

Fall 2024

THRIVE

NEWS FROM THE COLLEGE OF LIFE SCIENCES AND AGRICULTURE

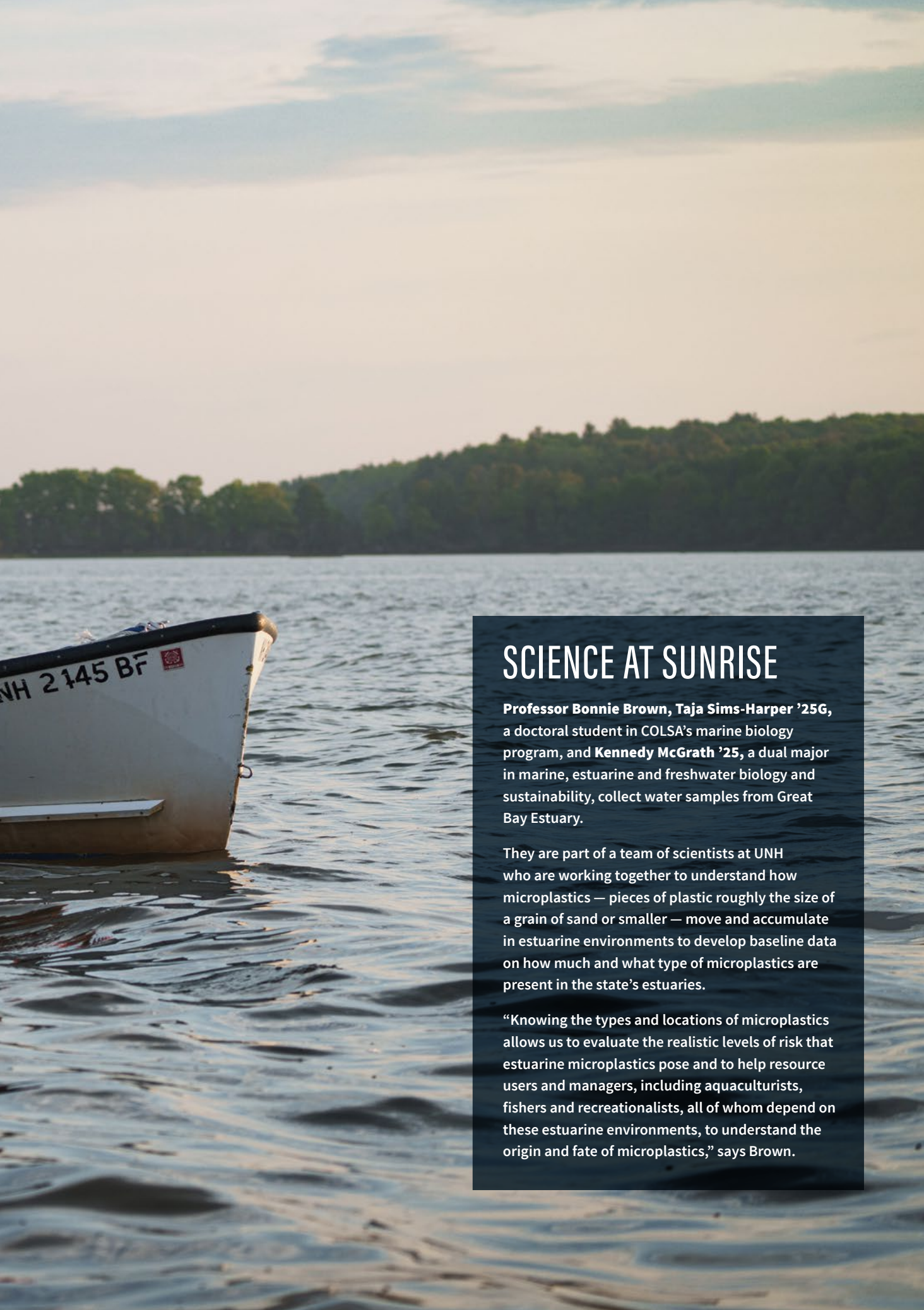
IN THIS ISSUE

The innovative teaching, transformative experiences and remarkable community that lead to student success



University of
New Hampshire





SCIENCE AT SUNRISE

Professor Bonnie Brown, Taja Sims-Harper '25G, a doctoral student in COLSA's marine biology program, and **Kennedy McGrath '25,** a dual major in marine, estuarine and freshwater biology and sustainability, collect water samples from Great Bay Estuary.

They are part of a team of scientists at UNH who are working together to understand how microplastics — pieces of plastic roughly the size of a grain of sand or smaller — move and accumulate in estuarine environments to develop baseline data on how much and what type of microplastics are present in the state's estuaries.

“Knowing the types and locations of microplastics allows us to evaluate the realistic levels of risk that estuarine microplastics pose and to help resource users and managers, including aquaculturists, fishers and recreationalists, all of whom depend on these estuarine environments, to understand the origin and fate of microplastics,” says Brown.



ON THE COVER

Gabrielle Jarrett '24 processes samples collected from New Hampshire's Hampton-Seabrook Estuary as part of her research investigating microplastic deposit patterns in salt marsh sediment. For more on Jarrett's work, check out her spotlight on page 20.

A FOUNDATION FOR THE FUTURE

I talk often about how the work of our faculty and students contributes in critical ways to solving the challenges that face our communities and ecosystems, in the Granite State and in many other places across the globe. And for good reason: There is a lot to talk about.

In this issue of THRIVE, however, I am truly pleased to share an array of stories that highlight the way we work to empower and nurture our students so that they, too, thrive, both while they are here and long after they graduate.

At COLSA, we are driven by the essential belief that students are here for more than a degree: They are here to build a foundation for a good and meaningful life. Where their work is an extension of their passions and a source of enduring pride. Where they learn to appreciate the world that surrounds them, to have a deep respect for knowledge and lifelong learning and — perhaps most important — to honor themselves and their well-being by being part of a community, connecting with friends and (my own personal favorite) taking a walk in the woods as often as they can.

Student success is at the core of what we do. From our faculty who deliver outstanding courses to our staff who provide the architecture that supports the many ways a student goes from freshman to graduate. This issue of THRIVE provides just a glimpse of the opportunities and programs that are in place.

Thank you for taking the time to read THRIVE, and I hope that we will see you on campus this fall, whether at the Taste of COLSA on October 18, for a visit to Spaulding Hall, or just because you want to explore campus. Feel free to reach out at any time by writing to colsa.dean@unh.edu.

Warm regards,

A handwritten signature in dark ink, appearing to read 'Anthony S. Davis'. The signature is fluid and cursive, with a long horizontal stroke extending to the right.

ANTHONY S. DAVIS

Dean, UNH College of Life Sciences and Agriculture

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Start UNH Homecoming Weekend with us at the **Taste of COLSA**

Friday, October 18, 2024
4 to 6 p.m.

Enjoy light refreshments,
including a selection of beer
and wine, food that our
students, staff and faculty
grow and study, and lively
conversation

Scan below to learn
more and register



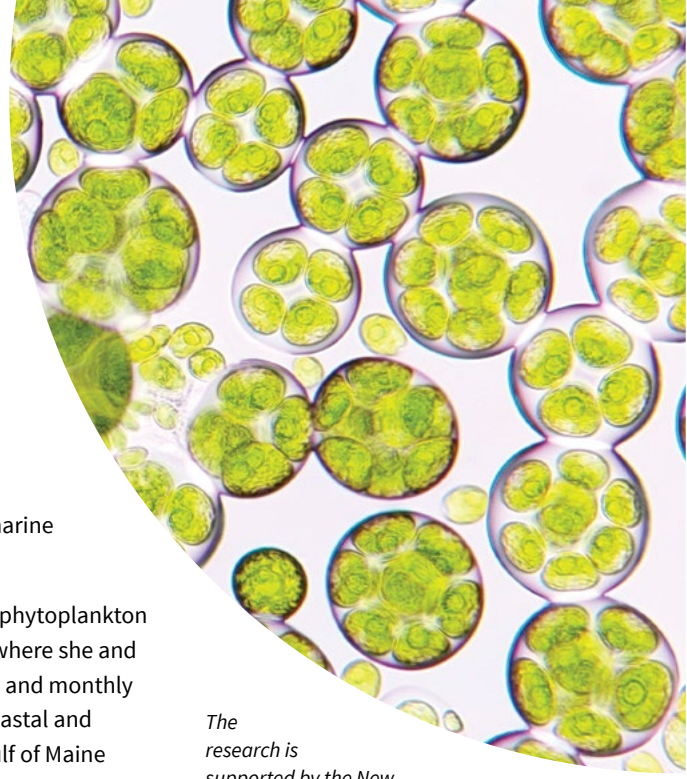
MICROSCOPIC PLANTS MAY FORETELL A DECLINE IN MARINE BIODIVERSITY

Phytoplankton are microscopic plants that sit at the base of the marine food web and play a significant role in regulating Earth's climate by helping to sequester carbon in the oceans. By studying phytoplankton, **Elizabeth Harvey**, associate professor of biological sciences, and her team aim to predict how global marine ecosystems will respond to climate change and potentially inform strategies to mitigate the effects of a changing climate on marine biodiversity.

"All the larger organisms that we enjoy eating or just observing rely on phytoplankton," says Harvey. "We can think of them as a marine version

of the canary in the coal mine — if we begin to observe significant changes in phytoplankton populations, these changes may directly alter the rest of the marine organisms present."

Harvey is focused on phytoplankton in the Gulf of Maine, where she and her team take weekly and monthly samples at several coastal and offshore sites. The Gulf of Maine is one of the fastest-warming bodies of water in the world, and thus is a critical area for observing climate change impacts. ▀



The research is supported by the New Hampshire Sea Grant, the National Science Foundation and the New Hampshire Department of Environmental Services.

RETHINKING MAPS TO INCLUDE INDIGENOUS PERSPECTIVES

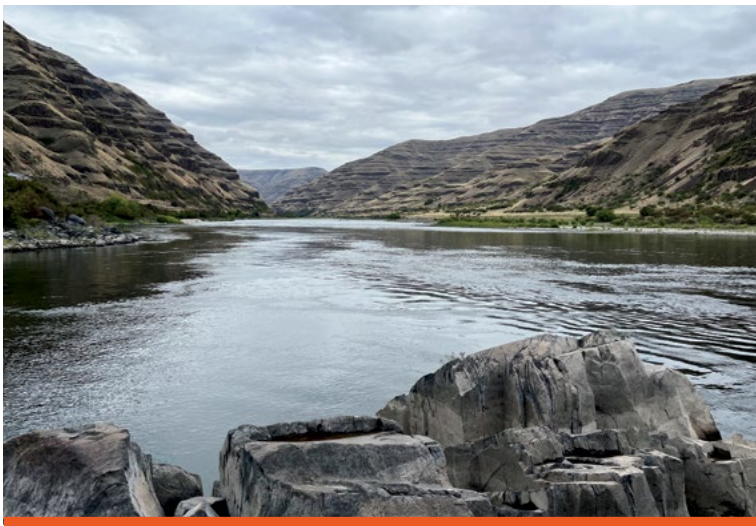
Scientists at COLSA are examining how our modern maps, which are used not just for navigation but also for research, land management and development, may not be showing the full picture of our landscapes — and how including indigenous knowledge and perspectives can support meaningful collaboration between tribal nations and land management agencies like the U.S. Forest Service.

Kristin Green, UNH natural resources and Earth systems science doctoral student, and **Teresa Cavazos Cohn**, associate professor of natural resources and the environment, previously worked with Nez Perce tribal members to create maps that include sites of water quality significance. At UNH, Green and Cohn plan to develop a guide for assessing and developing maps that could foster more effective consultation with indigenous groups

about national forest planning across the country — work that aligns with the federal government's increased efforts in recent years to include indigenous tribes in designing land management and forest planning practices.

The project is based on an indigenous research methodology called Two-Eyed Seeing, a collaborative strategy for engaging and respecting both indigenous and Western worldviews.

"Two-Eyed Seeing allows for true collaboration where folks can work from different perspectives in a way that's fruitful and respectful," says Green. ▀



CACTUS MICE OFFER INSIGHT INTO POTENTIAL CLIMATE CHANGE ADAPTATIONS

What can a tiny mouse tell us about survival in a changing climate?

Lots, COLSA researchers have found. The cactus mouse has evolved to be a desert survivalist, living in arid conditions and drinking barely any water. In a recent study, **Matthew MacManes**, professor of genome-enabled biology, and **Dani Blumstein '24G**, who recently earned her PhD in molecular and evolutionary systems biology, found that cactus mice respond to limited water access by eating less, a strategy called dehydration anorexia. By decreasing their food intake, the mice use less energy and limit water lost in digestion.

Blumstein says that our currently predicted patterns of climate change may force many species to face higher temperatures and more arid, water-stressed environments.

“Because of this, our findings are much more applicable to humans and other organisms that are likely to suffer physiological stress related to new conditions on our changing planet,” she says.

For future studies, says Blumstein, the MacManes lab will focus on non-desert-adapted species to develop an understanding of the degree of intervention needed to preserve non-adapted populations affected by climate change. 🇺🇸

The study was supported by the NIH National Institute of General Medical Sciences and published in the Journal of Experimental Biology.



REDUCING THE COST AND ENVIRONMENTAL IMPACT OF INDOOR FARMING

Md Sazan Rahman, assistant professor of agriculture, nutrition, and food systems, is developing sustainable technologies that support controlled environment agriculture (CEA). CEA is altering the landscape of food production in northern New England by providing optimal growing conditions inside greenhouses or other structures, regardless of external weather and temperature.

“CEA and the ability to grow our food indoors has become critical as populations rise, more and more global food crises occur, and our arable land diminishes due to climate change, overfarming and other factors,” says Rahman.

Rahman’s Engineering for Agri-Environment Lab recently developed a porous concrete substrate with embedded bioreceptive coils for hydroponic plant production. This material is strong, reusable and recyclable, and has a significantly smaller carbon footprint than other substrates. The embedded coils allow for temperature and humidity to be controlled at the roots, eliminating the need for additional HVAC systems that require more energy.

The goal of the new technologies, says Rahman, is not just to produce the same amount of food with fewer resources and lower environmental impacts, but also to reduce operational costs and the overall carbon footprint of CEA food production. 🇺🇸

RECOGNITIONS

2024 COLSA Teaching Excellence Award

Megan Enos-Fournier, senior lecturer and associate chair, department of molecular, cellular and biomedical sciences

2024 COLSA Outstanding Advisor Award

Liz Brock '01, clinical assistant professor

UNH Outstanding Assistant Professor

Nathan Furey, assistant professor

UNH Excellence in International Engagement

Drew Conroy, professor

J. Brent Loy Innovator of the Year Award

Iago Hale, associate professor

2023 William T. Pecora Award

Russ Congalton, professor

Stephen H. Taylor Agricultural Leadership Award

Robert Gibson, managing director, New Hampshire Veterinary Diagnostic Lab

Soil Ecology Society Professional Achievement Award

Stuart Grandy, professor

2024-2025 Fulbright U.S. Scholar

Wil Wollheim, professor (Spain)

2024 Fellow of the Society for Freshwater Science

William McDowell, professor emeritus

National Science Foundation Graduate Research Fellowship

Callyan Lacio '28G

Else Schlerman '28G

Goldwater Scholarship

Sarah Nicholls '25

NOAA Ernest F. Hollings Undergraduate Scholarship

Elisabeth Petit '26

UNH Granite State Award

Pauline Ikawa '77

COLSA Distinguished Alumni Award

Michael Paglia '02G

2024 New Hampshire Academy of Nutrition and Dietetics Awards

Outstanding Dietetics Educator

Amy Taetzsch '09, clinical assistant professor

Outstanding Dietitian of the Year

Gretchen Arnold '93, clinical associate professor

Dean's Awards of Distinction

Palash Mandal, agricultural science doctoral candidate

Lisa Buchalski, academic program manager

Melissa Mellor, pre-professional health programs advisor

Melissa Knorr, lab research supervisor

Vanessa Grunkemeyer, clinical associate professor

Community of Teaching and Research Scholars Award

Paul Tsang, professor

COLSA URC Awards

Poster Awards of Excellence

Arielle Kotulak '24

Margo Kamis '25

Matthew Rozinski '24

Madigan Jennison '24

Shea O'Connor '24

Sara Forcina '24

Kyla Drum '24

Most Outstanding Oral Presentation

Gabrielle Jarrett '24

Most Outstanding Poster

Maggie Krein '24

Nicole Marcotte '24

Graduate Research Conference Awards

Graduate Student Teaching Awards

Radhika Rani '24G

Kelsi Anderson '24G

Graduate Student Public Engagement and Outreach Award

Camryn Berry '26G

Granite State Society of American Foresters Awards

Undergraduate of the Year

Carter Cassedy '25

Ian Aldrich '25

Forest Tech Student of the Year

Evan Pauling '24AAS, '26

Graduate Student of the Year

Rue Teel '19, '24G

NASA Space Grant Fellowships

D. V. Bakke '24G

Sean Schaefer '24G

Alma Hernandez '24G

Convergent Arctic Research Perspectives and Education (CARPE) Fellowships

Nathan Alexander '22, '25G

Sam Bratsman '27G

Else Schlerman '28G

Dissertation Year Fellowship

Caroline Kanaskie '19G, '25G



Student Success: PRIORITY #1

Learn about the college team that works to make sure students get the most out of their UNH experiences

There are many reasons why, even during the pandemic, COLSA — and UNH as a whole — has had consistently higher-than-average rates of graduates employed or furthering their education, participation in internships and/or research prior to graduation and accepted into graduate programs compared with other colleges and universities in the U.S.

Undoubtedly, one of them is the College's commitment to comprehensive and professional advising — which includes undergraduate advising and pre-professional health advising — and career services. These resources are located together in COLSA's Student Success Hub, a constellation of offices and meeting rooms flanking the bustling hallway connecting Spaulding and Rudman Halls. Together, these teams provide essential guidance and resources, starting as early as fall of freshman year, that help ensure students will have the perfect alchemy of support, tools, knowledge and experience they need — so, no matter their chosen path, they graduate ready for what's next.

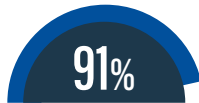
“There is nothing more rewarding for the team than working with students to find the intersection of what they are truly passionate about, what they enjoy doing and where their natural strengths lie, and helping them develop a plan that brings all these things together in preparation for a happy, fulfilled and productive future,” says **Kimberly J. Babbitt '84**, COLSA's associate dean of academic affairs and leader of the student success team.



COLSA Student Success



2 NUMBER OF ACADEMIC ADVISORS EVERY FRESHMAN IS ASSIGNED to support their educational and career goals — one professional advisor and one faculty advisor *(Does not include career office advisors)*



RECENT COLSA GRADUATES WHO ARE EITHER EMPLOYED OR FURTHERING THEIR EDUCATION (2023)



COLSA GRADUATES WHO COMPLETED AT LEAST ONE INTERNSHIP OR RESEARCH EXPERIENCE PRIOR TO GRADUATION (AVG. 2019-2023)

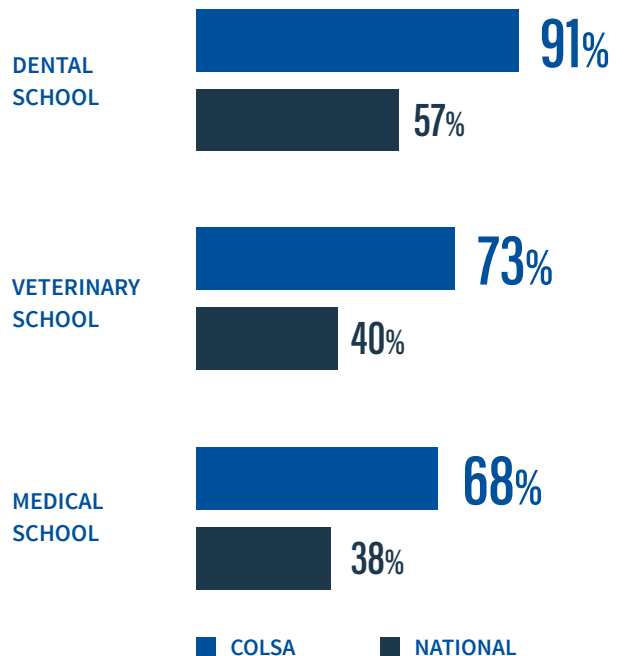


COLSA UNDERGRADUATES WHO PARTICIPATE IN FACULTY RESEARCH (2023)



COLSA UNDERGRADUATES WHO ENGAGE WITH THE CAREER OFFICE AT LEAST ONCE DURING THEIR TIME AT THE COLLEGE (2022-2023)

COLSA Student Acceptance Rates Compared to National Acceptance Rates



Meeting the Needs of Our Students

Undergraduate Advising

- Partners with students to provide individual guidance and support, including developing an academic plan, assisting with course registration and exploring extracurricular activities
- Collaborates with faculty advisors and the career team to provide students with a full range of supports, from navigating UNH policies and procedures to exploring research opportunities and career pathways
- Offers personalized holistic support for student success and well-being

Pre-Professional Health Advising

- Supports UNH students and alumni as they explore the health professions and become competitive applicants to professional schools
- Reviews prerequisite courses and creates academic plans
- Helps select experiential opportunities that strengthen applications and aids in the application process
- Provides a mentoring program that pairs medical school applicants with UNH alumni who recently started medical school

St. Martin Career Exploration Office

Part of UNH Career and Professional Services and serves the unique needs of COLSA students

- Career counseling based on students' individual personalities, characteristics, strengths and interests
- Comprehensive assistance for job, internship and graduate school application processes, including search strategies, cover letter and resume writing, interview preparation, personal statements and salary negotiation
- Employer recruitment and networking events and industry-specific career fairs and panel discussions with COLSA alumni
- Partnerships with faculty to seamlessly integrate career development into students' coursework and teach students how to articulate their skills, competencies and value 🍀

“The St. Martin Career Exploration Office was with me at nearly every step of my undergraduate journey, and their support was critical to getting me to where I am today.”

— Jessica Hodgkins '20



PRE-VETERINARY ADVISING

COLSA offers a pre-veterinary advising program that ensures students planning to attend veterinary school graduate with an ideal combination of classroom learning, field experience and clinical exposure. Expert advisors assist students throughout the entire process of selecting courses, exploring professional options and applying to veterinary schools. Each student's pre-veterinary advisor is there every step of the way to help plan for a successful and rewarding career in veterinary medicine.

“COLSA’s academic advisors are always eager to answer my questions and constantly support my goals. If I’m stuck and unsure of my next step, they are always available to help.”

— Kaitlyn DaSilva '26



Where Every Specimen Tells

The Essential Role of UNH's Natural History Collections

Natural history collections link past, present and future, documenting species diversity, tracking environmental change, supporting ecological studies and enhancing our understanding of the world.

At UNH, the Albion R. Hodgdon Herbarium and the UNH Collection of Insects and Other Arthropods exemplify these values. The insect collection, with over 800,000 specimens, aids entomological research and pest management, while the herbarium's 220,000 plant specimens, accessible online through its digitized collection, support botanical research and conservation.

Lost New Hampshire Flora: Rediscovering a Native Crabgrass

In 1901, several specimens of a peculiar crabgrass were discovered on the rocky slopes of Rock Rimmon in Manchester, New Hampshire. By 1931 they had vanished from the area, and the grass has not been seen since. Recently, UNH's Albion R. Hodgdon Herbarium, which holds three of the last known remaining specimens of the grass, played a key role in identifying these plants as a unique species, *Digitaria laevigulumis*, commonly known as smooth crabgrass.

The discovery involved collaboration among researchers at UNH and West Virginia University and in Mexico, as well as scientists from New Hampshire's Natural Heritage Bureau (NHB). Bill Nichols, New Hampshire state botanist and senior ecologist with the NHB, was the lead author of the study, which was published in the journal *Systematic Biology*. This marked the first documented plant extinction in New Hampshire and the 65th documented plant extinction in the U.S.

"Documenting the extinction of *Digitaria laevigulumis* has significant implications for biodiversity conservation," says **Erin Sigel '03**, collections manager for the UNH herbarium. "It highlights the vulnerability of endemic species, particularly those with very limited geographic ranges, and understanding the factors that led to the extinction of smooth crabgrass can help inform conservation strategies for other at-risk species.

"The case underscores the vital role herbaria play in preserving specimens and providing essential data for scientific research."



A Favorite Fruit at Risk: Identifying and Combating the Destructive Blueberry Gall Midge

UNH's Collection of Insects and Other Arthropods has been involved in key discoveries — including the identification of new invasive pests in New Hampshire like the Asian long-horned tick and the southern pine beetle — that have helped inform management practices and outreach efforts. One of the latest discoveries, made by **Monique Raymond '19, '23G**, a research technician in the department of biological sciences, was the identification of a fly species that feeds on and damages blueberry crops and are an emerging threat to blueberry plants. Infestations can result in significant crop loss and damage the plants' long-term productivity.

“Current monitoring methods struggle to detect these species,” says Raymond. “Without precise identification, developing effective integrated pest management — or IPM — protocols tailored for these pests, as well as their natural enemies, becomes incredibly difficult.”

One IPM strategy that Raymond explored in her study is the use of a specific parasitoid wasp that attacks the flies and is a promising alternative to chemical insecticides, which are often ineffective and harmful to non-target species, including pollinators. Specimens from the insect collection were critical to identifying the wasps, studying their interactions with the flies and developing effective biological control strategies.

Raymond's findings demonstrate that taxonomy and natural history collections can also help scientists solve practical challenges, including how to protect valuable crops and minimize environmental impacts.

“Accurate identification of invasive pests affecting agriculture, forestry and health requires access to reference collections to compare and determine effective biological solutions,” says **Istvan Miko**, collections manager of UNH's insect collection and a research scientist with COLSA. He notes that invasive pests can cause about \$33 billion in U.S. crop losses annually and incur tremendous mitigation costs and distinct ecological impacts. ▀

a Story



← The destructive blueberry gall midge

UNH's Albion R. Hodgdon Herbarium holds three of the last known remaining specimens of *Digitaria laevigulumis*, commonly known as smooth crabgrass.



Mighty Mitochondria

An early fascination with these cellular energy producers leads COLSA alumna Marcia Haigis '96 to an important discovery in the fight against cancer

The first time **Marcia Haigis '96** saw mitochondria, she was struck by their beauty and elegance. Mitochondria are organelles that generate the energy that powers the body's cells, decide which cells can be destroyed and control cell division and growth.

When it comes to cancer cells, however, all the work done by mitochondria is devoted to helping tumors survive and grow — they are elegant organelles with a destructive purpose. That growth requires a lot of fuel and generates a lot of cellular waste, including ammonia. What cancer cells do with that ammonia became a puzzle that Haigis was determined to solve.

A professor of cell biology at Harvard Medical School, Haigis and her research team have found a surprising answer: Rather than releasing ammonia and getting it out of the body, as cells normally do, cancer cells essentially recycle the ammonia and use it to fuel further growth.

Haigis was recognized for her research in 2023, when she was awarded the Samsung Ho-Am Prize in Medicine. She and her husband, **Kevin '96**, traveled to Seoul, South Korea, to receive the award.



“It’s always been a personal dream to work on a puzzle that, when solved, has the potential to contribute to human health. Working on mitochondria offered a piece of that puzzle.”

“It’s always been a personal dream to work on a puzzle that, when solved, has the potential to contribute to human health,” Haigis said during her acceptance speech. “Working on mitochondria offered a piece of that puzzle.”

Like the Nobel Prize, the Ho-Am Prize is awarded each year to individuals across disciplines who “have contributed to academics, the arts, and social development, or who have furthered the welfare of humanity through distinguished accomplishments,” according to the Ho-Am Foundation, which distributes the awards.

Nominations for the awards and the selection of winners are overseen by a committee. Haigis had no idea that she was being considered for the prize. “It was a huge surprise,” she said. “I felt very humbled and thankful to be nominated. And they didn’t just nominate me — they were honoring the work of the students and postdoctoral fellows in my lab. It’s a team recognition.”

Haigis’s research looks at the relationship between cancer cells and their waste products. Cancer cells need a variety of fuel sources to grow rapidly. For example, they use amino acids to build up cell biomass and survive in environments where normal cells cannot. After they use and break down amino acids, ammonia is left over.

“Because cancer cells are using and metabolizing so many proteins and amino acids, ammonia is generated and accumulates in the tumor’s microenvironment,” Haigis explained. “It’s been a long-standing question: What is the fate of all that ammonia that builds up?”

The answer: Cancer cells recycle the ammonia back into mitochondrial amino acids — and then use that fuel to keep growing. Using new technology like mass spectrometry, Haigis and her team were able to trace the life cycle of ammonia in cancer cells. They were surprised to see the cells reuse what has commonly been thought of as a waste product.

“It made sense that tumor cells wouldn’t just waste and throw away all the ammonia that they generated and would instead scavenge it and co-opt cellular pathways to take advantage of it,” Haigis said.

She and her team were intrigued to find this behavior across a number of cancer cell types, including brain and breast cancers.

Identifying ammonia as a fuel source in cancer cells opens up avenues for studying new potential treatments and poses exciting questions. “Are there other pathways that we haven’t anticipated that tumors might use and co-opt? What is the signaling in cells that happens downstream of the ammonia recycling, and what regulates the process in cancer cells? Those are things future studies are going to have to investigate,” Haigis said.

The roots of Haigis’s research can be found at UNH. It was in Professor **Rick Cote’s** biochemistry labs and classes that she learned fundamental skills and how to design experiments and analyze data. “It was a very supportive department,” she says. “There was a lot of scientific freedom. I could see for the first time how the lessons I was learning played out in the lab and helped solve scientific puzzles.”

When Haigis joined Cote’s lab in 1994, he was “immediately impressed” with her enthusiasm for taking on challenging projects. Her work in Cote’s lab led to a first-author publication in the *Journal of Biological Chemistry* — a distinction among Cote’s students that only she holds. “I am so proud, but not surprised, of what she accomplished in my lab, as well as her substantial achievements at Harvard Medical School,” Cote said.

The University also helped set the stage for Haigis’s personal life. She and Kevin met during an introductory biology class in Spaulding Hall and bonded over long study sessions and hours in the lab. “We always liked to go to the Dairy Bar and get ice cream,” she recalled. “It’s something we still do today when we return to UNH with our three children.”



Leading Research, Making an Impact

Many UNH undergraduates lead their own research projects, thanks in no small part to Paul Tsang and the Hamel Center for Undergraduate Research



Tsang, who has served as the Hamel Center's faculty director since 2011, stepped down from his role in spring 2024 but continues to teach and conduct research at COLSA. His expertise is in reproductive biology with a focus on fertility issues in dairy cows.

Paul Tsang, professor in the department of molecular, cellular, and biomedical sciences at COLSA, has played a pivotal role in advancing research opportunities for the University's undergraduate students as the faculty director of the Hamel Center for Undergraduate Research. We caught up with him recently to discuss how the Hamel Center and undergraduate research can shape the academic directions — not to mention the careers — of undergraduate students.

COLSA: How does leading their own funded research impact students' growth and experience at UNH?

Tsang: Engaging in research allows students to apply their classroom knowledge in real-world settings, contributing to their educational and professional development. It teaches them critical thinking, problem-solving, and resilience, as research often involves troubleshooting and overcoming unexpected challenges. This is an invaluable, high-impact educational experience for them.

COLSA: What are some of the funding programs offered by the Hamel Center?

Tsang: We offer several competitive grant programs, including the Undergraduate Research Awards (URAs), which is UNH's longest existing undergraduate research grant program; our summer grant programs — the Summer Undergraduate Research Fellowships (SURF) USA and SURF for Interdisciplinary Teams; the International Research Opportunities Program (IROP); and the Research Experience and Apprenticeship Program (REAP), which connects academically high-performing students to research opportunities during the summer following their first year of studies. We require students to submit a research proposal to be considered for one of these grants. Participating students are paired with faculty mentors. These programs cater to students at all different stages of their academic careers, from first-year students to rising seniors.

We also help introduce undergraduates to the process of research and what it entails through our Intercollege 590 Student Research Experience and 790 Advanced Research Experience courses. The Hamel Center also offers research proposal workshops and Research Presentation Grants. Combined, these efforts expose students to all aspects of the research world and help prepare them for graduate studies or professional careers. 🍷



BIOSCIENCE BOON

Renovated and expanded Spaulding Hall fully ready to welcome students

As part of COLSA's commitment to our students and faculty and our mission to enhance lives and livelihoods in New Hampshire and beyond, in the summer of 2019 the university broke ground on the Spaulding Biosciences Project, a \$95.5 million endeavor that included a 47,000-square-foot addition to Spaulding Hall followed by a full renovation of the original 83,000-square-foot building. This major project was completed in June 2024.

Biological science research can lay claim to many of the 20th and 21st centuries' most important scientific achievements: antibiotics, widespread use of vaccines, recombinant DNA, stem cells, and the sequencing of the human genome, to name a few. Looking ahead to a future shaped by increasingly complex global health and environmental challenges, we will continue to depend on bioscience research for the breakthroughs that protect and enhance our quality of life.

In recognition of this reality, COLSA is continuously investing in both our faculty's capacity to do high-impact research and our students' access to leading-edge technology and meaningful, real-world skill building. The work undertaken by COLSA faculty and graduates in the biological sciences

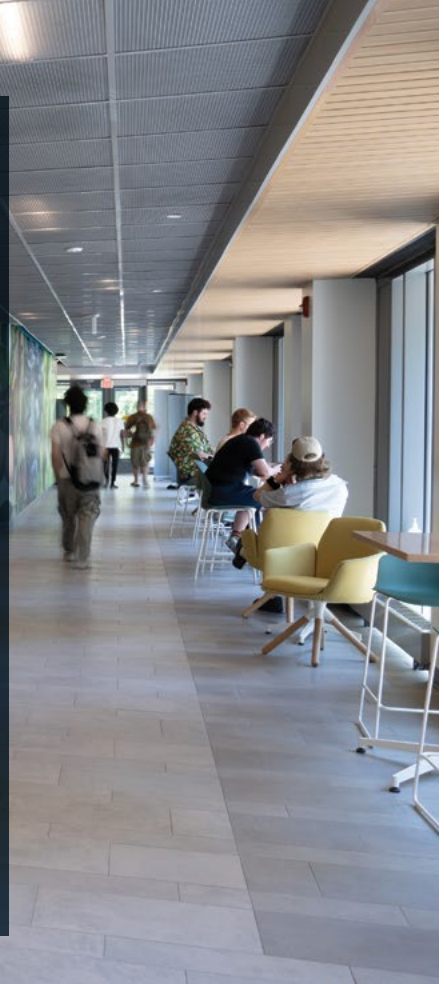
makes significant contributions in many areas, including human and animal health, research, environmental management and conservation, agriculture, biotechnology, business and industry, education, and politics and policy.

Now, Spaulding Hall not only provides a wide range of state-of-the-art spaces for advanced teaching and research, it also ably supports two of the College's central goals: expanding internship and research partnerships with the public and private sectors in New Hampshire and the continued development of a strong workforce pipeline that both prioritizes student goals and meets the growing demands for expertise in the life sciences across the state and region.

"The renovation and expansion of Spaulding Hall presents a tremendous opportunity for our students and faculty to continue to grow their impact," says **Anthony S. Davis**, dean of the college. "The intellectual horsepower across our community will take these expanded and upgraded labs and classrooms and put them to use in addressing the contemporary critical questions that face society, from human well-being through ecosystem health and everything in between."

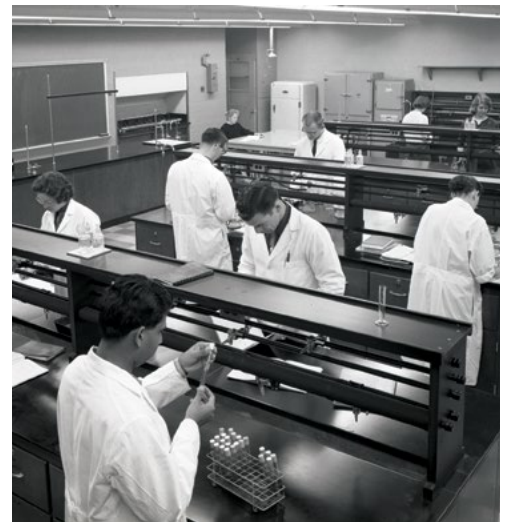
A few of Spaulding Hall's notable features:

- > Specialized research neighborhoods that foster seamless collaboration among faculty and students, support the specific needs of different types of research and encourage equipment sharing to reduce the building's energy footprint
- > An aquatic research core supported by both freshwater and saltwater laboratories that include giant tanks and living streams
- > A bioreactor core facility designed to carry out work with mammalian cell cultures vital for microbiology and biochemistry
- > State-of-the-art teaching labs to ensure students are ready for the modern workforce
- > A dedicated autoclave and glass wash facility for the sterilization of supplies used in teaching and research laboratories
- > Freezer farms throughout the building offering ultra-low cold storage units that support the preservation of cell lines
- > Large breakout and study spaces for individual and group study
- > Co-located area for the UNH natural history collections



SPAULDING HALL: A Look Back

The original Spaulding Life Science building was completed in 1960. The \$2 million, 82,000-square-foot building was named for former New Hampshire Governor Huntley N. Spaulding and his wife, Harriet Spaulding, and sister Marion Spaulding Potter, and housed the college's biochemistry, bacteriology and zoology departments. It underwent a limited laboratory renovation in 1995. 🇺🇸



Photos: UNH University Archives

DUCKWEED DISCOVERY

Can a common aquatic plant help protect the environment and improve crop health?

UNH researchers are studying whether a common aquatic plant called duckweed can be used as a natural fertilizer, reducing reliance on the chemical fertilizers used in agriculture and food production and, as a result, decreasing the amounts of nitrogen and phosphorus that could run off fertilized land and enter lakes, rivers and oceans. These nutrients cause a host of ecological and environmental problems in the water, including algal blooms and conditions in which fish and other species struggle to survive. In New Hampshire, nutrient pollution has also caused illness in people and animals and resulted in lake and pond closures.

According to **Anna O'Brien**, assistant professor in the department of biological sciences, several species of

duckweed are promising candidates for use as a “green manure” that would both reduce nutrients in stormwater runoff and support crop growth.

“Chemical fertilizers provide quick nutrient boosts, but when mismanaged can also lead to adverse environmental impacts. Green manures instead release nutrients slowly and support microbial activity, thus enhancing benefits to plants,” said O'Brien. “We chose duckweed as a possible green manure because it's a native plant in New Hampshire, it's naturally abundant in our waterbodies and research shows that it can recapture nutrients in runoff and agricultural wastewater.” O'Brien and her team, including **Alyssa Daigle '23, '25G**, a microbiology graduate student, are currently focusing on

how green manures from different duckweed species affect the levels of nutrient recapture and crop growth. They are also evaluating whether there is any risk of duckweeds transferring the toxins they absorb in their natural habitat, such as cyanotoxins produced by aquatic cyanobacteria, to crops.

“Ultimately, our findings could have significant implications for New Hampshire farmers large and small, offering a more sustainable and more affordable alternative to chemical fertilizers and practical ways to integrate green manure into agricultural practices,” said O'Brien. 🍷

This research is supported by the NH Agricultural Experiment Station through joint funding from the USDA National Institute of Food and Agriculture and the state of New Hampshire.





COLSA researchers are studying the impacts of tiny plastic debris on three key estuaries in the Northeast

MICROPLASTIC,
MACRO PROBLEM

According to recent research, as many as 358 trillion microplastic particles smaller than a grain of sand are floating on the surfaces of the world's oceans, and there are trillions more underwater. Their prevalence is a problem because the tiny particles are ingested by marine life and could have serious long-term implications for marine biodiversity, carbon storage and nitrogen cycling in the world's oceans.

There are also potentially serious implications for estuaries. These coastal regions, which provide critical nesting and breeding habitats for many animal species and serve as important ecosystems for cleaning and filtering ocean waters, are also known to trap and retain microplastics.

A COLSA team co-led by **Bonnie Brown**, professor and chair of the department of biological sciences, and **Gregg Moore**, associate professor of coastal restoration and resilience, are investigating the occurrence of microplastics in three of the Northeast coast's most important estuarine environments: the Great Bay Estuary and the Hampton-Seabrook Estuary, both in New Hampshire, and the Great Marsh in Massachusetts. The research will pave the way for further study of the impacts the particles have on estuarine organisms, water and sediment. Ultimately, the team aims to provide information and guidance to people who rely on estuaries for their livelihoods and those who use them for recreation.

Earlier this year, in a paper published in *Water Emerging Contaminants and Nanoplastics*, the team presented baseline data about microplastics in the three estuaries. They concluded that microplastics accumulate in areas with weaker water flow, more submerged vegetation and limited seabed erosion. According to the data, the Great Bay Estuary had the highest average number of microplastics — likely, says the team, because water is flushed more slowly there than in the other two more open estuarine environments. Another important outcome, according to **Taja Sims-Harper '25G**, a doctoral student in COLSA's marine biology program, was establishing a baseline for future studies of the effects of microplastics in the estuaries.

For the next phase of the work, the researchers will be modeling how and at what rate microplastics move through the estuaries, how many actually become trapped and where they accumulate. 🍷



STUDENT SPOTLIGHT: **GABRIELLE JARRETT '24**

Gabrielle Jarrett '24 used the microplastics research for her capstone experience, a critical milestone in fulfilling her degree requirements. The opportunity helped advance her skills in data analysis, sample processing and technical lab procedures and exposed her to the collaborative nature of science.

“Plastic pollution within the marine environment has been a primary interest of mine throughout my degree, so it feels serendipitous that I’ve been able to work on a study that I’m so passionate about as an undergrad,” says Jarrett.

In addition to working on the study with **Gregg Moore**, Jarrett conducted independent research on a subset of sediment samples from the Hampton-Seabrook estuary. She presented her work at the 2024 UNH COLSA Undergraduate Research Conference (URC), which she says offered her an extraordinary opportunity to practice science communication to a broad audience. She won “most outstanding oral presentation” at the event. The URC is one of the largest and most diverse events of its kind in the country and a signature annual showcase of student research and scholarly work at UNH.

Jarrett is now pursuing a master's degree in marine biology, studying microplastics in coastal wetlands in Moore's Coastal Restoration and Resiliency Lab. 🍷



COURSE SPOTLIGHT: ZOOL 566 Herpetology

Herps Perks

On a warm Friday afternoon in late April, **David Steinberg**, lecturer in the department of biological sciences, took his herpetology class on a field trip with two main objectives: to introduce the students to the herpetological diversity close to the campus and to collect data for a survey of amphibian breeding activity. Steinberg and Senior Lecturer **Jennifer Purrenhage**, with others outside UNH, will use the data to study the impact of climate change on seasonal events, like reproduction within biological communities.

With great enthusiasm, the students scoured vernal pools in UNH's East Foss Farm, a 164-acre tract of forested land less than a mile from campus, for signs of amphibious life. It didn't take long to spot green frogs, spring peepers, bullfrogs, wood frogs, redback salamanders and spotted salamanders, as well as gelatinous salamander egg masses that they carefully passed around.

The popular spring course, Herpetology, which is focused on the study of amphibians and reptiles — herpetofauna, or “herps” for short — fills quickly. Steinberg, who is certified in venomous snake handling, is excited to add more unique learning opportunities to the curriculum, including a revitalized reptile and amphibian teaching collection, a snake-handling lab where he can share latest best practices with students, and several new field trips that will widen the range of amphibians and reptiles they encounter. 🐍

“Professor Steinberg’s herpetology course was a fun, immersive experience that has opened my eyes to how unique and extraordinary the world of herps can be!”

— Sadie Smith '24





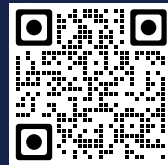
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FRUITS OF INNOVATION

Tasty, nutrient-rich, grape-size kiwiberries have long been recognized for their potential as a high-value crop in the Northeast.

In 2013 **Iago Hale**, associate professor of specialty crop improvement, planted nearly 200 varieties of kiwiberries at UNH's Woodman Horticultural Research Farm with the goal of testing the viability of the cold-hardy vined fruit for regional producers. While they've been growing in New England for nearly 150 years, the berries have yet to be produced on a commercial scale. That is about to change: Hale's years of work have made possible a commercial license that promises to drive kiwiberry production and distribution.

The kiwiberry's potential to become a new high-value crop aligns with Hale's vision of transforming regional agriculture. "Everyone should eat more weird fruit," he says.

