

Spring 2018

# forward ▶▶ thinking

The Research Newsletter of Montclair State University

## INSIDE:

- Facilitating Early Cancer Detection | 2
- Improving Water Quality | 2
- Research Explores 'Pockets of Peace' | 3
- Supporting Immigrant Teens | 3
- Developing New Treatments for Malaria | 4
- When the Research Is Personal | 5
- Spotlight: News Briefs | 6
- Connecting the Rainforest to Classrooms Around the World | 7
- Symposium Showcases Student Research | 8

## Working Toward New Cancer Treatments



Carlos Molina

**With the help of a nearly \$1.3 million research advancement award from the National Institutes of Health, Biology Professor Carlos Molina will be able to further develop his career as a cancer researcher and enhance his research productivity in order to eventually transition to NIH Research Project Grant support.**

Molina will receive \$324,488 for the first year of a four-year Support of Competitive Research (SCORE) award for his project "Post-translational Regulation of Inducible cAMP Early Repressor and its Implications in Cancer." Molina states that this funding "will allow me to dedicate four years to collecting, analyzing and reporting data for this project."

continued on page 7

## \$5.7 Million Grant to Fund Character Development Research



Boy Scouts of America

**What combination of training and experience of scoutmasters and other volunteers best builds character in scouts? How can that training be enhanced to strengthen the scouts' character development? These are among the questions that Family Science and Human Development professors Jennifer Urban and Miriam Linver are asking in a new research project that seeks to reveal how adults build character in scouts.**

The researchers, who are also co-directors of the Institute for Research on Youth Thriving and Evaluation (RYTE), at Montclair State University, will receive \$1,868,050 for the first year of a two-year, \$5.7 million Boy Scouts of America (BSA) National Character Initiative sub-award funded by the Stephen D. Bechtel Jr. Foundation. The grant supports the second phase of an ongoing project focused on uncovering the role of adults in youth character development.

"We're very excited to have this opportunity to study one of the longest-running youth-serving organizations in the nation," says Urban. "The RYTE Institute is focused on understanding what goes right with youth. A study of this magnitude could potentially impact hundreds of thousands of young people — as well as the adults who care about promoting their positive development."

The first phase of the project, she says, "confirmed that BSA offers a distinctive character initiative that is deeply rooted in its culture, as well as ideal for exploring and documenting the relationship between adult practice and youth character development."

continued on page 4

## Facilitating Early Cancer Detection

**At the most basic level, living organisms are composed of four families of structurally related macromolecules: nucleic acids, proteins, lipids and glycans. Montclair State Chemistry and Biochemistry Professor Jinshan Gao focuses his research on glycans, which play roles in fields ranging from health to materials fabrication.**

Gao is the recipient of a two-year, \$357,000 grant from the National Institutes of Health to develop free radical agents to enrich glycans — and make it easier to clarify their structure and the role they potentially play in the development of cancers, diabetes and immune disorders. “Without the enrichment of glycans, it would be very difficult to study their structures and functions,” Gao explains. “This novel approach will

significantly advance the frontier of the study of glycans, or glycomics.”

While mass spectrometry is the pivotal technique for characterizing glycans, fully profiling glycans and glycoproteins is particularly challenging for reasons ranging from their structural complexity and diversity to a low-abundance of native glycoproteins.

Gao’s grant supports research to develop solid-supported free radical probes, or SSFRP, for glycan enrichment and characterization. “After the glycans are coupled with SSFRP, all the impurities will be washed away,” he says. “This will create an easily accessible tool with which to simultaneously enrich and characterize glycans.”



Montclair State graduate and undergraduate students will be involved throughout the project’s research activities, with undergraduates obtaining preliminary data.

Ultimately, Gao believes his research will benefit biomedical researchers. “It will facilitate the development of glycan biomarkers for early cancer detection and help advance understanding of the roles of glycans in health and disease.” ■

## Improving Water Quality



Meiyin Wu

**A study released more than a decade ago recommended various ways to reduce longstanding fecal contamination in the Musconetcong River. While many of those management efforts have been in place since then, until now there has been little to no follow-up monitoring. Montclair State Biology Professor and Passaic River Institute Director Meiyin Wu recently received a two-year, \$340,000 award from the Delaware Watershed Research Fund/William Penn Foundation to revisit the Musconetcong River.**

“The project will replicate the 2007 water monitoring study to investigate the changes in water quality after 10 years of efforts implementing best management practices in the Lower Musconetcong watershed,” Wu explains. “We’ll be monitoring the Delaware River tributary for fecal coliforms and *E. coli* from May to October this year and seeking to determine the origins of the fecal contamination.”

Wu’s goal is to fully evaluate the effectiveness of earlier remediation efforts. “Restoration really does make a difference. We expect to find a reduction in pathogens and an improvement in the water quality of the river from what was reported a decade ago,” Wu says.

Through stakeholder meetings supported by the grant award, Wu hopes to start a conversation between regulatory agencies and local residents. “We hope to learn what prompts resident participation in restoration and provide opportunities to coordinate regional water quality management efforts.” ■

## Research Explores ‘Pockets of Peace’

**Associate Professor of Public Health Tamara G.J. Leech is focused on shining a light in corners of communities too often left in shadow.**

For years, Leech has devoted her research to the ways that neighborhoods in challenged communities can remain immune to violence and despair. Her work, “Pockets of Peace: Communities Resilient to Adolescent Violence,” focuses on uplifting news in Indianapolis, Indiana.

“We did the study in 127 one-block neighborhoods where residents faced a concentrated disadvantage in their circumstances, from a 35 percent poverty rate to high



unemployment rates and a reliance on government programs,” Leech says. “Of these neighborhoods, 19 averaged less than one act of reported violence per year for each of the five years we were in the field.”

While her original five-year study ended in 2012, she has continued to research the topic and received a one-year grant in 2017 from the William T. Grant Foundation to further study what makes neighborhoods resilient.

Why Indianapolis? Leech says that roughly a decade ago, when the

study began, Indianapolis outpaced Chicago in homicides. Through her work, she focused on a variety of assets, from churches and gas stations to the standing of “old heads,” longtime neighborhood residents who inspire young people to avoid self-destructive behaviors and focus on community.

“It is no surprise that the structural disadvantage that youth face in marginalized and underserved urban environments leads to violence,” Leech says. “But our study of these spaces gave us the opportunity to figure out in a realistic way how some entire neighborhoods thrive as ‘pockets of peace’ — resilient to the threat of violence.”

As part of the study, Leech gave iPhones to 28 young men in Indianapolis — 14 from neighborhoods that were “pockets of peace” and 14 from traditionally challenged neighborhoods — to talk with them weekly to gain their insights on life in their communities.

“We found that among these young men — even those who were engaging in violence — 100 percent wanted to continue completing their diaries in addition to sharing other things about their neighborhood.”

She hopes that other communities around the country will see these neighborhoods as examples to emulate. “We can make this strong argument that peace is possible everywhere,” she says, “despite conditions that are counterintuitive to it.” ■

## Supporting Immigrant Teens



**The International Network for Public Schools (INPS) — a network of high schools in New York City and across the country — supports recently arrived immigrant teens who are learning English.**

“These schools offer protection, education and possibility for immigrant youth during a political moment in which their identities are under siege,” notes Counseling and Educational Leadership Professor **Reva Jaffe-Walter**, who was recently awarded a three-year, \$70,000 William T. Grant Foundation sub-award from a New York University grant. The funding will support her study of the critical elements that contribute to the success of schools within the INPS in improving the outcomes of immigrant youth.

Collaborating with colleagues from NYU and the Research Alliance for New York City Schools, Jaffe-Walter is looking at how high schools can best serve immigrant teen English learners, who historically struggle more in school than their younger counterparts.

“This research will explore the key practices that help explain the schools’ successes, examine the academic challenges facing recently arrived immigrant students, and identify strategies educators have used to address these challenges,” explains Jaffe-Walter. ■

## Developing New Treatments for Malaria

**Almost half of the people in the world — especially those living in Sub-Saharan Africa, Asia and Latin America — currently risk contracting malaria. In 2016, the Medicines for Malaria Venture estimated that 216 million cases of malaria occurred worldwide, leading to 445,000 deaths.**

Malaria spreads to humans who are bitten by mosquitoes infected with *Plasmodium* – a single-cell parasite. While a number of antimalarial medications are available, the appearance of drug-resistant strains of *Plasmodium* has sparked renewed urgency in the search for novel antimalarial agents. **David Rotella**, Sokol Professor of Chemistry, and **John Siekierka**, Sokol Professor of Medicinal Chemistry and director of the University’s Margaret and Herman Sokol Institute for Pharmaceutical Life Sciences, are collaborating with researchers at Rutgers University on a new potential drug target in *Plasmodium*.



NIAID), with Montclair State receiving approximately \$770,000 over the three-year term of the grant. “We’re investigating inhibitors of a protein kinase found in *Plasmodium* that plays multiple roles in its life cycle,” says Rotella. “The most important point of this research is to attempt to confirm if this enzyme can inhibit the parasitic life cycle of *Plasmodium* at more than one point. If we can demonstrate that, it may be possible to combine this with other antimalarial drugs to treat infection and reduce or very hopefully prevent resistance from developing.”

According to Rotella, undergraduate, graduate and postdoctoral students are working in his and Siekierka’s labs on the project.

“This research,” notes Rotella, “is being done as part of the Sokol Institute’s mission to carry out academic drug discovery and help train new scientists to work in the field.” ■

**“It may be possible to combine this with other antimalarial drugs to treat infection and reduce or very hopefully prevent resistance from developing.” –David Rotella**

Rotella, Siekierka and the Rutgers researchers are sharing a \$1.5 million award from the National Institutes of Health’s National Institute of Allergy and Infectious Disease (NIH

---

### **\$5.7 Million Grant to Fund Character Development Research** continued from page 1

The team’s primary goal with the second phase is to understand more fully the relationship between adult practice and youth outcomes.

To do this, Urban and Linver will look at the entire BSA system to pinpoint the existing trainings and other adult experiences that lead to the strongest character outcomes in scouts. They will be assisted in all aspects of their study — from data collection and analysis to disseminating results through

reports and articles — by University undergraduate, master’s and doctoral students as well as post-doctoral fellows.

Ultimately, the data they collect will help BSA create a strategic professional development plan for all scout leaders, which will, in turn, result in a more efficient and consistent delivery of programming. Project findings can also serve as a blueprint for other youth-serving organizations.

According to Urban, identifying the pathways that build young people’s character is critically important. “It’s easy to be cynical about the state of civil society, but we only need to look as far as our youth to see the full potential for a brighter future,” she asserts. “We aren’t only going to be able to understand more about character development in youth, but we’ll also be able to understand more about how adult character develops through volunteering with BSA.” ■

## When the Research Is Personal

**Like any researcher, Assistant Professor of Nutrition and Food Studies Mousumi Bose was thrilled to receive an extension of a National Institutes of Health-funded training grant from the Sterol and Isoprenoid Research (STAIR) Consortium of the Rare Diseases Clinical Research Network.**

Unlike most researchers, however, Bose uses her work to celebrate the life of a son she lost far too soon.

Bose was a postdoctoral fellow at Columbia University when she became pregnant with her first son, Ilan, who was born in August 2010 with Zellweger Spectrum Disorder (ZSD), a rare metabolic illness that affects one in 50,000 children.

Bose was 37 weeks pregnant with her second son, Etash, when Ilan died. “Ilan had round-the-clock seizures, low muscle tone and was constantly on oxygen,” she says. “I didn’t know how long he would be with us, so I quit my job and cared for him. He passed away in October 2011.”

**I have the opportunity to contribute to a better understanding of these kids and make a difference for every family touched by ZSD.”**  
**—Mousumi Bose**

Before Ilan was born, she had specialized in the effects of gastric-bypass surgery, but things began to change after she joined an organization for families affected by ZSD, an often fatal peroxisome biogenesis disorder that prevents children from metabolizing specific types of fats.



Mousumi Bose uses her work to celebrate the life of her son, Ilan, pictured behind her.

“I got involved in advocacy for ZSD,” Bose says. “I joined the Global Foundation for Peroxisomal Disorders board when the secret got out that I had a science background. So I helped establish foundation-funded grant opportunities for researchers and facilitated getting scientists together to study this rare disease.”

In 2016, Bose became a full-time professor at Montclair State and “realized that I could make a difference by committing myself to working on ZSD research.” The NIH grant allows her to contribute

to the research goals of STAIR by investigating rare diseases of sterol metabolism, including nutritional aspects of the peroxisome biogenesis disorders.

“Now that I am into the second phase of this work, thanks to the rare-disease training grant, it gives me the freedom to teach my

classes, conduct research and build connections with other foundations in the STAIR consortium,” Bose says.

The Rare Diseases Act of 2002 led to the creation of the Rare Diseases Clinical Research Network, a group of consortia (including STAIR) that allows researchers to connect with patients and families that, while not large in number, represent a global issue. At present, rare diseases affect about 60 million people in the United States and Europe combined.

“I had started my research with 30 to 40 families,” Bose says, but “this grant allows me to get more families involved in the studies.”

Through it all, Bose has had her husband, Andrew, and children — Etash, now 6, and Kiran, 3 — to lean on, which gives her a rare perspective and desire to make a difference.

“I am not happy that our family went through what we went through,” says Bose, “but because of that experience and my background in science, I have the opportunity to contribute to a better understanding of these kids and make a difference for every family touched by ZSD.” ■

## SPOTLIGHT: News Briefs

### Sprague Library: Home to Institutional Repository

Montclair State University Digital Commons, a new institutional repository managed by Sprague Library, preserves and showcases the University's research and creative works under one umbrella.

The repository (which can be accessed at **digitalcommons.montclair.edu**) serves the interests of Montclair State — a national- and state-designated research university — by making the scholarly work of the University community easily discoverable through search engines in an open-access digital environment.

"By capturing the intellectual output of the University, the repository provides visibility and influence to a worldwide audience, which, in turn, opens up new avenues for further research and collaboration," says Sprague Library Research and Projects Specialist **Karen Ramsden**. ■

### STEM Pioneers



STEM Students in the "turtle lab."

The University's first cohort of STEM Pioneers — undeclared, first-year, first-generation students — are discovering the possibilities for majors in the fields of science, technology, engineering and mathematics.

The STEM Pioneers program expects to welcome about 75 new students in fall 2019. The program, developed by faculty members from the College of Science and Mathematics, in collaboration with the Research Academy for University Learning, is supported by a three-year, \$300,000 grant from the National Science Foundation.

"This has really opened my eyes to fields in science I didn't know existed," says Jose Castillo, a freshman from Bloomfield, N.J. ■

### Professor Receives Physics Fellowship

Associate Professor of Physics **Marc Favata** has been awarded a 2018 Simons Fellowship in theoretical physics by the Simons Foundation, giving him the opportunity to continue his cutting-edge research abroad for a year, working alongside fellow scholars in other parts of the world. Of the 12 scholars awarded Simons Fellowships for theoretical physics in 2018, Favata is the only honoree from a New Jersey higher education institution.

The \$108,000 grant will allow Favata to further his research in gravitational-wave astronomy, with the goal of discovering new areas that could be examined with the next generation of gravitational-wave experiments. He will visit Ewha Womans University and the Korea Astronomy and Space Science Institute as well as the Albert Einstein Institute in Germany and the California Institute of Technology.

"This is an incredibly exciting time to be working in gravitational-wave science," Favata says. ■

### Recording Montclair Township's Diverse History

To celebrate the 150th anniversary of the Township of Montclair's founding, the Montclair History Center is capturing oral histories from those who call Montclair home — paying particular attention to its ethnically diverse populations.

With grant funding from the New Jersey Council for the Humanities, the Center tapped Anthropology Professor **Chris Matthews** to

guide the project with the help of 16 students from his Historical Archaeology class, who have interviewed about 40 Montclair residents.

"We want to recognize what people have to share about the neighborhoods and communities they grew up in," he says. "Of great interest were the African-American community, which has played



Students interviewed 40 Montclair residents.

a prominent and active part in Montclair's history, and the Italian-American community that first settled here around 1900." ■

# Connecting the Rainforest to Classrooms Around the World

**When it comes to using interactive videoconference technology to connect students in K-12 classrooms with scientists and experts, Jacalyn Giacalone Willis, founding director of Professional Resources in Science and Mathematics (PRISM) — the K-12 education center of Montclair State's College of Science and Mathematics — is an international innovator.**

Since 2003, PRISM's Rainforest Connection project has linked researchers and educators at the Smithsonian Tropical Research Institute in Panama with students, teachers and experts in countries such as the United States, Australia, Belize, Costa Rica and Kenya. This past winter, 875 students took part in 46 sessions from 17 schools in 11 New Jersey school districts and one Michigan district.

"The Rainforest Connection engages teachers and students in an international conversation about environmental and conservation issues," says College of Science and Mathematics Acting Dean **Lora Billings**. "It provides the first steps in forging global collaborations that can lead to sustainable solutions."

A noted naturalist, Willis visits Panama each February to oversee and participate in the Rainforest Connection webcasts. In 2017, her "Classrooms Without Walls" project, bolstered by a University Global Education Center grant, expanded the Rainforest Connection by forging



sustainable partnerships among teachers, students and scientists in New Jersey, Panama and Kenya.

This year, Willis expanded the innovative program by connecting with colleagues in Madagascar and Bhutan.

While in Panama, Willis also takes an annual census of endangered wildlife on Barro Colorado Island. Using camera traps, she and her husband, Greg, have collected more than 1 million photos over 22 years — and walked hundreds of kilometers to take a trail census. "These long-term studies help guide conservation decisions," she says.

While the Willises are often seen on programs ranging from *Animal Planet* to the Smithsonian Channel, in March their work was shown on primetime television in Panama for the first time through TELEMETRO. "My aim was to gain popular support for the conservation of ocelots and other native cats — and for the remaining forests," Willis recalls. ■

---

## **Working Toward New Cancer Treatments** continued from page 1

"I'm studying how an unusual protein with tumor suppression activities in normal cells is eliminated or misplaced in cancer cells," explains Molina, whose students will be involved in his research. "The outcomes of this research will set the stage for testing pharmacological agents that will block the destruction and abnormal cellular localization of this protein as a potential — and novel — cancer treatment."

According to Molina, even though Inducible cAMP Early Repressor,

or ICER, functions like a tumor suppressor, there is no genetic evidence to show that it is a bona fide tumor suppressor gene product. He thus surmises that altered post-translational events could be responsible for observed abnormalities of ICER protein expression in cancer cells.

Molina's prior research, which set the stage for this grant-funded work, involved studying the ovaries of transgenic zebrafish with a focus on the role of genes with ovarian function. "Now that I have a state-

of-the-art laboratory and zebrafish facility at Montclair State, I am positioned to use my preliminary research results to fully explore the role of the transcriptional repressor ICER in cancer," he explains.

Molina hopes that ultimately the new project will serve as the basis for more extensive analyses of multicomponent complexes associated with the regulation of ICER in cancer cells, as well as spur the development of effective new therapeutic cancer treatments. ■

## Symposium Showcases Student Research

**At the University's 12th annual Student Research Symposium in the spring, 320 students showed how they apply the challenges and techniques of microbiologists, sociologists, anthropologists, psychologists, accountants, musicians, filmmakers, journalists, teachers and public health specialists to a range of questions, issues and problems.**

Among the presenters was Clinical Psychology graduate student Jacqueline Lawrence, who heads a team of student researchers examining the healing of emotional scars suffered when first responders rush to the scene of tragedies.

"First responders know what they are getting into," says Lawrence, a paramedic-firefighter who works on campus as managing director of emergency medical services for University Police. But that doesn't lessen the mental toll, she says.

Other student researchers also tackled problems with multiple methodologies and multidisciplinary approaches, providing a rich perspective on topics from the economic benefits of marijuana legalization to mathematical models in cancer research. Presentations were organized by themes: Applications of Marketing and Sustainability; Language and Power; Gender, Economy and the Law;

Educational Evaluation; and The Psychology of Race.

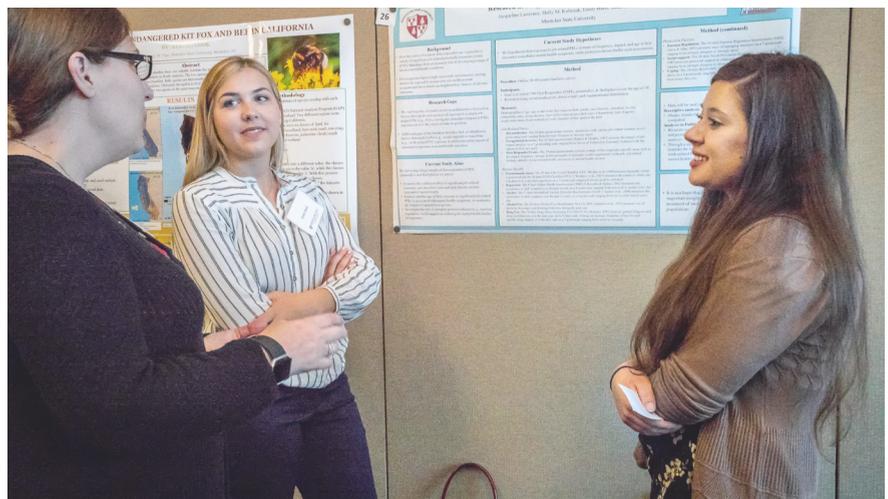
Robert Welch, a senior majoring in Political Science and minoring in Arabic Studies, as well as a classically trained musician, studied the connection between music, revolution and politics in "The Sounds of Revolution: Rethinking How We Hear Change." Conflict in Egypt inspired him to write a symphony, which led to the research. "It restored a lot of my previous drive in learning, and also pushed me to really go out of my comfort zone and ask questions that I previously would have been intimidated by," Welch says.

Students answered questions about their research, methods and conclusions. Lawrence, for example, shared the floor with students in Montclair State's trauma and

resiliency lab. They surveyed more than 600 first responders across the country, in Puerto Rico and in the Virgin Islands to find out whether they cope with the situations better or have psychological issues they're not reporting, Lawrence says.

Joseph Mettle, a senior Jurisprudence, Law and Society major, studied current weather patterns compared to past centuries. "Climate change is real and of great concern to all of us around the globe," he concluded in "Climate Change, Global Warming and the First Amendment."

"The Student Research Symposium definitely empowers our students to see the relevance of their work to the wider world," says Jessica Brandt, associate director of student affairs, College of Humanities and Social Sciences. ■



From left: Jacqueline Lawrence, Emily Baeli and Holly Kobezak discuss their research of first responders.

Building on a distinguished history dating back to 1908, Montclair State University is a leading institution of higher education in New Jersey. Designated a Research Doctoral University by the Carnegie Classification of Institutions of Higher Education, the University's 10 colleges and schools serve 21,000 undergraduate and graduate students with more than 300 doctoral, master's and baccalaureate programs. Situated on a beautiful, 252-acre suburban campus just 12 miles from New York City, Montclair State delivers the instructional and research resources of a large public university in a supportive, sophisticated and diverse academic environment.



**MONTCLAIR STATE**  
UNIVERSITY