



Bio Rhythms

December 2022

Department of Biological Sciences

Building the pipeline of biomedical talent

Maximizing Access to Research Careers (MARC) at Wayne State starts its second year

Academics and employers are not the only ones concerned about the leaky pipeline producing skilled biomedical researchers – the National Institutes of Health is also. This was the inspiration behind the development of the NIH Maximizing Access to Research Careers (MARC) training program. The MARC program is designed to build a cohort of research-oriented students from groups traditionally underrepresented in STEM fields. The mission of this initiative is to support students interested in pursuing careers as biomedical scientists that plan to, or are willing to consider, Ph.D. programs after graduation. In 2021, Drs. Lori Pile (Biological Sciences) and Matthew Allen (Chemistry) collaborated on a winning NIH MARC proposal, now in its second year of funding. In addition to student financial support, the MARC program provides professional development opportunities, such as weekly learning communities designed to foster scientific careers. Topics range from research and professional ethics to graduate-school applications.

continued on p.3



MARC Scholar Elliot Widd presents his research at the poster session during the end of year celebration.

Inside this Issue...

- 1 *Building the pipeline*
- 2 *Note from the chair*
- 3 *Pipeline (cont.)*
- 3 *Biology open house*
- 3 *Falcon update*
- 4 *Research Highlight: Hanaa Hariri*
- 6 *Research Highlight: Jared Schrader*
- 8 *Wayne State running community*
- 8 *Second Avenue Bridge*
- 9 *SciPol-Detroit*
- 10 *Graduate spotlight: Sarah Black*
- 10 *Detroit murals*
- 11 *Graduate spotlight: Ali Shakoor*
- 11 *Graduate spotlight: Linh Vo*
- 12 *Jordan Sinclair keynote speech*
- 12 *Robots arrive*
- 13 *Faculty news and notes*
- 13 *In memoriam*
- 14 *Awards and scholarships*
- 15 *Our graduates*

Note from the Chair

We are still here



"While students are eager to be back face-to-face, they are marked by years of remote learning"

I am delighted to let you know that campus life has returned to a near-normal pace. Most classes are in person and students are filling the resident halls, fitness and student center. But the reverberations of the pandemic will course through Wayne State for years. And, while students are eager to be back face-to-face, they are deeply marked by years of remote learning. Some undergraduates in upper-level laboratories never have taken an in-person laboratory class before, and some incoming graduate students never had the opportunity to do independent research — challenges shared by universities across the nation. Also, like most universities across the country, Wayne State is seeing lower enrollments. Falling numbers of college-age students in Michigan and abundant opportunities for full-time employment lead many to delay college for a few years. Our faculty and classrooms will be ready when they decide to return.

They will find a number of renovations on and around campus. State Hall has been closed for several months for extensive renovation and remodeling. We expect it to reopen in the fall of 2023. The historic Hilberry Theater is closing and a new performance space, the Hilberry Gateway, will open nearby soon. The Hilberry Theater will be remodeled to create the Gretchen Valade Jazz Center and linked to the Hilberry Gateway by an outdoor performance space. And, by the time you read this, the new Second Avenue bridge over I-94 will be open to traffic (see p. 8).

We are pleased to bring you the research profiles of two young scientists. Dr. Hanaa Hariri (p. 4) joined our department in 2021. Her laboratory studies the regulation of lipid metabolism from a genetic and cell biology perspective. Research in Dr. Jared Schrader's laboratory is profiled on p. 6. His group discovered that bacteria use phase separation to optimize critical cellular functions. Both of these laboratories are engaged in basic research that will help us understand disease, and may even contribute to treatments! Please consider donating to the Biological Sciences Research Development Fund. We use these funds to repair equipment, send graduate students to meetings and offer matching funds for the purchase of major equipment. You can find a link at: go.wayne.edu/bio. We also bring you stories about student accomplishments and outreach efforts, including the SciPol-Detroit initiative to connect scientists, community members and policy makers (p. 9) and Ali Shakoor's efforts to promote Great Lakes environmental preservation (p. 11). Sadly, we lost two cherished emeritus professors this year, Anthony Hough and Robert Arking. An appreciation of their long and distinguished careers at Wayne State University can be found on p. 13.

I am stepping down as Chair of the Department of Biological Sciences in August of 2023, and so this will be the last issue of *BioRhythms* that I write and edit. I have enjoyed putting out this newsletter and thank everyone who contributed over the years. As always, alumna Leslie Mertz wrote the exceptionally interesting research profiles. Students Katie Dwyer and Emma Fidler wrote about SciPol-Detroit, Maggie Sneiderman contributed photos and wrote about our new food delivery robots (p.12). Dr. Lori Pile wrote articles about the NIH MARC program and the Wayne State running community (p.8). Many thanks to Jessica Archer for cleaning up the layout, proofreading and supplying photos.

Thank you for reading this issue! Please update your alumni information so that you continue to receive *BioRhythms*. You can do so at alumni.wayne.edu/connect/update.

Vicky Meller

Mural on Gratiot St. See news item on Detroit's murals on p. 10



Building the pipeline of biomedical talent

Maximizing Access to Research Careers (MARC) at Wayne State starts its second year (cont.)

The inaugural cohort consisted of 12 students: five senior MARC scholars, five junior MARC scholars, and two pre-MARC scholars. Each scholar was matched to a lab and began their research projects. The rationale behind this program is simple: students who participate in independent research score higher on metrics of student success than those who do not – and they are much more likely to choose a career in a STEM field. MARC mentors also participate in exercises to foster community. An end-of-the-year celebration for the WSU MARC community, parents and guests was held in May to mark the completion of the first year of the program. The achievements of the MARC and pre-MARC scholars were recognized in an exhibition of research posters and a presentation of certificates to the inaugural class. A highlight of the celebration was the opportunity for the family and support community to mingle with the MARC scholars and mentors during the poster exhibition and learn about all the different types of research that are underway. So what does success look like? Three of the five seniors accepted offers to attend Ph.D. programs, while two opted to gain additional experience as a research technician or lab manager. Throughout the summer and into the fall of 2022, the continuing and new MARC and pre-MARC scholars attended learning community meetings and continued research. Program directors will begin recruitment of new scholars in the winter and welcome the next cohort of MARC scholars in the summer of 2023. We are excited to see what our MARC scholars will accomplish in the coming years!

For more information on the NIH-funded WSU MARC program, visit: clas.wayne.edu/research/marc

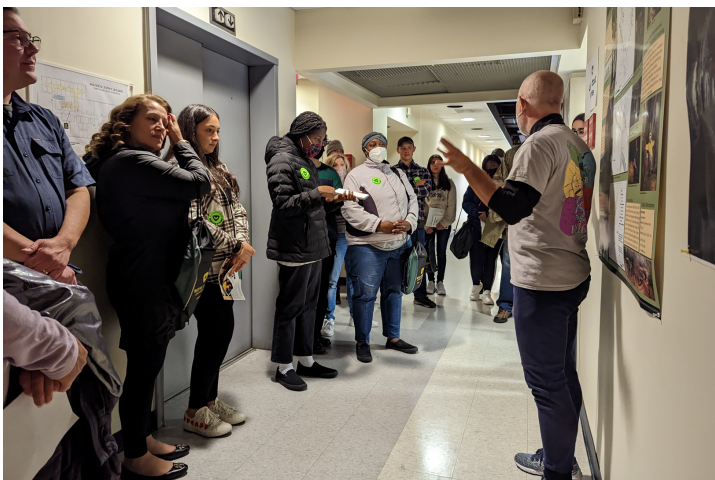


The first class of MARC scholars. From left to right: Skye Taylor, Milan Rogan, Anuri Mitchell, Sydni Alexis Elebra, Elliot Widd, Katelynn Haygood, Dr. Matt Allen, Melissa Torres, Dr. Lori Pile, Autumn Harris, Dr. Brooke Corbin, Alexis Taylor, Kailyn Fields, Nailah Bowman.

Record turn out for Biology Open House

Natural History Museum and labs host prospective students

Every fall, Wayne State University hosts an open house to introduce prospective students to our programs and research opportunities. This year, an unusually large number of high schoolers and their parents arrived for tours of the Pile and Friedrich lab, and visits to the Natural History Museum. These events are a wonderful opportunity for members of the community to see what happens in labs on campus.



Dr. Friedrich meets with the first of several tour groups that visited his laboratory during the fall open house.

Falcons fledge into parking lot

Native Detroiters appreciate automobiles

The Wayne State falcons had a mixed year. Two fledglings left the nest a bit prematurely and one was successfully rescued after alighting on a late model SUV in the Old Main parking lot. Sadly, the other encountered moving traffic and did not survive. Scan the QR code to follow @WSUFalcons on Instagram.



Falcon chick awaiting rescue in the Old Main parking lot.

Research Highlight: Hanaa Hariri

Eavesdropping on Organelles: Decoding the Mysterious Crosstalk Inside Cells

Beneath the constant buzz of cell-to-cell communication that keeps living things humming along, another little-explored network is whispering back and forth. This network runs within each cell and between its internal machines: the organelles.

“For a long time, we thought that these organelles just float around the cell and work separately, but we now know they interact with one another and are physically connected by proteins that we call tethers. This has opened up a new area in biology with a whole set of questions: What are the tethers? What do they do? How do they function?” explained Hanaa Hariri, Ph.D., whose WSU lab is trying to solve some of the mysteries surrounding tethers and organelle communication.

“I find myself very drawn to challenges, and I was excited about the opportunity to make discoveries in this new area of research,” she said. Hariri and her lab are particularly interested in the roles that tethers and organelle communication play in metabolic pathways, or the complex series of enzyme-regulated reactions and interactions necessary to transform food to energy, and therefore to sustain life.

To study this topic, Hariri’s group is deviating from the traditional research approach of breaking cells apart and studying the metabolic enzymes in a test tube. “Advances in high-resolution microscopy and other techniques are now allowing us to see what happens in a living cell,” she said. The distinction is important, because the environment in a living cell is always changing, and that can greatly impact its function. She explained why: Each reaction in a metabolic pathway requires specific enzymes as well



Dr. Hanaa Hariri received her master's in cell biology from the American University of Beirut and her doctorate in biophysics from Florida State University. She was a postdoctoral researcher at the University of Texas Southwestern Medical Center before joining our department in 2021.

as the substrates on which the enzymes act, so if either isn't available near the reaction site, the reaction can't run. If that happens, it can bring the metabolic pathway to a screeching halt. Hariri and her team are deciphering this complicated labyrinth of reactions and

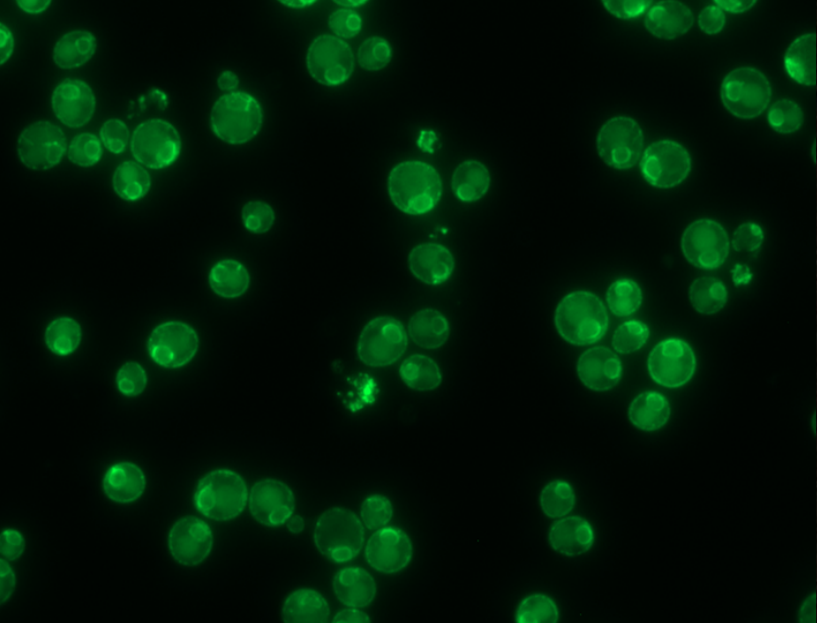
interactions with a variety of experiments. This includes genetically modifying a cell so it cannot produce a certain enzyme, and seeing how the cell changes its shape or organelle locations in response; and performing so-called “rescue experiments” where the researchers then supply the removed enzyme as a way to spot the exact reaction that is impacted. Other experiments involve adding an oversupply of lipids or other excess substrates to see how the cell responds, or isolating a tether to observe which enzymes it recruits and why.

“Tethers are fascinating because they are proteins that have domains on one end that insert in one organelle’s membrane, and other domains that insert in another organelle’s membrane, so they form a bridge — a molecular bridge — to hold organelles together,” she described. “Those bridges can be dynamic or static, so they can form and expand under certain conditions, and also deform. In addition, some of the tethers have been shown to form connections between more than two organelles at a time.”

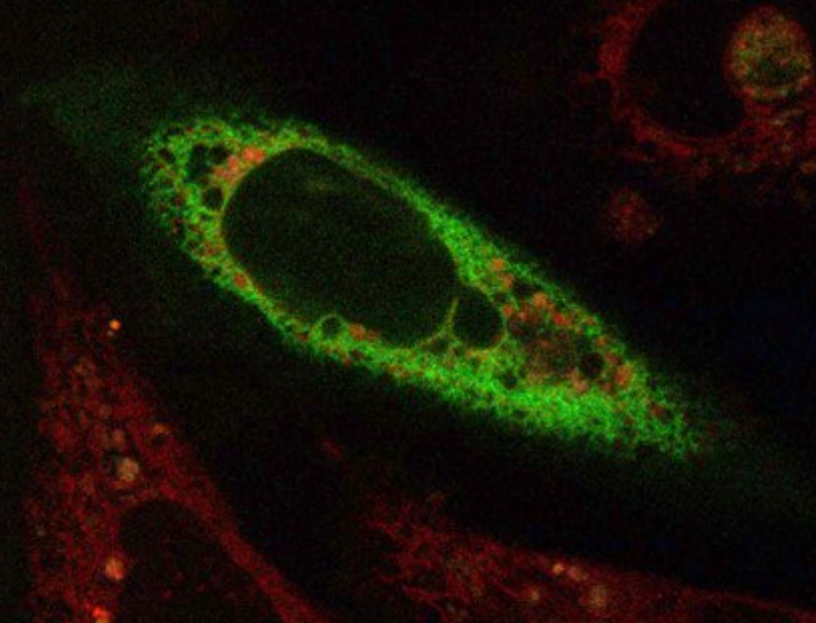
Although the reason for the bridge formation isn't completely clear, Hariri believes it may help put the organelles in the best alignment for a needed task, an idea that builds on some of her earlier work. “During my post-doc, we proposed that the tether-contact sites between organelles can act as platforms that are able to recruit different enzymes to perform a specific function at certain times. For instance, if a cell needs to either convert or store fatty acids at a certain site, the tether would have the capacity to bring in all the enzymes that are needed to do this function,” she said. “This is why spatial arrangement matters, and why my research group and I are now combining microscopy with other techniques, such as genetics, biochemistry and proteomics, to understand what is going on when everything is running smoothly, and also when it isn't.”



Hariri lab members (left to right) Research Associate Reema Smadi, Ph.D. students Eseiwi Obaseki, Daniel Adebayo, undergraduate Henry Uchenna visiting from North Carolina A&T State University, undergraduate researcher Dinela Zhuli, and Ph.D. student Sumit Bandyopadhyay.



Fluorescent imaging of yeast endoplasmic reticulum



Fluorescent imaging of mammalian endoplasmic reticulum

Unlike many scientists who decide on research questions based on what their techniques can do, Hariri prefers to decide on the question first and figure out how to answer it later. “I think this is the perfect field to have this question-driven, big-picture mentality because it’s very new and there are many unknowns,” she said. “And my lab members seem to like it, too.”

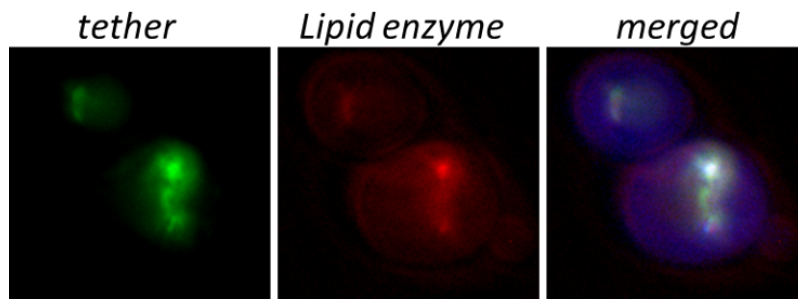
Her research group includes between six and seven graduate and undergraduate students, and a research assistant. “I think that learning to ask the right question is a much more transferable skill for my students than learning the mechanistic detail of one specific technique, and it also encourages a lot of conversations about which techniques and which collaborations might help us find answers. So, we ask a lot of questions and reach out to a lot of people.”

Her group’s research question at the moment, she said, is how tethers assist in the crosstalk between different metabolic networks, and specifically between the networks involved in lipid metabolism and in amino acid metabolism. Glitches in this interplay could have implications for a variety of health conditions, including obesity, diabetes and fatty liver disease, so this work could ultimately help guide the development of treatments.

She added, “There’s nothing about biology or how nature works that is not going to be connected to human health somehow, and that’s why we need to look at the big picture, ask the right questions, and get that foundational understanding. There’s still so much to learn.”

To learn more about work in the Hariri laboratory visit clasprofiles.wayne.edu/profile/hg7223.

“I think that learning to ask the right question is a much more transferable skill for my students than learning the mechanistic detail of one specific technique”



Ph.D. students Eseiwi Obaseki and Daniel Adebayo with yeast cultures.

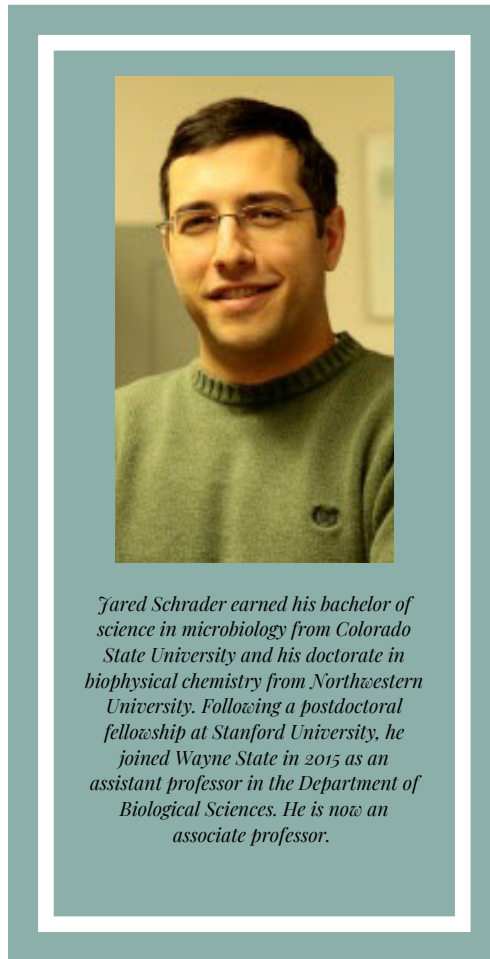
Research Highlight: Jared Schrader

No organelles? No problem! WSU Lab Discovery Shows How Bacteria Get the Job Done

A lot more goes on inside prokaryotic cells than once thought, according to research in a WSU lab. While they may not have the neat, membrane-bound organelles of eukaryotic cells to handle their inner workings, prokaryotic cells are able to survive and function by making their own membrane-free, blob-like versions of organelles when needed.

Eukaryotes also have some of these non-membrane-bound structures, such as the RNA factory called the nucleolus, but scientists lumped most of them under the generic name of granules or bodies and gave them little attention ... until recently. "There has been a revolution in the past decade, where people have started using more modern technology to look at these structures in eukaryotic cells and begin understanding more about them," said Jared Schrader, Ph.D., WSU associate professor of biological sciences. He and his research group joined that revolution by asking whether prokaryotic cells also make similar structures, and they quickly had an answer: Yes.

In 2018, Schrader and his group published their discovery of a bacterial version of the eukaryotic structures known as p-bodies and stress granules. These membrane-less eukaryotic structures are involved in degrading RNA, an important step in controlling gene activity and maintaining proper cell function. The bacterial version, which they named bacterial ribonucleoprotein bodies, or BR-bodies for short, also had the job of degrading RNA to keep cells operating smoothly.



Beyond identifying BR-bodies, Schrader's group went further and investigated how these membrane-free blobs formed. "We found that we could just put their component molecules (mainly proteins and RNA) in a test tube, and they would form droplets on their own. Nothing else was required. It was pure self-assembly," he described. This self-assembly was particularly interesting, because it relied on a mechanism somewhat analogous to what happens in well-shaken vinaigrette salad dressing. If left alone, the watery vinegar and the oil will soon begin to separate from one another because their molecules have different properties, he explained.

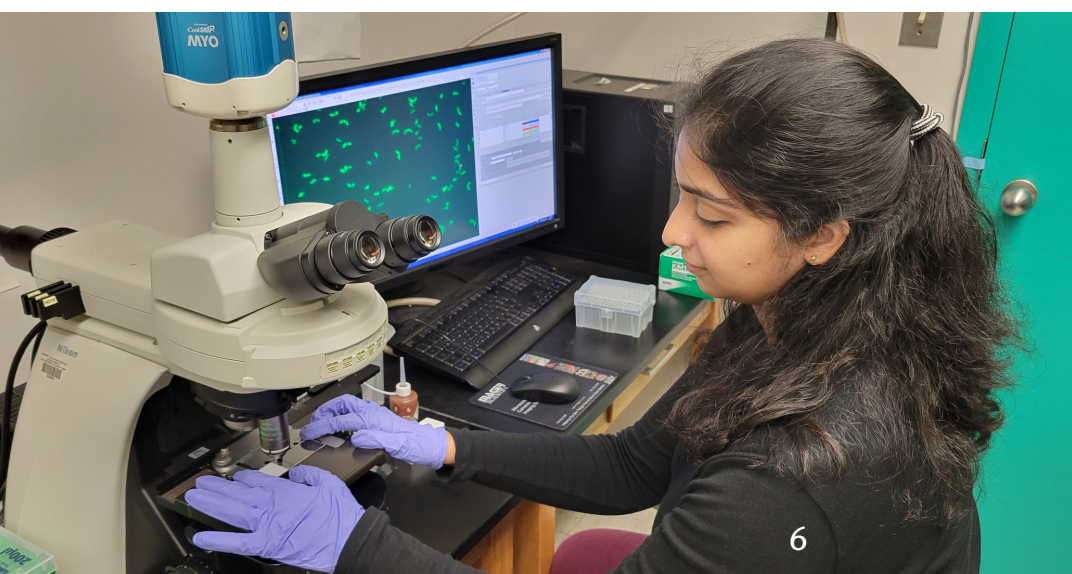
The same thing happens in BR bodies, but the separation happens a bit differently. "Certain regions of the proteins in BR bodies favor sticking to each other, and separating from the other molecules in the cells, and that is what allows them to create distinct droplets," Schrader said. Using a microscope, he and his research team were able to actually watch small droplets begin to form and then fuse together to create bigger and bigger blobs.

This mechanism of membrane-free blob creation is called liquid-liquid phase separation. "The cool thing about BR-body formation in prokaryotes is that you don't need the huge set of enzymes, lipids and proteins that eukaryotic cells need to make functional membrane-bound organelles," he remarked. "With just a small protein and often some nucleic acids, prokaryotic cells use this simple phase transition to generate a structure, and this structure is able to organize key biochemical pathways."

In addition to being the first to report this liquid-liquid phase separation in prokaryotic cells, Schrader and his group also noted that the droplets had binding sites that would target and acquire those enzymes necessary to degrade RNA. "Since then, a lot of other labs have found many other bacterial structures that also can assemble into 'biomolecular condensates,' which is the new, formal name for these non-membrane-bound structures in cells," he said.

The WSU research group is now tinkering with the BR-body enzymes to learn which enzymes slow down or speed up RNA degradation, and exactly how they do it. "RNA degradation has many steps involved in it, and we're finding that some specific steps get

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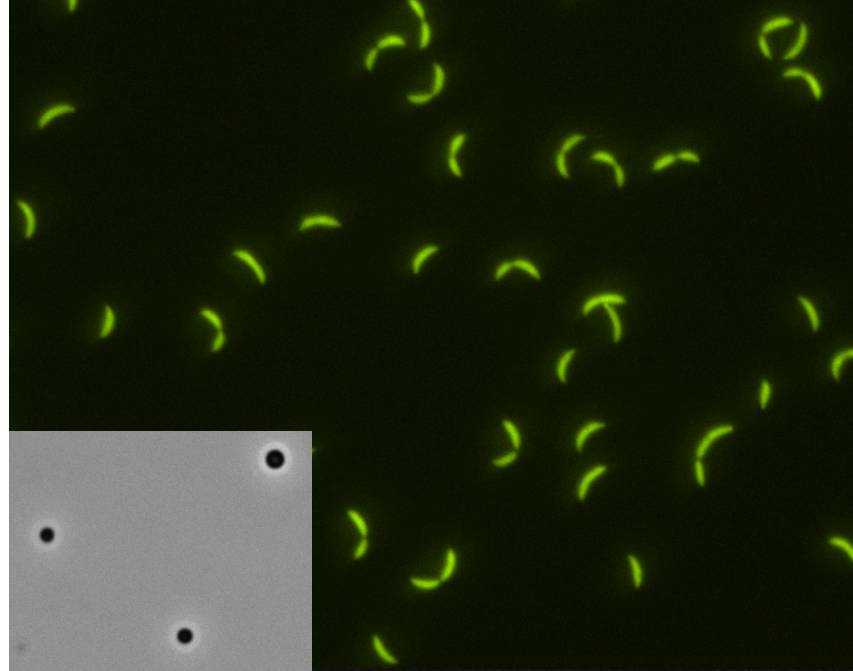


Ph.D. student Aishwarya Ghosh monitors phase separation by live cell imaging of fluorescent protein

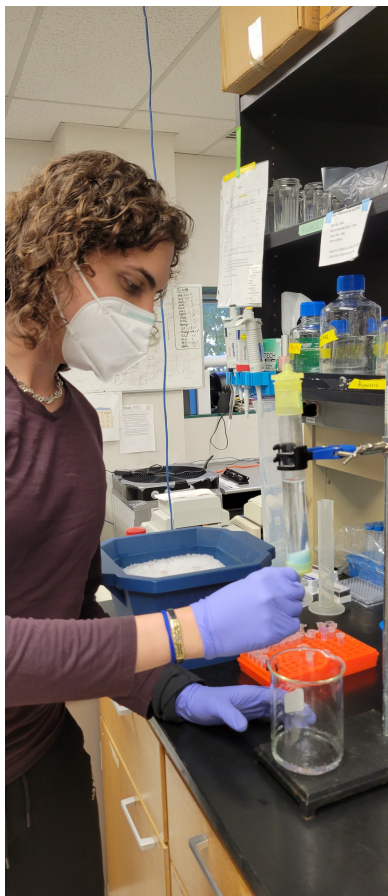
messed up if a particular enzyme is missing. As an example, a step may not happen as fast, which causes the next step in the process to also slow, which can then disrupt the order of events so nothing is happening in the right place and time,” he said. In addition, Schrader’s group has branched out from its original study species, a freshwater bacterium (*Caulobacter crescentus*), and is seeing similar biomolecular condensates and self-assembly processes in about a dozen other species representing a diversity of bacteria. “We’re trying to get the foundational knowledge to determine if these blobs and their self-assembly is universal across all bacteria, including bacterial pathogens,” he said.

Such a broader understanding could lead to a wide variety of applications, according to Schrader. “It could perhaps reveal new targets for next-generation antibiotics, or make it possible to engineer blobs that can help speed up the biofermentation of products like biofuels, or to generate all sorts of other useful bioproducts.”

These future applications are a very exciting part of this work, but to get to that point, researchers have to do the groundwork, he noted. “And that’s what we’re doing in my lab. We’re getting a basic idea of how these biomolecular condensates work in the first place, and how many bacterial cells have them.”



Bacterial cells visualized by in vivo imaging of fluorescent protein (main figure). Phase separated droplets form spontaneously in solution (inset)



Ph.D. student Hadi Yassine uses a column to separate cellular components.

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More information about the Schrader group’s discovery of BR-bodies and their self-assembly, including the liquid-liquid phase separation, is available at:

*Al-Husini, et al. “ α -Proteobacterial RNA Degradosomes Assemble Liquid-Liquid Phase-Separated RNP Bodies,” *Molecular Cell*, vol. 71, no. 6, September 2018, pp. 1027-1039.*

*Al-Husini, et al. “BR-Bodies Provide Selectively Permeable Condensates that Stimulate mRNA Decay and Prevent Release of Decay Intermediates,” *Molecular Cell*, vol. 78, no. 4, May 2020, pp. 670-682.*



Ph.D. student R.M.P. Imalka Wanigasekara prepares to plate out bacteria.

Winning teams!

Biological Sciences Faculty Participate in 2022 Detroit Free Press Marathon Relay

When asked to participate in the 2022 Detroit Free Press Marathon, Dr. Lori Pile didn't hesitate to say yes. After all, she was part of the all-female masters championship team from 2019, the CLAS Women Warriors, which included the Dean of the College of Liberal Arts and Sciences, Dr. Stephanie Hartwell. Inspired by her example, Dr. Chaunzhu Fan joined other Chinese faculty from Wayne State to form an all-male masters team, WSU-CHI-RUN, that earned second place in 2021! This year, 25 faculty and staff from Wayne State, including Dr. Justin Kenney from biology, came together to form five separate relay teams that took part in the annual race. For the first time since the COVID-19 pandemic, runners crossed the Ambassador Bridge into Canada and returned by the Detroit-Windsor tunnel. And, for the first time ever, participants ran through the Wayne State campus along Warren Avenue where members of the WSU athletic department manned water stations. In addition to running in the relay, Drs. Fan, Kenney and Pile regularly join other faculty and Dean Hartwell for "Run with the Dean" fun runs around Detroit. The training paid off with 2022 wins by WSU-CHI-RUN and the CLAS Women Warriors!



Five-million-pound bridge skeleton rolled across I-94

Planning was involved

Regular readers of this publication may recall a 2020 article about the replacement of the Second Avenue bridge over I-94. The must-see event of the summer was a long-awaited repositioning of the bridge skeleton to span I-94. The framework, assembled in a Wayne State parking lot, proceeded in parallel with construction of the bridge abutments. Finally, bridge and abutments were ready to go in the summer of 2022. Over ten days in late July, the completed skeleton was mounted on robotic, rolling platforms, driven to the edge of I-94 and slowly propelled across the (temporarily closed) interstate. Engineers from the Gordie Howe Bridge came to watch!

This is the first network-tied arch bridge in Michigan, featuring central arches and crossed hangers that support the roadbed. This design does not require a central pier, a feature that will facilitate the modernization of nearby I-94 interchanges in coming years. The structural integrity of the arch also enabled the self-supporting, 5-million-pound skeleton to be constructed nearby and carefully rolled into position. Relocation fell to a contractor specializing in moving oversized items, often in shipyards or at the scene of disasters. I-94 was closed for two weeks while the median barrier was removed, and the highway was covered with dirt and steel plates to prevent damage to the roadbed. The leading edge of the bridge skeleton was moved to the precipice and



handed off to rolling platforms that, over the course of several days, rolled it into place and carefully lowered it onto the abutments. Over the ensuing months, workers built rebar frames for sidewalks and roadbed, and, as of mid-October, cement is being poured. We expect the bridge to be open for traffic in December of this year!

You can view a time-lapse video of the bridge move here:



For more on I-94 modernization, and information about the amazing rolling platforms (self-propelled mobile transporters) used to move the bridge, follow the Second Avenue Bridge link at: i94detroit.org

Ready to roll! The Second Avenue bridge skeleton in position before crossing I-94

SciPol-Detroit tackles misinformation and shapes public policy

Biology students take science to the community

By Emma Fidler and Katherine Dwyer

The emergence of COVID-19 coincided with a decline in the trust of policymakers and scientists. Disinformation and politicization of disease fed a credibility crisis and highlighted the need for scientists to re-establish trust within the community. To address this, a group of Wayne State faculty and students came together around a simple question: how can we as scientists bring our knowledge to the public and policymakers to achieve change? The Science Policy Network-Detroit, (SciPol-Detroit) was born with the mission of bridging the gap between policymakers, scientists, and the public at large. This interdisciplinary coalition of students, faculty and community groups works by opening channels for communicating science.

The work of SciPol-Detroit is to unite, train and educate members to engage in policy discourse and civil advocacy. Members canvas Detroit communities, distribute literature on environmental and health hazards, provide information about resources and listen to residents' concerns. SciPol-Detroit partners with the Detroit Rotary Club, D-LEAD, a group of Detroit parents whose children have been affected by lead, and Detroit AirNet, working to provide air pollution monitors around Detroit. Data from these efforts supports policy briefs delivered to local and state-wide policymakers during office visits. Although science is an integral part of economic health and environmental policies, most politicians do not have a scientific background. SciPol-Detroit believes that it is up to us to use our knowledge and expertise to inform lawmakers. Members have made advocacy trips to Lansing and Washington D.C. to meet policymakers to communicate the importance of investing in health equity and research.

To prepare members to lobby legislators, SciPol-Detroit implements advocacy training workshops led by staff from the WSU Office of Government and Community Affairs. Communicating with the community is also important. SciPol-Detroit hosts panels with scientists, policymakers, and community leaders to discuss topics such as lead exposure and air pollution. Members also pen Detroit News Op-Ed articles, including one highlighting the widespread threat of residential lead contamination by Katie Dwyer, a biological sciences graduate student.

SciPol-Detroit is more than just the events they put on. It provides a space for people interested in science and policy to gather, share ideas and work collectively for a common purpose. The current executive board includes four Biological Sciences students: graduate students Katie Dwyer (President), Brenna Friday (Vice President), and Maggie Sneiderman (Communications Director & Graduate Student Liaison) and undergraduate Emma Fidler (Membership Coordinator & Undergrad Student Liaison). Students have opportunities to network with interdisciplinary scientists, community leaders and legislators. This work provides a unique perspective on scientific communication when findings have immediate societal implications. Ph.D. student Brenna Friday remarked "My involvement in SciPol-Detroit has helped me rethink what I want to accomplish as a scientist. These days, it doesn't feel like enough to only share our findings in peer-reviewed publications; we have to go directly into communities and lawmakers' offices to advocate for changes that our science indicates could improve lives."

Science does not have to stay in the lab! You can campaign for your local elections, call your congressperson about a bill that you care about, and you can also get involved with SciPol-Detroit by joining or subscribing to its newsletter at the link below. SciPol-Detroit is an affiliate of the National Science Policy Network and is supported by the College of Liberal Arts and Sciences and the School of Medicine at Wayne State University, the American Association for the Advancement of Science (AAAS), Research!America and the Union for Concerned Scientists.

To subscribe to the SciPol-Detroit newsletter and learn about events register at go.wayne.edu/Sci-Pol-Info

Biology undergraduate researcher and SciPol-Detroit board member Emma Fidler (front right) discussing the Black Maternal Health (Mommibus) Act with Michigan representative John Moolenaar. Left to right: Representative Moolenaar, Edlira Sako, Ayia Almufti, Maggie Sneiderman, Clara Zundel, Katie Dwyer, Victoria Kelley, Savannah Rayyan, and Lana Grasser.



SciPol-Detroit members canvassing Detroit neighborhoods with resources for gun violence prevention. Top row (L to R): Edlira Sako, Zazai Owens, Julia Evanski, Jack Schroeder, Saurav Singh, Daed Daher. Bottom row: Joseph Genna, Savannah Rayyan, Breanna Borg.

"My involvement in SciPol Detroit has helped me rethink what I want to accomplish as a scientist . . . we have to advocate for changes that our science indicates could improve lives."

- Brenna Friday

Graduate spotlights

Growing crops in the city

Ph.D. student Sarah Black studies urban pollution and agriculture

Sarah Black found her way to Wayne State while working in and around the city of Detroit. As a federal regulator with the US Army Corp of Engineers, she spent a lot of time studying pollution in post-industrial cities. While completing a master's thesis on restoration ecology and insect recruitment, Sarah began to wonder how contaminants, particularly legacy contaminants such as metals, moved through trophic levels in urban areas. In 2020, she joined the Hood Lab and is pursuing these questions for her Ph.D. research.

Sarah, now a National Science Foundation fellow in the interdisciplinary Transformative Research in Urban Sustainability Training (T-RUST) program at WSU, is evaluating the effects of heat islands and air pollution on urban agriculture. Last summer she partnered with twelve urban farms and community gardens throughout Detroit to test the idea that air pollution and heat islands interact to change plant uptake and sequestration of metals. She is measuring yield and metal uptake in common garden produce. In addition, she is quantifying soil quality in vacant lots for potential conversion to agriculture, particularly in sections of the city suffering from food apartheid, or lack of access to supermarkets.

Sarah also recently joined the NIH-funded Center for Leadership in Environmental Awareness and Research (CLEAR) as a trainee, helping the Hood Lab to pioneer the use of insect-induced plant galls to "phytoscreen" for belowground chemical contaminants, specifically volatile organic compounds (VOCs). She presented this research at the 2022 Graduate Student Symposium and placed second in the oral presentation category. Sarah will present this work at the National Institute of Environmental Health Sciences 35th Anniversary of Superfund Conference in December in Raleigh, NC.



Sarah at one of her research sites, Cadillac Urban Gardens in southwest Detroit.

For more about research in the Hood lab visit: sites.google.com/view/hood-lab

Learn about the NSF-funded T-RUST: trust.wayne.edu

NIH-funded CLEAR superfund center is at: research.wayne.edu/clear



Detroit, city of murals

The hunt for street art just got easier

Many of you know about the amazing murals on the streets of Detroit, but did you know that we are one of the top cities for street art in the country? The city now partners with CANVS to catalog murals in an app that geolocates public art and links it to artist information.

You can use the app to locate over 200 murals in Detroit, identify an artist or set it to ping when you are within 150 feet of a mural. You can even add new murals and artist information.

Download the app (canvsart.com) to browse pictures of murals and learn about artists in Detroit and other cities.

You can learn more about this project at: detroitartsandculture.com

One Man Army by Aryz (Spanish artist Octavi Arrizabalaga) on Farmer St. and CANVS.

Graduate spotlights

Conservation and outreach

Ph.D. student Ali Shakoor wins Large Lake Champion Award

The International Association for Great Lakes Research (IAGLR) has selected Ali Shakoor, a member of Donna Kashian's research group, as one of the inaugural honorees for the Large Lake Champion Award. Ali brings his love of the outdoors and Great Lakes science to underrepresented communities, and he brings his expertise on topics such as fish consumption advisories, fisheries science, abiotic effects on fish biology and ecology, microplastics, and invasive species to anglers and conservation clubs. His media appearances alone during the pandemic are too numerous to list here. The IAGLR Awards Committee admired Ali's ability to bridge the divide between research and practice in a way that is engaging to the public. They were also impressed with his work with Detroit K-12 groups. Ali's appearances as a featured speaker at the Belle Isle Aquarium in Detroit show his interest in stepping beyond media engagement to reach out directly to members of his community. We congratulate Ali on his award!

You can learn more about the International Association for Great Lakes Research here: iaglr.org



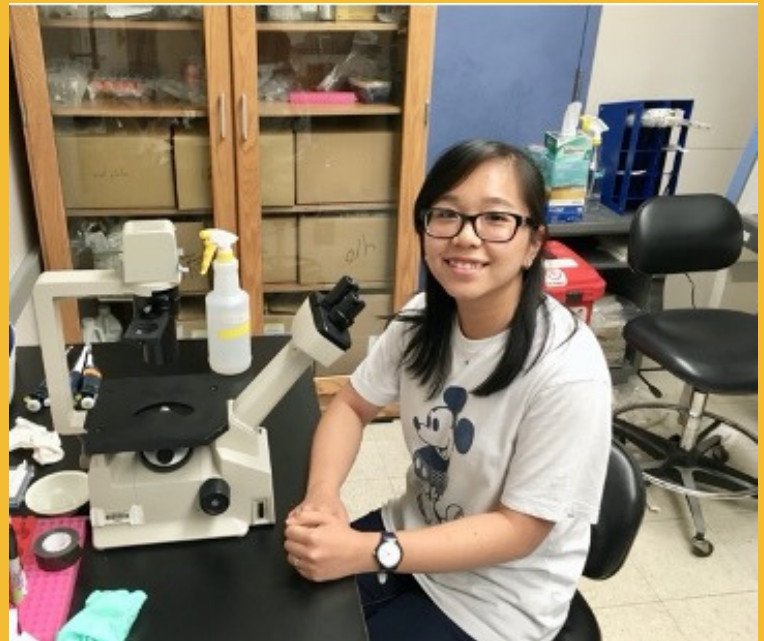
"... ability to bridge the divide between research and practice in a way that is engaging to the public."

Understanding rare diseases

Ph.D. student Linh Vo studies molecular disease mechanisms

The pathophysiology of many diseases represents a proverbial black box. While we may know the root cause (e.g., a gene mutation), details on how this leads to the clinical presentation are often vague, and this precludes the development of effective treatments. This dilemma lies at the heart of Ph.D. candidate Linh Vo's research. As a member of the Greenberg lab, Linh's work focuses on understanding the molecular basis of cardio- and skeletal muscle myopathy and exercise intolerance in Barth syndrome patients, a rare genetic disorder caused by mutations in the cardiolipin remodeling enzyme, tafazzin.

Using a variety of techniques, Linh has identified a novel link between cardiolipin remodeling and regulation of muscle development and repair. These findings have caught the attention of the Barth syndrome research community, and this past summer, Linh was invited to present her research at the 2022 Barth Syndrome Foundation International Scientific, Medical, & Family Conference. Linh's talk, titled "Cardiolipin metabolism regulates MyoD1 expression and muscle development", was well-received by those in attendance and has stimulated a new research direction for understanding and potentially treating the most debilitating feature of Barth syndrome. Furthermore, Linh's preliminary data served as part of the basis for the Greenberg Lab's most recently awarded grant from the Cayman Biomedical Research Institute.



Ph.D. student Linh Vo is studying the molecular basis of Barth Syndrome.

A chaotic trajectory: Math, biology and agriculture

Dr. Jordan Sinclair presents keynote address at research retreat

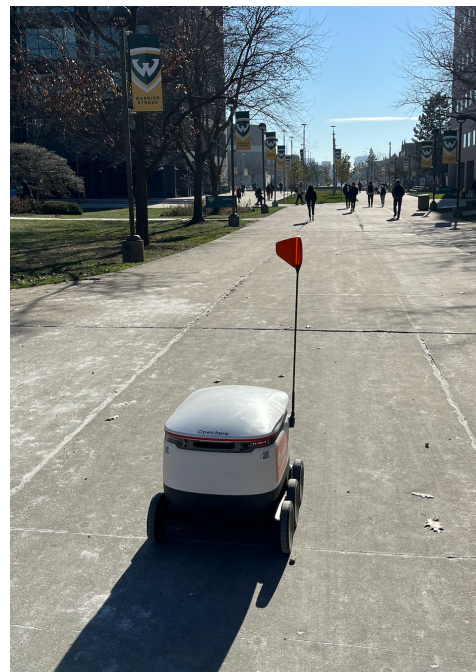
Dr. Jordan Sinclair first intersected with biology at an academic recognition luncheon hosted by the athletic department. She was a math major on the softball team and happened to chat with Carl Freeman, now an emeritus professor in biological sciences, who was invited by another student-athlete. Carl had the vision to see that this mathematically inclined student had the makings of a first-class ecologist. He offered her a summer position doing fieldwork in the southwestern desert and the trajectory of her life changed. She started taking biology courses while finishing up an M.A. in mathematics and joined the Ph.D. program in biological sciences, working with Dr. Freeman to probe the ecological implications of skewed sex ratios in plants. Jordan emphasized the value of making interpersonal connections in grad school and meetings. She formed connections with a group of graduate students at a conference and they ended up editing a special issue of the American Journal of Botany — while in graduate school! Along the way, she took advantage of opportunities to work at a field station in Costa Rica and study aspen trees in Colorado and Minnesota with Dr. Dan Kashian. Then, as Jordan approached graduation, she won a postdoctoral fellowship that enabled her to work in Hokkaido, Japan with a group studying shrub reproductive ecology. She considered learning Japanese but decided that was too hard and opted to spend the long, snowy nights picking up the statistical program R instead. This turned out to be a sound investment for a future data analyst! Then she landed a second postdoc at Rice University, this time doing field work on seed dispersal by lemurs in Madagascar.

After two postdocs and facing a tough job market in academia, Jordan applied for a job as a data analyst at an electrical utility distribution company - and was rather surprised that they hired her immediately! After three years of acclimating to the industry, she accepted a position as the head of data analytics at Deveron, a consulting group based in Chatham Ontario that analyzes agricultural data for farmers. Their goal is to apply the wealth of data produced by agriculture to develop more efficient and sustainable farming practices. These days she uses research methodology and her coding skills to decipher the enormous troves of data produced by soil samples, agricultural equipment and aerial imaging. Jordan's work may ultimately influence farming practices all over North America. We are proud to welcome Jordan back to Wayne State and learn about her remarkable career.



Dr. Jordan Sinclair doing fieldwork in a cold, wet, rocky environment

"I had never met an ecologist before. It seems naive to me now, but before I met Dr. Freeman, I really thought my career options were teaching or actuarial science."



Cute, cute, *cute!*

Food delivery robots bravely navigate Wayne State's sidewalks

Wayne State has new employees in the form of earnest, adorable food delivery robots. We can now order takeout from select locations on campus through GrubHub and it will roll to our building. So how will this work out? Time will tell. The robots contain cameras, sensors, and GPS to navigate campus. But it is not clear how well the robots are equipped to handle ongoing sidewalk replacement. A pair of students was recently spotted helping a robot confounded by a construction barrier. The robots are cared for and stabled right on campus, providing potential employment options for students. And Wayne State is not alone. With broad, pedestrian malls and an abundance of fast-food retailers close to lots of 18-22-year-olds, campuses are the ideal environment for the robots now whirring around universities nationwide. Bon appétit!

Faculty news and notes



Dr. Marianna Sadagurski has been tenured and promoted to Associate Professor. She is a co-investigator on a collaborative, \$11.3 million award from the National Institute of Environmental Health Sciences to study urban pollution and health. Along with collaborators in Engineering, Pharmacology and the Center for Molecular Medicine and Genetics, Dr. Sadagurski will study ties between benzene, found in exhaust and cigarette smoke, and inflammatory signaling in the central nervous system. Dr. Sadagurski's research was profiled in *BioRhythms* in 2020.

Dr. Miriam Greenberg was appointed to the Barth Syndrome Foundation Board of Directors. She has also been awarded funding from the Cayman Biomedical Research Institute to study the use of the molecule irisin as a treatment for impaired muscle development in Barth syndrome patients. This project, developed in part by Dr. Greenberg's postdoctoral fellow Dr. Newton T. da Rosa Jr., will use a cell line model of Barth syndrome previously generated in the Greenberg lab.



Dr. Penelope Higgs was selected as a 2022-23 Fellow, Wayne State University Academic Leadership Academy. She is also the current President of the Michigan Branch American Society for Microbiology and serves on the board of the International Academy Okma Business Coalition.

Dr. Athar Ansari has been promoted to full Professor. He also won a 5-year, \$1 million award to investigate the integration of mRNA production and processing, a project inspired by his discovery that the transcription factor TFIIB is involved in the processing and termination of messages. Dr. Ansari has been appointed associate editor and member of the editorial board of *Frontiers in Molecular Biosciences* and is an invited member of the editorial board of the *Biochemistry and Molecular Biology* section of *Biology*.



Dr. Lori Pile has been promoted to full Professor and was appointed Associate Dean in the College of Liberal Arts and Sciences with responsibility for staff and undergraduate affairs. You can read an update on achievements from the NIH MARC award on which she is a co-investigator on p. 1 of this issue.

In memoria

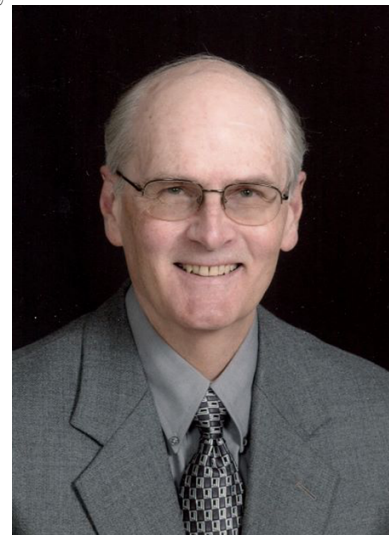
The Department of Biological Sciences mourns the passing of Professor Tony Hough

The Department of Biological Sciences and Wayne State University lost one of their beloved emeritus professors with the passing of Richard Anton Hough on June 9, 2022. Known as Tony, he spent 34 years here as a teacher, researcher, and administrator. He will be deeply missed by his friends and colleagues.

Tony had interests in marine and freshwater ecology. He was well-published and a respected researcher, mentored nine Ph.D. and 4 MS students and was an engaging instructor. His students adored his calm demeanor and dry humor. Tony was awarded the President's Award for Excellence in Teaching. He also served as the department's associate chair for ten years.

Tony left an enduring legacy at Wayne State. He designed and curated the Natural History Museum. Tony also displayed great foresight with his development of the Environmental Science Program in 2003. He designed this program to train students to address urban environmental issues. Tony considered his work facilitating this collaboration between Biological Sciences and Geology to be one of his greatest career achievements.

Tony grew up in Urbana, Illinois and earned his B.S. from the University of Illinois, his M.S. from the University of Michigan, and his Ph.D. from Michigan State University in 1973. He worked with the University of Michigan Great Lakes Research Division, the U.S. Naval Oceanographic Office, and the National Science Foundation Great Barrier Reef Photorespiration Expedition. In retirement, he continued to follow his love for the water on cruises with his wife of 54 years, Lynn. Tony maintained a weblog called "Seafaring: Tony Hough's Chronicles of Messing Around in Boats" and published two mystery/action novels in his retirement, *Halcyon Fury* in 2011 and *No Swimming* in 2013. Both are set in Michigan and based upon the Great Lakes. Tony Hough forever maintained an even keel during tumultuous times. We have lost a great colleague and an even greater person.

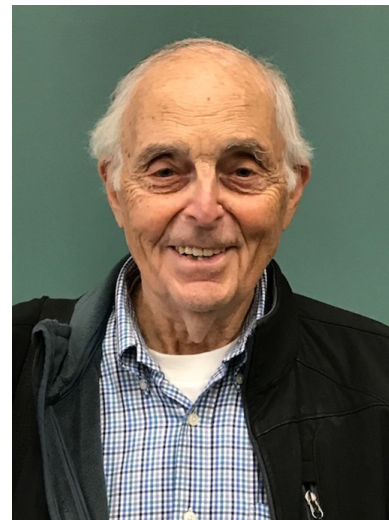


We mourn the passing of Dr. Robert Arking

Biological Sciences and the Wayne State University community mourn the passing of Professor Robert (Bob) Arking, who died suddenly in May of this year. Bob was a dedicated researcher and beloved colleague and mentor who spent more than 45 years at Wayne State. He helped to shape the department. His visionary educational initiatives influenced the lives of countless students. He was instrumental in reforming the department's undergraduate curriculum, promotion of modern teaching methodologies and development of courses to help at-risk students. And, being a true scientist, he collected and analyzed data that confirmed the effectiveness of active learning and learning communities. Even after his retirement in December 2020, Bob continued to teach his course on the Biology of Aging as a volunteer — a testament to his love of teaching and learning.

Bob received a B.S. in Biology from Dickenson College and a Ph.D. from Temple University. He was fascinated by the physiology of healthy aging and developed a strain of long-lived fruit flies that enabled him to identify the factors that promote healthy aging. Throughout his career, he collaborated with scientists in Russia, Switzerland and South Korea to explore the genetics, physiology and metabolism of aging using these flies. In addition to prolific research articles and reviews, Bob was the sole author of a textbook, *Biology of Aging*, now in its fourth edition.

A celebrated researcher, Bob won the Wayne State faculty recognition award in 2000 for outstanding scholarship and was elected a fellow of the Gerontological Society of America and the American Aging Association. He was an invited visiting professor at Pusan National University, South Korea, in 2000 and 2013 and won a Fulbright Fellowship to teach and study at the University of Salzburg in 2006. In addition to his scholarship and teaching, he held several positions with the AAUP/AFT. His many friends throughout the university will miss his enthusiasm, humor and friendship.



2021-2022 Scholarship and Prize Winners

Without our donors, we wouldn't have been able to support our students for the current academic year. The following scholarships have been awarded to biological sciences students.

Graduate Awards

Department Retreat Best Oral Presentation

Kendall Case
Michael O'Brien

Department Retreat Best Poster Presentation

Neha Rajput Katie Dwyer
Chisom Onu Shelby Kasto

Armstrong-Bromel Inspirational Graduate Student Teaching and Mentoring Award

Christina DeGregory

Thomas Rumble Fellowship

Brittanie Dabney Hector Esparra-Escalera
Katherine Dwyer

Graduate Teaching Awards

Graduate Teaching Assistants

Anja Zlatanovic
Hector Esparra-Escalera

Instructional Assistants

Krystal Bakkila
Emily Powell

Graduate Research Awards

Hashan Jayarathne
Anindita Mitra

Undergraduate Awards

Nicolette Therese Keller Endowed Scholarship in Biological Sciences

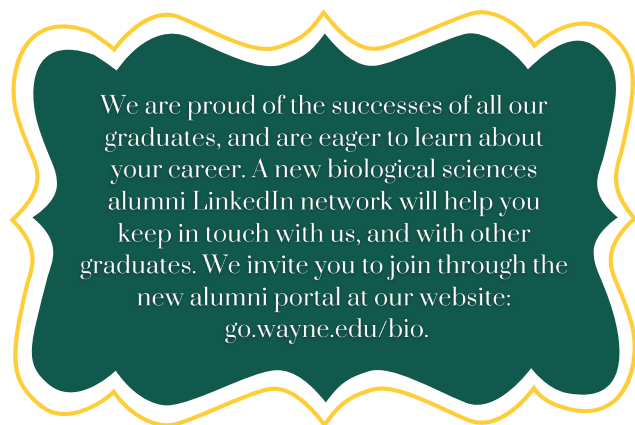
Jodi Protasiewicz

Kathryn and Gary Armstrong Endowed Scholarship

Yousef Aamir
Haidy Aziz
Cheryln Wade

Michigan Garden Club Scholarship

Samantha Chauvin



A little help from our friends

We hope these newsletter articles, which highlight the accomplishments of our students and faculty members, have shown you that our department is dedicated to providing an education that reaches for higher and higher standards. We want our graduates to receive the recognition that comes with a degree from a highly reputable department and university. These are worthy goals, but they are expensive. Your past contributions have helped us. Your future contributions will ensure our continued success.

Please help us reach these goals. Your generosity allows us to modernize our equipment, support graduate students and advance new teaching initiatives.



Does your employer match your gift?

More than 1,000 companies in the United States have matching-gift programs that will, in effect, double or triple your gift to Wayne State University. Check with your employer to see if it has such a program.

To participate, notify the appropriate person - usually someone in the human resources or community relations office - that you would like to have your gift matched. Arrangements will then be made to send your gift to us along with or followed by a second gift, courtesy of your firm's matching-gift program.

Sounds easy? It is! Please take advantage of this opportunity, and help us double or triple your gift.

Our Newest Alum

We are proud to introduce our newest doctoral and master's graduates

Master of Science

M.S. Biological Sciences

Anindita Das

Advisor: Karen Beningo

"Exploring the mechanism of invadopodia formation"

Despina Tsitlakidou

Advisor: Aleksandar Popadic

"The sweet smell of mysery: scent gland development"

M.A. Biological Sciences

Jacob Jaboro

Doctoral Level

Those receiving Ph.D. degrees include:

Darrin Hunt

Advisor: Donna Kashain

"Impacts of dispersal of invasive bivalves, *Dreissena* and *Corbicula* spp., on stream and benthic communities"

Anindita Mitra

Advisor: Lori Pile

"Investigating the role of Sin3 isoforms in control of genes and pathways necessary for energy metabolism and cell survival"

Mahmoud Suliman

Advisor: Miriam Greenberg

"Inositol is a major regulator of lipid metabolism and stress signaling in mammalian cells"

Feng Tao

Advisor: Chuanzhu Fan

"Beyond the identification of differential gene expression using RNA-seq in plants"

We are extremely pleased to acknowledge our most recent undergraduate degree recipients and welcome you to the status of alumni!

Since Fall 2021, we are proud to say that we have added 204 undergrads to the rank of alumni. Thirty of these graduates were inducted into the prestigious Phi Beta Kappa honor society in 2022!

Way to go, Warriors!



Department of Biological Sciences
1360 Biological Sciences Building
Wayne State University
Detroit, MI 48202

Donor form

I would like to make a contribution to support the Biological Sciences Department at Wayne State University:

- Biological Sciences Department Scholarship Fund (222823)
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