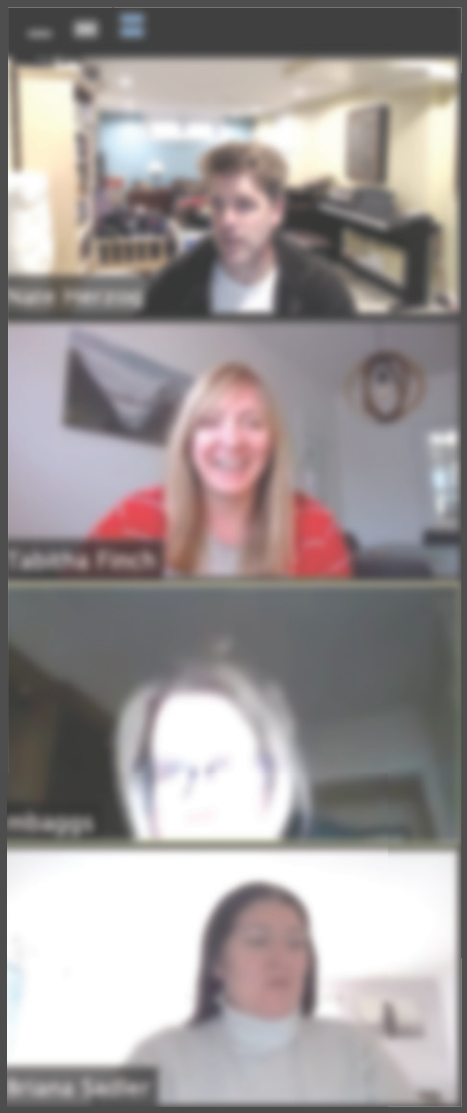
Vermont Biomedical Research Network

VBRN

An IDeA Network of Biomedical Research Excellence (INBRE)



INSIDE: VBRN SUCCESSES & ACTIVITIES

Message From The Director

In this digital issue of our annual magazine, our cover features a Zoom meeting in order to reflect how we have all been conducting business during the pandemic. And for the Vermont Biomedical Research Network (VBRN), going online is working! VBRN's goal is to increase the infrastructure for biomedical research in the state of Vermont by funding faculty research at baccalaureate institutions and involving undergraduates in this research. The National Institute of General Medical Science (NIGMS) recently renewed our funding for five more years to continue to meet this goal. Many people-- ranging from our outstanding VBRN staff to UVM's Research Administration to the administrations of our partner institutions to the Research Coordinators/faculty/students at these institutions to the staff of NIGMS-- are responsible for the ongoing success we have had. It has truly "taken a village" to make VBRN an organization that has improved the culture of research across the state of Vermont during the past 19 years! As is illustrated by the articles in this magazine, I firmly believe our successes will multiply as we move forward. We welcome all who want to be a part of this exciting time.

Ruth L Fouchaux

Upcoming VBRN Events

February 20, 2021

| Online Professional Development Workshop

Save the date. Agenda TBA

April 7, 2021

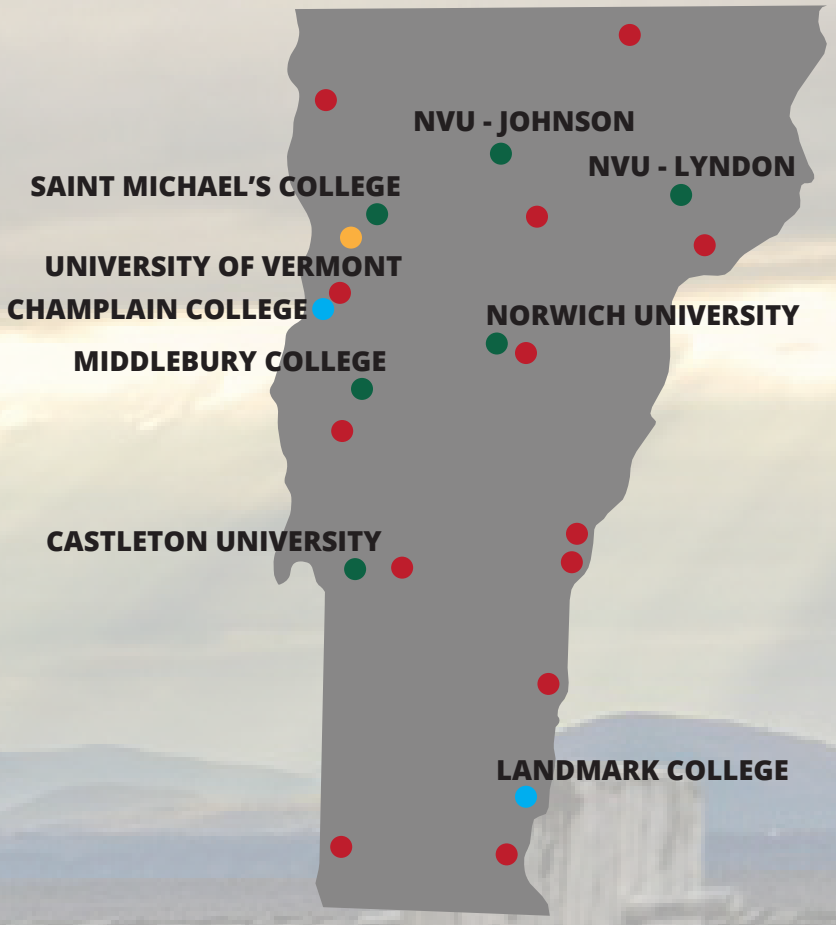
| Online Career Day

Save the date. Agenda TBA

| Conferences, **| Seminars,** and **| Funding Opportunities** are also posted on the VBRN Events calendar weekly. More information at https://vbrn.org/events

About the Vermont Biomedical Research Network (VBRN)

The Vermont Biomedical Research Network (VBRN) is in its fourth phase of funding with a five-year $19.4 million award from the INBRE program of the NIGMS at the National Institutes of Health. The mission of VBRN is to build human and physical infrastructure in Vermont for biomedical research. At the lead institution, the University of Vermont, we have developed state-of-the-art facilities for Proteomics and Bioinformatics to provide to researchers across Vermont the resources they need to carry out world class research and compete for federal funding. To address workforce development and its diversity, we build cultures of research by supporting faculty and student research at our Baccalaureate Partner Institutions: Castleton University, Middlebury College, Northern Vermont University (Lyndon and Johnson campuses), Norwich University, and Saint Michael's College. We also work with students in college lab classes throughout Vermont in order to bring state-of-the-art research resources into their education, including at the Community College of Vermont, Landmark College, and Champlain College.



Northern Vermont University

Castleton University

Middlebury College

Norwich University

Saint Michael's College

The University of Vermont

VBRN is funded by the National Institute of General Medical Sciences as part of the **National Institutes of Health initiative IDeA Networks of Biomedical Research Excellence (INBRE)** under award number P20-GM103449.

UVM Receives $19.4 Million NIH Grant to Promote Biomedical Research and Education in Vermont

Story by: Jeff Wakefield

The University of Vermont has received a $19.4 million, five-year award from the National Institutes of Health to foster biomedical research expertise among faculty at Vermont's four-year colleges and attract students at those schools and at UVM to careers in the biomedical sciences.

The new grant is the fourth consecutive multi-year award UVM has received from NIH to fund the initiative, formerly called the Vermont Genetics Network. In June 2020, the UVM initiative was renamed **Vermont Biomedical Research Network** to reflect the broader field of research supported by the award. The program, which launched in 2002, is part of the IDeA Network of Biomedical Research Excellence (INBRE) program at NIH, which funds similar programs in other states.

In addition to promoting workforce development, an aim of VBRN during the new award period is to develop and sustain statewide groups of scientists from colleges in the state, UVM and state government around a common research theme — the ecology of diseases like Lyme's disease, for instance — that can promote the health of Vermonters.

"I'm proud and delighted that the National Institutes of Health once again selected the University of Vermont's Vermont Biomedical Research Network for funding."

Senator Patrick Leahy (D-Vt.), vice chair of the Senate Appropriations Committee

"Strengthening biomedical research and education at the college level throughout Vermont and helping grow the state's STEM workforce are very much part of UVM's 21st century land-grant mission," said Suresh Garimella, UVM president. "**VBRN** enables us to use our nationally recognized strength in biomedical research to help make Vermont healthier and more economically vibrant, key elements of our strategic vision, Amplifying Our Impact. We are very grateful to Senator Leahy for ensuring that this important work can continue."

"I'm proud and delighted that the National Institutes of Health once again selected the University of Vermont's **Vermont Biomedical Research Network** for funding," said Senator Patrick Leahy (D-Vt.), vice chair of the Senate Appropriations Committee. "This multi-year investment through the IDeA Network of Biomedical Research Excellence (INBRE) program will ensure that students and faculty at colleges across the state will have access to research supports and dollars to work on some of Vermont's most prescient and persistent biomedical challenges. On the Appropriations Committee I have advocated for INBRE funding because I believe that Vermont's colleges have what it takes to be national leaders in biomedical research, but also because I know that the research conducted on critical health issues, like Lyme Disease, will touch the lives of Vermonters across our state."

Schools participating in the **Vermont Biomedical Research Network** include Castleton University, Champlain College, Community College of Vermont, Landmark College, Middlebury College, Northern Vermont University, Norwich University and St. Michael's College.

A key component of the program is providing seed funding to faculty at schools in the network, which are primarily teaching colleges, that will allow them to develop their own research agendas and secure independent funding to advance them. Faculty apply for the seed grants through UVM.

The program has been successful in meeting that objective, said Rex Forehand, Ansbacher Professor of Psychological Science at UVM and director of the **Vermont Biomedical Research Network**. "A significant number of faculty have used the seed funding to develop rigorous research programs and subsequently received external funding to support them," he said.

The **Vermont Biomedical Research Network** also supports paid internships for students at Vermont colleges

to work in the labs of faculty in their home schools or at the Colchester campus of the Albany College of Pharmacy, the White River Junction VA Medical Center or Delaware State University, an historically black university with whom UVM has a partnership agreement. It also supports internships for out-of-state students in the research labs of UVM faculty.

The goal of both internship programs it to build Vermont's STEM workforce, said Tabitha Finch, director of **VBRN's** professional development and education core.

"We're creating a pipeline for these students, including those from out-of-state, to continue in the biomedical field," she said. "Many of them elect to stay and work in the state of Vermont after they graduate."

Forehand is optimistic that the program will continue to meet its goals, based on its past successes:

- After receiving a seed grant from UVM, faculty in the network have been awarded 21 external grants totaling more than $5.4 million dollars.
- Recent examples include:

Amanda Crocker, Middlebury College, received an NIH grant to study what happens at a molecular level in the brain when an animal experiences physically painful stimuli. Her research will offer insight into why some people who experience painful stimuli develop PTSD as a result.

Ari Kirshenbaum, St. Michael's College, received an NIH grant to study the abuse potential of E-cigarettes in young adults.

Preston Garcia, Castleton University, received a National Science Foundation grant to investigate some of the ways in which bacteria have the ability to directly sense their environment and change their behavior according to their surroundings, using rhizobium as his model species. Rhizobia beneficially infect legumes and provides usable nitrogen to increase crop yield, so expanding the knowledge of the genetic mechanisms of this system has the potential to positively impact Vermont agriculture.

David Allen, Middlebury College, received an NIH grant R15 to develop a predictive model for the control of Lyme disease transmission.

- Over the four years of the previous grant round, 146 students were supported with paid internships either at their home schools or at UVM, the Albany College of Pharmacy, the VA Medical Center and Delaware State.. Students received funds for lab supplies and for travel support when needed.
- Of 85 students who received internship support over the first three years of the last grant round, 97% had or were majoring in a STEM course of study. Of the graduates, 23% were pursuing a graduate or medical school degree, and 66% had entered the workforce in a biomedical field. Forty percent of graduates were working in Vermont or pursuing advanced training in the state.

Originally published: https://www.uvm.edu/uvmnews/news/uvm-receives-194-million-nih-grant-promote-biomedical-research-and-education-vermont

Darlene Olsen

Norwich University Lands $650,000 National Science Foundation Grant

Story by: Matthew Crowley

*(Dr. Olsen has received funding from the **Vermont Biomedical Research Network**.)*

Norwich University's commitment to education and excellence in science, technology, engineering and mathematics, or STEM, got a major boost this month when a team led by mathematics **Professor Darlene Olsen** landed a $650,000 grant from the National Science Foundation to increase STEM degree completion by low-income, high-achieving undergraduates.

The five-year grant ends Jan. 31, 2025, and supports "Promoting Success of Undergraduate STEM Students Through Scholarships, Mentoring and Curricular Improvements in First-year Mathematics Courses." Olsen is the award's primary investigator. She'll work with College of Science and Mathematics Dean Michael McGinnis, mathematics Professor Christine Latulippe; and physics Professor Tabetha Hole, all co-primary investigators.

"I really want to make a difference in somebody's life. If we can provide opportunities for low-income students to attend a great academic institution like Norwich, that's awesome."

Professor Darlene Olsen

Scholarships from the grant will support two 11-scholar cohorts, one from the Class of 2024, one from the Class of 2025. The program will award at least six scholarships of up to $10,000 to low-income, academically talented incoming high school students majoring in biology, biochemistry, chemistry, neuroscience, mathematics or physics for the fall 2020 semester.

McGinnis said the National Science Foundation money could be fate-altering for some prospective students. With the money, Pell Grant-eligible students in the College of Science and Mathematics majoring in STEM degree tracks will be eligible for an additional $10,000 scholarship grant. McGinnis said he suspects the money could drastically reduce, or eliminate, the tuition a scholar's family must pay.

Karen Hinkle, a biology professor and Norwich's associate provost for research, said the scholarship program, which will use educational research to expand Norwich's STEM programs and bolster retention and recruitment, will heighten the university's profile as a STEM leader.

"It boosts our reputation, not only regionally, but nationally, as an attractive choice for academically strong

students," she said. "It shines a light on our already strong STEM programs and showcases how we strive to support our students to succeed from the time they enter our doors to the time of graduation, and even beyond as the students (graduate and) enter the workforce."

A boost to mentoring, research

McGinnis said the grant will boost mentoring, expanding and creating opportunities for new internships, undergraduate research and student engagement.

Beyond math, Olsen said that by bolstering calculus offerings, the new program will help Norwich's engineering majors, who must take the subject, and boost student outcomes, because the U.S. armed forces, businesses and nonprofits are eager to hire STEM graduates.

Most importantly, she said, the program will give some talented students, especially from underrepresented populations a chance to attend and succeed at college.

"I really want to make a difference in somebody's life," Olsen said. "If we can provide opportunities for low-income students to attend a great academic institution like Norwich, that's awesome."

The project team recognizes that students who enter college with less mathematics experience are less likely to graduate with STEM-discipline degrees. So, Norwich's program will:

- Measure the benefits of corequisite implementation of precalculus and calculus to help students complete the required calculus sequence by the end of their first year
- Implement and assess a leadership training program to improve communication and leadership skills for peer tutors in mathematics courses
- Measure the effect of improved academic, financial and career support for the scholars across their academic career at the university.

Persistence pays off

Landing the grant took two years, requiring a second application after the first fell short. (Norwich's "I will try" motto became "I will try again.") Olsen said working with the **Vermont Biomedical Research Network** over the past decade and attending National Science Foundation S-STEM workshops (the first S stands for scholarships) sharpened her grant-writing chops. She has negotiated with the foundation since July (2019), revising the proposal and budget several times, most recently over Thanksgiving break (2019).

Latulippe will help with curriculum changes for the program's calculus sequence and help train the student tutors. Hole will oversee the mentoring program and mentor the physics scholars. Professors Meghan Doczi (biology, neuroscience) and Ethan Guth (chemistry, biochemistry) will mentor the scholars in their disciplines.

"To get this has been a team effort," Olsen said.

Olsen said she was thrilled when Mina Peshavaria, Norwich's sponsored-programs director, emailed to say the grant was landed and official. The news was especially nice, she said, given that, according to the foundation, only 17 percent to 19 percent of the grant proposals in a given year succeed.

"Mike McGinnis came up to my office when the funding was final," Olsen said, "and we had a good (moment of) 'Go, team, go.'"

Although Norwich's program will focus on math, the foundation, on its website, said the S-STEM grants, as they're called, support scholarships to study biological sciences (except medicine and clinical fields); physical sciences (including physics, chemistry, astronomy and materials science); mathematical sciences; computer and information sciences; geosciences; and engineering. The scholarships also support studying STEM-related technology including biotechnology, chemical technology, engineering technology and information technology, the foundation said.

Beyond the classroom, the foundation said, the S-STEM grants encourage collaboration among disciplines, institutions and faculty and partnership among educational institutions, business and community organizations, national labs and governments.

Originally published: https://www.norwich.edu/news/2085-norwich-university-national-science-foundation-2019

David Allen Awarded $332,000 NIH R15 Grant

Middlebury College Associate Professor in Biology, Dr. David Allen, won an R15 AREA grant from the National Institute of Allergy and Infectious Diseases to fund his research over the next three years.

The grant entitled "A climate and host community driven *Ixodes* population and infection dynamics model" totals $332,044. This was Allen's third R15 grant submission and is a good reminder that persistence pays off when it comes to grant seeking.

As Allen describes, "The big picture focus of the work is developing, parameterizing and validating a tick population and infection dynamics model. Tick-borne diseases are a major public health problem and their incidence has increased over the past two decades. We lack successful tick-borne disease control strategies on a large-scale. This work will provide a tool to test potential strategies to find the most cost effective one in a given setting."

His model is unique in that it will take a realistic representation of the tick host community into account. "It will be parameterized by direct experiments in the field to measure needed inputs to the model. This will include trapping for small mammals and using game cameras to measure populations of larger mammals. We will also manipulate weather variables, which could affect tick populations. This will allow us to better understand how weather variables affect tick populations and encode them into the model."

Allen acknowledges that the preliminary data he collected as well as participating in **VBRN's** program helped strengthen his extramural proposals. "The four years of **VBRN** funding provided enough preliminary data to write a strong proposal. Also, applying for **VBRN** funding gave me great practice for the format of an NIH grant."

A major focus of the R15 program, and **VBRN**, is the involvement of undergraduate student researchers. This grant will provide support for nine summer research assistant positions for Middlebury College students as well as offer additional support for research positions in Allen's lab during the academic year. These opportunities give students great hands-on experience that includes everything from programming statistical models to conducting tick sampling, all while contributing to Middlebury's culture of research.

Professor Earns Award For Impact on Her Field and the Community

Story by: Norwich University Office of Communications

(Dr. Neal has received funding from the **Vermont Biomedical Research Network**.)

Norwich University **Assistant Professor of Biology Allison Neal** has been named the 2019 winner of Vermont Women in Higher Education's (VWHE) Peggy R. Williams Emerging Professional Award.

The Peggy R. Williams Emerging Professional Award, named for the former Lyndon State and Ithaca College

Allison Neal

president, is presented to a woman who is in the early stages of her career, demonstrates excellence in her contributions to students, colleagues, and/or her institution (in such areas as service, innovative programs, teaching, research, etc.), and shows promise and potential for future contributions.

In her four years at Norwich University, Neal has impacted her field and her community discernably. She is a respected educator and has mentored 16 students in multiple research projects, one of which gained national attention at the prestigious Posters on the Hill in Washington, D.C. She is also the co-director of the statewide Science, Technology, Engineering and Mathematics (STEM) Fair.

"By stepping up to help direct this STEM initiative in Vermont is proof of Dr. Neal's contributions to science education across all grades in Vermont," wrote Professor of Mathematics and Honors Program Director Darlene Olsen in her nominating letter.

Statewide, Neal helped coordinate a thematic Disease Ecology Research Group through the **Vermont Biomedical Research Network (VBRN)**. This group has held two conferences bringing together **VBRN**-funded faculty and students from several undergraduate institutions in Vermont to discuss their research on parasites in Vermont.

Neal said she became inspired at a summit for women in the Science, Technology, Engineering and Mathematics (STEM) in which the advice for encouraging more women into the male-dominated field was to build supportive communities.

"When I looked at the list of amazing women who have won this award in the past, what struck me most was how many of them I already know. I have already been supported so much by so many amazing women in higher education, both people who have won this award in previous years and people whose contributions have been recognized in other ways," Neal said. "I am truly honored to have been selected for this award and deeply grateful to all of the people who are so supportive of me. I hope that I can help continue to strengthen this amazing community."

The award was presented at VWHE's Fall Awards Dinner in the Silver Pavilion at the University of Vermont Alumni House in Burlington, Vermont.

Originally published: https://www.norwich.edu/news/1989-norwich-university-professor-earns-award-for-impact-on-her-field-and-the-community

Christine Palmer

Palmer Named Fulbright Scholar

Story by: Castleton University's Office of Marketing and Communications

(Dr. Palmer has received funding from the **Vermont Biomedical Research Network**.)

Castleton University Assistant Professor of Biology Dr. Christine Palmer – better known as Palmer to many around campus – has been named a Fulbright Scholar and will engage in research in Iceland.

The Fulbright Program is a prestigious flagship international educational exchange program sponsored by the U.S. government and is administered through the U.S. Department of State's Bureau of Educational and Cultural Affairs. The Fulbright Program offers grants to provide students, scholars, teachers, artists, and scientists like Palmer the opportunity to study, teach and conduct research, exchange ideas, and contribute to finding solutions to shared international concerns.

"There's a student program, who act as kind of an ambassador, and there's a scholar version for people who are established and are going to bring their expertise to other countries. There's usually a need that the country has that a Fulbright can help with," Palmer said. "It is ridiculously competitive. You have to convince them that what you're bringing as a skill set is what their country needs."

Palmer is one of two Castleton professors to receive a Fulbright Award this year. Dr. Monica McEnerny, associate professor of Education, has also been named a Fulbright Scholar and will work with Kazakh graduate students who are teachers in their local schools.

For Palmer, that international concern is climate change. While in Iceland, Palmer will expand on research previously conducted with Icelandic Forest Service Director Adalsteinn Sigureisson to assist with reforestation efforts and help Iceland achieve its goal of becoming carbon neutral. Her focus fits perfectly with the Fulbright Program's Arctic Initiative, a joint venture with the National Science Foundation.

"A lot of people explore geological processes, melting ice, and fisheries. Trees are not a common topic," Palmer said.

While in Iceland, Palmer will be living at the Icelandic Forest Research Station. She will spend most of her time in Iceland's volcanic ash fields or in the forest in various parts of the country, collecting soil and ash samples.

"We are trying to see which fungi microbes are there. We are looking at, 'What should it look like in a forest that's been there?' and, 'What should it look like in a barren ash field?' she said. "We're trying to figure out which of the trees they're planting can survive."

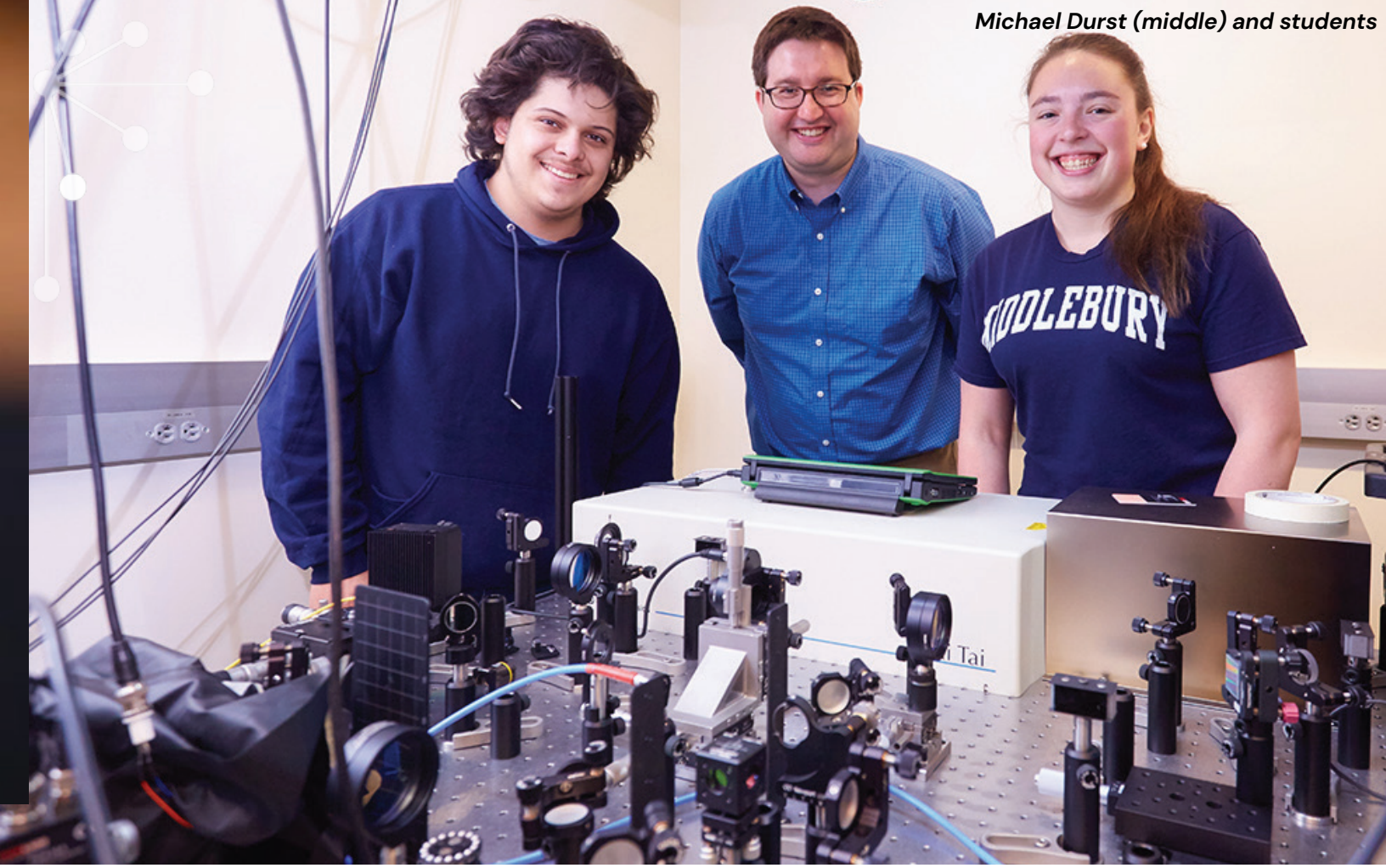
Beyond the research, Palmer is also looking forward to how this experience will benefit her when she returns to Castleton.

"I look at professors before and after they've gone on sabbatical. They are like brand new humans. They are so energetic, excited, and rejuvenated. They come back fired up and that's great for the classroom," she said. "I keep thinking about our Wildlife & Forest Conservation program. This experience will improve it and our courses will be so much better because of it."

Palmer is grateful for the opportunity.

"I definitely consider myself a lifelong learner. You know that feeling when you learn something new? I love that," she said. "Being somewhere different allows us to have a perspective on our home that we can't get on vacation. There are lots of things you can't be grateful for if you don't know any other place. Seeing other parts of the world reminds us that we are fundamentally similar. We are different, but the core of humans is the same."

Originally published: https://www.castleton.edu/news-media/article/palmer-named-fulbright-scholar



Michael Durst (middle) and students

Michael Durst Awarded $381,000 NIH R15 Grant

Dr. Michael Durst, Assistant Professor of Physics at Middlebury College, received an R15 AREA grant from the National Institute of Biomedical Imaging and Bioengineering, which will fund his research over the next three years.

The grant entitled, "Volumetric Temporal Focusing Microscopy for Fluorescence-guided Surgery" totals $381,280. This was Durst's second R15 submission and as he describes, the reviews from the first proposal really shaped his revision application. "The reviewers from the original proposal noted that [my] approach needs to also solve a biologically relevant problem. In my resubmission, I focused on applying this technique to fluorescence-guided surgery. Directly and concretely addressing the reviewers' concerns was described favorably in the summary statement of the funded proposal."

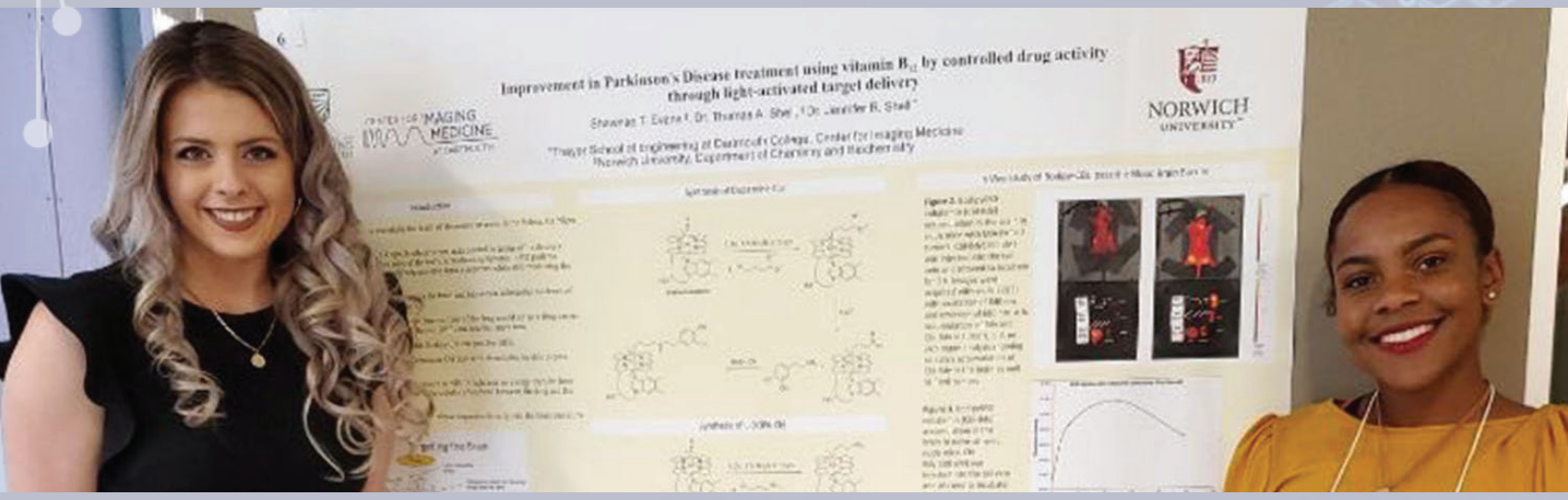
Durst's project uses lasers to image through biological tissue and has a public health implication for cancer margin detection. As he states, "We are developing tools for fluorescence-guided surgery, in which the tissue targeted for biopsy is brightly labeled with a dye. Such an approach allows the surgeon to minimize the amount of tissue removed and to maintain as much functionality of the area as possible. While current implementations of fluorescence-guided surgery can provide real-time wide-field images, it lacks the ability to differentiate between signal from the surface of the tissue versus deeper layers, which is essential for cancer margin detection."

Durst is doing this research in collaboration with Dr. Kimberly Samkoe at Dartmouth College, whom he met by networking with her colleague at a **VBRN** Faculty Retreat. Samkoe plays a critical role in this project; she introduced Durst to the field of fluorescence-guided surgery and will provide samples for his lab to image. In addition to connecting Durst to his R15 collaborator, he credits **VBRN** funding for allowing him to buy equipment, collect preliminary data, and publish his technique with student co-authors to make his R15 proposal successful.

Durst applies his strong belief in the value of research as part of an undergraduate education by involving students every step of the way in his projects. This grant will fund nine student researchers in his lab over the summer and many others throughout the academic year. Through this hands-on experience, students will learn everything ranging from how to assemble the microscope from scratch to measuring the pulse width of the laser to imaging the tissue samples. As Durst notes, "By funding this project at Middlebury, the NIH will provide new opportunities for biomedical imaging research and will encourage physics majors and other students to pursue NIH-funded research fields."

From a Pair of Science Scholars, a Powerful Display of Ingenuity

Story by: Matthew Crowley



The presentation was virtual, but the thrill was real.

In April 2020, Norwich rising seniors and science majors Shawnae Evans and Halee Lair used social media to participate in Posters on the Hill, an annual undergraduate research poster session directed by the Council on Undergraduate Research, a national nonprofit membership group that was founded in 1987 and supports undergraduate research.

Posters on the Hill would have run from April 20 through April 21 in Washington, D.C., if not for the event-scrubbing coronavirus pandemic. Ordinarily, Congress members and their staffs would attend the event to talk with the student researchers about their work.

For the second straight year, Norwich students were the lone Vermont college representatives at the event. The spot usually accommodates just one student, but Lair, a biology major and Honors Program student from Litchfield, Maine, and Evans, a neuroscience major from Fort Lauderdale, Florida, applied together and were accepted as a tandem.

Only 60 of more than 350 applications were accepted nationwide. Lair and Evans are the fourth and fifth Norwich students to gain Posters inclusion in the past six years; Class of 2020 graduate Dillon Zites, a biology major from Clarksville, Tennessee, attended the 2019 session.

Evans and Lair presented their research, "Development of Cobalamin Drug Conjugates as Trojan Horse Molecules for Drug Delivery" on a small-whiteboard-size placard, an image of which they showed on Twitter. Thomas Shell, a Norwich chemistry professor, and collaborator from Dartmouth College, Dr. Jennifer Shell, mentored the students through their work.

Lair and Evans had also presented research done with Shell in 2019. Lair showcased "Development of Light-activated Compounds for the Improved Treatment of Head and Neck Cancers" Aug. 14 through Aug. 16, 2019, at the Northeast Regional IDeA Conference, in Bretton Woods, New Hampshire. Evans presented "Development of Light-activated Compounds for the Improved Treatment of Parkinson's Disease" at the same conference.

Evans also showed the project at the 2019 Women in STEM Summit, April 6, 2019, at Wheaton College in Norton, Massachusetts.

"We both wanted to go," Lair said, discussing the Posters on the Hill application during a February interview. "I think we both came up with the idea to combine the poster and apply together. We were very determined, we were like, 'We are going, we're getting this done. We want to be there.'"

They would be.

Celebrating the achievement

Lair, who met Evans last year in Shell's organic chemistry class, said she was in class when Shell texted her with the news.

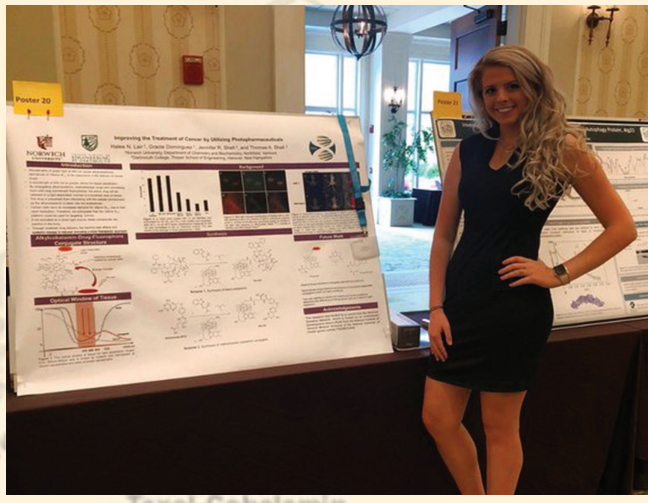
"I was like, 'No way,'" she said with a smile. "I left class, I called my mom, my mom was at work. I was like, 'You need to answer, Mom. It's an emergency.'"

Lair called Evans next.

"I was supersurprised," Evans said, recalling the call. "I had to hold onto the (steering) wheel really tightly because I was just ecstatic."

Lair said the Norwich community exulted with them. Congratulatory emails rolled in from faculty.

"They said, 'Congratulations, congratulations. We're going to be there for you. What do you need?'"



Halee Lair

An award from the **Vermont Biomedical Research Network**, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103449, backed the Posters on the Hill project.

In their research, Lair and Evans worked to reduce the harmful side effects that can result from chemotherapy drug interactions in mice. Using vitamin B12 (cobalamin) drugs to localize treatment to an area of interest, such as a tumor or brain tissue, they reasoned, would cut these side effects.

In a summary of their poster, Evans, a Corps of Cadets member, and Lair, a civilian student, wrote that their experiments showed these drugs can be delivered both to tumors and across the blood-brain barrier, something other Alzheimer's and Parkinson's disease-fighting treatments struggle to do.

Lair and Evans further wrote that they developed drugs linked to vitamin B12 derivatives that are not active in the body until exposed to light. (Zites' 2019 work also explored this idea.)

When Lair and Evans showed their poster on Twitter on April 21, the **Vermont Biomedical Research Network** praised it and conversed with them virtually. The network asked whether the treatments can aid ailments beyond head and neck cancer. Yes, the students wrote; the treatment can fight pancreatic and breast cancer, too, basically any cancer with an overexpression of transcobalamin receptors.

Mounting successes

Lair said she hopes the Posters experience and her other presentations will steel her to enter medical school and work toward her goal of becoming a surgeon.

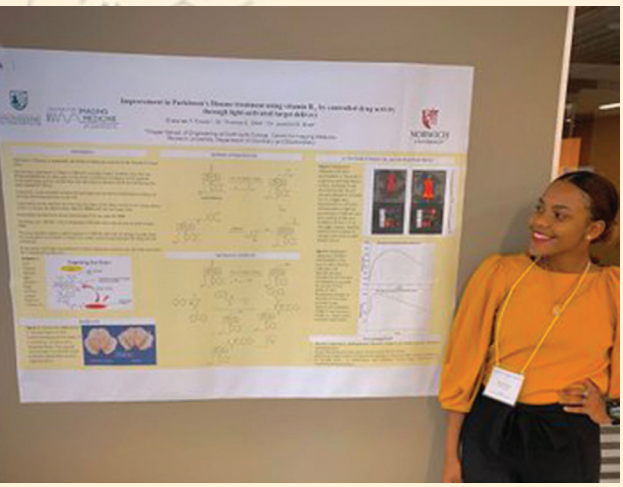
"It's such an honor to be accepted," Lair said.

Evans, who is contracted in the U.S. Air Force and will commission as an officer following graduation, added, "A great feeling of accomplishment. Something you work so hard for."

Rising senior and biology major Halee Lair said she hopes research she did for Posters on the Hill will help her toward her goals of attending medical school and becoming a surgeon. (Photo courtesy Shawnae Evans and Halee Lair, via Twitter.)

Lair and Evans' achievement lengthens a research success record at Norwich. Over the past decade, Norwich's investment in research has grown. Through 2019, endowed income and reinvested grant overhead for research faculty and undergraduate research had topped $800,000, complementing more than $17 million of externally acquired research and institutional grants managed by the Office of Academic Research.

The **Vermont Biomedical Research Network** has stoked Norwich's research. In 2019, the network granted Shell and Norwich biology Professor Allison Neal $75,000[1] each for research. Norwich mathematics Professor Darlene Olsen credited the network for improving grantwriting chops she needed to land $650,000[2] from the National Science Foundation for science, technology, engineering and mathematics scholarships in November.



Shawnae Evans

In a recent essay on Norwich's response to the coronavirus pandemic, professors Amy Woodbury Tease, Lea Williams and Karen Hinkle said research prepares students for fruitful futures.

"Undergraduate research prepares graduates for life, work and citizenship," they wrote. "(It) demands critical thinking, data collection, innovation and collaboration, but … also involves planning, patience, empathy and understanding.

"We must cultivate student scholars by giving them opportunities to wrestle with uncertainty," they added. "What better time than now to do this?"

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Faculty Collaborators Funded For Stress-In-Space Study

Story by: Mark Tarnacki

(Drs. Tomasulo and Loisel have received funding from the **Vermont Biomedical Research Network**.)

Saint Michael's College faculty collaborators Melissa VanderKaay Tomasulo of neuroscience/ psychology and Dagan Loisel of biology learned this week that a "small-scale research grant" of $50,000 through Vermont Space Grant Consortium for which they applied earlier this year has been funded in full. The goal of the study funded by this grant is to identify stress-relieving countermeasures that astronauts could use during long-duration space missions to reduce stress and the resultant immune dysregulation.

Dagan Loisel

"We plan to study stress-induced reactivation and shedding of latent herpes viruses in college students as a terrestrial analog to determine if stress-relieving activities (e.g. guided meditation delivered through virtual navigation) alter the dynamics of this viral shedding," Tomasulo said. "We will be collaborating with Dr. Brian Crucian, Lead Immunologist, and Dr. Satish Mehta, Virologist, who are scientists from NASA's Human Research Program (HRP) at Johnson Space Center. NASA's HRP offered to match our grant funding if we were successful with our application, so the total award is for $50,000. While we are professionally and personally excited about this project, we hope this award will also have a direct impact on Saint Michael's College. It is not common for a small, liberal arts and sciences college to have this opportunity."

Melissa VanderKaay Tomasulo

She said the project came about because of collaborative work she and Loisel did on the new Saint Michael's Introduction to Health Sciences course this past fall. "During our unit on the biological effects of stress on the body, we presented a NASA study by Dr. Crucian, which investigated the effects of stress during space flight on the immune system, and then got to thinking. We look forward to involving students in this project and having our research further inform our teaching. This is a demonstration of interdisciplinary research at its finest."

Tomasulo said she and Loisel "understand that the impact of Covid-19 on this project is unknown, but for now, we are relishing in the accomplishment."

Angela Irvine, the College's director of advancement programs, said, "This is a significant grant well beyond the dollars. These collaborations are one of the most effective ways for faculty at Saint Michael's to build their research program and make important connections that will lead to larger awards in the future. The collaborative model is true for all disciplines. I hope that we can continue to support and encourage faculty across the College to find opportunities to support their scholarship and engage students in these experiences. We all benefit from the success of these awards."

The Vermont Space Grant Consortium (VTSGC) is an organization consisting of academic institutions, private industry, and public entities. Funded by a grant from NASA's National Space Grant College and Fellowship Program, key goals of the VTSGC are: to build aerospace-related research infrastructure within the state; to promote science, technology, engineering and mathematics.

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VBRN Core Facilities

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VBRN Highlights

- **Dr. Ari Kirshenbaum** from Saint Michael's College was awarded an NSF Small Business Innovation Research grant to develop a reliable tool for law enforcement to detect cannabis-related driving impariment
- **Dr. Ruth Fabian-Fine** from Saint Michael's College received tenure
- **Drs. David Allen, Clarissa Parker, Robert Moeller** and **AJ Vasiliou** from Middlebury College received tenure
- Former VBRN summer intern from Delaware State University, **Tiara White**, enrolled in a MD/PhD program at Stony Brook University
- Norwich University's **Darlene Olsen** was appointed as Charles A. Dana Professor in recognition of her outstanding teaching, scholarship, and service
- Middlebury College's **Drs. Amanda Crocker, Catherine Combelles, Mark Spritzer, Michael Durst** and **Clinton Cave** received an NSF Major Research Instrumentation grant to purchase a confocal microscope

Vermont Biomedical Research Network

An IDeA Network of Biomedical Research Excellence (INBRE)

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https://vbrn.org

Photo Credits:

Todd Balfour – "Michael Durst Awarded $381,000 NIH R15 Grant", "David Allen Awarded $332,000 NIH R15 Grant"

Norwich University - "Norwich University lands $650,000 National Science Foundation grant", "Professor earns award for impact on her field and the community"

Castleton University - "Palmer Named Fulbright Scholar"

Shawnae Evans and Halee Lair - "From a pair of science scholars, a powerful display of ingenuity"

St. Michael's College - "Faculty collaborators funded for stress-in-space study"

Editorial Edits:

"From a pair of science scholars, a powerful display of ingenuity"

1. **The article originally stated awards were $750,000 each.**
2. **The article originally stated the NSF award as $750,000.**

Titles of Our Current Faculty Funded Research

Clinton Cave, Middlebury College, *"The Role of GDE6 in Neural Tube Patterning"*

Michael Linderman, Middlebury College, *"Non-parametric Genotyping of Structural Variants in Whole Genome Sequencing Data"*

Robert Moeller, Middlebury College, *"College Student Mental Health Pathways Wave 3"*

Lindsay Repka, Middlebury College, *"Development of Photoredox Crosslinking Approach to Target Identification"*

Martin Seehuus, Middlebury College, *"The Moderating Role of Sleep in Anxiety"*

Thomas Shell, Norwich University, *"Development of Photopharmaceuticals to Treat Head and Neck Cancers"*

Emily Tarleton, NVU-Johnson, *"Steady On: Measuring Basic Resource Needs of Older Adults Participating in a Falls Risk Assessment"*

Michael Larsen, Saint Michael's College, *"Statistical Analysis of Dental Research Data with Missing Values"*

Andrew Korich, Saint Michael's College, *"No Metal No Problem: Boron-Activated Alkynes"*

The **VBRN** links resources at the University of Vermont to its partner institutions, which include:

Castleton University
Northern Vermont University – Lyndon
Northern Vermont University – Johnson
Middlebury College
Norwich University
Saint Michael's College
Community College of Vermont*
Landmark College*
Champlain College*

NIH reminds us that "IDeA Investigators being funded through one of the IDeA initiatives are expected to apply for and receive independent research funding." **VBRN's** mission is to provide the resources for researchers in our partner institutions to develop their research and submit competitive proposals to support their research into the future.