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## Momentum: Research & Innovation for Fall 2019

University of Rhode Island

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THE  
UNIVERSITY  
OF RHODE ISLAND  
DIVISION OF RESEARCH  
AND ECONOMIC  
DEVELOPMENT

# Momentum

Research & Innovation

## **COVER STORY**

**PASSIONATELY  
CONSERVING OUR  
NATURAL HERITAGE**

Featured Inside  
**Developing  
Technology for  
Medical Diagnostics**

Featured Inside  
**Digging Deeper  
into the Cultural  
Undertones of Music**

FALL **2019**



“From its inception 25 years ago, the RINHS has been THE institutional glue that has brought together the community of scholars, practitioners, and naturalists interested in Rhode Island’s biodiversity. It has served our students and faculty at URI, it has advanced our understanding of Rhode Island’s native plants and animals through its publications and conferences, and it has created a congenial community of people passionate about conserving our natural heritage.”

– Peter August, URI professor emeritus  
RINHS founding president and board member



**Momentum**  
Research & Innovation



# FROM THE VICE PRESIDENT

With the unprecedented and disturbing flood of both domestic and geopolitical events that have saturated our lives, with each day seeming like it contains a month's worth of "breaking news," it is next to impossible to keep track of complex chains of interwoven events and stories. Many of us are feeling exhausted, worn down and unsurprised anymore by the constant barrage of poor behavior and impulsive decisions that we witness nightly on the evening news or on twitter feeds.

If you think back to June of this year, a little more than four months ago, we were then facing a steadily growing cacophony of stories pertaining to the separation of young children (including infants!) and adolescents from their parents at the U.S.-Mexico border. The dramatic acceleration of this practice led to a chaotic set of events whereby thousands of children who were too young to talk, to defend themselves, or even to describe their parents physically were separated; and effective systems to later reunify families were completely absent or broken. Adults and children alike were warehoused, many without the ability to sleep with the lights off or to simply wash themselves or brush their teeth. Several children died from treatable illnesses, and we all witnessed images and read reports from venerable and trusted news organizations of hungry and dirty children being held under terrible prison-like conditions.

Although access to information about the continuation of these practices has become more difficult to obtain in recent months, the most recent statistics provided to congressional staff by the U.S. Customs and Border Protection Service (which may be out of date by the time this issue of *Momentum* has been printed), suggests that as many as 2,000 "unaccompanied alien children" are still being held in detention facilities at any one point in time.

What does a research university, such as The University of Rhode Island, have to offer as we consider the ramifications of current national and global crises? For the humanitarian crisis at the U.S.-Mexico border, we have social scientists such as Professor Evelyn Stern (Department of History, College of Arts & Sciences), who can help frame this issue as a humanitarian crisis rather than as an immigration crisis. We have Professor Karen McCurdy (Department of Human Development & Family Studies, College of Health Sciences), who can frame the trauma these children endure in terms of lasting effects on brain development, the emergence of psychological disorders and their high risk for post-traumatic stress disorder (PTSD). We have Professor Paul Bueno de Mesquita (Department of Psychology, College of Health Sciences), who adds support to the serious concerns of lasting negative impacts of such trauma on the future socialization and mental health of the children who are being victimized. And, we have Professor Julie Keller (Department of Sociology, College of Arts & Sciences) who can demonstrate how these current detention practices are entirely inconsistent with both the past century of U.S. immigration policy as well as international conventions on the treatment of refugee children. I invite you to read an article on their important work, in this issue of *Momentum*.

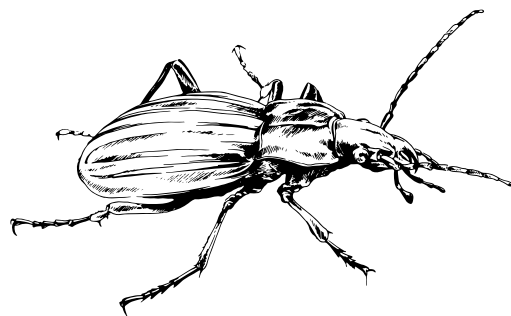
URI's faculty have expertise, knowledge and data – across a myriad of disciplines – to frame the context of this national discussion, to redirect debate to one that is based on facts and figures (as opposed to belief and bias), and to hold our leaders accountable. By doing so, we support groups right here, such as the "Never Again Action Rhode Island" movement, which has just succeeded in gaining support from our elected leaders to advance legislation that would ban private ICE detention facilities in our state. Our job as a research university is to help frame this public debate with education, with verifiable data, with deep content knowledge and with moral conviction.



Peter J. Snyder, Ph.D.

Vice President for Research and Economic Development  
Professor of Biomedical and Pharmaceutical Sciences  
Professor of Art and Art History  
University of Rhode Island

Scholar-in-Residence  
Rhode Island School of Design



**Momentum**  
Research & Innovation

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The URI library is evolving into a community hub of information and data in ways patrons never imagined. Dean Boughida has positioned the library system to create user and tech-based learning spaces, house a data analytics team, partner to launch a data science major, utilize 3D printers, lasers, and virtual reality to literally visualize learning and produce rapid prototyping research.

# Momentum

## Research & Innovation

### ACKNOWLEDGEMENTS

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Cover photo | Snapping Turtle

Inside cover photo Salt Marsh | photo by David Gregg



# PASSIONATELY CONSERVING OUR NATURAL HERITAGE ACROSS GENERATIONS CONNECTING A COMMUNITY OF SCIENTISTS AND ADVOCATES

written by **BETHANY DELOOF '21**



Moss sample from 2019 BioBlitz at Roger Williams Zoo.



Joe Warfel (left) nationally recognized as an expert on spiders and photography of spiders with RINHS Executive Director David Gregg.



# RINHS BIOBLITZ

Nancy Karraker  
URI Associate Professor  
Natural Resources Science

On a sunny June morning in Jamestown, RI, a group of children from Central Falls hopped off a bus and were ready for an adventure. Little did they know, as they shrieked at their first glimpse of a glistening pickerel frog, that by the end of the day they would be scouring the meadows looking for as many different kinds of frogs and toads as they could find.

The activity and excitement were part of the game of BioBlitz, the community engagement program that the Rhode Island Natural History Survey (RINHS) has organized annually for the last 20 years in cities and towns across the state. RINHS Executive Director David Gregg describes his favorite program, BioBlitz, as an opportunity to bring together community members from ages five to 95, spanning all levels of expertise, from world renowned scientists to a child wanting to learn more about frogs.

“What we try to do is match up participants from all age groups, so we have a kid who thinks the environment is really cool paired with teenagers, undergraduate and graduate students, professors, scientists, activists, and land trust representatives,” Gregg says. “People from all walks of life have something to contribute. Even the most

senior researcher doesn't know everything – and even the most 'green' beginner knows something.”

The mission of the non-profit RINHS, hosted since its 1994 founding by the University of Rhode Island (URI), is to gather and disseminate information on Rhode Island's animals and plants, geology, and ecosystems, to support the use of scientific information in the management of natural resources, and to facilitate the work of the people, agencies, and organizations interested in the state's ecology. The organization achieves this through a variety of programs, grants, partnerships, databases, tools, collections, libraries, and resource materials dating back decades.







2019 BioBlitz participants collecting and reviewing samples.


“Among the greatest contributions from my perspective are the opportunities the Survey creates to connect URI undergraduate and graduate students with scientists through field outings, BioBlitz, local conservation projects, and meetings,” says Nancy Karraker, URI associate professor of natural resources science. “Seeing one of our students working side-by-side with a scientist at BioBlitz, a pair of natural historians gazing through adjacent microscopes to identify, perhaps, an aquatic insect swept up from a pond or a beetle corralled into a cup in the forest, assures me that the good work of the RINHS will be carried on into future generations.”

Recently, in a collaborative project called Operation Spadefoot RI, in which the RINHS was instrumental, URI undergraduate and graduate students put into action what they learn about in their classes – implementing conservation measures for an endangered species. The eastern spadefoot toad (*Scaphiopus holbrookii*) is endangered in Rhode Island and only one population is

“One of the greatest contributions from my perspective is the opportunities the Survey creates to connect URI undergraduate and graduate students with scientists through field outings, BioBlitz, local conservation projects, and meetings.”

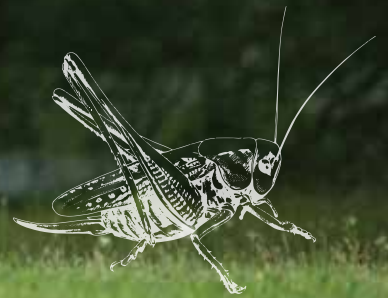
- Nancy Karraker



A photograph of two children walking away from the camera in a grassy field. The child on the left is wearing a pink shirt and blue shorts, holding a green insect net. The child on the right is wearing a light blue shirt and blue shorts, holding a white insect net. The background is a dense line of green trees.

“Even the most senior researcher doesn’t know everything – and even the most ‘green’ beginner knows something.”

- David Gregg



known to remain in the state. Their habitat was in danger of drying up due to climate change. Under the guidance of a wetland restoration specialist, Bill Buffam of the EDC, and with the coordination of the RINHS, 15 URI students joined the team to build two new breeding habitats in Richmond for this at-risk species.

“Having our students literally in the trenches for three days, working alongside conservation professionals, scientists, and members of the public, with the shared goal of saving this amphibian, embeds them in conservation communities working for positive change in the state,” says Karraker. “This was really an amazing effort by our students, and these are the kinds of connections that the RINHS is uniquely situated to make.”



2019 BioBlitz participants cataloging samples.



# RINHS

# THE NARRAGANSETT BAY COYOTE STUDY



Photo by Dave Hornoff/The Conservation Agency.



Photo by Dave Hornoff/The Conservation Agency.

Currently, RINHS is working on four major programs with partners across the state. The Narragansett Bay Coyote Study, funded by the RI DEM's Division of Fish & Wildlife through the U.S. Fish and Wildlife Service's Wildlife and Sport Fish Restoration Program, is developing scientifically informed coyote management practices with Roger Williams Park Zoo, the Potter League for Animals, the Norman Bird Sanctuary, and the Aquidneck Land Trust, as well as URI.

The project is led by Numi Mitchell, a biologist at The Conservation Agency in Jamestown, RI, and assisted by URI alum Kyle Hess, now at the RINHS. The program tracks coyotes on Aquidneck Island, Conanicut Island, and on mainland Rhode



“We know that the ultimate success of any coyote management strategies we propose will hinge on making successful connections with the public and government.”

- Numi Mitchell



Photo by Dave Hornoff/The Conservation Agency.

Island. Examining coyotes' movements and the food sources they use generates insights to help wildlife managers as well as increases public awareness and safety with regard to coyotes.

“The Conservation Agency – a collection of nose-to-

the ground researchers – has found the Survey, with its network of collaborators, contacts, and resources, to be an ideal partner,” says Mitchell. “We know that the ultimate success of any coyote management strategies we propose will hinge on making successful connections with the public and government. That is what they do.”





Photo by Amber Hardy '19.

RINHS also collaborates with the RI DEM on developing methods for rapidly assessing wetland conditions across the state to gather more precise information on the health and diversity of Rhode Island wetlands. This project, led by wetlands scientist Thomas Kutcher, uses GIS and remote sensing technology, as well as fieldwork, to obtain comprehensive views of watershed and wetland conditions.

The purpose of this work is to prioritize wetlands for protection, to assess and monitor impacts on wetlands due to degradation of habitats, and to monitor the location and extent of invasive species that affect state wetlands. Additionally, the project aims to develop a database to evaluate trends and identify causes, and to thereby consider and recommend management policy changes when needed.

“It’s really important that the state has the tools and processes in place to understand and manage our wetlands,” says Kutcher, “because they’re so important for people and wildlife.”

Salt marshes are one of the major environments at risk in Rhode Island.

Gregg notes: “Due to sea level rise salt marshes are disappearing. They need a break twice a day when the tide goes down. The problem is now that sea level is rising, they’re getting less and less of a break from inundation. So, at first, they become unhealthy and then they outright die. The plant roots don’t hold the marsh together and the marsh breaks off in chunks



RINHS Executive Director David Gregg. Photo by Kim Gaffett.

“Due to sea level rise salt marshes are disappearing. They need a break twice a day when the tide goes down. The problem is now that sea level is rising, they’re getting less and less of a break from inundation.”

- David Gregg

that mycorrhizal associations — connections between the plants’ roots and fungi in the soil — as well as the plants’ relationships with other plants around them, play an important role in plant survival. Without this communalism, the salt marsh plants won’t survive, and neither will the marshes.

“As a botanist trying to understand the various tolerances of the individual species, I was able in a sense, *to see* the environmental conditions created by the distribution of plant species across the project area,” says Leeson. “Combining my observations and documentation with physical data collected by others added another layer of understanding to the project results, and the insights gained are informing plans for future salt marsh enhancement projects.”

and erodes away. The marshes are actually falling apart and disintegrating.”

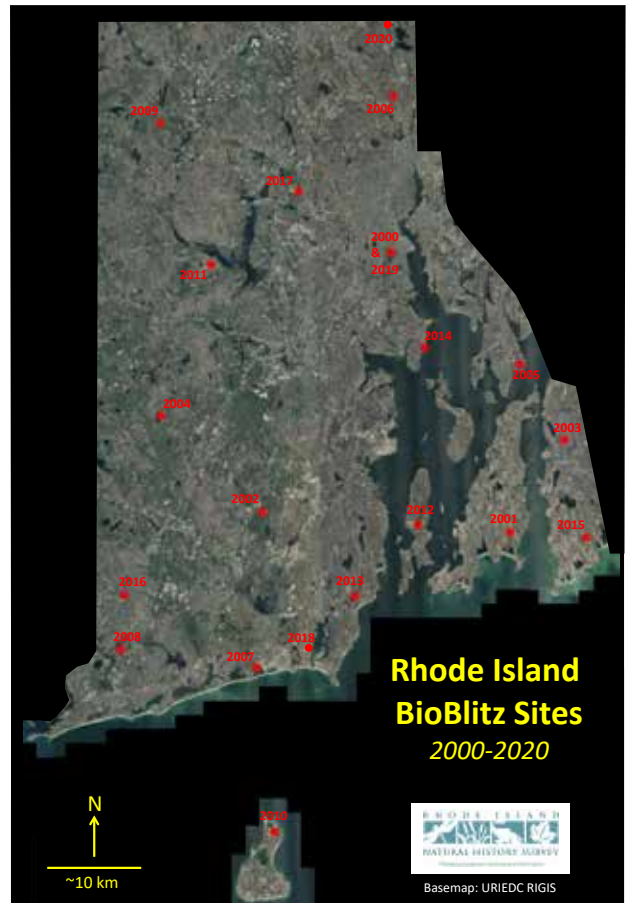
There are dozens of species that live only in salt marshes, according to Gregg. If all the salt marshes disappear, the state will lose a critical part of the ecosystem – with all of those species that depend on these marshes for survival, including birds, plants and insects.

The potential societal and health impacts of such erosion are both difficult to fully predict and potentially devastating. For example, salt marshes help to absorb storm energy such as the nor’easters common in New England. Fringing marsh land insulates the shore from waves and storm energy. Salt marshes also help to absorb sediments and pollution runoff from upland sources.

Along the coast, salt marshes and sea grasses capture and hold carbon, creating what is called a carbon sink. These coastal systems, though much smaller in size than the planet’s forests, sequester this carbon at a much faster rate, and can continue to do so for millions of years. Most of the carbon taken up by these ecosystems is stored below ground. When those soils disappear, the sequestered carbon returns to the atmosphere.

Gregg explains that people are trying to save the salt marshes by depositing thin layers of sand, putting up various types of barriers, and digging shallow ditches or “runnels” to let the water drain off. But now the question remains how will the plant life of the marsh respond to these efforts?

To research the impact of these interventions, RINHS, Coastal Resource Management Council (CRMC), and the National Oceanic and Atmospheric Administration (NOAA) are funding Hope Leeson, a botanist who studied the intricate plant communities in Rhode Island’s salt marshes in summer of 2018. She discovered



The 2020 RINHS BioBlitz will be at Mercy Woods, Cumberland, RI in early June.



**“An enormous piece of the puzzle is conserving enough habitat.**

To that end, I help federal, state, and local decisionmakers to consider the needs of wildlife in their policy, programs, and funding decisions, as well as to help local land-use planners make smart siting decisions that result in healthy, well-designed built spaces and to leave enough room for nature.”

- Amanda Freitas



Operation Spadefoot RI, releasing the endangered species into its new habitat. Photo by David Gregg.

The Rhode Island Natural History Survey also originated and helps support a full-time position to improve coordination between RI DEM and municipalities for wildlife conservation. Amanda Freitas is the Rhode Island Wildlife Action Plan (RIWAP) community liaison, funded by the U.S. Fish and Wildlife Service. The RIWAP brings together scores of scientists and educators from across the Ocean State to assess the health of non-game wildlife species and their habitats.

RIWAP identifies our most vulnerable animals and the greatest threats to their habitats in a statewide plan. Much of the conservation effort happens locally, however, among municipal planners, boards, and commissions. The community liaison, therefore, helps communicate to towns and cities the sometimes technical priorities set by the plan, and reciprocally helps communicate the priorities and constraints on municipal action to state wildlife managers. The liaison improves implementation of the current plan and improves future ones.

“An enormous piece of the puzzle is conserving enough habitat,” says Freitas. “To that end, I help federal, state, and local decisionmakers to consider the needs of wildlife in their

policy, programs, and funding decisions, as well as to help local land-use planners make smart siting decisions that result in healthy, well-designed built spaces and to leave enough room for nature.”



Under the guidance of a wetland restoration specialist, and the RINHS, 15 URI students worked alongside conservation professionals, scientists and members of the public, to build a new habitat for the spadefoot toad. Photo by Nancy Karraker.





“Having our students literally in the trenches for three days, working alongside conservation professionals, scientists, and members of the public, with the shared goal of saving this amphibian, embeds them in conservation communities working for positive change in the state. These are the kinds of connections that the RINHS is uniquely situated to make.”

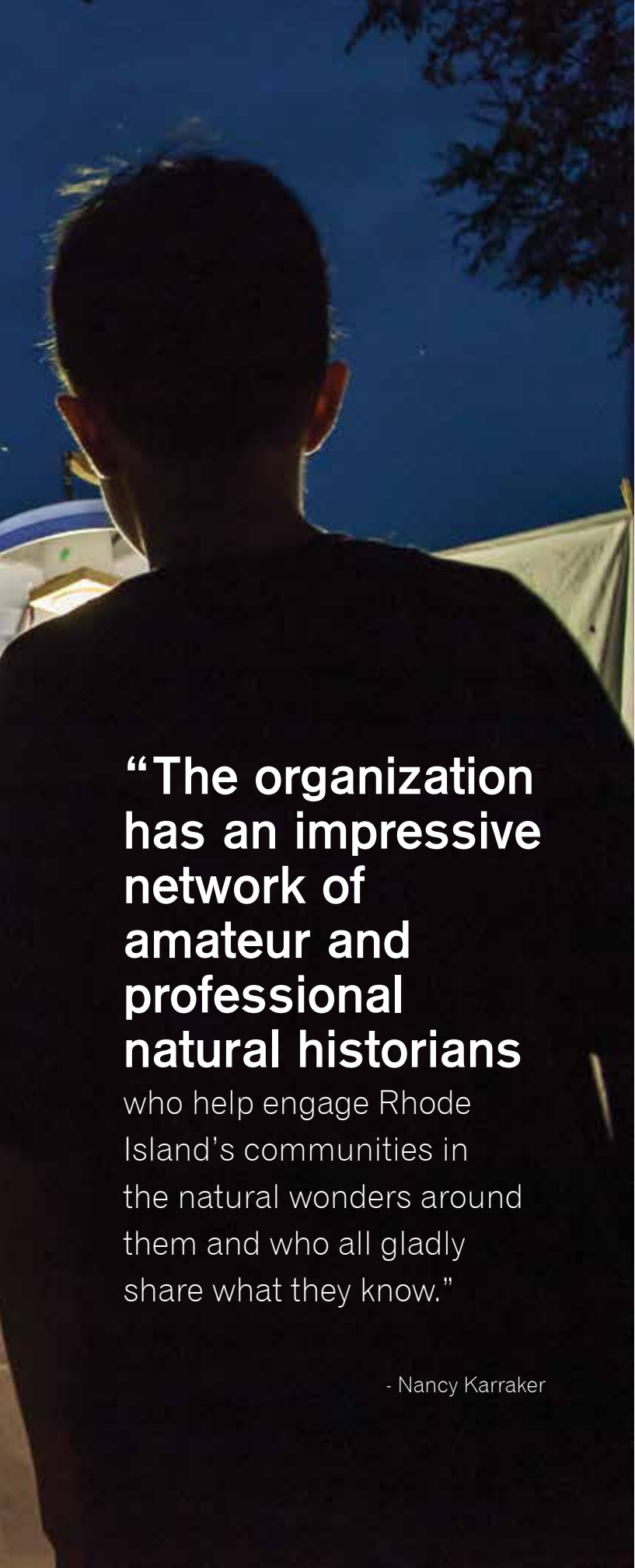
- Nancy Karraker



# RINHS

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# “The organization has an impressive network of amateur and professional natural historians

who help engage Rhode Island’s communities in the natural wonders around them and who all gladly share what they know.”

- Nancy Karraker



Northern Saw-whet owls believed to be a rare species in Rhode Island. Photo by Adriana Hughes '19.

These are only a few of the projects the RINHS is doing to preserve and protect the natural resources of Rhode Island. They also develop assessment tools for city and town land trusts. The RINHS facility, located on URI’s East Farm campus, also includes a classroom, conference room, and a library that includes a vast plethora of information spanning decades about the state’s biodata of plants, animals, rare species, invasive species, ecological communities and geological systems.

“The Rhode Island Natural History Survey is one-stop shopping for information on the natural history of orange sulphur butterflies, tupelo trees, harbor seals, snowy owls, spadefoot toads, or any other plant or animal, geologic formation, or unique soil type that a person is interested in,” says Karraker. “The organization has an impressive collection of amateur and professional natural historians, who help engage Rhode Island’s communities in the natural wonders around them and who all gladly share what they know.”

RINHS does this so Rhode Island’s natural scientists, educators, and decision makers have scientific data that can be used to help make informed management decisions, and to foster the preservation of the state’s natural history collections and provide educational outreach.

“From its inception 25 years ago, the RI Natural History Survey has been THE institutional glue that has brought together the community of scholars, practitioners, and naturalists interested in Rhode Island’s biodiversity,” says Peter August, URI professor emeritus, and RINHS founding president and board member. “It has served our students and faculty at URI, it has advanced our understanding of Rhode Island’s native plants and animals through its publications and conferences, and it has created a congenial community of people passionate about conserving our natural heritage.”







# *Exploring*

## DIVERSE PERSPECTIVES THROUGH FRENCH CINEMA

written by **ARIA MIA LOBERTI '20**

“That is the beauty of having students from diverse areas of study and backgrounds.”

- Leslie Kealhofer-Kemp

Leslie Kealhofer-Kemp embodies the University of Rhode Island's (URI) mission to cultivate ideas that transform the way we understand our world, each other and our differences.

“What we see represented on screen shapes our thoughts and our mentalities about others,” she says.

Her research interests are interdisciplinary, focusing on contemporary French cinema and television primarily in terms of representations of immigrants and minority-ethnic populations in France.

Through her research, the associate professor of French has explored how the narratives,

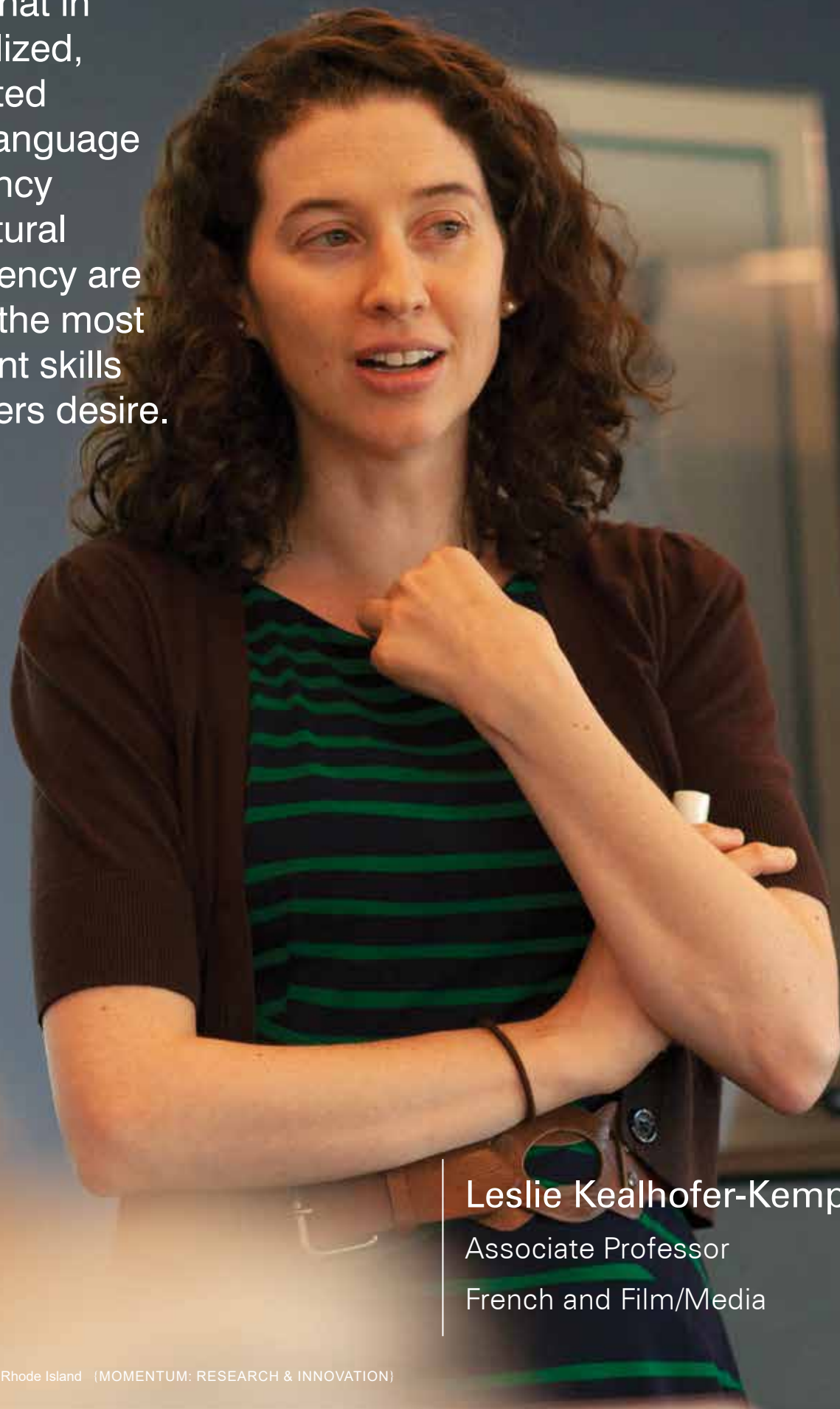
experiences, and identities of North African women in France are communicated through French cinema.

Her book on the subject, *Muslim Women in French Cinema: Voices of Maghrebi Migrants in France* (Liverpool University Press, 2015), examines cinematic representations of Muslim women from Algeria, Morocco and Tunisia in documentaries, short films, made-for-television films, and feature films. Many of the films have not been the subject of any other research.

“This book brought together my interests in film, immigration, and identity in France” she says.



Indeed, research shows that in a globalized, connected world, language proficiency and cultural competency are among the most important skills employers desire.



**Leslie Kealhofer-Kemp**

Associate Professor

French and Film/Media



France’s population is about 9 percent Muslim — the largest in Western Europe — and France continues to grapple with questions relating to integration and inclusion. By considering Muslim women’s perspectives through the lens of French cinema, Kealhofer-Kemp’s research contributes to a much-needed discussion about how cultural productions can bring often-silenced voices and perspectives to the fore, as well as shape perceptions.

Kealhofer-Kemp’s distinctive research interests stem from a passion for French language and culture. She discovered her affinity for the French language through an introductory course in junior high school. Later, in high school, she was impacted by an inspiring French teacher who kept the study of French alive in their small town in Iowa. Kealhofer-Kemp traveled to France alongside her teacher, sister, and classmates.

“Once I started using the language and meeting people in France, I immediately wanted to go back,” she says. “My world got a lot bigger when I started studying a language.”

Fueled by these passions, Kealhofer-Kemp majored in French and political science at the University of Notre Dame. There, she took classes in French and Francophone

literature and participated in a study abroad program in Angers, France. It was a pivotal experience.

“Doors had opened,” she says, “and I had a cultural immersion. When I got back, I wanted to find a way to bridge both of my majors, and I did this through a year-long senior thesis.”

Her project focused on the immigration policies of Nicolas Sarkozy, who at the time was France’s Interior Minister and later served as president.

Graduate school at the Winthrop-King Institute for French and Francophone Studies at Florida State University exposed her further to immigration issues in France, particularly those pertaining to the North African population.

“During my first semester, I read a book for class about the son of Algerian migrants in France, within a post-colonial context,” she says. “It made me very interested in researching this part of France’s history.”

In addition to her research, she has taught courses in French and film and has organized film festivals on campus, bringing French-language film to the URI community.





“Studying the humanities expands your worldview. This can be done in many ways — for instance, through literature and film. It shapes how we see other people and interact with the world.”

- Leslie Kealhofer-Kemp



will explore the emergence and implications of minority-ethnic stardom in France.

Kealhofer-Kemp joined the faculty at URI in 2013. “It was one of only universities actively looking for someone doing work in French and film,” she says.

In spring 2020, she’ll travel to France as part of a sabbatical sponsored by a URI Faculty Career Enhancement grant. Working primarily in France’s National Audiovisual Institute, she

“The past 15 to 20 years have seen an increased number of actors and actresses from different backgrounds becoming stars in the French film industry,” she says. “The television and film industries are starting to reflect France’s population to a greater degree, and I am looking to explore this change.”

By examining films, interviews, and records at the





institute — many unavailable anyplace else — she will explore the films these actors and actresses make, the roles they are offered (or not), the construction of their star personas, and how they discuss their identities and careers.

Kealhofer-Kemp emphasizes that her research connects to teaching. She describes a distinct experience teaching a course on French cinema, in which she taught French majors and Film/Media majors in the Harrington School of Communication and Media, alongside students who had never studied the language or watched a French film.

“That is the beauty of having students from diverse areas of study and backgrounds,” she says. “I see films

in new ways thanks to their questions and comments.” Through this merger of disciplines and experiences, a highlight of the humanities, Kealhofer-Kemp wants to inspire her students as she was inspired.

She is currently teaching an upper-level class entitled “Filming the Margins in French and Francophone Cinema,” which focuses on French language films whose protagonists are on the margins — of society, family, history, politically or in other ways.

Students who have paired a major in French with a major in science or engineering have shared with her the influence of studying a language and the humanities on careers and personal growth. Indeed, research shows that in a globalized, connected world, language proficiency and cultural competency are among the most important skills employers desire.

“Studying the humanities expands your worldview,” Kealhofer-Kemp says. “This can be done in many ways — for instance, through literature and film. It shapes how we see other people and interact with the world.”

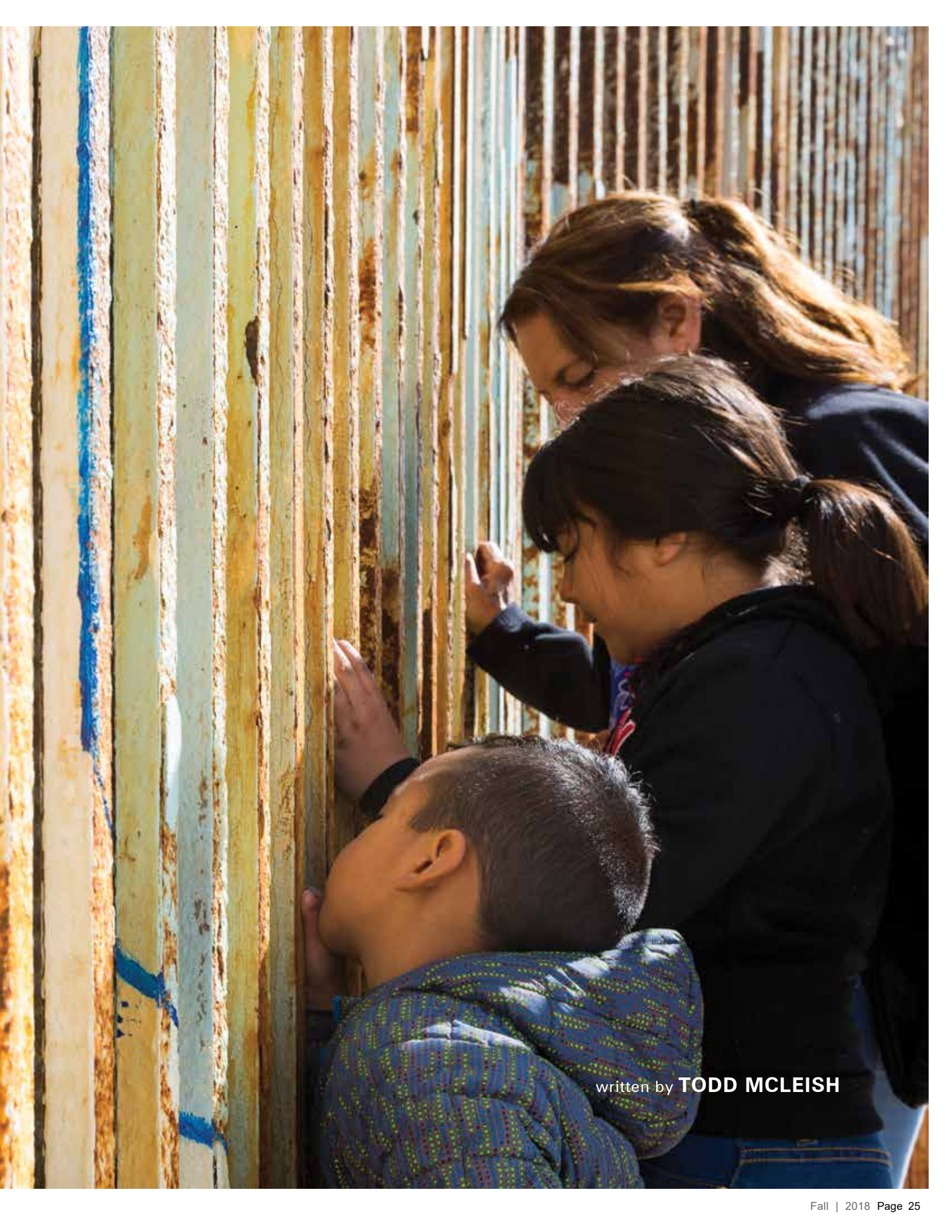







**The Impacts of Incarcerating  
Children  
at the Border**





written by **TODD MCLEISH**





“It’s essentially political violence manifesting itself through governmental policy. For children, they’re facing what psychologists call adverse childhood experiences. Their suffering may last a lifetime.”

- Paul Bueno de Mesquita

The flood of refugees, asylum seekers, and immigrants attempting to cross the southern border of the United States has been called a “national security crisis” by the current executive administration. And yet for four University of Rhode Island (URI) faculty members who study immigration, child welfare and related topics, the situation is more accurately described as a *humanitarian crisis* — especially for children — created largely by the nationalistic policies of the current administration.

“I define crisis very differently from the way this administration does,” says Evelyn Sterne, URI associate professor of history, who studies the history of immigration in the United States. “My perception is that this is a crisis in how the children are being treated, rather than being a crisis because they are trying to get into this country. Children are being held under inhumane conditions, separated from their families, simply because they’re trying to escape crime, food and employment problems in their home countries.”

The policy of separating children from their parents, enacted initially as a strategy to discourage families from attempting to cross the border, can result in long-lasting mental and physical problems that Karen McCurdy, URI professor of human development and family studies, equates to other causes for post-traumatic stress disorder.

“When kids are separated from their parents, they usually become withdrawn, especially when they realize the parent probably isn’t coming back,” she says. “They become hyper-vigilant, they want to know where is the person who protects them, and they can become

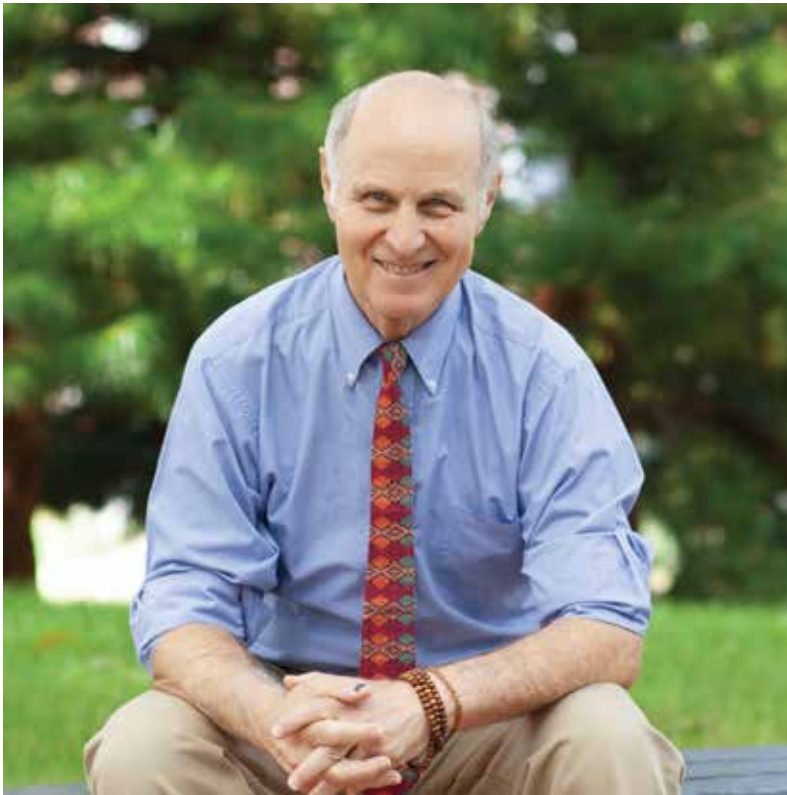
alarmed, agitated and chronically anxious. Some children become depressed and/or develop behavioral changes such as increased aggression. These behavioral and psychological impacts can be quite profound and lead to lasting changes in brain chemistry, structure and function.”

According to URI’s Paul Bueno de Mesquita, professor of psychology and director of URI’s Center for Nonviolence and Peace Studies, these children are facing a form of systemic violence.

“It’s essentially political violence manifesting itself through governmental policy,” he says. “It’s harmful to anyone who is seeking freedom from violence in their own countries. But for children, they’re facing what psychologists call adverse childhood experiences — things like physical, emotional and psychological trauma, witnessing violence, neglect, abject poverty — which, when experienced early in life, is linked to long-term negative health and mental health outcomes. Their suffering may last a lifetime.”

“The affected parents are under great psychological stress as well, and they are also vulnerable to depression, anxiety disorders and even physical illness.”

- Karen McCurdy



Professor of Psychology, and Director of the URI Center for Nonviolence and Peace Studies, PAUL BUENO DE MESQUITA

The reported unhealthy, unsafe, and unhygienic conditions under which the children are being held all serve to compound the situation. Bueno de Mesquita and Sterne compare the current conditions in the detention facilities to the internment camps Japanese-Americans were forced to live in during World War II.

“The conditions by themselves are shocking to me,” adds McCurdy, “but the impacts on children being detained are substantial. For kids, they’re confused and scared. Likewise, the affected parents are under great psychological stress as well, and they are also vulnerable to depression, anxiety disorders and even physical illness.”

Julie Keller, a URI assistant professor of sociology who studies migration from Latin America, agrees that the present situation on the U.S.-Mexico border constitutes a humanitarian crisis. She views the issue from an international law perspective and cites the violation of several human rights agreements ratified by the United States.

“The Refugee Convention of 1951 lays out the rights of asylum seekers, and with our situation today, there are clear disparities and violations,” Keller says. “Anyone — minors and adults — has the right to apply for asylum when they’re being persecuted in their home country. And now the current administration is weakening U.S. law to say that first you have to have applied for asylum and been rejected by every other country you’ve traveled through.

Nowhere in the 1951 convention does it say that.”

Sterne also notes that the treatment of families at the border is inconsistent with every U.S. immigration policy enacted in the last 95 years.

“Protection and reunification of families has been a priority for immigration policy,” she says. “Even in our first comprehensive immigration act in 1924, which placed limits on immigration and was extremely discriminatory in terms of how quotas were allocated, there were still loopholes to keep families together. That principle was enshrined in our 1965 immigration act and again in the 1990 act. So this separation of kids from their parents is wildly inconsistent.”

How should federal policies change to better handle the surge of people attempting to cross the border? These URI professors all agree that the first step is to reunite all children and their parents, to immediately and dramatically improve basic living conditions at the detention centers, and to provide the necessary manpower and legal guidance to speed up the asylum hearings so those seeking asylum aren’t detained as long. Also, the more recent practice of refusing to allow asylum seekers



Assistant Professor of Sociology, JULIE KELLER





“When kids are separated from their parents, they usually become withdrawn, especially when they realize the parent probably isn’t coming back. They become hyper-vigilant, they want to know where is the person who protects them, and they can become alarmed, agitated and chronically anxious. Some children become depressed and/or develop behavioral changes such as increased aggression. These behavioral and psychological impacts can be quite profound and lead to lasting changes in brain chemistry, structure and function.”

- Evelyn Sterne



Professor of Human Development and Family Studies, KAREN MCCURDY

“The Refugee Convention of 1951 lays out the rights of asylum seekers, and with our situation today, there are clear disparities and violations.”

- Julie Keller

to remain in the U.S. at all while their cases are being considered is, in itself, inhumane and will lead to measurable harm for many thousands of individuals.

“We can’t look at this as an isolated incident, though,” asserts Keller. “It’s a larger issue that’s not going away any time soon. We can’t see it as some kind of invasion of people who are different. This is a humanitarian crisis and it requires a compassionate response.”

“We also need to hold the administration accountable,” she adds. “The current administration is violating laws, so we have to hold our government accountable to prevent it from continuing.”

Bueno de Mesquita’s recommendations for addressing the situation take a broader view: “Besides humanitarian assistance to children and families, we need to get to the



root causes, occurring in several parts of Central America, that are leading to the current events, namely, political instability, poor healthcare, inadequate food supply (which will likely escalate with continued global climate change), poverty, crime and violence.”

“That means that the most effective long-term U.S. strategy will be to provide these countries with the assistance and aid that creates regional peace and security. It seems like our policies now are to remove all foreign aid as an act of retaliation when we should be intervening to address these problems within the local social and economic contexts of a few key countries.”

He concludes: “And any policy has to also ensure that we avoid causing lasting psychological damage. These are policies about people, and they have to be consistent with the best psychological science that we have with respect to children, the biological, behavioral and social impacts of severe trauma, and about desperate people who are fleeing violence.”



Associate Professor of History, EVELYN STERNE



Sterne also notes that the treatment of families at the border is inconsistent with every U.S. immigration policy enacted in the last 95 years.



# INVESTIGATING THE EARLY LIFE

written by **ALLISON FARRELLY '16**

During her 10 years as a neonatal intensive care unit (NICU) nurse, Amy D'Agata focused singularly on keeping premature infants alive. Now, as a researcher, the University of Rhode Island (URI) assistant professor examines the long-term impacts of this lifesaving care on infant development.

As medical technology advances, increasingly more of the 10–12 percent of babies born prematurely each year go home with their parents after intensive care in a hospital's NICU. One aspect of the NICU experience that currently is not tracked, however, is the amount of stress infants endure and how that stress can impact development.

"As I was practicing, I paid little attention to the total burden of stress that these really vulnerable infants were experiencing," D'Agata says. "As a team, we were focused on saving their lives, but not really pausing to think about their cumulative experience. In some cases, infants require ongoing medical care for weeks or months, during which they are exposed to a lot of negative stimuli."

The first step, she says, involves recognizing how stress can influence a developing baby.

"These are pre-verbal human beings," D'Agata says. "They can't advocate for themselves. They can't say no to care, they can't push you away, they can't stop anyone from doing something to them. I believe



# STRESS

EXPERIENCE FROM MEDICAL CARE ON PREMATURE INFANT BRAIN DEVELOPMENT.





A well-known and powerful infant stress reduction intervention occurs when parents perform skin to skin holding with their infant.



Amy D'Agata  
Assistant Professor  
Nursing

that this huge vulnerability, particularly during a sensitive period of brain development, can have long-term health impacts, thus making it important for clinicians to work to understand and to assist the infant experience.”

In her research, to categorize stressful and/or painful procedures and interventions, D’Agata uses a stressor scale specifically designed for the NICU. For example, the scale categorizes a chest tube or intubation as “extremely stressful,” a heel stick for blood draw as “very stressful,” diaper changes as “moderately stressful,” and simply cleaning a sick infant’s mouth as “a little stressful.”

To better understand how this early life stress exposure affects preterm infant development, D’Agata explores these relationships at a molecular level. She has looked at how stress influences the development of the infant gut microbiome and cortisol reactivity — the body’s main stress hormone — as well as how genetic variations can predispose some infants to lower stress tolerance. Ultimately, all her research relates to how these physiological and molecular mechanisms impact brain development.

“The work we’ve done so far does seem to be signaling that the early life stress experience from medical care occurring during this very sensitive time of development is important to neurodevelopment, and is something that should continue to be better understood,” D’Agata says.

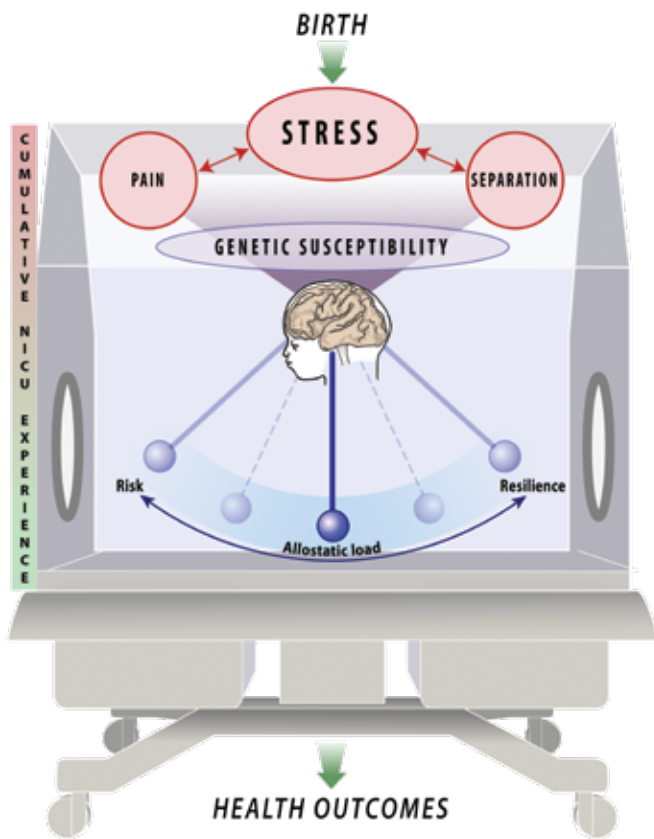
Her long-term hope is that her research will provide evidence to clinicians about the impact of early life stress, as well as give them tools to measure and lessen infant stress. A well-known and powerful infant stress reduction intervention occurs when parents perform skin to skin holding with their infant, especially during procedures that may be stressful or painful.

“The lifesaving care we provide is really important and we can offer remarkable care,” she says. “However, the burden of traumatic stress that some infants experience in the NICU can be profound. I think that there are opportunities where we could modify the experience for infants to be less stressful.”



“I believe that this huge vulnerability, particularly during a sensitive period of brain development can have long-term health impacts.”

- Amy D’Agata



When discussing the potentially traumatic experience of infants, D’Agata encountered concerns from some clinicians about the word “trauma” in relationship to what infants experience in the NICU. Through research conducted in focus groups, she found that the word “trauma” can be difficult for some clinicians to reconcile.

“It’s difficult when you’re faced every day with saving lives and providing care in ways that can be unpleasant. Sometimes clinicians have to protect themselves in this process,” she explains. “Thinking about being an agent of trauma, the one doing something to someone else that is traumatic, can be difficult to consider.”

Recently D’Agata submitted a grant proposal to the National Institutes of Health that, if awarded, will allow her to jumpstart a five-year study with Women and Infants Hospital in Rhode Island. The study will follow 165 infants born prematurely, between 28 and 32 gestational weeks, to examine the impact of their NICU stress experience, inflammation and gene transcription during their first year of life.

She is particularly eager to integrate this research into her teaching at URI. Since joining the University in the fall of 2017, D’Agata says she has been struck by the collegiality and professionalism within the University’s College of Nursing, and she is eager to collaborate with students and other faculty interested in preterm infant research.







# DEVELOPING NANOPORE TECHNOLOGY

for Medical Diagnostics

written by **BETHANY DELOOF '21**

contributing editor **BUDDINI KARAWDENIYA '18**

This shows the electrical discharge supplied by an electronic “flameless lighter”— a handheld \$20 voltage source that we have repurposed so that other groups might more easily make nanopores.

“What we do in the lab is one thing — and it is a vital thing — but how do we translate our discoveries for benefit in the real world?”

- Jason Dwyer

Jason Dwyer, an associate professor of chemistry at the University of Rhode Island (URI), and his team are developing tools that can detect one molecule at a time. Each molecule is pushed through a miniature detector — a small hole called a nanopore with dimensions one hundred thousandth of the diameter of a human hair — that allows them to be characterized. According to Dwyer, the single molecules he’s looking at are complex biomolecules and the nanopore dimensions and properties must be carefully fine-tuned to ensure success. This ultra-sensitive technique allows Dwyer to determine whether any harmful molecular components are present and if the levels of such harmful contaminants are high enough to be consequential.

One demand for this research stems from the pharmaceutical industry’s desire for sensors capable of performing stringent quality assurance tests for the purity of their products. In 2008, the domestic supply of Heparin, a widely used anti-coagulant, was contaminated, and the contaminant went undetected with standard chemical tests — a mistake that proved fatal.

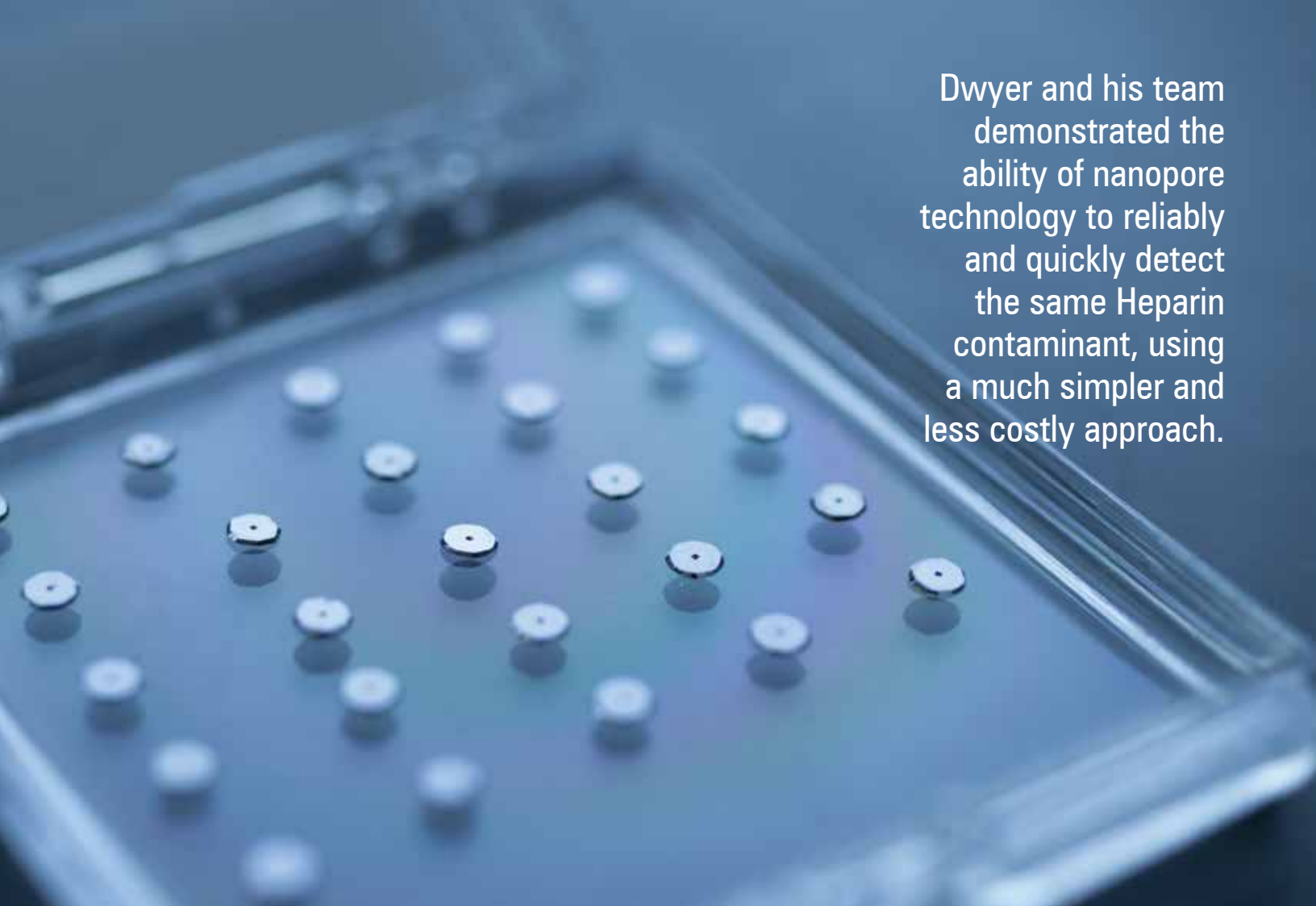
“There are tests that are much more sophisticated and expensive to detect the impurity,” says Dwyer. “What we were able to do is — in a very inexpensive and rapid fashion — fingerprint Heparin and tell when there is a contaminant in it.”

After several years of research, Dwyer and his team demonstrated the ability of nanopore technology to reliably and quickly detect the same Heparin contaminant, using a much simpler and less costly approach than what had been necessary after the contamination crisis. His study was published in the prestigious *Nature Communications* journal in the summer of 2018.

“The test we came up with takes about 20 minutes and works at clinically relevant concentrations,” he says. “We always try to think about the consumer market. What we do in the lab is one thing — and it is a vital thing — but how do we translate our discoveries for benefit in the real world?”



Dwyer and his team demonstrated the ability of nanopore technology to reliably and quickly detect the same Heparin contaminant, using a much simpler and less costly approach.



Chips used to support the nanopores that consist of nanofabricated silicon nitride films sandwiching a silicon support in the middle.



This is a thin film conductivity measurement system. When designing nanofabricated electronic sensors it is helpful to be able to independently characterize their properties.

Although Dwyer works in the URI Department of Chemistry, he attributes the success of his nanopore technology to drawing on skills and approaches that are more frequently associated with other disciplines across the University's campus. While engineering expertise is required to design and develop new tools, attention to economics and manufacturing considerations helps to ensure effective future commercialization of a product, and social science approaches are required to best understand the needs, concerns and demands of the technology's target audience.

Dwyer gives an example of a consumer's needs, saying, "If I'm developing a medical diagnostic tool that's going to be useful for people in communities without a regular supply of electricity, I should make sure my technology can be battery-powered or solar-powered. And, you have to be aware of what the demands are."

Another aspect of Dwyer's research involves creating nanopore technology to detect sugars — known more technically as glycans — found in aquatic environments, in pharmaceutical products and that play an important role in biological processes by acting as a source of food and energy for organisms.

Dwyer acknowledges his own attraction to novel technologies as a motivator in his work, but he notes that, ultimately, it is people and creative ideas that drive technological advancements.



Jason Dwyer  
Associate Professor  
Chemistry

The study of these glycans, or glycomics, therefore, constitutes both scientific research and it is of keen public health interest. But Dwyer takes studying sugars one step further to develop the tools needed to analyze — molecule by molecule — a type of sample that continues to challenge chemical analysis even without attempts to achieve such exquisite sensitivity.

Tool development and sugar analysis comprise two vastly different areas of work, and yet Dwyer believes the two sets of activities complement each other. Improved technology can lead to more effective detection of impurities, thus better informing efforts to eliminate such

impurities and to increase public health safety.

“Glycan analysis is incredibly complicated, and in 2012, the National Academy of Sciences issued a call saying, ‘We need new tools to do this,’” says Dwyer. “We’re trying to answer that call.”

Funding for Dwyer’s lab and research comes from various sources, including: The National Institutes of Health, the URI Council for Research and Creativity, the Rhode Island Medical Foundation, and the National Science Foundation, from which the lab recently received a \$302,000 award for work on nanopores in glycomics.





To add to the impressive collection of achievements and awards to his team, Dwyer recently won the 2019 *Federation of Analytical Chemistry and Spectroscopy Societies* SciX Innovation Award for his nanopore sensing technology.

Custom instrument parts such as fluid handling components can be rapidly prototyped in-house using a 3D printer.

Recently, his team also received funding from the Rhode Island Science and Technology Advisory Council (STAC), which distributes grants to scientific research that addresses the needs — including economic needs — of Rhode Island. To add to the impressive collection of achievements and awards to his team, Dwyer recently won the 2019 *Federation of Analytical Chemistry and Spectroscopy Societies* SciX Innovation Award for his nanopore sensing technology.

Dwyer says a strength of URI is the breadth and richness of research taking place, with a college of engineering, college of pharmacy, college of the environment and life sciences, a graduate school of oceanography, and a state-of-the-art facility on campus where he conducts his research.

“There’s a tremendous amount of expertise on campus,” he says. “URI has the capabilities that I was looking for in

terms of the expertise that’s here, and with proper laboratory facilities for this delicate research to be possible at all.”

Dwyer acknowledges his own attraction to novel technologies as a motivator in his work, but he notes that, ultimately, it is people and creative ideas that drive technological advancements. He credits his collaborators, and especially the graduate and undergraduate students whom he has mentored, with the continued success of nanopore technology research at the University.

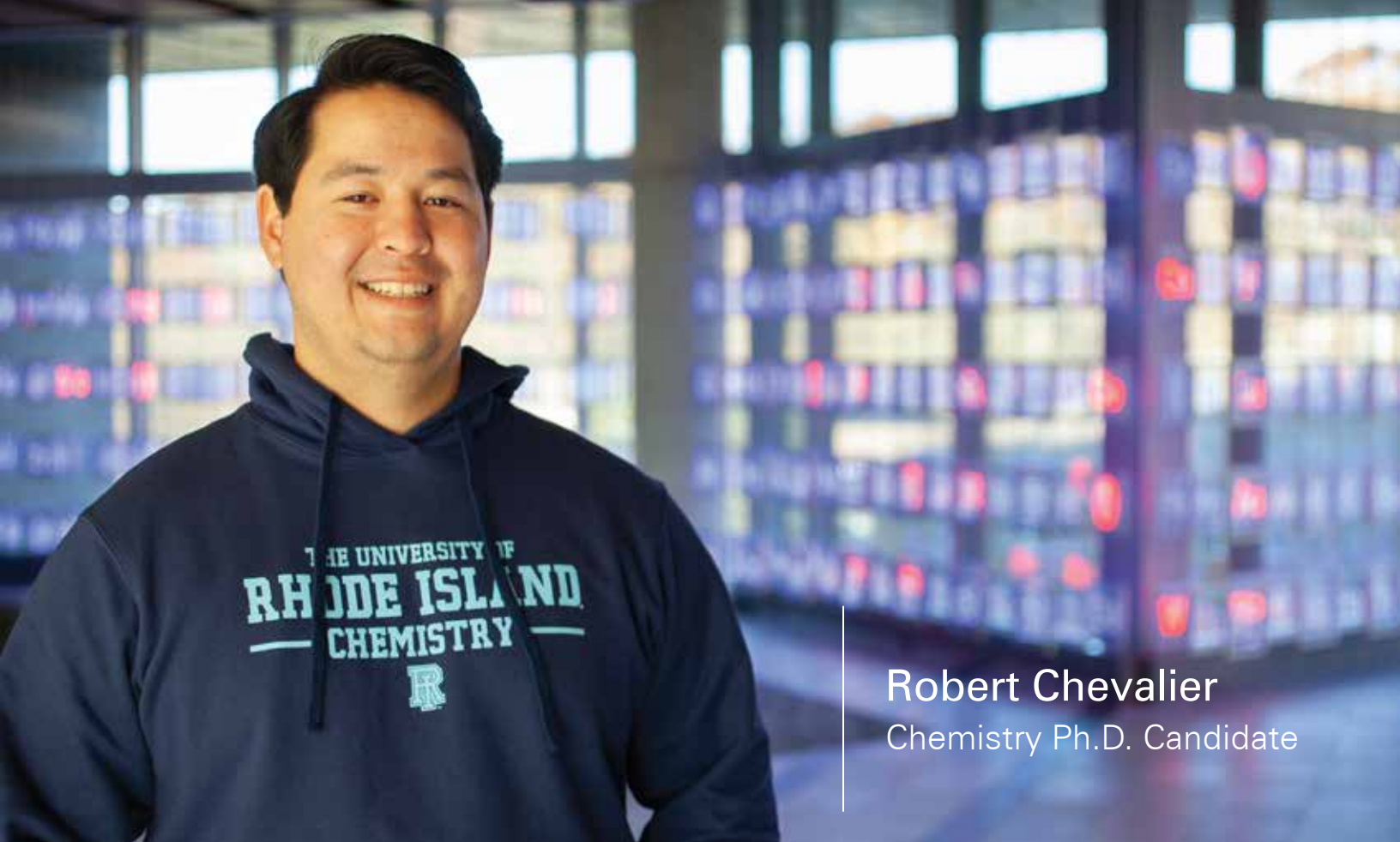
“One of the interesting things about this is that the technology and the science are often strong drivers,” says Dwyer. “They’re flashy and that’s what interests people, but there’s also a human side to the story. I am not just referring to a focus on human health, but rather that all of this results from the inventiveness, curiosity and creativity of the people engaged in this work.”

Whether he’s analyzing molecules in pharmaceutical drugs or molecules present in aquatic environments, Dwyer aims to determine the types of molecules present, the quantity, and nature of these molecules, and how they interact with each other as well as their interactions with the human body’s microbiome.

“This is the discovery mission of the University,” Dwyer says. “Every time we do an experiment with a new molecule, it’s a new day for discovery.”



Benchtop control electronics for sensing single molecules using nanopores.



**Robert Chevalier**  
Chemistry Ph.D. Candidate

Having worked in Associate Professor Jason Dwyer's chemistry lab since November of 2016, Robert Chevalier, a Ph.D. student at URI, continues to draw on his previous experience in analytical and surface chemistry at the College of the Holy Cross. He has been learning to conduct research in the Dwyer lab that is focused on single molecule detection of polysaccharides, or carbohydrates, in order to improve the characterization of these molecules. Chevalier's current work also includes a project designed to detect low concentrations of nitrites and phosphates in seawater.

Chevalier collaborates closely with doctoral students Brian Sheetz and James Hagan, as well as with students working in the labs of chemical engineering Professors Geoffrey Bothun and Arijit Bose. The team effort has both moved the ball forward in this area of research and provided a valuable learning experience for these emerging scientists.

"It's very beneficial to have someone else to bounce ideas back-and-forth with on problems that I have in lab, and I also enjoy working with my graduate student peers to understand their great work and the activities in their labs," Chevalier says. "Teamwork is very important in science because it's hard for one person to know everything. With a group of collaborators from different specialties, we can work together on complex problems and in a highly multidisciplinary way."

Chevalier has also been involved in the Rhode Island Consortium for Coastal Ecology Assessment Innovation & Modeling program (C-AIM). Funded by a \$19 million grant from the National Science Foundation and a \$3.8 million state match project, the program seeks to develop new approaches to access, predict, and respond to the effects of climate change on coastal ecosystems, Chevalier's work on nitrites and phosphates detection is essential to better understanding the impacts of climate change, and it falls squarely within C-AIM's objective. Not only has Chevalier received financial support from C-AIM, but he credits the program for helping graduate students like himself prepare for the future through many varied various workshops and other opportunities.

Above all, Chevalier is grateful for his time working with Dwyer, and he believes he has gained valuable life skills while involved in the group.

"Working with Professor Dwyer has been an immense help as I look forward to my own future career," Chevalier says. "He always provides his students with great insights about potential jobs in both academia and industry, and he shares so many different resources with his trainees, such as articles, workshop opportunities, grants, etc., all to help us to prepare for our own futures as scientists and scholars."



# SEQUENCING A PERSON'S GENOME

to Spot a Trend of Developing Cancer

written by **BETHANY DELOOF '21**





“Is it possible to better predict this risk, and to let that person know, ‘You have a higher than average chance of developing lung cancer if you continue to smoke,’ even before the cancer is there?”

– Deyu Li

People come in contact with potential causes of cancer every day, from chronic exposure to harmful industrial pollutants, to soaking up the sun’s ultraviolet rays (without skin protection) at the beach.

Because we are exposed to so many potential sources and types of carcinogens, how can we determine whom is at risk for developing cancer later in life?

According to Deyu Li, assistant professor of medicinal chemistry at the University of Rhode Island (URI), the answer to connecting the timeline between carcinogen exposure and cancer lies in each individual’s genome.

Li points to a young smoker as an example:



“Say a person starts smoking when they’re 21 years old, and when they’re older, about 60 or 70 years old, they develop lung cancer,” he explains. “During that individual’s middle years, there may be no cancer at all, but it is likely that their genome has been damaged. Is it possible to better predict this risk, and to let that person know, ‘You have a higher than average chance of developing lung cancer if you continue to smoke,’ even before the cancer is there?”

The trend Li refers to is a mutational signature. Every person’s cells are made up of four DNA bases: guanine, adenine, cytosine, and thymine. These bases bind together in specific pairs to make up our genetic code and create a DNA sequence. However, any alteration to this sequence causes a mutation, and the accumulation of mutations, often from damaging factors like smoking or exposure to the sun’s ultraviolet rays creates cancer cells.

A number of other factors also exist that can cause a mutation, such as inflammation or simply aging. Li’s solution, therefore, is to look at the bigger picture by sequencing a person’s genome, rather than focusing on a single point mutation, and to then observe patterns that indicate a high risk of developing cancer.

Li notes that one way to identify a mutational signature is to compare across individual genomes, but he finds this practice unreliable, providing more of a suggestion than a definite answer because there are multiple layers of information. Every person is different, and there remains the possibility for unpredictable epigenetic influences such as inflammation and diet.



## Deyu Li

Assistant Professor  
& Paramaz Avedisian  
Endowed Chair in  
Medicinal Organic  
Chemistry

Therefore, Li is working on an alternate method that involves chemistry.

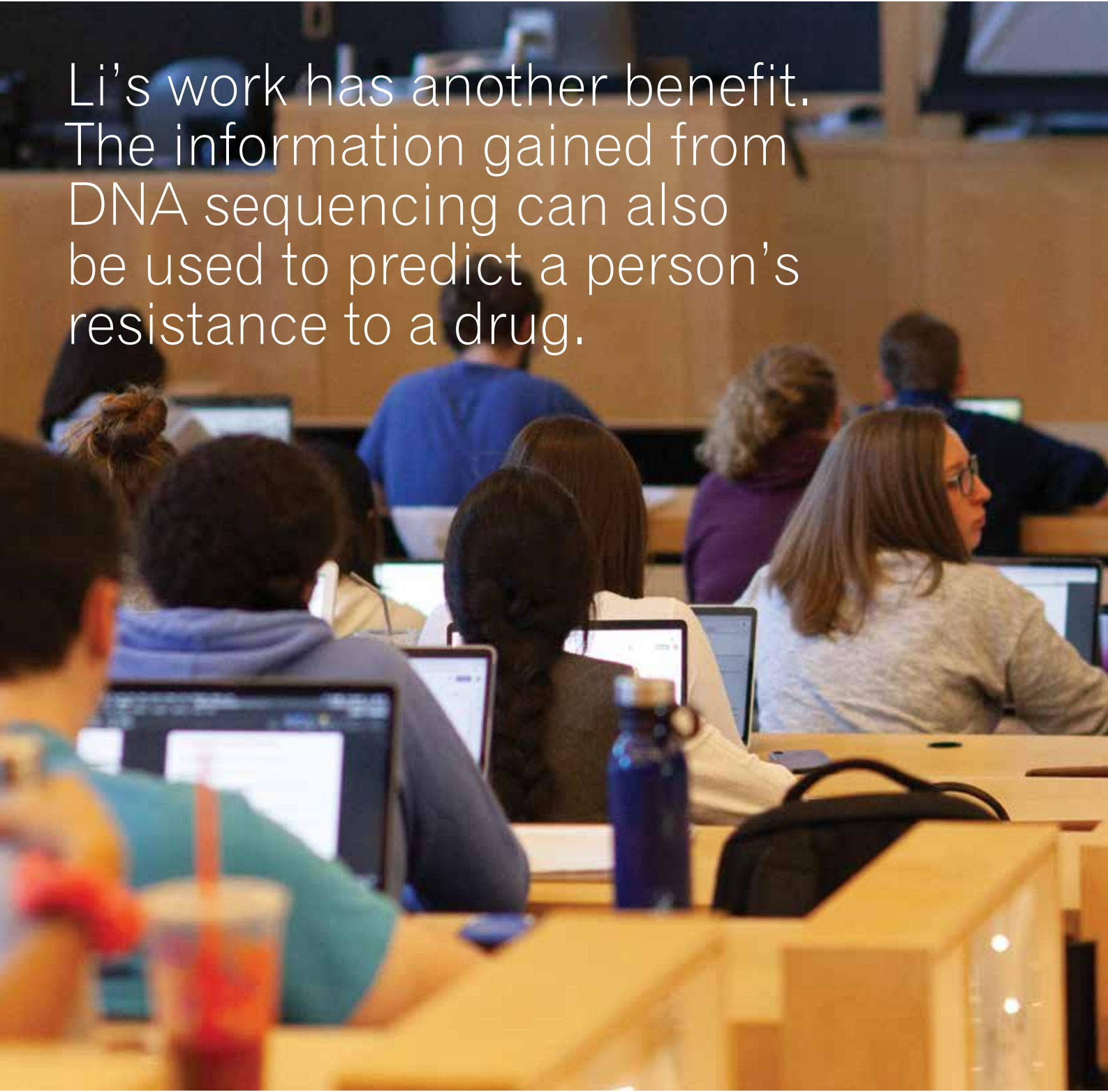
Chemicals that cause cancer react with DNA and form DNA adducts. By intentionally inserting these adducts directly into a cell through using a vector, and then allowing these adducts to replicate, it may be possible to search the resulting mutations for a specific pattern for cancer caused by the chemical. And, the use of a vector eliminates responses from other factors like metabolisms and abnormal cellular responses, giving a clean mutational signature.

Li's work has another benefit. The information gained from DNA sequencing can also be used to predict a person's resistance to a drug, which is essential to know in tailoring chemotherapy treatments for individual patients. Patients may have an unknown resistance to a certain drug used to treat cancer, but by sequencing a person's genome to identify a resistance pattern to the drug, the best potential drug intervention could be selected.

According to Deyu Li,  
the answer to connecting  
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Li's work has another benefit. The information gained from DNA sequencing can also be used to predict a person's resistance to a drug.

After joining URI's College of Pharmacy and starting his lab in 2014, Li found himself surrounded by a community of colleagues and students who care about science, much like himself. Li and his team have received an R01 grant, awarded by the National Institute of Health (NIH) for research projects that support the organization's mission of improving public health, as well as an R15 grant that the NIH provides for projects that train students in research.

Li has secured more than \$2.5 million from the government to support his research for the next several years. Li says he also has received help from many different levels at URI, including students, colleagues, the Department of Biomedical and Pharmaceutical Sciences, the College of Pharmacy, the URI Foundation, and the RI-INBRE program.

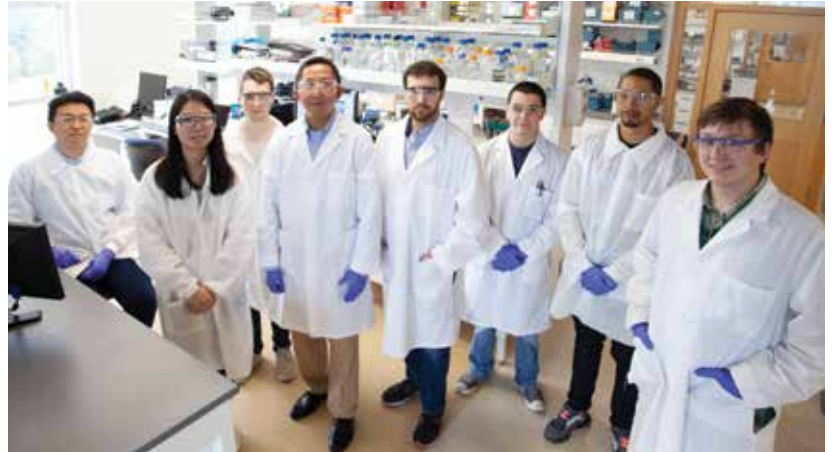
Li also collaborates with researchers from many



institutions, such as MIT, Harvard Medical School, University of California Riverside, Vanderbilt University, Duke University, Brown University, and the University of Lethbridge in Canada.

“If you have a good team you can achieve a lot of things that one person alone cannot,” he says.

And when he’s not in the lab, Li is in the classroom, following URI’s “Think Big, We Do” motto by training his students to become problem solvers. He tells his students to find a problem in today’s health and medical field and create their own solutions, encouraging the future scientists to think outside the box.



Assistant Professor Deyu Li and his research team of URI graduate and undergraduate students.

“I encourage my students think about how to contribute their knowledge to better our society,” he says. “Teaching does not only provide students with knowledge, but also assists them to think creatively and to take action. That’s really important.”

The overall goal of Li’s lab is to understand the mechanisms of disease and developing better therapies.

“We’re trying to help people in different ways, either through prevention, by creating better therapies, or by withholding use of potent and dangerous drugs when they are destined not to work for patients with resistance to those medicines,” Li says.

Ultimately, Li looks to the future with a desire to help people, encouraging people to use early detection to enable positive health changes and prevention of disease.



Li’s solution, therefore, is to look at the bigger picture by sequencing a person’s genome, rather than focusing on a single point mutation, and to then observe patterns that indicate a high risk of developing cancer.




It is her research that motivates her, and one of the many reasons she enjoys coming to work each day.

DIGGING  
DEEPER INTO  
THE CULTURAL  
UNDERTONES OF

# MUSIC

written by **ARIA MIA LOBERTI '20**



**T**here is no denying the power, size and influence of the music industry in today's world. Whether offered by a multibillion-dollar business for mass consumption, or as an artist's cultural or self-expression, or both, the musical arts offer important tools, experiences and benefits. And it often reflects a cultural moment, an era or a political cause.

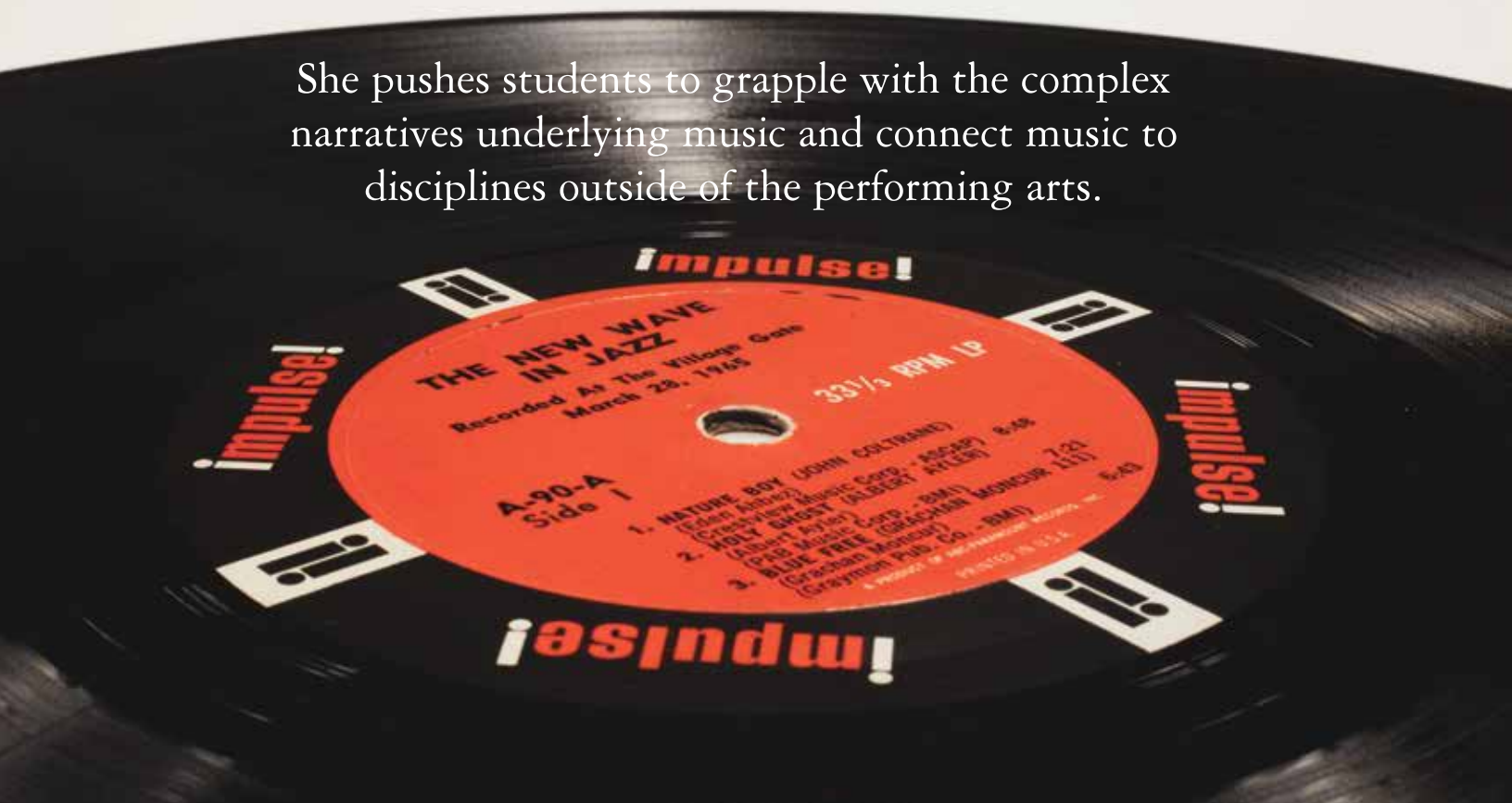
Indeed, digging deeper into the cultural undertones of music offers a new perspective on historical moments and a new way to appreciate the diversity of the world around us. For Vilde Aaslid, University of Rhode Island (URI) assistant professor of music, it's another day at the office.

She puts musical theory into practice through her work in musicology and music history. Aaslid uniquely works to integrate genres like jazz into studies of musical form and function that are typically only reserved for classical or Western-influenced music. It's all an effort to make music studies more accessible, approachable and culturally inclusive.

Aaslid is preparing to launch that effort in a new way with a book. Currently in progress, it highlights the political intersections of jazz



She pushes students to grapple with the complex narratives underlying music and connect music to disciplines outside of the performing arts.



and “When jazz musicians and poets come together often what they make is explicitly moving and inspires a reaction or action,” she says. “Jazz’s encounters with poetry gives us an opportunity to understand jazz better. Often when we are talking about absolute music — music without an external referent — we bump into challenges when we try to describe what the music is actually doing. When we put language to it and watch how it reacts — as through poetry — we can learn more about what jazz signifies.”

For example, take artist Samora Pinderhughes who composed a piece in response to the Black Lives Matter movement. The work includes improvised passages, a jazz score and poetry.

“When I went to the performance, I was struck with how overwhelmingly earnest it was,” Aaslid says. “Here was this intense, emotional plea for engagement.”

She noticed how the poetic elements of the piece draw on sentimentality, which she underscores in her book, *Listen In: Poetry as Politics in Jazz*.

“The piece’s main job is not to impress you or comment on something. Its primary purpose is to move your heart,” she says. “With your heart moved, you may take action.”

Her book also includes chapters on the politics of genre, gender and language in jazz, the politics of interactivity and Black Nationalism in the 1960s. The wide-ranging project is one Aaslid describes as fun, challenging, and incredibly satisfying by drawing on music’s intersections with philosophy, gender studies, rhetoric, sociology and beyond.

She hopes that her work can cut across the often-rigid boundaries of music studies, where the methods of research are too often determined by the kind of music being studied rather than the kinds of questions the researcher wants to answer.

“In both my research and in my teaching, I find myself bouncing into walls: ideological walls, political walls and unintentional restraints that people have placed on interactions with music in their lives,” she says. “Whenever I encounter those, I want to tear them down, because they stop us from having a free and full relationship with music.”



Vilde Aaslid  
Assistant Professor  
Music

Aaslid has long infused music into every aspect of her life. She grew up in a musical family. Her grandfather played violin and her grandmother played piano in the small Norwegian city where they lived. As a child, Aaslid trained as a violinist and attended a pre-college conservatory where she took a music history course.

“It became clear in my first year in conservatory that my interests were academic,” she says.

She turned her attention to music’s research components. By age 19, she was teaching music history classes at that same conservatory at which she was previously a student.

Aaslid later completed her doctorate at the University of Virginia, which houses a cross-disciplinary training program in critical and comparative music studies. After completing her degree, she moved to New York and taught at Brooklyn College. Then, she completed a post-doctoral fellowship at Columbia University.

In 2016 she interviewed at URI.

“What really drew me to URI was this attitude of, ‘bring what you have,’” she says. “They needed someone who could do many different things.”

She settled in not only continuing her research but taking on a varied teaching role. Here, she has taught

almost every core history course the Music Department offers, exposing freshmen through seniors to her own research.

She pushes students to grapple with the complex narratives underlying music and connect music to disciplines outside of the performing arts. Her pedagogical approach is exploratory and invites students to drop preconceived notions of music’s purpose or background, and instead make more informed interactions with music or to engage with non-Western musical traditions and histories.

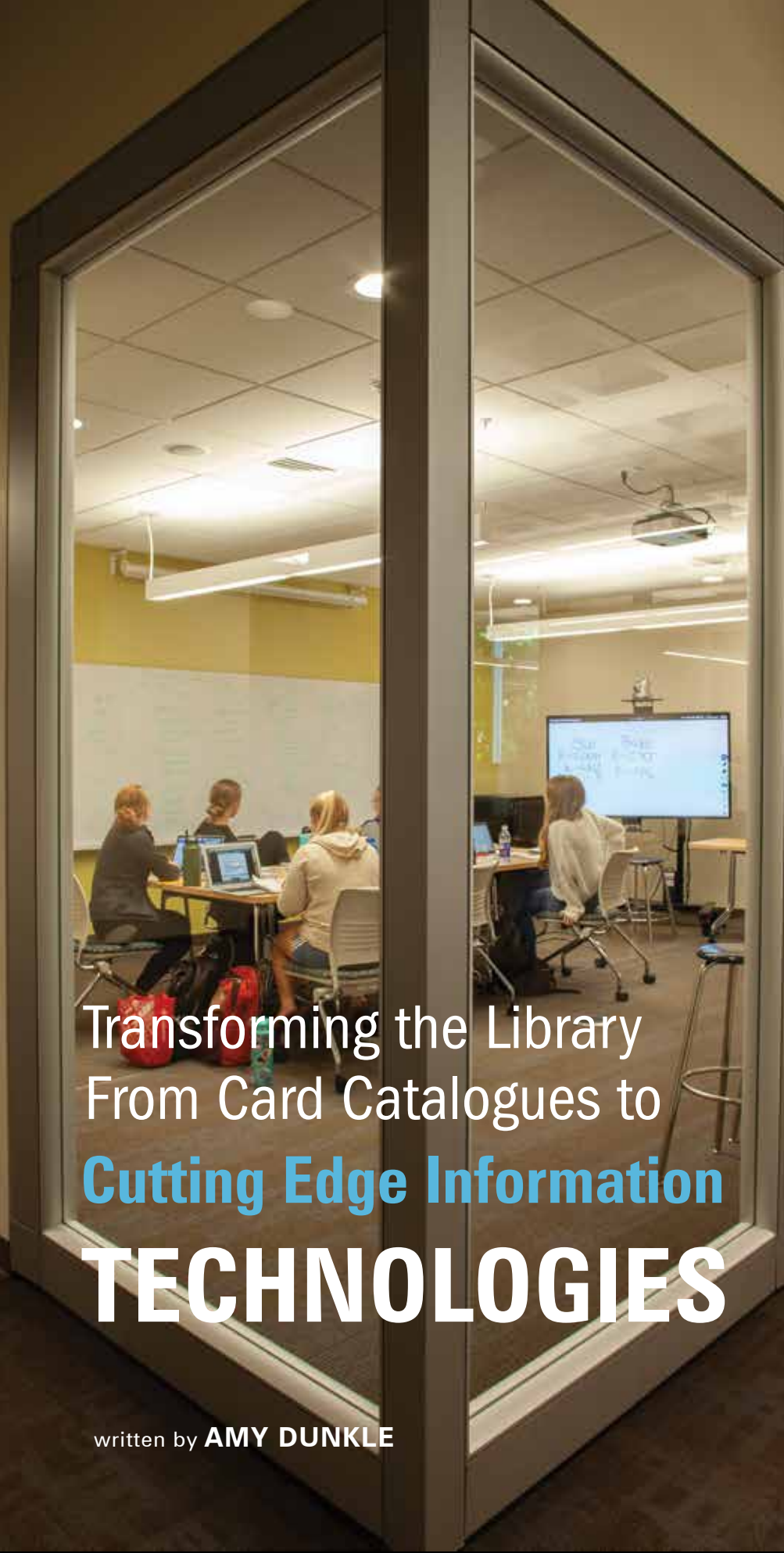
“If we understand where judgments and assumptions are coming from,” she says, “our relationship with music becomes freer and less hierarchical. But, of course, music can be just pleasure, too. To reconnect us with that is very meaningful, especially when we are not constrained by ideas of what music is supposed to be.”

Even outside of her teaching and research, Aaslid seeks to exemplify this open mindset. She plays Norwegian folk music on the hardanger fiddle, a folk instrument from her home country. But it is her research that motivates her, and one of the many reasons she enjoys coming to work each day.

“I feel so privileged to get to do this work,” she says. “I am so fortunate.”







URI student discovering the potential of a virtual reality mask.

In the days of card catalogs and microfilm, hushed students and researchers crouched over tables at the university library, peering at books and weathered journals. Librarians maintained order for the collection of millions of books, and they pointed lost souls to the proper stacks to find an obscure copy of a key journal for course assignments. Modern tech consisted of an electronic typewriter with a dry-erase ribbon.

Today, while still a study haven rich with books and research resources, the library has been evolving into a community hub of information and data in ways patrons never imagined.

At the University of Rhode Island (URI), Karim B. Boughida, dean of University Libraries, says the Robert L. Carothers Library and Learning Commons, founded in 1892 and moved to its present location in 1964, is shifting from being transactional to transformational in its mission.

Rather than rest solely on the book and analog resources business, a much more expansive and valuable role awaits the flagship library and its sister libraries at the Providence and Narragansett campuses. The Providence Campus Library supports the Feinstein College of Education and Professional Studies, and the College of Nursing. The Pell Marine Science Library has unique and rare collections on oceanography, marine biology,

# Transforming the Library From Card Catalogues to Cutting Edge Information TECHNOLOGIES

written by **AMY DUNKLE**

Today, while still a study haven rich with books and research resources, the library has been evolving into a community hub of information and data in ways patrons never imagined.

**Karim B. Boughida**  
Dean  
University Libraries

fisheries, among other fields, and is home to the National Sea Grant Library.

“We want to align our services with the University’s strategic goals, rather than just focusing on the traditional library function of book borrowing,” says Boughida.

At URI, Boughida has positioned the library system to

create user and tech-based learning spaces, house a data analytics team, partner to launch a data science major, throw open the doors to the community, and build an in-house café.

In one corner of the Carothers Library now sits Makerspace URI, a place where students and faculty have ready access to various types of 3D printers, lasers, and virtual reality systems, to literally visualize learning and to produce rapid prototypes that enable creative and scholarly work. While smaller outposts of such equipment exist elsewhere on campus, the library space intentionally belongs to no single college and brings together scholars from all disciplines. Even the history department — a discipline rarely associated with 3D printing — has utilized the space for 3D printing of medieval artifacts like swords, notes Boughida. There is also a newly designed Think Lab and a Launch Lab for Innovation and Entrepreneurship.

The focus on supporting multidisciplinary and interdisciplinary learning carries over to the nearby artificial intelligence (AI) lab designed for integration



MakerspaceURI





The focus on supporting multidisciplinary and interdisciplinary learning carries over to the nearby artificial intelligence (AI) lab designed for integration with courses across campus.

courses across campus. The lab offers access to a high-performance graphics processing unit (GPU) AI supercomputer to facilitate processing-intensive operations such as deep learning and analytics applications.

Workstations in the lab can be used to develop deep learning applications that allow machines to learn on their own and to make choices based on real-time data acquisition. This requires researchers from areas as varied as engineering to psychology to explore not just the nuts and bolts, but also the legal, ethical, and social justice implications of computers that have capabilities to autonomously modify their actions and reactions to stimuli.

“URI is the first in the world to have an AI lab in a university library,” Boughida says. “Typically, people ask, ‘Why?’ But, why not? AI is here and already having an impact on lives and jobs. Why not prepare

students for the massive upheaval and change that AI innovations will exert on the larger workforce?”

What’s more, the library is not just focused on URI students. Last summer, the library offered an AI camp for students in elementary to high school grades, setting the stage for discovery with hands-on projects to explore robotics, machine learning, circuits, programming, 3D modeling and 3D printing. The students gained awareness and understanding of basic concepts as well as the social implications involved. During the academic year, the library hosts a speaker series, *Rhode Island AI Meet-ups*, to engage in conversations about AI.

All visitors can find an updated learning commons that provides a collaborative work and study space, and group rooms with shared monitors in support of learning that is increasingly team oriented. A Pop-Up Learning Lab provides workshop-style classes with desktop computers and access to library materials. Expanded workspace with inviting tables and chairs allows more room for students to study in close proximity to the labs, physical reference materials, and librarians. Since the building is not associated with one college or major, the space serves as a



“URI is the first in the world to have an AI lab in a university library.”

- Karim B. Boughida



melting pot of students with many varied interests, just as Boughida had planned.

“We are, by definition, interdisciplinary,” Boughida says. “We serve everybody. The labs are open for everyone and help with solving problems and the development of critical thinking skills. This is what employers want. They care about the degree, but they also want employees to be able to think critically and to solve challenging problems. A liberal arts education pushes students to consider not only how to solve problems, but also trains them to ask which problems to focus on and why.”

This kind of big thinking often involves the need to access big data. A new data analytics unit — DataSpark — brought 11 staff members on board to help researchers manage their data and to work with cutting-edge data visualization techniques. DataSpark also works with government agencies across the state to tackle complex questions, such as how to support adult education, to identify ways to streamline healthcare delivery, and to spot risks related to the state’s child protection services.

To bolster faculty research, the University has hired new professors and brought existing faculty together under the Big Data Collaborative initiative, for which the library is managing the collaboration and interactions between scholars. And for students, there is a new data science major and minor that will prepare students for careers that require these advances skills.

For those students crunching the late-night database, the library’s reach expands far beyond the physical building. Most research now takes place online, with Boughida noting that the library today spends most of its acquisition budget on online resources that are accessible from virtually anywhere in the world.

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DataSpark also works with government agencies across the state to tackle complex questions, such as how to identify ways to streamline healthcare delivery, and to spot risks related to the state’s child protection services.

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And yet, good reasons remain to visit the URI libraries. A highly trained team of librarians can guide patrons to the right online resource or even to one of the 2 million physical volumes in the collection. They also provide guidance and teach classes on information literacy, research and publication ethics, on what information sources to trust and, in the case of the library’s labs, how to use the on-site equipment.

When hunger pains or the need for caffeine arise, there is no need to pack up and leave. At the Carothers Library and Learning Commons, Boughida worked with URI Dining Services to build a new café.

“The library is about community engagement,” Boughida says. “We’ve become an umbrella to support and accelerate new ideas on campus.”

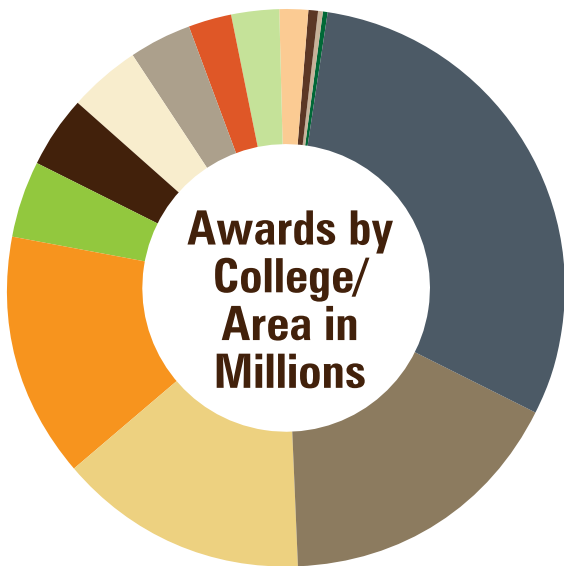
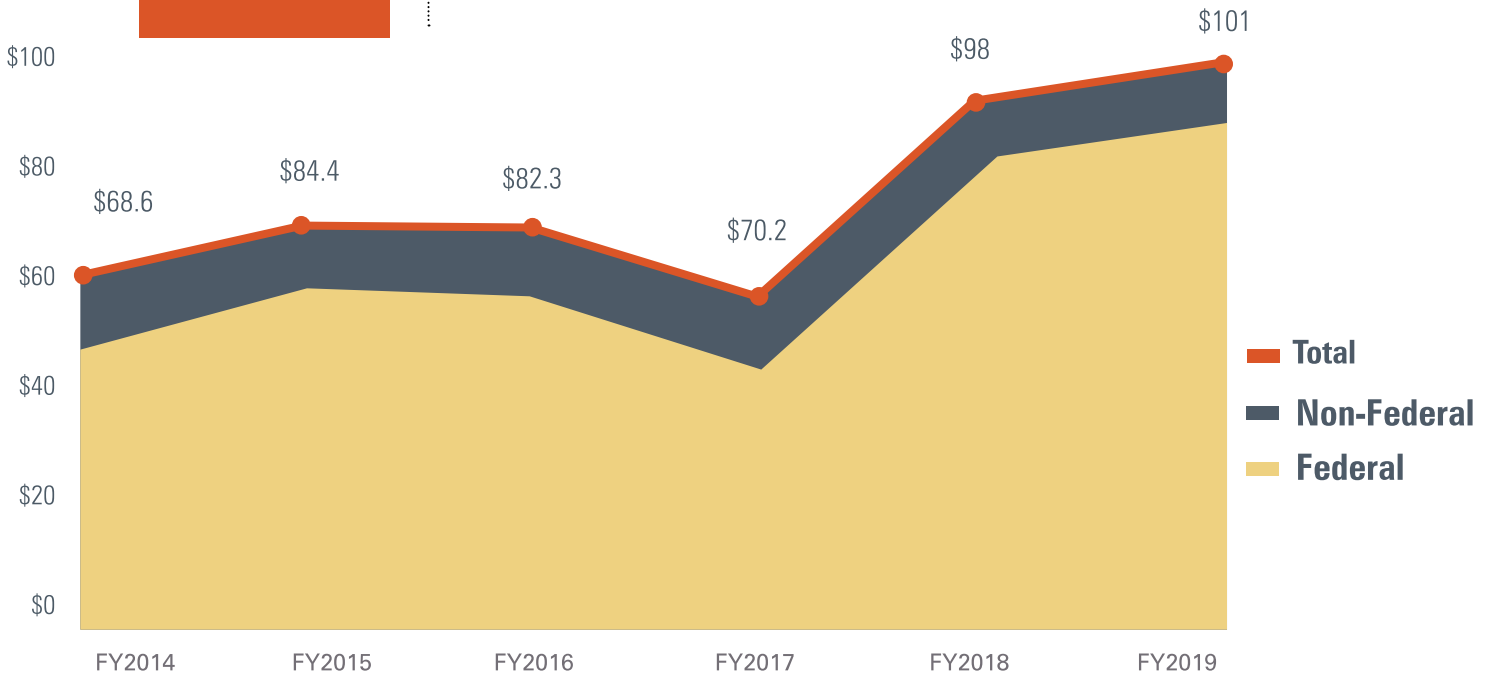






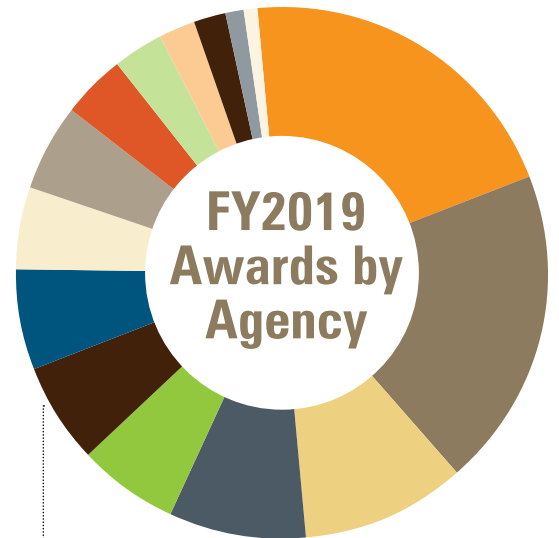
**FY2014  
to  
FY2019**

## Sponsored Awards in Millions



**Awards by  
College/  
Area in  
Millions**

- Graduate School of Oceanography
- Environment and Life Sciences
- Engineering
- Pharmacy
- Arts and Sciences
- Health Sciences
- Education and Professional Studies
- Nursing
- Academic Health Collaborative
- Research and Economic Development
- University Library
- Business



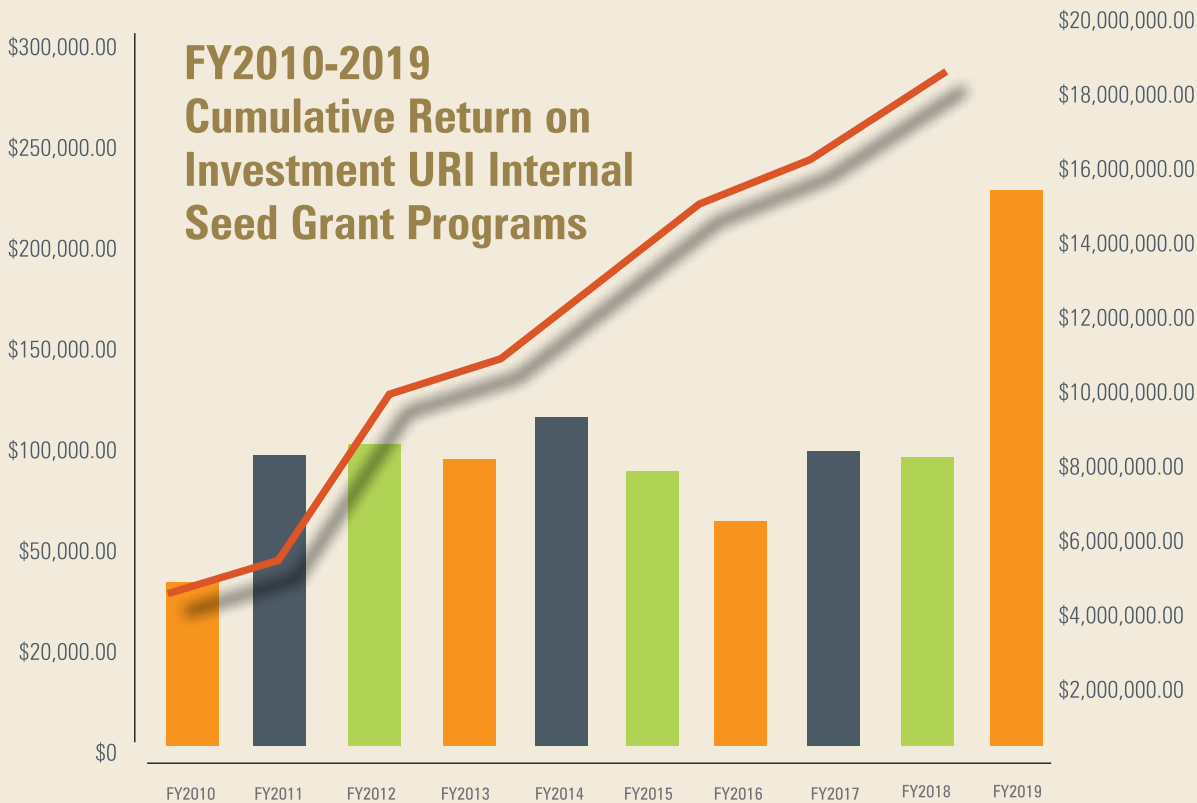
**FY2019  
Awards by  
Agency**

- NSF
- HHS
- AID
- DOD
- USDA
- DOC
- STATE
- OTHER
- FEDERAL AGENCIES
- NON PROFIT
- PRIVATE FOR PROFIT
- OTHER MISC
- INTERIOR
- UNIVERSITIES
- NASA

**Total  
\$100.9M**

**College/Area  
in Millions**





In FY2019  
the Annual  
Internal  
Seed funding  
more than  
doubled in  
size from  
\$89,323 to  
\$225,000.

# RISBDC-POLARIS-IP

## IMPACTING THE RHODE ISLAND ECONOMY

### URI INTELLECTUAL PROPERTY FY2011-FY2019

100 U.S. and Foreign Issued Patents  
324 Patent Applications  
201 Invention Disclosures  
6 Companies Formed: CREmedical, pHLIP, Velobit, Burbank, Labonachip, and Plant Advancement

### URI IMPACTING RHODE ISLAND BUSINESS

#### POLARIS MANUFACTURING EXTENSION PROGRAM (MEP) FY2018

Engaged with more than 200 Rhode Island manufacturers during the past year  
\$44.1 Million total increased or retained sales  
\$1.5 Million in cost savings  
521 jobs added or retained  
\$10.3 Million new client investments  
For every \$1 of federal investment, the MEP National Network generated \$29.50 in new sales and \$31 in new client investment.

#### RHODE ISLAND SMALL BUSINESS DEVELOPMENT CENTER (FROM 9/1/18 - 8/31/19)

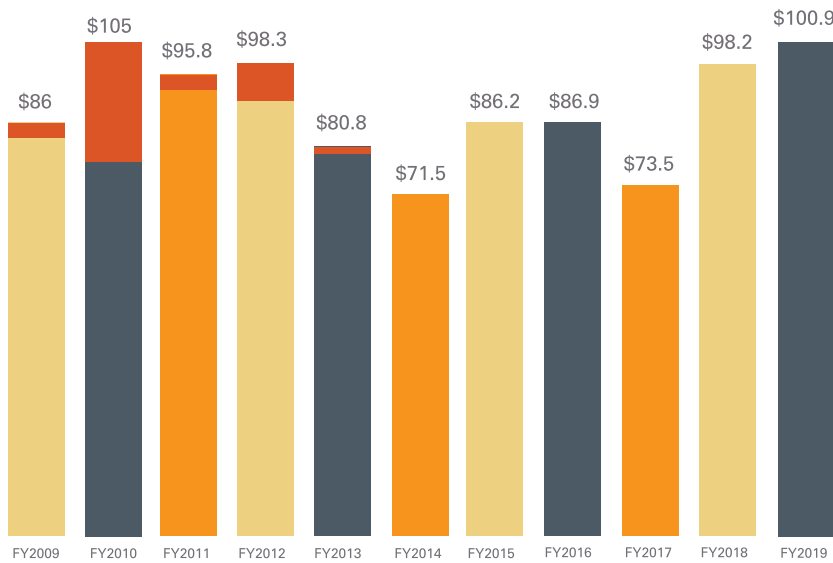
Total number of clients served: 820  
Total number of counseling/prep hours delivered by the counseling staff: 5,300  
Total number of counseling sessions: 3,002  
Total capital formation (this is the amount of money RISBDC counselors have helped business owners to access through loans, investors, etc.): \$10,739,262

# 2019

## ANNUAL REPORT FISCAL YEAR

### TOTAL AWARDS TREND

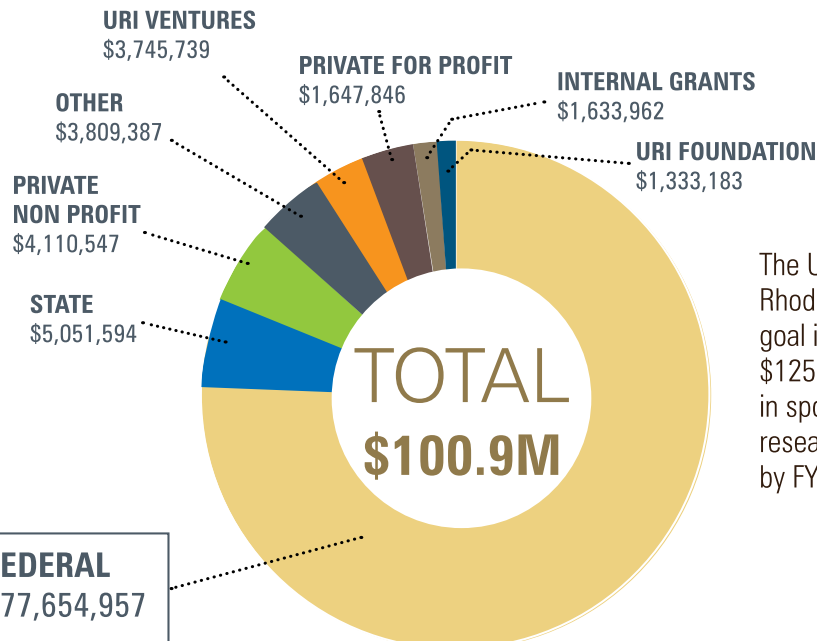
FY2009 -  
FY2019  
in Millions



Research Proposals  
Submitted FY2019  
**\$283.6 Million**

Expenditures FY2019  
**\$89.8 Million**

ARRA Funding



The University of Rhode Island's goal is to reach \$125 million in sponsored research funds by FY2024



THE  
UNIVERSITY  
OF RHODE ISLAND

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AND ECONOMIC  
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