BIOCHEMISTRY *In Vivo*

2025

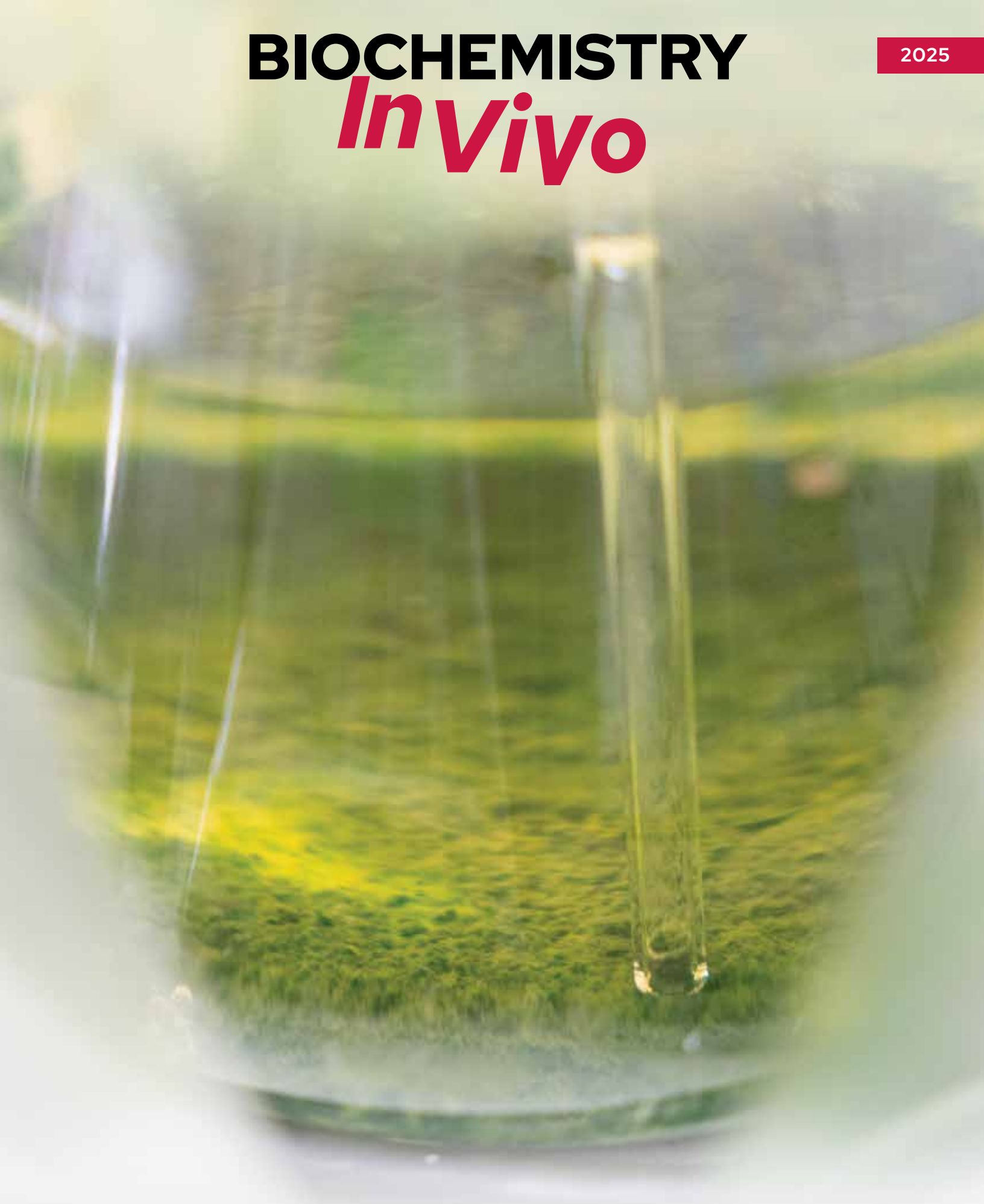

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Table of Contents

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Front Cover:
Researchers in Christopher Gisriel's lab work with cyanobacteria, some of the ancestors of modern plant life. This year, Gisriel's lab captured the first images of the photosynthetic machinery in a recently discovered ancient cyanobacterium. Read about this research on p. 6.

The 2025 issue of *Biochemistry In Vivo*, we introduce new faces and discoveries, celebrate education and achievement, and highlight the impacts of our successes. It is our sincere hope that the news we share about our current members, alumni, supporters, and friends worldwide will bring you pride in your Department and inspire you to help shape our future.

This will be my last time writing words of welcome in this publication. After 10½ years, I am stepping down as Chair of the Department of Biochemistry. This service has been the greatest professional honor of my life, and I am deeply appreciative of the support and encouragement I have received from colleagues and friends across the university.

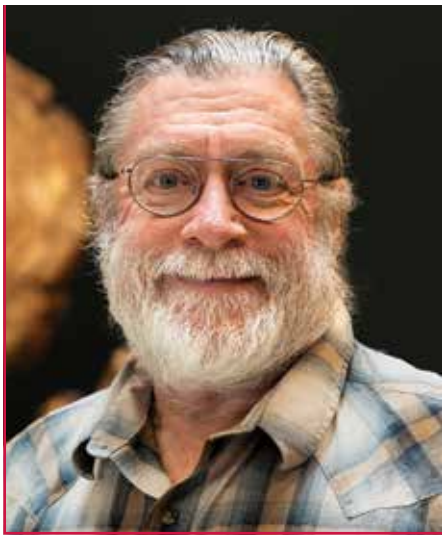
Professor Rick Amasino begins serving as Department Chair in January 2026. Rick has been a professor in the Department since 1985 and has served alongside me since 2020 as Vice Chair. He has a wealth of experience with the Department's academic, research, and outreach endeavors, and a deep commitment to collaborative work. He brings all of that, as well as his knowledge of and active participation in the campus enterprise, to this new role. Please welcome Rick as Chair with enthusiasm and support.

There are three principles that have guided me as Chair: encourage our faculty to contribute at the highest level and advance their research, teaching, and service; build an outstanding collaborative staff with agency and responsibility to sustain the best department anywhere; and engage with alumni to learn together how to support the Department in new ways.

Over the past decade, we hired amazing faculty, built national centers of research excellence, and expanded our research funding, impact, and philanthropic support. There are few campuses in the world that can match the proximity and interactions of three national centers supporting state-of-the-art biological research across many topics. Dr. Brad Schwartz, Chief Executive Officer of the Morgridge Institute for Research, was a key partner, and I greatly appreciate his friendship and confidence. With leadership from Professors Rick Amasino and Sam Butcher, and teaching assistant professors Mario Pennella and Erica Shu, the Department grew as a powerful contributor to undergraduate education by delivering innovative courses and attracting large summer enrollments. We created an undergraduate advising hub, prominently located along beautiful Henry Mall. We built a communications team and expanded national awareness of our outstanding research and academic programs and facilities through marketing and social media.

Cathy Michael, our Department Administrator who retired earlier this year, was at my side for all of this. I credit Cathy with an immense portion of the Department's success over our ten years together, all starting from my simple question on my first day as Chair, "...Cathy, do we have some documentation on how to run this place..."

As I transition out of service as Department Chair, I am looking ahead to new endeavors. With support from the Vilas Distinguished Achievement Professorship and



Brian G. Fox

an appointment as a Fellow of the Stellenbosch Institute for Advanced Studies, I will join a team of scientists at the Stellenbosch University Centre for Epidemic Response and Innovation to create a pipeline for real-time computational prediction of the structures of proteins encoded in emerging pathogen genomes, and to map evolutionary changes in these structures to current knowledge about drugs, antibodies, vaccines and other treatments to hopefully get ahead of the next pandemic.

I will also be working to increase awareness of opportunities for technology transfer from campus inventors to address critical problems in human health, animal safety, food security, and creation of a circular bioeconomy, wherever the need is greatest, world-wide. As an inventor and long-time partner of WARF, I am coordinating presentation of WARF patents as opportunities for young African entrepreneurs in the Africa Stars program (funded by a grant from the MasterCard Foundation to Stellenbosch University and the University of

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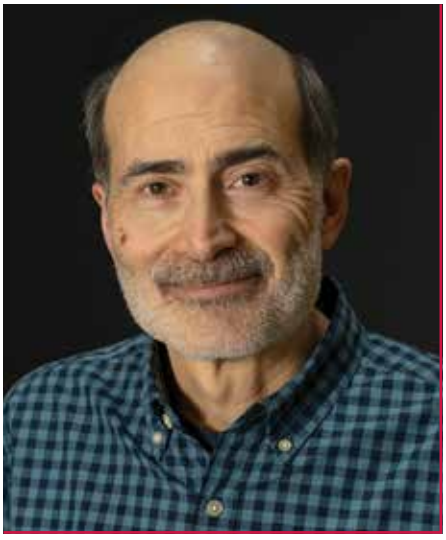
Senegal). Entrepreneurs that choose WARF patents will come to UW–Madison inventor laboratories and carry out additional business plan development, technology derisking, and company formation. Please let me know if you would like to learn more.

And last but certainly not least, I look forward to continuing to serve the Department of Biochemistry as a professor. It brings me great joy to know that the research programs, educational programs, partnerships, and facilities built and grown over the last decade will continue to grow and thrive for decades to come. And, through changes in leadership and staff, our graduate and post-graduate researchers will continue to be the engine of our research success. We applaud them and enjoy staying in touch as they move to impactful careers in industry, academia, and government.

With my final words, I wish to remember a colleague instrumental in shaping the department we have today. Ann Palmenberg was a mentor, colleague, intellectual sparring partner, and great friend. The innumerable ways she has bettered the field of virology will be a lasting legacy.

I owe every one of you thanks for helping to make my tenure as Chair a truly enjoyable and productive time in my life. I hope to see many of you in Madison in the coming year. Until then, we wish you a good year ahead.



Richard Amasino

I am both humbled and honored to have been selected to serve as chair of one of the top biochemistry departments in the world. I have been quite fortunate to be a faculty member in the Department of Biochemistry and have the enjoyable privilege of participating in undergraduate teaching each semester while being in a great environment to explore, alongside wonderful graduate student and postdoctoral colleagues, the molecular mechanisms that plants have evolved to synchronize flowering to certain seasons. One main area of discovery has been how exposure to the prolonged cold of winter renders plants able to flower in the spring.

I look forward to a broader departmental role of working alongside faculty, students, postdocs, scientists, and alumni in our pursuit of scientific understanding and innovation, and in communicating the wonder and value of science through our teaching and outreach. Professor Katie Henzler-Wildman and Professor Vatsan Raman will be especially instrumental to our shared success in their roles as Vice Chairs.

I wish everyone a productive, healthy, and happy 2026.

Profile: Bryce LaFoya

This August, Bryce LaFoya joined the faculty as an assistant professor. His lab will study neural stem cells and brain regeneration.

LaFoya first learned scientific research could be a career as a student attending community college in southern California. Committed to completing his undergraduate degree, LaFoya paid for school by running a business installing and maintaining fishtanks in office buildings. He eventually landed at Boise State University, where he earned his bachelor's degree while gaining research experience.

"It can be hard as a transfer student or as a non-traditional student to find opportunities in labs," LaFoya recalls. "Juniors and seniors in college who want to pursue careers in research can see a lot of doors closing because they didn't join a lab early enough. When I transferred to Boise State as a senior, I had no research experience. But a professor was willing to give me a spot in their lab. I hope that as my career progresses, I will have opportunities to do the same for students here at UW–Madison."

LaFoya stayed at Boise State to complete his graduate studies. His research focused on cell signaling pathways coordinating blood vessel development. "Sometimes, in biology, seeing is believing. There is powerful knowledge that comes with observing cells in action, so I switched gears for my postdoc and dove into microscopy, which was a whole new world for me."

LaFoya's postdoctoral research, completed at the University of Oregon, examined neural stem cell divisions in *Drosophila* flies. His lab at UW–Madison will build on this research.

"There's a concept in biology that mammals are fantastic failures at tissue regeneration. Our bodies struggle to effectively repair tissues once they're injured or diseased, and this is especially true in the nervous system. But many animals can actually regrow parts of their brain after an injury. My lab will look at regenerative animals such as *Danionella* fish, and try to understand how their neural stem cells are able to regenerate brain tissue following injury or disease." The end goal is to unlock mechanisms that can help activate regeneration in human brain tissue.

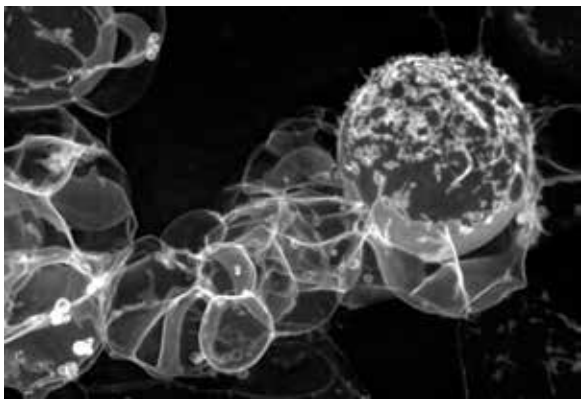
LaFoya was drawn to UW–Madison by the supportive community of researchers and staff in the Department and across campus. He is excited to expand his research through collaborations and with access to resources such as the Cryo-Electron Microscopy Research Center and Biochemistry Optical Core.

He also emphasizes that research careers are made richer through engagement with scientists who have different approaches and have pursued different career paths. As a

Bryce LaFoya

mentor, LaFoya encourages students to connect with people outside of academic research and find the path that is right for them. He has already begun to grow his lab with a staff scientist who has experience working in the biotechnology industry.

"I've moved around a lot, I've changed lanes in my career, I've needed different types of support from different people," says LaFoya. "I'm committed to supporting trainees in my lab and helping them build relationships with other mentors, because building mentoring teams can drive success and create new opportunities."



Live imaging of developing *Drosophila* brains captures neural stem cells in action, revealing the dynamic processes behind brain formation.

Profile: Hannah Wayment-Steele

Hannah Wayment-Steele

Hannah Wayment-Steele joined the faculty in August as an assistant professor. Her lab will build deep learning models that better predict the dynamics and functions of biomolecules, and will then test these models with experiments.

Wayment-Steele majored in math and chemistry as an undergraduate student at Pomona College. At the time, the concepts of biochemistry seemed a world away from her research interests. While completing her master's degree in chemistry at Cambridge University in the United Kingdom, she came to appreciate the connection between these realms of science through the chemical complexities of biomolecules.

"The thing that caught my interest was that, in order to function as they do biologically, proteins and RNA have to occupy different conformations and change among those conformations with specific timings. It's like a dance," Wayment-Steele says. "A single sequence can have enough information to dictate all of the moves in this dance."

With a newfound appreciation for biomolecules, Wayment-Steele shifted her focus. During her doctoral research at Stanford University, she modeled the dynamics of proteins using computer simulations and developed more effective statistical methods to understand the models. Her research also used experimental data on thousands of RNA sequences to build a model that could better predict RNA ensembles, work that proved useful in the race to find an effective, shelf-stable mRNA vaccine for SARS-CoV-2.

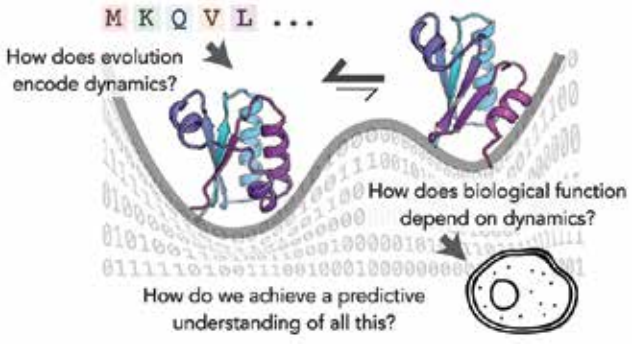
In her postdoctoral research at Brandeis University, Wayment-Steele created a large dataset that held information she and her colleagues used to train a model predicting protein dynamics. They were interested in information that could help identify new protein targets for treating diseases, obtained by predicting the locations of protein dynamics that were too slow for existing simulations to reach.

The Wayment-Steele Lab will continue to build and improve on deep learning models. The first steps, Wayment-Steele says, are to creatively identify what questions biochemists would like to be able to answer, then to identify existing datasets that might hold information to answer that question.

"Deep learning is great once you've identified the task you want to optimize. But there are so many interesting questions [in biochemistry] that haven't even been formulated for deep learning. That's what interests me the most — it's the step before data can be used to build a new model," says Wayment-Steele.

Wayment-Steele sees the breadth of biochemical wisdom and experience at UW–Madison, as well as an emphasis on entrepreneurship and translational research, as key to her lab's success. "I want our research to have real-world impacts. Through collaborations on campus, I'm excited to apply our models beyond what I alone could ever think to do," she says. She has already begun to grow her lab, and a postdoctoral researcher will be joining this year.

An avid rower, Wayment-Steele sees her role in the lab as akin to a coach. "When we're tackling a research question, I don't know what the answers are from the start," Wayment-Steele says. "My role is to watch the game's progress, to give insights and pointers, to be there when people need me. And, to make sure they know that they can work hard and be a world-class scientist *and* they can have interests and passions outside of their work hours."



Seeking a quantitative and predictive understanding of biomolecular dynamics, and a deeper understanding of how evolution shapes dynamics and function.

Profile: Wei Wei

This August, Wei Wei joined the faculty as an assistant professor. His lab will explore the fundamental question: How does what we eat affect our health?

Wei majored in biomedical sciences at Zhejiang University in China. As an undergraduate, Wei gained research experience in the U.S. as a summer researcher at Boston Children's Hospital and the University of California, Davis.

As a graduate student at Stanford University, Wei's research examined how metabolic processes are impacted by physiological pressures, including exercise and eating. His doctoral work included developing a tool to help scientists map the secretion and movement of metabolically important polypeptides, such as insulin. Wei's postdoctoral research, also completed at Stanford, took a more chemistry-focused approach, studying the roles of nutrients in regulating homeostasis in mammals.

Now, in his lab, Wei will examine the biochemical nature of nutrients within our food to understand their physiological effects at the molecular level. "I want to approach my research from a basic biochemical viewpoint to better understand how chemicals in our food feed into the basic biochemical network within our bodies," says Wei. "How do they react with enzymes? How do they get transported? And what is the impact on physiology?"

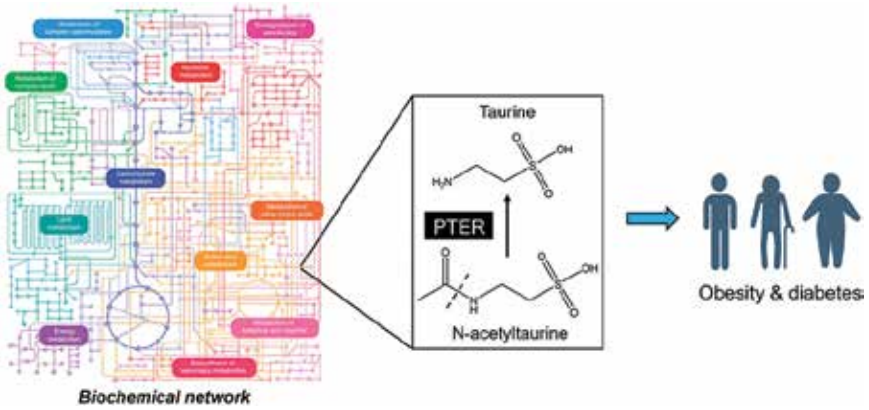
Wei says that, with its long history of metabolic research that continues into the present, the Biochemistry Department is an ideal place to build his lab and establish new connections. "I am excited to work with new colleagues in the Department who are doing such great work in metabolism and biochemistry in general. I came here because the Department is highly supportive and truly cares about the growth of new faculty and also of the student trainees," says Wei. "Throughout my time in the United States, I have met incredible scientists who tell me that they studied biochemistry at UW–Madison."

Wei attributes his own success to mentors who allowed space for his interests and skills to evolve. He plans to approach each student in his lab with the support they need, whether that means hands-on mentorship or giving space, allowing students to come to him when they need help. "People are all different," notes Wei. "People need different things at different phases. My job is to help students find their confidence and give them the support they need to grow and make progress. Then, to know when I can give them more space to find their own way."

As a person who devotes his research to understanding the impacts that diet and exercise have on our bodies, Wei prioritizes physical activity in his time outside

Wei Wei

of the lab. While he especially enjoys playing basketball, Wei says that students in his lab will be strongly encouraged to find their own passion outside of the lab. "It's so important to have something in your life that isn't research," Wei reflects. "There are a lot of ups and downs in research projects, and often it can be more downs than ups. Scientists are more resilient researchers when we can walk out of a difficult day in the lab and know that there's something beautiful waiting outside. It can be anything — cooking, music, games, or, of course, exercise."



Linking taurine metabolism to feeding and obesity.

Ancient Cyanobacteria Hold Insights into Evolution of Photosynthesis

Christopher Gisriel

Cyanobacteria have had an outsized impact on our planet. These single-celled, photosynthetic organisms made way for modern plant and animal life when they began transforming Earth's atmosphere with the oxygen emitted during photosynthesis. Today, cyanobacteria provide a basis for studying how photosynthesis has evolved over millennia.

Sophisticated evolutionary modifications to early photosynthetic organisms, such as the development of chloroplasts and efficient energy harvesting from a wide range of wavelengths of light, enabled complex organisms like algae and plants to grow. The photosynthetic machinery of today's giant trees still bears strong resemblance to that of ancient cyanobacteria ancestors.

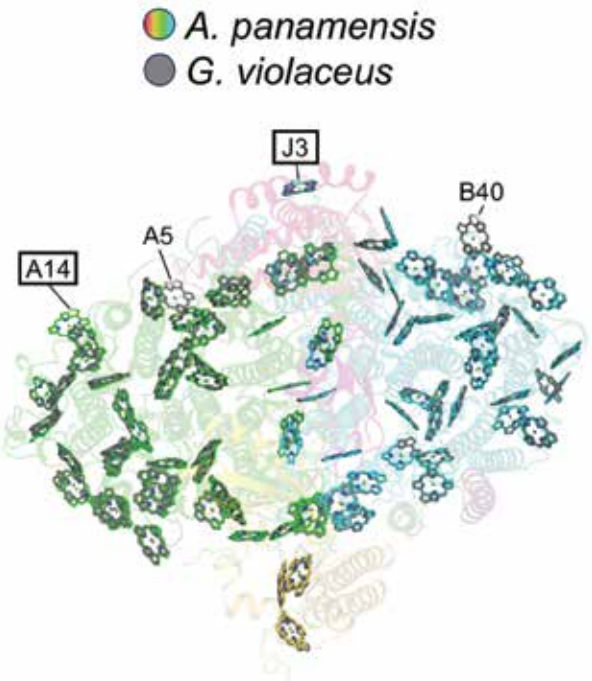
Current research on cyanobacteria may have implications for agriculture and sustainability through improved biofuels and plant breeding with protein engineering. It also helps broaden our understanding of the evolution of photosynthesis.

This year, the Gisriel Lab captured the first images of photosynthetic machinery (photosystems) in the cyanobacterium *Anthocerotibacter panamensis*, a species discovered in 2021. Their research, published in the *Proceedings of the National Academy of Sciences*, gives scientists a novel evolutionary line to explore the history of photosynthesis.

Researchers believe that *A. panamensis* is an especially ancient strain of cyanobacteria because it lacks stacked membrane structures which hold photosystems in more advanced cyanobacteria. Now, with the Gisriel Lab's findings, scientists can see where *A. panamensis* falls in cyanobacteria's genetic tree.

Images the Gisriel Lab obtained using cryo-electron microscopy revealed that *A. panamensis* retains some ancestral features — such as a distinct mix of light-soluble pigments and an ability to capture low-energy light — not seen in Gloeobacter, a distant cousin. These differences suggest that primitive cyanobacteria evolved in distinct ways and, the researchers say, highlight the importance of studying multiple lineages of cyanobacteria to understand early photosynthesis.

This research was funded in part by the National Institutes of Health National Institute of General Medical Sciences.



Comparison of the *A. panamensis* photosystem I (PSI) Chl sites to those from three other cyanobacteria. Superpositions are shown of the *A. panamensis* PSI structure (colored) with PSI structures from *G. violaceus* (left, gray), *Synechocystis* 6803 (center, gray), and *T. vestitus* (right, gray). Sites labeled with boxes are present in *A. panamensis*, but not in the other structure. Sites labeled without boxes are absent in *A. panamensis*, but present in the other structure.

"These studies are an important building block. Understanding how the biology of photosynthesis evolved different features can lead to leveraging that knowledge."
– Christopher Gisriel

Read more

Shedding Light on Treatment for Rare Genetic Disorder

Research from the Hoskins Lab has revealed key insights into how a therapeutic drug targets spinal muscular atrophy (SMA), the most common genetic cause of death in infants. The results open doors for further investigations into these and other RNA-targeting drugs.

SMA results from errors in production of the survival of motor neuron (SMN) protein. SMA affects nerve cells responsible for voluntary muscle movement, including respiratory muscles, causing the muscles to shrivel and become inactive.

Until recently, babies born with the most severe forms of SMA rarely survived past early childhood. Drugs such as branaplam, nusinersen (Spinraza®), and ridsiplam (Ecrysdi®) are giving hope to children born with SMA and their families. Some children with SMA and treated with nusinersen, which acts by binding to a region of the SMN RNA, are now approaching adolescence. Risdiplam and branaplam change how the cell cuts and pastes RNA — part of a process known as splicing — so it can make a functional SMN protein.

Branaplam was developed to interact with RNA's nucleic acid building blocks. Despite the drug's life-saving capabilities, exactly how branaplam and related drugs address errors in RNA splicing has eluded researchers. That's because the RNAs and factors involved in splicing are complex and difficult to study.

The Hoskins Lab partnered with Remix Therapeutics, a pharmaceutical company that develops RNA-targeting drugs such as branaplam, to study the drug's impact on RNA splicing. (Note: Professor Aaron Hoskins is a member of the scientific advisory board at Remix Therapeutics.)

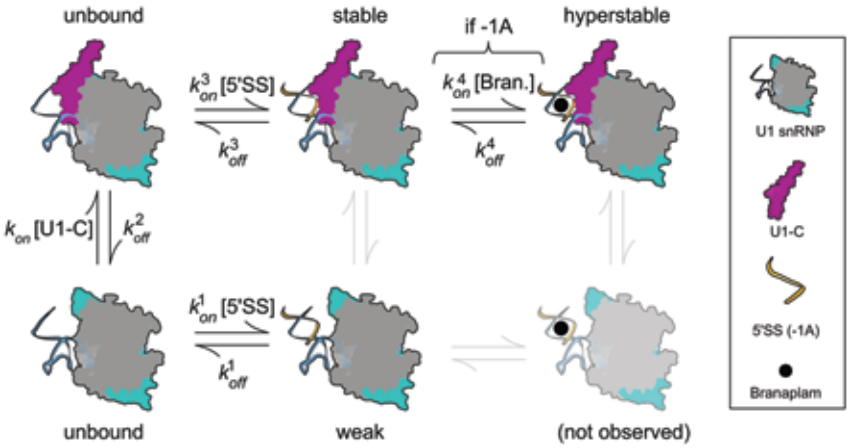
Aaron Hoskins

In their study, published in *Nature Communications*, the scientists discovered that branaplam does not, as previously believed, directly target RNA. Instead, the drug targets a complex made of both RNA and protein. In the absence of that protein, the drug only weakly associates with RNA, likely explaining the results of earlier research.

Results have already opened new possibilities for further study into how these drugs are able to target specific sites, such as the SMN gene, rather than randomly affecting RNA splicing. The researchers hope that this work will also pave the way for new, increasingly effective therapeutics to treat SMA and other illnesses such as Huntington's disease, which could also be treated with RNA-targeting drugs.

This research was funded in part by Remix Therapeutics, a Research Forward grant from the Wisconsin Alumni Research Foundation, and the National Institutes of Health.

"The available drugs are limited now, but this industry-academic collaboration is a step towards finding more therapeutic options for people with deadly genetic diseases."
– Aaron Hoskins



A sequential binding mechanism for -1A bulged 5'SS RNA recognition by U1 snRNP and modulation by branaplam. A kinetic model for -1A bulged 5'SS association and dissociation in the presence and absence of U1-C and branaplam. Equilibrium arrows in grey indicate transitions that are not supported by our experimental data or mathematical modeling.

Read more

Researchers Link Mutations in RPA Protein to Cancers and Other Diseases

Ci Ji Lim

Our chromosomes are protected from degradation by telomeres, the protective caps at the ends of chromosomes made from repetitive DNA sequences and proteins. While telomeres naturally shorten as we age, dysfunction in telomere formation and maintenance can lead to premature aging and other diseases.

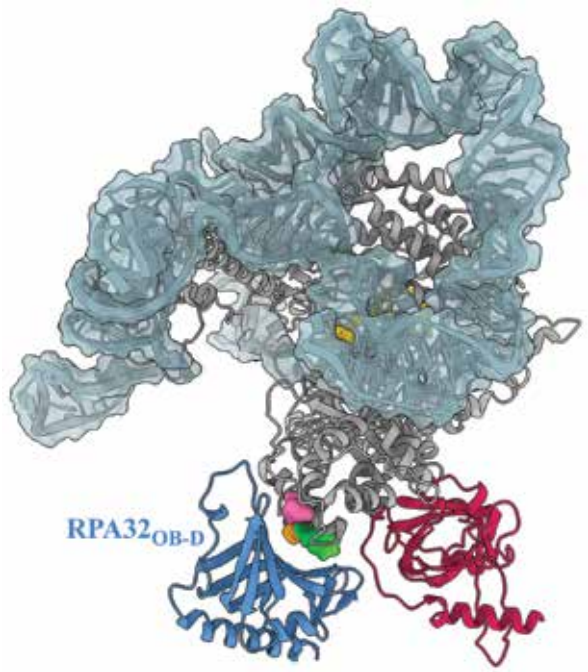
Researchers in the Lim Lab, in collaboration with researchers in the Chemistry Department, were interested in identifying proteins that interact with telomerase, an enzyme responsible for maintaining telomeres. Malfunctions in these proteins could cause some diseases resulting from shortened telomeres.

Using AlphaFold, a machine learning tool that predicts the 3D structures of proteins and protein-protein interactions, the scientists searched for proteins likely to interact with telomerase. They found that replication protein A (RPA) plays an essential role in maintaining telomeres by stimulating telomerase. RPA's role in DNA replication and repair has long been understood, but its role in maintaining long, healthy telomeres in humans was previously unconfirmed. Guided by their findings from AlphaFold, the team experimentally validated that in humans, RPA is required to stimulate telomerase and help maintain telomeres.

Their findings, published in *Science*, have immediate implications for some patients with severe illnesses resulting from shortened telomeres, including aplastic anemia, myelodysplastic syndrome, and acute myeloid leukemia. Lim and his team have received inquiries from clinicians and scientists around the world asking if their patients' diseases could be the result of genetic mutations inhibiting RPA's function.

This research was funded in part by the National Institutes of Health, the NIH National Institute of General Medical Sciences, the UW–Madison Office of the Vice Chancellor for Research, the Wisconsin Alumni Research Foundation, and the UW–Madison Department of Biochemistry.

"This line of research goes beyond a biochemical understanding of a molecular process. It deepens clinical understanding of telomere diseases." – Ci Ji Lim



A model of the human telomerase complex highlights where RPA is predicted to dock. Three structural variants of telomerase that have been linked to patients with various diseases fall within this docking zone, suggesting that these variants could inhibit RPA's interaction with telomerase.

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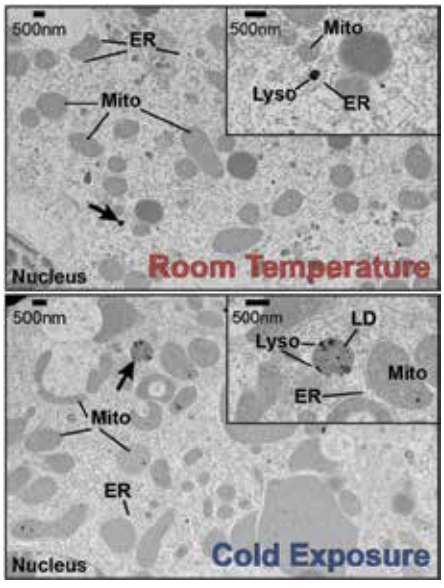
An Enzyme That Helps Break Down Energy Expenditure

When we're under stress from nutrient deficiencies or exposure to extreme cold, our cells break down energy stores to help us survive. To access this stored energy, cells can release enzymes that dock to BMP lipids and initiate the breakdown of other lipids in lysosomes. In times of stress, to break down more lipids, both BMP lipids and the docking enzymes increase in abundance. A dysregulated buildup of BMP lipids is associated with a variety of diseases, including diabetes and neurodegenerative disease.

Scientists don't know why BMP lipids sometimes build up and result in disease. And despite their vital importance, it's also been difficult to identify which enzymes are responsible for regulating BMP lipids. Research in the Simcox Lab, published in *Cell Metabolism*, identified a liver enzyme in mice and humans that helps to break down BMP lipids and regulate their abundance in cells.

The researchers increased levels of BMP lipids in liver cells through cold exposure and identified the enzymes that were more abundant and that were in lysosomes where BMP lipids were localized. From these results, they hypothesized that the regulatory protein Pla2g15 is responsible for breaking down BMP lipids. Further experiments showed that in cells with functional Pla2g15 proteins, BMP lipids were broken down and decreased in abundance, while in cells with dysfunctional Pla2g15 proteins, BMP lipid levels remained elevated.



Electron micrographs of liver sections from mice kept at either room temperature (RT) or cold exposure (Cold). Lysosomes are visible as dark, electron-dense organelles. Arrows indicate zoomed in regions within insets. The zoomed region shows lipid droplets (LD) in lysosomes exposed to cold.

Judith Simcox

Pla2g15 proteins, the researchers believe, may play an important role in our survival during times of metabolic stress. They're now planning to explore the relationship between Pla2g15 dysfunction and metabolic diseases. In other published research, they've helped demonstrate that inhibiting Pla2g15 activity can lead to a greater abundance of BMP lipids, which can help break down other accumulated lipids responsible for symptoms caused by a neurodegenerative disorder.

This research was funded in part by the National Institutes of Health, the NIH National Institute of Diabetes and Digestive and Kidney Diseases, a Hatch Grant, and the Juvenile Diabetes Research Foundation. Simcox is an HHMI Freeman Hrabowski scholar.

"A lot of lipid metabolism research focuses on metabolic disease. That tells the story of lipids as villains. But, really, they're just molecules, and molecules have functions and purpose." – Judith Simcox

How Our Bodies Maintain a Healthy Balance of Lipids

Researchers from the Ntambi and Simcox Labs studied SCD1, an enzyme responsible for regulation of some lipids. They found that SCD1 impacts the balance of lipids beyond those it makes and regulates directly. Their lipidomics results indicate that the absence of SCD1 results in a decrease of energy storage lipids, such as triglycerides, and an overproduction of some metabolically significant saturated lipids. Among the overproduced lipids is acylcarnitine, a lipid known to induce insulin resistance, which can lead to diabetes, suggesting a connection between SCD1 and metabolic disease. Read more

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A Step Ahead of the Next Pandemic

Robert Kirchdoerfer

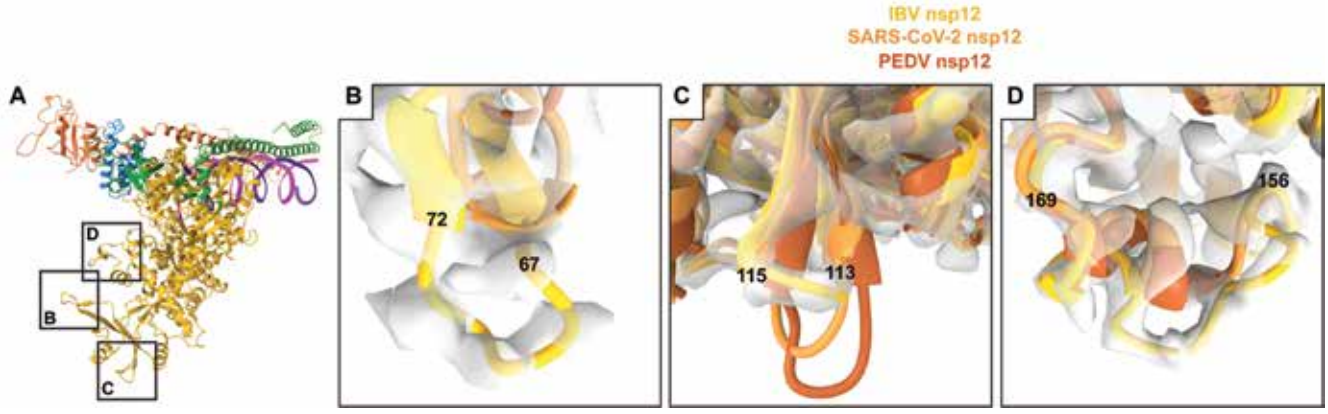
In the 2021 edition of *In Vivo*, we described how, in the wake of a global pandemic, biochemistry researchers pivoted their focus to identify avenues for effectively treating COVID-19. Some of these scientists continue to study related viruses, comparing what we know about different coronavirus structures to determine whether therapeutics may be effective across the whole coronavirus family.

Last year, the Kirchdoerfer Lab published high-resolution images of RNA polymerase, a protein complex key to RNA replication. The researchers examined images of RNA polymerase from the alpha coronavirus porcine epidemic diarrhea virus (PEDV) and from gamma-coronavirus infectious bronchitis virus. Comparing these images to past studies of SARS-CoV-2 revealed that the RNA polymerase complexes from alpha-, beta-, and gamma-coronaviruses function similarly. (Scientists have far less information about alpha-, delta-, and gamma-coronaviruses than they do beta-coronaviruses.) This suggests that antiviral drugs targeting viral polymerase function are likely to be effective across the virus family.

In their study, they also noted that a part of a protein needed to build viral RNA polymerase was shaped differently in alpha-, beta-, and gamma-coronavirus polymerases. Furthermore, they found that each group of coronaviruses used this part of the protein in different ways to assemble the RNA polymerase.

This research was funded in part by the National Institutes of Health and the U.S. Department of Agriculture.

"Designing new antiviral drugs begins with key foundational work on the biochemistry of viral targets. To do this, scientists rely on federal funding. Without this support, we will be left without the knowledge, expertise, and strategies to rapidly address newly emerging viruses."– Robert Kirchdoerfer



Sequence divergent features in coronavirus nsp12. A, an overview of the IBV replication-transcription complex indicates the locations of structurally divergent nsp12 regions. B, an insertion in IBV nsp12 67 to 72 presents as an extended loop. C, IBV nsp12 has a shortened loop in the 113 to 115 region as compared to SARS-CoV-2 and PEDV nsp12. D, an insertion in IBV nsp12 156 to 169 presents as an altered conformation compared to SARS-CoV-2 and PEDV. IBV, infectious bronchitis virus; nsp, nonstructural protein; PEDV, porcine epidemic diarrhea virus; RTC, replication–transcription complex.

Read more

Tool Makes Quick Health, Environmental Monitoring Possible

Small molecules that interact with proteins can initiate, enhance, and inhibit vital biological processes. Vitamins and hormones, for example, are linked to our health, while others, like opioids, are toxic. The presence of certain small molecules can even indicate the presence of pollutants and environmental toxins, such as metals in our drinking water.

Detecting small molecules in a sample often involves expensive and time-consuming lab tests, delays that can defer life-saving treatment. An on-site test kit that relies on a well-designed protein could quickly and inexpensively initiate a biochemical alert system in the presence of a specific molecule, such as a narcotic or metabolite.

The Raman Lab was interested in designing such a system. But, while some proteins naturally evolved to interact with one or more small molecules, engineering a protein to interact with a specific small molecule involves testing thousands of possibilities to find the best fit. This process can be cost- and time-prohibitive.

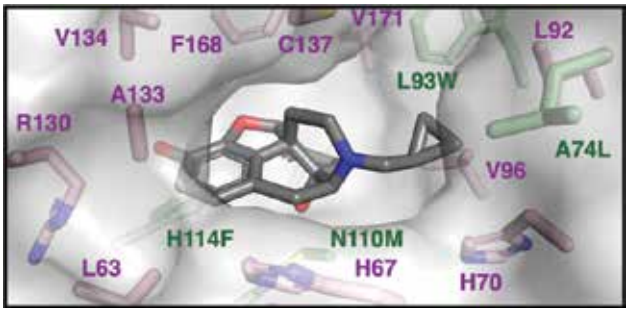
To expedite this process, they developed Sensor-seq, an assay that screens tens of thousands of protein mutations simultaneously to identify which ones bind to a molecule of interest. The proteins can be further modified to act as a switch, flipping on a visual signal (a green glow, for example) that a small molecule is present in a sample and activating a kind of biochemical alert system.

Vatsan Raman

The researchers tested Sensor-seq with several small molecules of interest, including naltrexone, a drug that mimics opioids. Out of tens of thousands of possible protein mutations they designed, they identified which ones sensed naltrexone. Then, they created a biosensor that made the protein glow green when it interacts with naltrexone.

Their method worked: naltrexone induced a green glow visible to the naked eye. The findings were published in *Nature Communications*. Now, the researchers are building computer models that will narrow down possible protein matches for other small molecules relevant to human and environmental health. They see broad applications for the technology, including environmental monitoring, military applications, and health monitoring.

This research was funded in part by the U.S. Army Research Office.



The dark grey represents a crystal structure of naltrexone bound to a designed biosensor.

"My goal is that if you tell me what molecule you want to sense, we should be able to give you a protein biosensor for that molecule in just a couple of weeks."
– Vatsan Raman

Exploring Markets for a Start-Up

Developing innovative and applicable science is just the beginning for Naia Novy, a graduate student in the Raman Lab who worked on the Sensor-seq assay. With an eye toward turning biosensor technology into a viable product, Novy was accepted into the NSF Innovation-Corps program, which supports scientists looking to commercialize the fruits of basic science research. She attended trade shows, met with hundreds of stakeholders, learned techniques for pivoting to new markets, and identified key regulatory barriers. "I was always interested in entrepreneurship, but you never know if your research will align with that interest," reflects Novy. "My [career] goal remains starting a company based on this research, so now it's just about finding the right markets." Read more

Read more

The Next Generation of Scientists: Undergraduate Student Researchers

The next generation of scientists often gets their start as undergraduate researchers. These students bring essential creativity and hard work to their projects and labs, while learning skills that will prepare them to make their own breakthrough discoveries. Below, six biochemistry majors discuss their research projects in labs across campus.

Kaden Calkins

Lab: Carol Lee
Hometown: Sun Prairie, WI

About my research: When people think about omega-3 fatty acids, they often think about fish, not the algae that makes the compound. Understanding how changing environments impact the nutritional quality of algae prepares us for how these effects amplify up the food chain, to us. My research subjects a freshwater algae species to increasing salt and temperature conditions, mimicking road salt runoff and rising global temperatures, and identifying changes in the algae's genes and fatty acid composition.

Gavin Chang

Lab: Jason Cantor
Hometown: Blane, MN

About my research: The research in the Cantor Lab overlaps with my interests in cancer cell biology. My project focuses on deguelin, a naturally derived compound that has potential for use as a chemotherapeutic. Over the summer, I plan on continuing to investigate how deguelin can stop cancer cell growth. I hope that my research will one day contribute to the advancement of translatable cancer treatment strategies.

Emma Mayhew

Lab: Audrey Gasch
Hometown: Madison, WI

About my research: I am studying the effect of the drug rapamycin on cells with extra or missing chromosome (aneuploidy). Rapamycin is known to block the TORC1 pathway, which is thought to help regulate the cell cycle. My goal is to remove critical TORC1 genes and see if rapamycin affects these cells more significantly, which would suggest that TORC1 is important for surviving an aneuploid condition. The idea of being able to better understand the connections among cellular processes, such as TORC1 and translation, is so cool.

Claire Schleicher

Lab: Vatsan Raman
Hometown: Sheboygan Falls, WI

About my research: My project involves engineering transcription factor proteins that bind to heavy metals. The goal is to change their sensitivity and specificity to make useful in biosensors. We want to create biosensors that sense heavy metals in water systems at useful concentrations. I really like that my research combines computation and physical biological research. As a double major in biochemistry and data science, it has been really cool to see all of the ways we can apply computation to biological systems.

Paige Sikora

Lab: Aaron Hoskins
Hometown: Green Bay, WI

About my research: SNAPv2 is the 2nd version of a common self-labeling protein tag used to mark proteins in biological systems. While SNAPv2 and other tagging systems have been compared before, there is still a lot to learn about how different systems compare for studying single molecules. I am studying SNAPv2 with the hopes that my lab will be able to use it for single-molecule studies in the future.

Colten Tramburg

Lab: Ci Ji Lim
Hometown: Kenosha, WI

About my research: My research exposes me to new methods and tools to identify structures of proteins such as cryo-electron microscopy (cryo-EM), a technology used for imaging biomolecular structures. Cryo-EM is a process where samples of proteins are frozen in ice and electron beams are shot at the ice to produce a 3D image of the protein. We are working on a method to help researchers keep proteins they are studying in ideal condition during the cryo-EM imaging process.

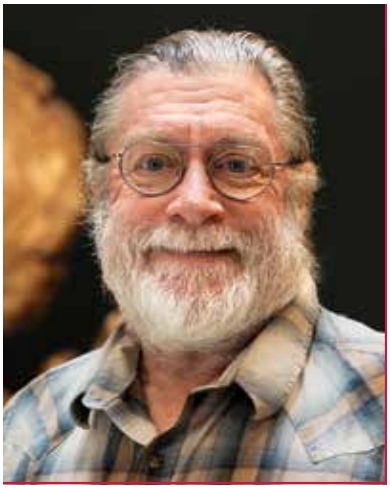
Support for these students is funded in part by awards from the Department of Biochemistry made possible by generous donations.

Read more

Entrepreneurial Spirit, Borne from Discovery

Our researchers work at the frontier of scientific exploration, pushing scientific boundaries in pursuit of knowledge and to better the world. Their research spans a wide range of topics, including the human gut microbiome, technology development, aging, and sustainability. Below, five of our faculty innovators discuss what excites them and inspires their research, and the power of collaborative science.

"Investigating interactions between bacteria and humans is a huge challenge. We still don't have tools to co-culture bacteria with human cells in the lab, for example. Understanding the basic molecular mechanisms underlying host-microbiome interactions will allow us to develop microbiome-targeted therapeutics. Partnerships allow us to get a comprehensive view of what important questions we need to ask, any new and revised approaches we should consider, and ultimately how our research can help cure diseases." – Snehal Chaudhari

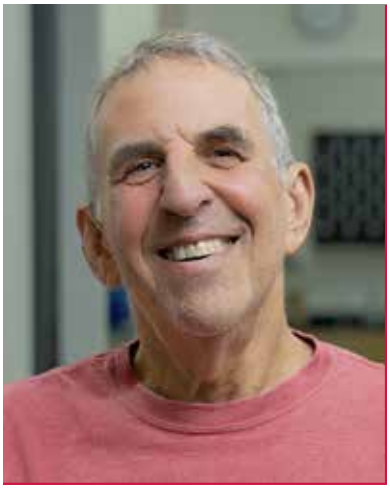


"Some people say necessity is the mother of all invention, but to reduce necessity to practice, innovation must often lead the way. Doing things the same old way, and perhaps not getting a new insight is not inspiring. Trying out something totally new and gaining new insight is both inspiring and motivating to innovate again. Collectively, teams ask better questions and obtain broader understanding. Research collaborations work best when the partners bring unique and complementary aspects to the partnership." – Brian Fox

Read full Q&As with these innovators

"I am excited by the challenge of uncovering fundamental mechanisms of telomere maintenance in humans. Building new tools to probe telomere biology allows us to ask questions that were previously inaccessible. And, the potential to reveal insights into aging, cancer, and other diseases makes this work both impactful and intellectually stimulating. My research partnerships and my on- and off-campus collaborators bring diverse perspectives and expertise. They inspire new questions, introduce innovative methodologies, and accelerate discoveries." – Ci Ji Lim

"I'm driven by the challenge of identifying and developing tools that...transform the way we study and engineer biological systems. Often, a field reaches a standstill, where progress slows because existing methods can't push the boundaries any further. But the right technological innovation can break through these barriers. I strive to stay closely connected to the biotechnology industry. Understanding the challenges facing industry helps us identify opportunities where scientific discoveries can lead to real-world impact." – Vatsan Raman



"Curiosity, plain and simple. I love developing new genome technologies to help reveal basic biological mechanisms. I am the ultimate experimentalist. When I hit roadblocks...I have colleagues in fields that I know less about, that I can call and ask, "Hey, what does this result mean?" I encourage scientists not to underestimate the emotional and intellectual satisfaction that comes from seeing your basic research go out there and do something important."
– Michael Sussman

Clean Water Project

Since 2005, the nonprofit organization Village Health Project has been ensuring access to clean water for people living in villages across Uganda. Now, as VHP celebrates its 20th year, a group of undergraduate students is helping to continue the organization's work. They secured a $5,000 Knapp Bequest award to install six new water tanks in the villages of Lweza and Kanganda. The funded project is led by Professor James Ntambi and John Ferrick, former associate director of international programs in CALS. Learn more: go.wisc.edu/vhp.

Taylor Lee, Claudia Biebel, and Neha Kulkarni (pictured left to right).

New Study Abroad Program in Japan

Hiroshima University campus.

In Summer 2026, a group of biochemistry majors and other STEM students from across campus will pack their bags and board a plane to Japan, where they will gain experience tackling biochemistry research in an intercultural setting. As the inaugural cohort in the Introduction to Biological Sciences Research in Japan Study Abroad Program, the students will get an introduction to lab-based research at Hiroshima University, located near Hiroshima City in southern Honshu (Japan's largest island). The program is led by biochemistry teaching assistant professor Erica Shu. Shu, who was born in China and moved to the U.S. for her undergraduate studies, believes that cultural exchange is important to building a robust, inclusive scientific community. She designed the new program to fill a gap in the study abroad programs available at UW–Madison. The Japan Study Abroad Program will offer a summer term experience for students to focus on introductory level biochemistry research and coursework while immersing themselves in local culture. Learn more: go.wisc.edu/biochem-in-japan.

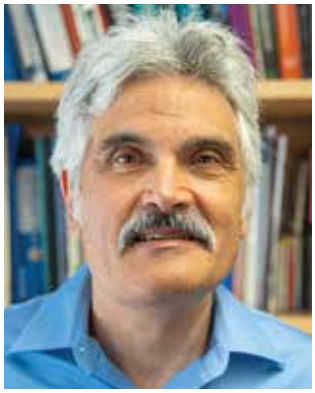
Undergraduates Find Community & Engage Through Biochemistry Connections

Undergraduate students have myriad opportunities to find and build community on campus. Here are two ways that students are connecting with the biochemistry community on campus and beyond.

Many biochemistry majors come together to learn, socialize, and network through **UW–Madison's ASBMB Student Chapter**, advised by Professor Aaron Hoskins. For members, the organization is just as much an opportunity to connect with peers as it is about career readiness. Learn what student leaders have to say: go.wisc.edu/asbmb-msn.

The **Biochemistry Engagement Program** is a new program that encourages, celebrates, and recognizes the importance of students' involvement in the Department. Guided by advisors in the Undergraduate Advising Hub, participants will gain an increased understanding of biochemistry research and connections with faculty and other undergraduates. Learn more: go.wisc.edu/engagement-program.

Alan Attie: WARF Named Professor



The WARF Named Professorships honor faculty who have made major contributions to the advancement of knowledge through their research endeavors, teaching, and service activities. Award recipients choose the names associated with their professorships. The Henry and Annrita Lardy Professor of Biochemistry recognizes Attie's dedication to advancing our knowledge of diabetes and metabolism. Henry Lardy was a professor in the Biochemistry Department from 1945-1988, where he studied pathways of cellular metabolism. He and his wife, Annrita, were longtime supporters of the biochemical sciences.

Brian Fox: Hilldale Award

Each year, to recognize their contributions to teaching, research, and service, the faculty divisions honor four faculty members with the Hilldale Award. Fox's research on the complex chemical reactions controlling life-building proteins has served as the bedrock for thousands of further studies. His commitment to mentorship and instruction prepares students to conduct their own research. As department chair, he built a renowned research program, recruited diverse faculty, and established three national state-of-the-art research centers on campus.

Christopher Gisriel & Judith Simcox: Distinguished Faculty and Staff Postdoc Mentoring

The awards are given annually to recognize faculty and staff that contribute their time, knowledge, energy, and enthusiasm to mentoring postdocs in their labs. Faculty are nominated by current or former postdocs. Also recognized this year were postdoctoral researchers Lauren W. Yowelunh McLester-Davis (Simcox and Gleason Labs) and Jericha Mill (Simcox Lab) (see p. 18).

Vatsan Raman: NeuroTech Challenge Recipient & Vilas Associate

The Wisconsin Alumni Research Foundation and Nexus NeuroTech Ventures awarded $100,000 in development funding to three innovative research projects, including one from the Raman Lab, aimed at transforming the diagnosis and treatment of neurological disorders.

The Vilas Associates competition recognizes new and ongoing research of the highest quality and significance. Winners receive research salary support during the summers of 2025 and 2026, in addition to $25,000 flexible research funds over the two years.

Katherine Henzler-Wildman: AAAS Fellow

A tradition dating back to 1874, researchers are elected as Fellows of the American Association for the Advancement of Science annually by their peers. Fellows are recognized for distinguished contributions to advance scientific inquiry and its applications. Henzler-Wildman, who is also a co-director of the National Magnetic Resonance Facility at Madison, is known for her exploration of the dynamics, mechanisms, and functions of transport proteins that control movement of molecules across cell membranes. Her research on drug efflux pumps is broadening our understanding of the mechanisms involved when cells use proton gradients to energize the process of removing toxins and drugs.

Chad Rienstra: Evelyn Mercer Professor in Biochemical Sciences

The Evelyn Mercer Professor in Biochemical Sciences was established with funds from Samuel T. Mercer, in honor of his sister Evelyn, and recognizes a distinguished professor engaged in research to understand fundamental life processes. Rienstra, who is a co-director of the National Magnetic Resonance Facility at Madison, and his lab group have pioneered nuclear magnetic resonance (NMR) methods and technologies, and their efforts are having a major impact on understanding Parkinson's disease, fungicidal drug action, and protein-lipid interactions in blood coagulation.

Collin Borcik: Boyer Award for Postdoctoral Excellence in Biochemistry

The award is presented annually by the Biochemistry Department to a postdoctoral researcher in recognition of their excellence in research. The award was made possible by Professor Paul D. Boyer, who earned a Ph.D. (1943) from the department. Borcik, a postdoctoral researcher in the Rienstra Lab, seeks to determine unique fibril morphologies associated with specific types of Parkinson's disease that could serve as diagnostic markers. To explore fibril structures, Borcik uses multiple imaging techniques, including solid state nuclear magnetic resonance and cryo-electron microscopy, and he and collaborators have developed an optimization software and new NMR probe design.

Lauren W. Yowelunh McLester-Davis & Jericha Mill: Postdoc Excellence Awards

The annual awards recognize current postdocs that contribute their time, knowledge, energy, and enthusiasm to mentoring, teaching, and service. Postdocs are nominated by themselves, current or former mentors and mentees, or colleagues. McLester-Davis was recognized for her service, and Mill for her teaching.

Silas Miller: NIH Predoctoral Fellowship (F31)

The prestigious grant will support Miller's research and stipend. Miller, a doctoral candidate in the Cellular and Molecular Biology Graduate Program, is exploring mechanisms responsible for antibiotic resistance in infectious bacteria. Through his research in the Raman Lab and in collaboration with the Henzler-Wildman Lab, Miller will analyze amino acid mutations that increase antibiotic susceptibility.

Rohith Rajasekaran: CALS Distinguished Graduate Fellowship

The year-long fellowship was awarded to two students in the College of Agricultural and Life Sciences this year. The fellowship was established in 1999 by the estate of Elsa Thomsen to support CALS graduate students who demonstrate excellence in research. Rajasekaran, who is earning his PhD in biochemistry as a member of the Coyle Lab, studies how to repurpose cellular systems that exist in nature to engineer new functions into cells. His research appeared on the cover of *Cell*, and a patent has been filed through the Wisconsin Alumni Research Foundation.

Elliot Weix: Goldwater Scholar

The undergraduate scholarship in mathematics, engineering, and the natural sciences honors the late Sen. Barry Goldwater and is designed to foster and encourage outstanding students to pursue research careers. Weix is a junior majoring in biochemistry and math. Working in the Coyle Lab as both a high school student and an undergraduate, Weix has earned co-authorship on a high-profile paper published in *Cell* in 2024 as well as on two preprinted manuscripts. Recently, Weix's research led to an original discovery, which he is developing into a model for studying the development of multicellular structures from a single-cell perspective. He plans to pursue a doctorate in computational biology or biochemistry and a career researching epigenetic inheritance mechanisms using mathematical tools and synthetic biology methods.

Visit the
News & Events
section of our website
to read more about these
talented students,
our award-winning
research faculty,
and more news from the
Biochemistry Department.

IPiB Degrees: Nov 1, 2024 - Oct 31, 2025

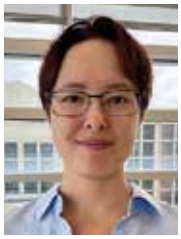
Haley Bridge
(Weeks)
PhD

Nithesh Chandrasekharan
(Coyle)
PhD

Joshua Choi
(Senes)
PhD

Chase Freschlin
(Romero)
PhD

Samridhi Garg
(Senes)
PhD

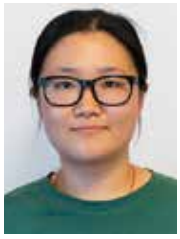


Allison Hollatz
(C. Fox)
PhD

Kimberly Huggler
(Cantor)
PhD

Andrea Hunger
(Simcox)
PhD

Erli Jin
(Merrins)
PhD



Teresa Jing
(Simcox)
MS

Max Rector
(Record/Landick)
PhD

Saeed Roschdi
(Butcher)
PhD

Gina Wade
(Simcox)
PhD

Bingnan Zhao
(Coon)
MS

Biochemistry Advisor Degrees

Jackie Chen	(Raman)	Cellular and Molecular Biology PhD
Lauren E. Clark	(Attie)	Nutrition and Metabolism PhD
Peter L. Ducos	(Grant)	Biophysics PhD
Benjamin D. Harding	(Rienstra)	Biophysics PhD
Qixiang He	(Lim)	Biophysics PhD
Gan Li	(Grant)	Biophysics PhD
Ye Liu	(Hoskins)	Biophysics PhD
Sierra Love	(Hoskins)	Genetics PhD
Riley J. Petersen	(Butcher)	Chemistry PhD
Katarzyna Radziwon	(Weeks)	Biophysics PhD
Juan C. Sanchez	(Wright)	Biophysics PhD

Faculty

Alan Attie	WARF named professorship Michael Brownlee Visiting Professor Lectureship in Diabetes Research, at the Joslin Diabetes Center, Harvard Medical School
Brian Fox	2025 Hilldale Award in the Physical Sciences Stellenbosch Institute for Advanced Study Fellowship, Stellenbosch University, South Africa Vilas Distinguished Achievement Professor
Christopher Gisriel	Distinguished Faculty and Staff Postdoc Mentoring Award
Katherine Henzler-Wildman	Elected 2024 AAAS Fellow
James Ntambi	Knapp Bequest Award with Claudia Biebel, Neha Kulkarni, and Taylor Lee
Vatsan Raman	Vilas Associate
Chad Rienstra	Evelyn Mercer Professor in Biochemical Sciences
Judith Simcox	Distinguished Faculty and Staff Postdoc Mentoring Award Distinguished Mentor Award from SACNAS Nationals 2025
Wei Wei	ICTR Pathway Program STRIDE scholar
Andrew Buller	(Biochemistry Affiliate) H.I. Romnes Faculty Fellowship

Staff

Rebecca Danner	Chaudhari	Recognized as committed mentor in UW Carbone Cancer Center Advancing Research in Science with Excellence (ARISE) Program Award

Postdoctoral Staff

Dominique Baldwin	Simcox	Biology of Aging and Age-Related Diseases Training Grant
Collin Borcik	Rienstra	2024-25 Boyer Award
Christian Brininger	Gisriel	Donald A. Bryant award for best oral presentation, 2025 Cyanobacteria and Algae Research and Education Workshop
Xuyao Liu	Lim	Won a travel award to the SMBio 2025 West Symposium
Lauren W. Yowelunh McLester-Davis	Simcox	Postdoc Excellence Awards for Service Indigenous Data Sovereignty Fellow 2025 Linton-Poodry SACNAS Leadership Institute Fellow 2025 Keynote Speaker, UC-San Francisco Full Circle of Native and Indigenous Scientists in Biology Annual Symposium 2025 Keynote Speaker, University of Utah Annual Native Research Methods Symposium 2025
Jericha Mill	Simcox	Leirmo Award American Society of Mass Spectrometry (ASMS) Postdoctoral Career Development Award Postdoc Excellence Awards for Teaching

Graduate Student Awards

Juyeong Cho	Chaudhari	Graduate Women in Science (GWIS) Ruth Dickie Research Scholarship Korean Honor Scholarship 1st prize best poster presentation at the 2025 Nutrition and Metabolism Poster Session
Jessica Davidson	Simcox	Rising Star in Diabetes and Metabolism Research from the University of Utah 2025
Maximino Emerson	Gisriel	Best poster presentation, 15th Workshop on Cyanobacteria Oral presentation prize, 2025 Midwest/Southeast Photosynthesis Conference
Isabella James	Simcox	Selected Speaker and Travel Award Recipient, Fredrickson Lipid Conference
Woo Sung (Matthew) Kim	Chaudhari	1st prize best poster presentation at the 2025 Frontiers in Metabolism Conference
Silas Miller	Raman	Awarded F31 grant 2nd place poster presentation, 2025 Central U.S. Synthetic Biology Workshop

Graduate Student Awards continued

Gina Wade	Simcox	Denton Award for Graduate Student Excellence in Teaching & Mentoring
Jack Williams	Chaudhari	2nd prize best poster presentation at the 2025 Nutrition and Metabolism Poster Session Poster presentation in the WI State Capitol for University of Wisconsin–Madison Day
Connor White	Hoskins	National Science Foundation (NSF) GRFP Honorable Mention

Graduate Student Fellowships

Sourav Agrawal	Lim	Arthur B. Michael Graduate Fellowship
Ethan Aubuchon	Hoskins	Arthur B. Michael Graduate Fellowship
Roma Broadberry	Grant	Steenbock Predoc Graduate Fellowship
Laura Campbell	Weeks	William R. and Dorothy E. Sullivan Wisconsin Distinguished Graduate Fellowship
Bianca Chavez	Lim	Arthur B. Michael Graduate Fellowship
Jessica Davidson	Simcox	National Science Foundation (NSF) Graduate Research Fellowship
Ashely Hiett	Henzler-Wildman	Dr. James Chieh-Hsia Mao Wisconsin Distinguished Graduate Fellowship
Isabella James	Simcox	William H. Peterson Graduate Fellowship
Andres Lira	Wayment-Steele	Science and Medicine Graduate Research Scholars (SciMed GRS) Fellowship
Lauren Mazurkiewicz	Weeks	William H. Peterson Graduate Fellowship
Silas Miller	Raman	National Institute of Health Predoctoral Fellowship
Rohith Rajasekaran	Coyle	CALS Louis and Elsa Thomsen Wisconsin Distinguished Graduate Fellowship
Conor Raymond	Neugebauer	Steenbock Predoc Graduate Fellowship
Ena Tully	Kirchdoerfer	Steenbock Predoc Graduate Fellowship
Xiao Lin (Casey) Wong	Coyle	Natural Sciences and Engineering Research Council of Canada (NSERC) Fellowship

Graduate Student Training Grants

Kaitlyn Abe	Lim	Molecular Biophysics Training Program (MBTP)
Emily Elliott	Lim	Molecular Biophysics Training Program (MBTP)
Maximino Emerson	Gisriel	Biotechnology Training Program (BTP)
Hana Hieshima	Neugebauer	Chemistry-Biology Interface Training Program (CBI) Traineeship
Woo Sung (Matthew) Kim	Chaudhari	Chemistry-Biology Interface Training Program (CBI) Traineeship
Thomas Kizzar	Simcox	Biotechnology Training Program (BTP)
Keelin Reilly	Raman	Chemistry-Biology Interface Training Program (CBI) Traineeship
John Rossi	Neugebauer	Chemistry-Biology Interface Training Program (CBI) Traineeship
Jonah Schwartz	Raman	Biotechnology Training Program (BTP)
Zoe Semersky	Neugebauer	Biotechnology Training Program (BTP)
Saylor Strugar	Raman	Genomic Sciences Training Program (GSTP)
Nicole Wicker	Chaudhari	Biology of Aging and Age-Related Diseases Training Grant
Jack Williams	Chaudhari	Biotechnology Training Program (BTP)

Undergraduate Awards

Ellie Baudhuin	Hoskins	Wisconsin Ag Alumni Outstanding Sophomore Award
Claudia Biebel	Ntambi	Knapp Bequest Award with James Ntambi, Neha Kulkarni, and Taylor Lee
Neha Kulkarni	Ntambi	Knapp Bequest Award with James Ntambi, Claudia Biebel, and Taylor Lee
Taylor Lee	Ntambi	Knapp Bequest Award with James Ntambi, Claudia Biebel, and Neha Kulkarni
Hypatia Newton	Neugebauer	Awarded a UW–Madison Department of Chemistry Undergraduate Scholarship
Kyle Prock	Gisriel	Poster prize, 2025 Midwest/Southeast Photosynthesis Conference
Shimo (Judy) Tang	Gisriel	Poster prize, 2025 Midwest/Southeast Photosynthesis Conference

Undergraduate Awards continued

Biochemistry Mary Shine Peterson Award

Sam Carey	Cavagnero
Gavin Chang	Cantor
Claire Schleicher	Raman
Colten Tramburg	Lim
Kiara Wolfram	

Biochemistry Undergraduate Summer Research Award

Kaden Calkins	
Palak Dhiman	
Emma Mayhew	
Ben Pralat	Hoskins
Amelia Rancour	
Paige Sikora	Hoskins

Physician Scientist Biochemistry Scholarships

Samanyu Ambewadkar **Katelyn Jacobs**

Undergraduate Fellowships

Hilldale Undergraduate Research Fellowship

Gavin Chang	Cantor	**Nicholas Rienstra**	Wright
Marisse Covin	Hoskins	**Lateef Saheed**	
Emily Grimes		**Claire Schleicher**	Raman
Abigail Laughlin		**Jonathan J. Sze**	
Mia Lor		**Colten Tramburg**	Lim
Sofia K. Merrick	Cavagnero	**Kiara Wolfram**	

Sophomore Research Fellowship

Anvika Annyapu		**Abigail Koch**	Simcox
Ellie Baudhuin	Hoskins	**Akshata Moorthy**	Cavagnero
Ava Berdelman	Wright	**Sananda Shyamkumar**	
Jonathan Buscher	Landick	**Elliot Weix**	Coyle
James Johnson			

Goldwater Fellowship

Elliot Weix Coyle

The 2025 Biochemistry Undergraduate Summer Research Awards were made possible by: Henry A. Lardy Undergraduate Research Fund, Marc A.T. Muskavitch Undergraduate Research Fund, Stuart L. Feldman Biochemistry Scholarship Fund, and Eric Bey and Amanda Boley Scholarships and Research.

Awardees for whom a lab is not listed perform research in other departments on campus.

We Heard About You

Below are some updates we received from the faculty and other sources.
Have something you'd like to share with us? (You don't need to wait for someone else to tell us.)
Contact: alumninews@biochem.wisc.edu.

Hoskins Lab

Maggie Rodgers recently gave birth to a daughter (Madelyn).
Sierra Love started a job with Thermo Fisher in Madison.
Ye Liu is now a postdoc at UMass Chan Medical School with Athma Pai.
Karli Lipinski recently joined Zeba Wunderlich's lab as a postdoc at BU.

Kiessling Lab

The Kiessling Group Reunion this past summer was attended by about 80 former and current group members.
Jack Borrok (PhD) is a senior Director of Protein Therapeutics at Amgen.
Eric Underbakke (PhD) has been promoted to Associate Professor with Tenure at Iowa State University.
Darryl Wesener (PhD) is now an Assistant Professor at Ohio State University.
Adam Courtney (PhD) is an Assistant Professor of Pharmacology at UMichigan.
John May (PhD) is an Associate Professor of Chemistry and Biochemistry at UW-La Crosse.
Matt Allen (Postdoctoral Fellow) is a Professor and Chair at Wayne State University.
Murshid Alam (MS, PhD MIT) is an Associate Director at Paragon Therapeutics.
Deena Al Mahbuba (MS, PhD MIT) is a Senior Scientist at AbbVie.
Alex Justen (PhD) is a Senior Scientist at Syensqo.
Joe Klim (PhD, CMB) is a Scientist at Aquinnah Pharmaceuticals.
Danny Zwick (PhD) is a researcher in HPV Serology at Frederick National Laboratory.

Lim Lab

Qixiang He joined the lab of Sam Sternberg in Columbia University as a postdoc.
Victoria Tholkes started graduate school at MIT.
Eric Leisten started graduate school at University of Chicago.

Ntambi Lab

Kaela Kathleen Grappel, a former undergraduate, now a medical student at UW–Madison SMPH.
Danny Bergman a former undergraduate now working as a medical assistant at OrthoIndy, an orthopedics hospital in Indiana.

Pagliarini Lab

Edrees Rashan, PhD is now a postdoc at MIT with Matt Vander Heiden.
Jon Tai MD, PhD now in a research residency at UCSF.
Laura Steenberg, MD, PhD now in a research residency at University of Pittsburgh.
Andrew Sung, MD, PhD now in a research residency at UTSW.

Raines Lab

Steve delCardayré (PhD 1994) is now a Founder and the CTO at Zero Acre Farms, Inc.
Jin-Soo Kim (PhD 1994) is now a Distinguished Professor at KAIST and a Founder and the CTO of GreenGene, Inc.
Ken Woycechowsky (PhD 2002) is now an Associate Teaching Professor at Arizona State University.
Kelly Gorres (PhD 2009) has been promoted to Professor at UW-La Crosse.

Record Lab

Dylan Plaskon (IPiB) received his PhD in 2021. He is currently an NIH Postdoctoral Fellow in Prof. Rita Tamayo's laboratory at UNC Chapel Hill, and continues to inspire undergraduates with his teaching and mentoring in the classroom and laboratory.

Hao-Che Wang (Biophysics) received his PhD in 2022. He is currently an ACS Postdoctoral Fellow in Prof. Eric Greene's laboratory at Columbia University.

Max Rector (IPiB) received his PhD this year (2025).

Simcox Lab

Helaina Walesewicz, former graduate student, is now a postdoctoral fellow at the University of Minnesota.

Andrea Hunger, former graduate student, is now a Scientist III at PPD.

Teresa Jing, former master's student, is a technician at University of Arizona.

Paige Ellingson, former undergraduate, is now a patient care technician at UT Health Austin.

Michael Gilpin, former undergraduate, is now a graduate student in CMB at UW–Madison.

Sussman Lab

Brian Conti is a scientist at LabCorp.

Pei Liu is a scientist at Millipore Sigma.

Kelly Stecker is an assistant professor at Utrecht University.

Melanie Ivancic is a scientist at Arrowhead Pharmaceuticals.

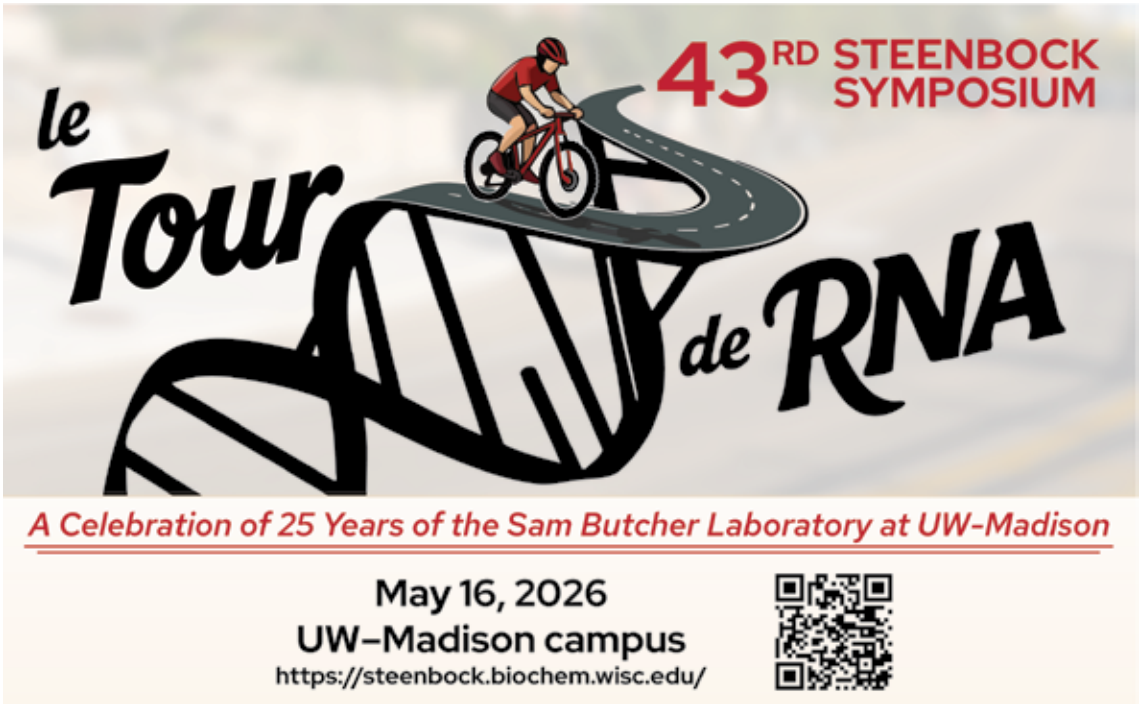
Lindsay Traeger is a research specialist at Solventum Health.

Matthew Blackburn is an application scientist at Bellbrook Labs.

Thao Nguyen is a senior scientist at the Gerker Proteomic Center at the University of Missouri.

Xu Lab

Alena Yang, a former research intern, is now a graduate student in the Biochemistry, Quantitative Biology, Biophysics and Structural Biology program at Yale University.



Remembering Professor Emerit Ann Palmenberg

Ann C. Palmenberg, professor emerit of biochemistry and former director of the Institute for Molecular Virology, passed away on February 20, 2025 after a lengthy illness. She was 76 years old. A world-renowned virologist, Palmenberg received numerous honors for her groundbreaking research and her strong advocacy for women and junior scientists.

Witnessing science's life-saving potential when the polio vaccine was administered propelled Palmenberg toward her future career. In 1970, she received her undergraduate degree from St. Lawrence University. She graduated from UW–Madison with a Ph.D. in biochemistry in 1975 (PI Paul Kaesberg). After spending four years in Zurich as a postdoctoral fellow, she returned to UW–Madison as a postdoctoral researcher and was promoted to a scientist (PI Roland Rueckert). Palmenberg joined the faculty in 1987. A decade later, she was directing the Institute for Molecular Virology as a full professor in the Biochemistry Department.

Palmenberg was a trailblazer in virology and infectious respiratory disease research. A renowned expert on the biochemistry of picornaviruses, she studied how human rhinoviruses such as the common cold contribute to asthma. By exploring the genomes of viruses and their physical structures, she solved the atomic structure of a cold virus linked to severe asthma and respiratory infections in children — research that paved the way for potent new therapies and antivirals against virus-induced asthma.

She was the first to describe a way to make new types of live virus vaccines using recombinant complementary DNA. Her discovery and application of viral internal ribosome entry sites is the basis for nearly all pharmaceutical drug production. And she developed panels of new antivirals, vaccines, and highly sought-after reagents used in thousands of research labs around the world.

Though Palmenberg was known to describe her own work as "taking viruses apart and putting them back together," this description fails to capture her influence on virology and public health, and her unbridled advocacy and support of junior faculty and women in science. She regularly advocated for those with less knowledge of academia than she and was known for her sound advice and helpful feedback.

Elected President of the American Society for Virology in 2007, Palmenberg was also a Fellow of the American Academy of Microbiology, a Fellow of the American Association for the Advancement of Science, and a Fellow of the National Academy of Inventors. She received numerous awards from UW–Madison, the Wisconsin Alumni Research Foundation, and the American Society for Virology, and multiple awards were established in her name during her lifetime.

Enthusiastic, jovial, and persistent, Palmenberg rarely did anything halfway, at work or at home.

Among her many passions, Palmenberg followed college athletics closely. She could be found in the stands at Badgers football and basketball games or simply watching a game at home, a cold drink in hand. For over ten years as a graduate student and into her early career as faculty, she herself pitched semi-pro fastpitch softball, stopping only due to the demands of faculty life.

In 2011, Palmenberg chose to downsize her lab after being diagnosed with Stage 4 T-cell lymphoma. Though the illness sapped her of strength and mobility, she remained committed to her research. She retired in 2023.

Said Palmenberg in an autobiographical article published in the *Annual Review of Virology*, "Whether you just threw a third strike or a home-run mistake, the subsequent pitch is the one you now need to face. Perform, or do not; the deed is yours alone. Success or failure is measured only at the end of the game, when those individual events are added in sequence. Science is similar. Define the next thing you need to do for any given situation and then execute it. If you screw up (don't do that too often), just throw the next pitch and make that one count." Read more

Remembering Professor Julian Davies

Julian Davies, professor of biochemistry, passed away on February 2, 2025. He was 93 years old. Davies' long-term academic and professional homes were at UW–Madison and the University of British Columbia (UBC). Microbes and DNA sequencing were always at the top of his mind, and he approached many of life's adventures with a similar passion.

Born in Wales, Davies received his PhD in organic chemistry from Nottingham University in 1956. He completed postdoctoral work in natural product chemistry at Columbia University and at UW–Madison. A self-proclaimed rolling stone, he held teaching and research positions at Manchester College of Science & Technology, Harvard Medical School, and the Pasteur Institute in Paris before he established his own research lab in the Department of Biochemistry at UW–Madison. He left Madison and in 1992 went to UBC, where he served as head of the Department of Microbiology and Immunology and director of the Life Sciences Institute.

Davies was renowned for his research on the mechanisms of antibiotic activity and resistance. His pivotal work illuminated the origin, evolution, and spread of key antibiotic resistance genes and paved the way for new methods in genetic engineering. In his later career, he delved into the wealth of bioactive molecules produced by microbes. His numerous accolades include being named a Fellow of the Royal Society of Canada and a member of the US National Academy of Sciences, among many others.

At the heart of Davies' accomplishments was his palpable passion for exploring the diversity and complexity of microbe communities. In a constant quest to learn, he was known to approach colleagues with printed copies of papers he was eager to discuss and to ask insightful questions at every seminar. Davies not only gleaned but shared knowledge, promoting science education and communication and fostering a collaborative environment.

He is remembered for his generosity, whether with his home in Vancouver, BC, where he and his wife Dottie hosted lively dinner parties, his condo in Whistler, BC, where a weekend stay was included in an annual department raffle at UBC, or his time. He was a "fine (French) Chef…deeply Francophile and would never miss a Wales-France rugby game," and was known for commuting to the lab in Madison by bike, even during the bitterest winter weather.

As Davies wrote in an autobiographical article in the *Annual Review of Microbiology*, "The practice of science has provided me with a lifetime of good experiences, lots of fun, and only minor disappointments…Overall, the excitement of following lines of reasoning or leaps of imagination to a new finding is more than enough compensation."

A version of this remembrance was originally published by the University of British Columbia. His colleagues from around the world remembered him in an article in *The Journal of Antibiotics*, published in June 2025.

In Memoriam

Bijoy Bhuyan
MS 1954, PhD 1956 — Johnson
August 2025

Karim Bitar
BS 1987
October 2025

Gary Case
PhD 1977 — Harper
February 2025

Robert Cassens
MS 1961, PhD 1963 — Hoekstra
December 2024

Jackson Clemmons
MS 1949, PhD 1956 — Link
September 2025

Julian Davies
Professor 1967-1980
February 2025

Nancy Kneer
Staff — Lardy
October 2024

Martin Kovacs, Jr
MS 1960 — Hoekstra
October 2025

Michael F Kuhrt
BS 1968
December 2024

Kenneth Latigo-Olal
BS 1969
December 2007

Robert Lowe
MS 1969, PhD 1971 — Strong
June 2025

E Burt Olson
MS 1965, PhD 1969 — DeLuca
September 2025

Ann Palmenberg
PhD 1975 — Kaesberg
Professor 1987-2023
Emeritus 2023-2025
February 2025

Terry Richter
BS 1976
January 2025

John Rotruck
MS 1969, PhD 1971 — Hoekstra
August 2025

Jean Tews
MS 1952, PhD 1954 — Williams, Jr
Senior Scientist — Harper
November 2023

Eldon Ulrich
Emeritus Director BMRB
June 2025

Ann Waldron
BS 1979
April 2025

Our thoughts are with all of the families of those in the Biochemistry community who recently passed.

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Ms Pauline Bariola
Dr Daniel Bellissimo &
Dr Cheryl Hillery
Mr Charles & Mrs Sandra Biddlecome
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Professor David & Ms Nila Emerich
Dr Stuart & Ms Rebecca Feldman
Dr C David Foster &
Ms Marilyn Foster
Dr Charles & Ms Barbara Frolik
Dr Carl & Dr Linda Gilbert
Professor Jeffrey & Mrs Mary Gorski
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Dr Joshua Hamilton
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