"So often we put academics at the top," she says. "And that's not to say that TREE doesn't believe it's of utmost importance. But we know that we need to meet the social and emotional needs of students, and TREE seeks to help teachers and schools and families and communities do that for all children."

PAMELA CANTOR is a child psychiatrist in New York City specializing in trauma and violence in children's lives. She works with Turnaround for Children, an organization focused on issues related to trauma and poverty in urban schools in the South Bronx.

Not long after the Sept. 11, 2001 terrorist attacks, Cantor was asked by New York officials to assess the impact of the events on the city's public school students. She and her

team recognized that, for students in the poorer neighborhoods, the day-to-day trauma of growing up surrounded by poverty and other social ills far eclipsed the trauma of 9/11.

The initial Turnaround for Children framework called for providing schools with three people with expertise in mental health or social work, instruction and leadership to be additional school personnel.

Cantor's brother is UMaine educational leadership professor Richard Ackerman. In 2012, Ackerman introduced Turnaround and Cantor's work to CCLC executive director Alan Furth, who went to New York to learn more about the program. Furth returned determined to find a way to bring a version of it to Down East Maine.

"In an incredibly supportive gesture, Pam said, 'If you can pull together a team of great experts in community development and education, you can have everything we've done, and create a rural model that is at least informed by Turnaround,'" says Furth, whose educational leadership was recognized with a 2011 UMaine Alumni Association Career Award.

The Maine initiative started with a seven-person advisory board that expanded to 32 community members in 2015.



Not long after the Sept. 11, 2001 terrorist attacks, child psychologist Pamela Cantor was asked by New York officials to assess the impact of the events on the city’s public school students. She and her team recognized that, for students in the poorer neighborhoods, the day-to-day trauma of growing up surrounded by poverty and other social ills far eclipsed the trauma of 9/11.

Ackerman says it was a struggle just to agree on the challenges to address, and long conversations ensued about what was meant by the word “trauma.”

In 2015–16, two catalysts helped bring the project into focus. First, Ray was hired as TREE program director. A “bridge-builder,” she brought a wealth of experience working in Washington County schools, and an ability to see the big picture and know whom to contact to make something happen.

The second catalyst was the formation of a research-practice partnership between TREE team members and faculty from UMaine and Colby. The partnership came together because of the unique personal and social circumstances that sometimes occur in a state like Maine.

Colby education professors Lyn Mikel Brown and Mark Tappan have longevity in the state’s academic community. Brown grew up in Calais and attended UMaine for two years. She and Tappan met in graduate school at Harvard. They were completing their doctoral programs in human development at the same time Ackerman was earning his degree in administration, planning and social policy. After graduation, Brown and Tappan shared a position at Colby, where Ray was one of their students.

In 2016, the researchers interviewed more than a dozen TREE advisory board members and observed some of the board’s meetings. Later that year and into early 2017, they conducted focus groups with more than 20 Washington County school administrators, 160 teachers, and 200 students, parents and community members. The goal was to evaluate issues and design a program tailored to the specific needs of the county communities.

Among the issues identified during interviews and by focus groups: lack of transportation for students; mental health support wait times as long as 16 months; and a shortage of nurses, school counselors and social workers in schools.

Teachers told the research team they cared about their students, but didn’t know how to help those who came to school hungry and were unsure where they would sleep that night. Students said the best part about school was the support they got from teachers. But students said they were frustrated by their lack of voice and input about what happens at school.

With this knowledge, the researchers designed a program to increase student and family access to mental health services, and facilitate greater connection to and sharing of community resources to meet needs.

In addition, they envisioned TREE empowering students to advocate for themselves, and build their social and emotional skills. The program also would seek to improve instruction and leadership in TREE schools.

Brown says efforts to transform a school must include people who directly experience that school’s policies and practices.

“Kids learn and are socialized in schools. They experience the gaps between family and school values and teachings,” Brown says. “If we want to develop trauma-informed practice that meets children where they are, we have to learn from them and be willing to take what they say seriously.”

CCLC raised more than \$1.3 million to start the pilot project in three schools. Initial funding came from an anonymous donor through the Silicon Valley Community Foundation.

Teachers told the research team they cared about their students, but didn't know how to help those who came to school hungry and were unsure where they would sleep that night. Students said the best part about school was the support they got from teachers. But students said they were frustrated by their lack of voice and input about what happens at school.

Other anonymous donors also backed the project, as did the Elmina B. Sewall Foundation, Jane's Trust, the Charles G. Wright Endowment for the Humanities, the Maine Community Foundation and the Boston Foundation.

The pilot schools were chosen based on criteria such as percentage of students receiving free and reduced-price lunch, special education rates and test scores, and the willingness of faculty and staff to look critically at their operating assumptions.

It also was important that the schools had a history of partnering with community agencies or organizations, "and really were collaborative in nature," Brown says.

Although the TREE program is in its early stages, some evidence has emerged that its focus on creating safe and supportive environments for students is making a difference. Ray points to state testing data at Milbridge, where last school year there was marked improvement in math and literacy scores.

A **HOMEMADE** poster regularly adorns the trophy case in the Milbridge Elementary School hallway. This day, the poster features a tree, sun and colorful cartoon animals proclaiming "Today is Kayla's 4th grade Someday."

Students are invited to submit recommendations for something special they'd like to have happen someday at school, says Laura Thomas, TREE resource coach for Milbridge. During the year, the program seeks to fulfill everyone's someday.

"Some of them have been just eye-opening," Thomas says of the student requests, including several from second-graders who asked to have seconds at lunch. In addition to the predictable requests for extra-long recess, there have been suggestions for opportunities for students to feel more engaged. Kayla, the student whose name is on the poster, wanted to do a cooking competition like on the reality show "MasterChef Junior."

"They made pizzas that were judged on creativity, uniqueness (and) originality. And we talked about what kids can accomplish in being thoughtful about what you do," Thomas says.

She knows the challenges that many students face in Washington County. She was a nontraditional, first-generation college student when she earned a degree in 2009 in elementary education at UMaine. She worked for a year in Bangor before accepting a position teaching English as a second language in Milbridge.

Thomas noticed that students in Milbridge needed help to meet basic needs of food, clothing and hygiene. The school offered a small meal assistance program in addition to free and reduced-price lunch, but there wasn't enough food to meet demand.

"We had kids (who) on Wednesday would be asking if it was food day, which wasn't until Friday," she says.

The school collaborated with Maine Seacoast Mission to build a food pantry in a corner of a resource classroom. Today, the shelves are stocked with nonperishable goods,

including snacks that students can grab if they're hungry.

Last year, the school bought a refrigerator with a grant from Good Shepherd Food Bank, which delivers 36 half-gallons of milk a week to the school. Some of the milk goes home with students whose families need it. The refrigerator also means the pantry can accept cheese, yogurt, meat and other perishable products.

Thomas says seeing students take advantage of the food pantry has been rewarding. One student, the oldest of several siblings, has used supplies to help prepare meals for her brothers and sisters.

"And to think, having this be something she can use, but at the same time also thinking, that's a lot to think about when you're a fourth- or fifth-grader," Thomas says.

A clothing closet, a tiny room connected to the school library, contains winter boots, socks, soap, shampoo and toothpaste. All of it has been donated and is free for students.

"Teachers know it's here now," Thomas says. "I think if there's a kid that they feel like has worn the same clothes every day, it's just checking in with the kid and checking

in with parents, you know: 'We have lots of stuff here. Is there stuff that we can send home with you guys?'"

Kandi Robertson, a therapist working with TREE in Milbridge, says in the first year of the program she interacted with clients in the school one day a week. Now in the second year, she sees clients twice a week.

"I get to walk down the hall and directly talk to teachers where they're having difficulties," says Robertson, who uses a play therapy approach to help children process trauma and other issues. "I can take my session with the child from the playroom — strategies and things that we're working on — and walk right into the classroom and put those in practice."

Robertson says she has noticed a difference in the students she's working with; they play more openly and build friendships. A fourth-grader recently told her he's so happy that he now has some hope, that he has friends and things are going to get better for him.

The same boy, she says, almost made the honor roll after having never come close before. "He's just feeling more confident and better about himself." ■



'What makes us human'

Two English majors named inaugural McGillicuddy Humanities Center Fellows

KIM CROWLEY and Nick Rotter-Weller are the inaugural recipients of the Clement and Linda McGillicuddy Humanities Center Undergraduate Fellowship.

The fellowship provides financial support so students can concentrate on coursework, develop research projects, work collaboratively with peers, participate in interdisciplinary humanities programs and gain professional skills.

Crowley, of Newport, Oregon, majors in English, focuses in professional writing and minors in marketing. "The Personal Is Poetic: A Case for Poetry Therapy" is the title of her Honors thesis and fellowship project.

"Since I never knew why I was drawn to poetry over other artistic expressions, I wanted to research its clinical uses and compare them to my own, to use it to better understand my experience and vice versa," she says. "It's valuable because it feels very personal, but at the same time, it could be beneficial to other people."

Rotter-Weller, of Palos Verdes Estates, California, majors in English, concentrates in analytical writing and minors

in political science. Talking politics led him to his capstone and fellowship project — an interpretation of Arthur Miller's play "A View from the Bridge" that seeks to escape the 20th-century ideological binary of capitalism versus communism.

"The idea was a culmination of years of research into political ideology and the Cold War as it relates to drama," he says.

The McGillicuddy Humanities Center promotes intellectual curiosity and critical reflection, and advances teaching, research and public knowledge about art, literature, history, philosophy, politics and diverse cultures.

"The humanities are what you're drawn to after your material and physical needs are met," says Rotter-Weller. "The name is apt — it's a uniquely human thing. It's valuable and people gravitate toward it."

For Crowley, "having these spaces where you can sit, think and engage in discourse surrounding your interests really grounds you and brings you back to the things that matter. It is what makes us human, after all." ■



Students first

Nick Rotter-Weller and Kim Crowley

REGENERATION DEBT

EXTENSIVE LAND development, invasive species and too many deer may make it difficult for tree migration to keep pace with climate change in the Northeast, according to a new study.

The research, led by Kathryn Miller, a plant ecologist with the National Park Service Inventory and Monitoring Division, and Brian McGill, a University of Maine professor of ecological modeling, analyzed U.S. Forest Service data covering 18 states, from Tennessee to Maine.

The researchers found a large swath of land in the mid-Atlantic states severely lacking in forest regeneration. Even where present, species regenerating on the forest floor differed from those making up the forest canopy.

Earlier studies have raised concern about regional regeneration, but this is the first to document the sheer extent and severity of the problem, according to Miller, who recently earned a Ph.D. from the UMaine School of Biology and Ecology.

Coining the term “regeneration debt” to describe this phenomenon, the researchers found the region simultaneously faces challenges of more invasive plants, deer overabundance and heavy land development.

The zone of regeneration debt raises questions about the future of forests in the immediate region and far into the northeastern U.S., according to the researchers, whose findings were published online in the *Journal of Applied Ecology*.

Miller and McGill say combining this research with a 2018 study they conducted raises even more concerns. The earlier study simulated a century of seed dispersal for 15 tree species across the eastern U.S. while taking into account current land development patterns.

The researchers’ simulations revealed an area in the mid-Atlantic region with such extensive human land use that tree dispersal was effectively blocked from moving northward. The species most affected by this dispersal barrier are the same oak, hickory and pine species found to be experiencing severe regeneration debt.



FISH AND FAT

SOME PEOPLE trying to eat healthy increase their consumption of salmon, tuna or mackerel — foods rich in omega-3 polyunsaturated fats (n-3 PUFA).

People also take fish oil supplements that boost intake of vitamin D for healthy bones and muscle, and to regulate the release of serotonin, which affects appetite and stress.

And why not? The prevailing nutritional narrative is that diets that include omega-3 fatty acids and fish oil supplements are metabolically healthy, says Kristy Townsend.

But the University of Maine neurobiologist demonstrated, for the first time, that while young mice on an n-3 PUFA diet had a striking reduction in weight gain, they also sustained adipose, or fat, tissue damage and dysfunction.

That’s because the n-3 PUFAs had undergone peroxidation, a process of nonenzymatic degradation that produces toxic fatty acid byproducts.

Regardless of the source of the n-3 PUFAs, including tinned fish and fish oil supplements, as well as attempts to mitigate the process of peroxidation, Townsend found most sources contained high levels of potentially harmful peroxidized lipids.

The findings potentially have important implications for human nutrition and dietary health, says the associate professor of neurobiology.

Since the brain is second only to adipose tissue (fat, or loose connective tissue that stores energy and cushions and insulates the body) in terms of fat/lipid content, it’s important to understand how dietary fats affect brain and adipose lipid metabolites — small molecules involved in metabolism — and their cellular functions.

The types of tissue damage Townsend observed in the adipose of mice on the peroxidized n-3 PUFA diet also have been observed in people, and have been linked to underlying mechanisms of cardiovascular disease, cancer and neurodegenerative diseases, including amyotrophic lateral sclerosis (ALS), Parkinson’s disease, Alzheimer’s and Huntington’s disease.

The findings were published online in ScienceDirect’s *Journal of Nutritional Biochemistry*.

TICK TESTING

UNIVERSITY OF Maine Cooperative Extension is accepting tick samples for tick-borne disease testing. Maine residents can have ticks tested for the pathogens that cause the three most common tick-borne diseases — Lyme disease, anaplasmosis and babesiosis — for \$15 per sample. Species identification of tick samples continues to be free.

Testing is done at the new UMaine Extension Diagnostic and Research Laboratory in Orono.

Prior to the lab's opening last summer, UMaine Extension was the only resource providing tick identification in the state. Now it also is the only resource in Maine available to the public that offers testing for tick pathogens.

The tick identification and testing program will allow researchers to track the spread of ticks and their associated diseases in the state, while also surveying for new tick species and pathogens.

Instructions on submitting a tick specimen are online.

Information on different tick species of Maine, tick management, tick-borne diseases and personal protection also is on the tick lab's website.

Photo by Griffin Dill



PREVENTING THE VIRUS THAT CAUSES PML

MORE THAN half the human population is infected with a virus that resides undetected in the kidneys of healthy people. But when a carrier of the human JC polyomavirus, or JCPyV, has a weakened immune system, the virus can migrate to the brain and become fatal.

The virus spreads through contaminated food or water and from person to person — as it settles in a person's urinary tract and bone marrow, and can be shed in urine. The virus stays in these sites for a lifetime, and many people never know they have it, says Melissa Maginnis, University of Maine assistant professor of microbiology.

In people with weak immune systems, the virus can travel to the brain and cause a serious infection called progressive multifocal leukoencephalopathy (PML), which damages the outer coating of nerve cells, causing permanent disabilities and eventually death.

Currently, there's no cure for PML.

Maginnis, who examines the biology of JCPyV seeking to identify ways to prevent the virus from causing PML, has been awarded more than \$435,000 through the National Institutes of Health Research Enhancement Award program.

Maginnis, a recipient of the 2018 UMaine Graduate Mentor of the Year Award, is dedicated to providing undergraduate and graduate student training opportunities in biomedical research.

The team hopes its findings will improve the understanding of JCPyV and possible treatments for PML, and enhance knowledge of how viruses invade cells.

Maginnis and her team recently published an article in the *Journal of Virology* that identifies specific components of the cellular pathway usurped by JCPyV to invade cells in the kidney and nervous system. The study was led by Colleen Mayberry, a Ph.D. student in the Maginnis Lab and alumna of the undergraduate biochemistry program.



This research will pave the way forward to better understand **how viruses are able to sneak into cells and cause infection.**

Melissa Maginnis



Reuse value

THE RELATIONSHIP between community resilience and reuse markets is the focus of a project led by University of Maine researchers.

Cynthia Isenhour, a professor of anthropology and climate change, and Andrew Crawley, a professor of regional economic development, were awarded more than \$265,000 from the National Science Foundation to examine Maine's reuse markets and their potential to advance social, environmental and economic public policy goals.

The study is part of "ResourcefulME," a three-year research project designed to explore Maine's vibrant culture of reuse — yard sales, flea markets, Uncle Henry's, thrift stores, antique shops, community swaps, lending libraries — and the value of these practices.

"Policies designed to encourage reuse are popping up all over the country, as cities and states have learned how effective reuse can be for climate mitigation, waste reduction and natural resource conservation," says Isenhour, who also is a faculty associate in the Senator George J. Mitchell Center for Sustainability Solutions. "Maine already has a vibrant reuse economy, which raises all sorts of interesting questions about its cultural roots and whether there are lessons here in Maine that might be valuable for encouraging reuse in other locales."

While recycling aims to recover reusable components and materials from waste to produce new goods, reuse refers to recirculating goods in their original form. Despite claims of economic and environmental benefits, reuse economies are significantly understudied, according to the researchers.

NAME THAT PLANT

SINCE ITS inception, University of Maine Cooperative Extension has provided free plant identification for anyone with an interest in Maine flora.

The newest development in this service is an online mobile-friendly, interactive Plant Identification Submission Form.

Users can enter plant information and upload photos from their computer or mobile device, and submit them to UMaine Extension ornamental horticulture specialist Matthew Wallhead. Accompanying descriptive information could include whether the plant is woody or herbaceous, its size and location, and when the photo was taken.

After asking any follow-up questions, UMaine Extension experts can share information about the plant, which may include how to manage the invasive weed, cultivate the crop or tend to the ornamental.

UMaine Extension also can still receive plant samples for identification in any of its 16 county offices statewide.

Plant identification is particularly relevant for farmers, landscape horticulturists, nursery managers and gardeners seeking to identify varieties of crops, weeds, native plants or ornamentals.



UMaine Extension's **online Plant Identification Submission Form** is a resource designed for home gardeners and commercial horticulturists.

ANTHRAX RESPONSE

BETTER PREDICTION of the emergence, spread and evolution of the environmentally transmitted pathogen that causes anthrax is the focus of a National Science Foundation award to the University at Albany, State University of New York and the University of Maine.

Wendy Turner, University at Albany assistant professor of biological sciences, is leading the research team on the four-year, nearly \$2.5 million project. Co-principal investigator is Pauline Kamath, UMaine assistant professor of animal health. They will be joined by scientists from the University of Pretoria, University of Namibia, University of Oslo and University of Hohenheim.

Anthrax is a serious infectious disease caused by the bacteria *Bacillus anthracis*, according to the Centers for Disease Control and Prevention. The environmentally persistent pathogen naturally occurs in soil, and can infect wild and domestic herbivore animals that inhale or ingest spores in soil, plants or water. The disease is zoonotic, meaning it can be transmitted from animals to humans following contact with infected carcasses or animal products.

The variation in anthrax outbreaks worldwide hinders successful prediction and response, according to the researchers. There is a lack of understanding of the factors driving geographic differences in the ecology of the pathogen, as well as the pattern of disease outbreaks.

The scientists will conduct research in two national parks in southern Africa where anthrax outbreaks differ in timing and severity.

The research, which uses genomics, statistics and dynamic modeling, has implications for public health, agriculture and biosecurity. It also could add to the understanding of other epidemic and emerging diseases that similarly have a variety of transmission modes, high environmental survival and wide host range. Researchers will build models to predict anthrax transmission dynamics across ecosystems.

The research will facilitate development of predictive tools to better manage public health and related policies for complex, multithreat zoonotic diseases, including anthrax.



OVERLOOKED TRENDS, UNDERESTIMATED RISKS

A REANALYSIS of worldwide annual trends in precipitation demonstrates that risk to human and environmental systems has been underestimated, according to University of Maine researchers. As a result, they found more than 38 percent of the global population and more than 44 percent of land area have been experiencing overlooked precipitation trends.

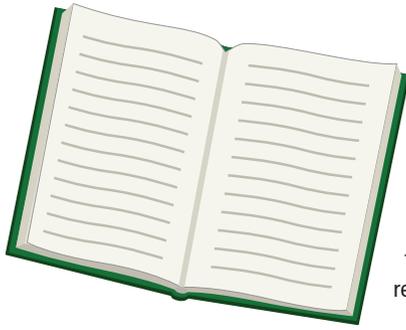
Conventional trend analysis approaches examine changes in mean annual precipitation over time, and erroneously assume that changes in high and low precipitation levels follow suit. That's according to Anne Lausier, a UMaine doctoral candidate in civil and environmental engineering and a National Science Foundation Graduate Research Fellow, and Shaleen Jain, professor of civil and environmental engineering.

In their paper, "Overlooked Trends in Observed Global Annual Precipitation Reveal Underestimated Risks," published in the journal *Scientific Reports*, Lausier and Jain present an innovative trend typology using quantile regression and offer a comprehensive analysis of overlooked trends worldwide.

The most frequently overlooked trends include an increased risk of extreme wet conditions and increased variability found in parts of the midwestern United States, northern Canada, south-central Asia and Indonesia — home to nearly 860 million people.

Conversely, the new comprehensive analysis found 840 million people exposed to a decreased risk of wet conditions, particularly in southern Africa, South America and parts of northern Asia, indicating a decrease in the incidence of high annual totals.

An estimated 630 million people are impacted by an increased risk of dry conditions in parts of southern Europe, the western U.S., southern Canada and northern Africa. More than 40 percent of global rainfed agricultural areas are exposed to overlooked trends, including parts of southern and western Africa and the midwestern U.S.



Poetry is one of the **more personal genres of writing** and has been used for centuries to provide beautiful, interesting language.

POETRY WORKS

EDUCATORS HAVE long recognized the power of poetry to inspire a child's enduring passion for language. But over time, poetry instruction for beginning readers has declined in favor of other teaching methods. Now, some scholars are trying to revive it.

University of Maine professor of literacy William Dee Nichols and four colleagues discuss why early reading teachers ought to be using poetry in their classrooms in an article, "Why Poetry for Reading Instruction? Because It Works!" published in the International Literacy Association journal *The Reading Teacher*.

Poetry is one of the more personal genres of writing, and has been used for centuries to provide beautiful, interesting language, according to the researchers.

Nichols and his co-authors define poetry in a broad sense, including traditional verse, nursery rhymes, playground chants and Dr. Seuss. Poetry's rhythmic and musical qualities make it especially adaptable to different ages and learning abilities, they say. Many poems also are short enough that they can be reviewed repeatedly during lessons, making them effective tools for developing skills such as fluency



WHERE HAVE ALL THE FLOWERS GONE?

SPRING WILDFLOWERS may face challenges in a warming climate. That's according to researchers who combined their findings with historical observations collected by philosopher and author Henry David Thoreau.

Conservation biologists Caitlin McDonough MacKenzie of the University of Maine and Richard Primack of Boston University presented Thoreau's scientific observations from the 1850s in Concord, Massachusetts to Mason Heberling, assistant curator of botany at Carnegie Museum of Natural History.

The data included tree and wildflower leaf-out dates measured for 37 separate years between 1852 and 2018. Their findings were published in the scientific journal *Ecology Letters*.

Primarily as a result of human activities, temperatures in Concord, Massachusetts have warmed by 3 degrees Celsius over the past century, say the researchers.

During the same time period, tree and wildflower leaf-out dates — when plants produce leaves — have shifted significantly.

"Wildflowers are now leafing out about one week earlier than 160 years ago, but the trees are leafing out two weeks earlier," says McDonough MacKenzie, a David H. Smith Conservation Research Fellow at the Climate Change Institute. "Understory wildflowers need the sunny conditions before the trees leaf out for their energy budgets, but we didn't know how a shadier spring would affect these plants on the ground."

SENSOR TECHNOLOGY FOR GERIATRIC HEALTH

THE UNIVERSITY of Maine is leading multi-institution efforts to provide physicians with tools to help aging people avoid falls and to detect biomarkers associated with pancreatic cancer.

Directed by UMaine engineering professor John Vetelino, researchers at UMaine, the University of Maine at Farmington and the University of Maine at Machias are collaborating with St. Joseph Hospital in Bangor.

"We wanted to know how the sensor technology that we are developing at UMaine could contribute to health care in Maine and beyond from the viewpoint of physicians and health care providers," Vetelino says.

UMaine researchers and students initially met with St. Joseph doctors and caregivers, and determined that a sensor system that collected data about the gait and fall risk of aging adults could make a significant and immediate beneficial impact.

In addition, UMaine and Dartmouth College researchers have begun collaborating on a sensor system to detect biomarkers associated with pancreatic cancer.





TAKING STOCK

THE ATLANTIC States Marine Fisheries Commission recently accepted a new assessment of northern shrimp populations in the Gulf of Maine that relied on a computer model developed at the University of Maine.

Yong Chen, UMaine professor for fisheries population dynamics in the School of Marine Sciences, and postdoctoral associate Jie Cao created the model, which divides the northern shrimp stock into size groups. It also incorporates temperature and tracks changes in the proportion of shrimp in each size group across seasons and years to estimate fishing mortality and population size.

The model uses data from the Northeast Fisheries Science Center Trawl Survey, the Gulf of Maine Northern Shrimp Summer Survey, commercial landings and a winter sampling program conducted in partnership with fishermen.

The new UMaine northern shrimp stock assessment model considers potential impacts of temperature on the dynamics of northern shrimp stock in the Gulf of Maine — a significant improvement in the assessment of northern shrimp that prefer colder water temperature, Chen says.



With a warming Gulf of Maine, such an improvement in the model is **critical for improving the quality of northern shrimp stock assessment.**

Yong Chen



Insights

Coastal climate futures

MAINERS CAN expect significant environmental changes in the next two decades due to increased greenhouse gas emissions and patterns of variability in the climate system, say University of Maine researchers Sean Birkel and Paul Mayewski.

Their report — “Coastal Maine Climate Futures” — provides a base for planners to prepare for a variety of plausible short- and long-term climate challenges in their communities, where fishing, forestry, tourism and agriculture are economic cogs.

Birkel is a research assistant professor and the Maine state climatologist based at the Climate Change Institute (CCI); Mayewski is a Distinguished Maine Professor and CCI director.

Maine’s coastal climate is strongly influenced by a number of factors that determine short- and long-term changes in climate. Those key factors include El Niño/Southern Oscillation (ENSO), volcanic eruptions and warming in the Arctic associated with increasing greenhouse gas emissions. ENSO is a particularly important feature as El Niño brings warm/dry conditions and La Niña brings cool/wet conditions to Maine.

This pattern of variability oscillates every three to five years. And the three strongest recent El Niño events (1982–83, 1997–98 and 2015–16) occurred approximately 15 years apart.

Birkel and Mayewski analyzed historical climate trends, climate-commodity connections and sources of climate variability that affect Maine to put forth five plausible climate scenarios for 2020–40. The scenarios: no additional change to the current “new normal”; moderate warming; another abrupt Arctic warming and even greater Arctic sea ice collapse; cooling from increased volcanic activity; and drying from more frequent and extreme El Niño events.



GREEK HISTORY

HISTORICALLY, FRATERNITIES and sororities on college campuses have mirrored broader social and cultural patterns when it comes to issues of race and racism. That includes patterns of oppression and exclusion, as well as racial uplift and cultural validation.

University of Maine assistant professor of higher education Kathleen Gillon analyzes these themes in the latest issue of *New Directions for Student Services*, for which she also served as lead editor.

Gillon says the goal was “to start conversations about issues related to equity and inclusion, specifically around race, ethnicity and culture in sororities and fraternities on college campuses.”

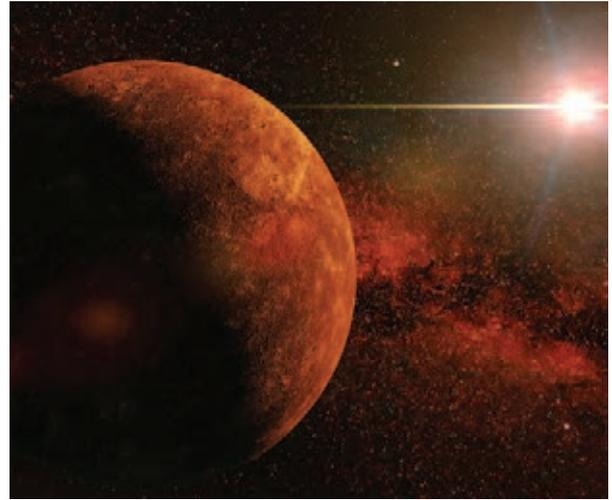
Gillon co-wrote a pair of articles in the collection. She was lead author, with Florida State University assistant professor Cameron Beatty and Florida Atlantic University assistant professor Cristobal Salinas, on “Race and Racism in Fraternity and Sorority Life: A Historical Overview.” Gillon was second author with Salinas and California State University, Long Beach director of student life and development Trace Camacho on “Reproduction of Oppression Through Fraternity and Sorority Recruitment and Socialization.”

In the historical overview, Gillon and her co-authors write that the earliest Greek-letter organizations in the U.S., established predominantly during the 19th century, “reflected the broader collegiate student population of the time.” Students of color were excluded from these groups, just as official and unofficial policies of segregation restricted which institutions they could attend.

In the early 20th century, students of color at some colleges and universities began forming their own fraternity and sorority groups in response to issues of academic discrimination.

According to the article, Black Greek Letter Organizations “included a principle of service to the community” that differentiated them from the more socially oriented fraternities and sororities established by white students. Gillon and colleagues say this theme of racial uplift continues in many black fraternities and sororities today.

As diversity improved in higher education, **multicultural fraternities and sororities** started to appear on college campuses to help “create a sense of **validation and cultural relevance** in light of the oppression and marginalization” students of color have historically experienced.



MERCURY'S GLACIERS

THE PROCESSES that led to glaciation at the cratered poles of Mercury, the planet closest to the sun, have been modeled by a University of Maine-led research team.

James Fastook, a UMaine professor of computer science and Climate Change Institute researcher, and James Head and Ariel Deutsch of Brown University, studied the accumulation and flow of ice on Mercury, and how the glacial deposits on the smallest planet in the solar system compare to those on Earth and Mars.

Like the moon, Mercury does not have an atmosphere that produces snow or ice that could account for glaciers at the poles. Simulations by Fastook's team suggest that the planet's ice was deposited — likely the result of a water-rich comet or other impact event — and has remained stable, with little or no flow velocity. That's despite extreme temperature difference between the permanently shadowed locations of the glaciers on Mercury and the adjacent regions illuminated by the sun.

“We expect the deposits (on Mercury) are supply limited, and that they are basically stagnant unmoving deposits, reflecting the extreme efficiency of the cold-trapping mechanism” of the polar terrain, according to the researchers.

Their findings, published in the journal *Icarus*, add to understanding of how Mercury's ice accumulations — estimated to be less than 50 million years old and up to 50 meters thick in places — may have changed over time. Changes in ice sheets serve as climatic indicators.

Analysis of Mercury's cold-based glaciers, located in the permanently shadowed craters near the poles and visible by Earth-based radar, was funded by a NASA Solar System Exploration Research Virtual Institute grant for Evolution and Environment of Exploration Destinations, and is part of a study of volatile deposits on the moon.

One of the team's primary scientific tools was the University of Maine Ice Sheet Model (UMISM), developed by Fastook with National Science Foundation funding. Fastook has used UMISM to reconstruct the shape and outline of past and present ice sheets on Earth and Mars, with findings published in 2002 and 2008, respectively.



CELEBRATING SUCCESS

THE UNIVERSITY of Maine Foundation was created on June 9, 1934 when University of Maine President Harold Boardman called the first meeting to order. The Class of 1909 has the distinction of making the first gift to the Foundation, presenting President Boardman, a member of the Class of 1895, with a check for \$1,000 that night at the annual Alumni Banquet.

Since 1934, the Foundation has experienced tremendous growth, thanks to many loyal donors. The foresight and generosity of alumni and friends have had a dramatic impact on the University of Maine.

Today, the University of Maine Foundation is leading the University of Maine's \$200 million Vision for Tomorrow comprehensive campaign. As of February 2019, more than \$170 million has been raised.

From a small annual fund gift to a multimillion dollar bequest or naming gift, it all makes a difference for the college of our hearts, always.

To create your philanthropic legacy through a gift to benefit the University of Maine, please contact the staff at the Foundation to become part of this transformational 85-year tradition.

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