Greetings from the Chair by Katrina Forest

Dear Friends and Alumni of the Bacteriology Department,

In my first greeting since becoming chair in January 2021, I'll begin with recognition of outgoing chair Chuck Kaspar. Chuck guided us through the depths of the pandemic (more throughout newsletter). He also spearheaded two important initiatives for students in the Bacteriology Department. First, acting on a vision of Bacteriology colleague and CALS Associate Dean for Academic Affairs Karen Wassarman, Chuck worked to create a fully staffed Advising Hub for both Microbiology and Biochemistry undergraduates. The Hub came into being in late 2019, replacing and expanding on our former Bacteriology Department Student Services Coordinator position. The four full-time staff members here provide flexibility, continuity of operations, deep expertise, and a welcoming physical space for undergraduates to take care of all their advising needs. Secondly, Chuck was successful in creating a new position for a Master’s Program Coordinator. Jennifer Heinritz joined us in January 2021 and has been a whirlwind force for good. Professor Kaspar didn’t have long to recover after transitioning out of his productive tenure as Chair. On July 1, 2021, he assumed the role of Director of UW-Madison’s Food Research Institute.

Of course, since our last newsletter the unavoidable report is how those of us here in Madison weathered the most acute phase of the Covid-19 pandemic. Courses went online over the course of one week in March of 2020 with grace and adaptability on the parts of instructors and students, and with new pedagogies and flexibilities in the fall and spring of the 2020-2021 academic year (see articles from student and instructor perspectives). After the initial shut down, we were allowed in the building for essential research with a greatly reduced density of workers. Weekly Covid-19 testing and the “Badger Safe” cell phone app became the norm. Now we have come back together in person in our remarkable Microbial Sciences Building (and in the Wisconsin Energy Institute). There are many new faces who began their time in Bacteriology during the work-from-home phase. Please read on for introductions to our newest faculty members and teaching staff.

The research in our department continues to push the forefront of microbiology into the future. Our labs are highlighted regularly in UW-Madison and CALS publications, which you can read using live links in the on-line version of the newsletter (found here: go.wisc.edu/bact-newsletter-2022). The

Continued on next page

While we were not allowed to celebrate with a large gathering for our Spring 2021 Microbiology graduating seniors, we did have fun presenting each with a mug, all while masked, and at low density. Pictured: a proud graduate with Katy France, then Student Services Coordinator.
New Faculty

Kerri Coon - Transferred tenure home 2020
Kerri Coon joined the Bacteriology faculty in Summer 2020 as a tenure-home transfer from the Department of Entomology. Dr. Coon obtained her PhD from the University of Georgia in Mike Strand’s lab, after which she trained as a postdoctoral fellow at the University of Texas at Austin with Nancy Moran.

Research in the Coon lab centers on insect-microbe interactions, with a current focus on understanding the diversity and function of gut microbes in mosquitoes and other disease vectors. Lab members integrate field and lab-based experiments with bioinformatic approaches to tease apart the mechanisms by which microbes colonize and regulate fundamental processes in their insect hosts, from their development and reproduction to their ability to transmit disease-causing agents to humans and other mammals.

David Hershey - January 2021
David Hershey joined the Bacteriology faculty in January 2021 after completing his postdoctorate at the University of Chicago in the Crosson lab. Dr. Hershey earned his PhD in Microbiology from the University of California, Berkeley.

Despite often being misrepresented as simple organisms, bacteria are quite sophisticated. They can organize proteins within their cells and undergo precise developmental programs, tasks that are commonly associated with eukaryotic organisms. The Hershey lab uses the process of colonizing solid surfaces as a model to understand how bacteria carry out these complex behaviors. Seeking, recognizing and growing on solid surfaces allow bacteria to form attached communities called biofilms that have a profound impact on society. The Hershey lab uses genetics, biochemistry, cell biology and computational approaches to study the surface colonization program with the ultimate goal of manipulating these systems for human benefit.

David didn’t always have the ambition to be an academic PI but got interested in graduate school after his undergraduate advisor told him he would like it. During grad school, while his work on genetics and physiological studies of magnetotactic bacteria was fruitful, David wanted to work on problems in microbiology that are more pressing for society, specifically the rise and spread of antibiotic resistance. Lacking a background in immunology, David realized he could still contribute to this area by studying mechanisms of attachment and colonization which are known to increase and propagate antibiotic resistance.

David also likes all kinds of music but lately has been listening to classic rock or ‘plastic rock’ as his toddler daughter calls it.

Erica L.-W. Majumder - January 2021
Erica Majumder joined the Bacteriology faculty in January 2021. Previously, she held an assistant professor appointment in the Chemistry Department at the SUNY College of Environmental Science & Forestry in Syracuse, NY. Dr. Majumder obtained her PhD from Washington University in St. Louis in the Blankenship lab. Following this, she trained as a postdoc at the University of Missouri and was a Research Associate at The Scripps Research Institute in La Jolla, CA.

The Majumder Lab employs ‘omics-guided biochemistry to study the mechanisms and consequences of microbial inorganic metabolisms on environmental and human health. They achieve this by investigating 1) Organismal response to perturbations in their environment, 2) Gene and metabolite function in situ, 3) Environmental applications of novel microbial chemistries. Current projects are focused on microbe-plastic interactions in landfills, lake harmful algal blooms and chicken guts. The lab also uses metabolic engineering to convert dairy and agriculture biomass to biobased and biodegradable plastics.

Dr. Majumder decided to pursue academic research early in life. She became interested in environmental justice in elementary school. Pursuing this passion allowed her to travel the world, but it was seeing the devastation caused by acid rain during a trip to Peru that ultimately drove her to combat the effects of pollution using science. As she became more active in pursuing environmental causes, she was struck by the deference given to people with PhDs. When they spoke, people listened. She knew a PhD would help her address the problems she was passionate about solving. Dr. Majumder went on to train in a range of disciplines within the chemical sciences, and her group leverages these skills as the basis for using microbes to address the plastic problem.

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- People
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  - Transitions
- Instruction and Training
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  - Student Perspective - learning in a pandemic
- Stories
  - How to Time Travel Without Fear
  - Microbes and Coffee
  - Intersection of Science and Art
  - Microbe-powered fuels and chemicals
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  - Dr. Thomas Brock
  - Dr. Marcin Fikowicz
- History and Future of Women in Bacteriology
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Welcome Faruk Kula to the Bacteriology faculty in Fall 2022!

Faruk Kula joined the Bacteriology faculty in Fall 2022 after completing his postgraduate studies at the University of California, Berkeley, in the laboratory of Mindy Silverman. Dr. Kula obtained his PhD in Microbiology, Immunology and Molecular Genetics from the University of California, Los Angeles, under the mentorship of Michael Kastan.

Dr. Kula’s research focuses on understanding the role of DNA damage responses in cancer metabolism. Specifically, he investigates how DNA damage signaling affects cellular metabolism and how this interplay can be exploited for therapeutic purposes. His work has implications for the development of novel therapeutic strategies for cancer treatment.

Dr. Kula’s appointment to the Bacteriology faculty is a testament to the department’s commitment to diversity and inclusion. As he joins the faculty, he will bring his expertise and passion for research to our community, fostering an environment of innovation and collaboration.

Campus articles
Visit go.wisc.edu/bact-newsletter-2022 for live links

Jean-Michel Ané
Corn that Acquires its Own Nitrogen

Erica Majumder
Microbial Metabolism in Environmental Remediation

David Hershey
Mechanisms of Surface Colonization by Bacteria

Karthik Anantharaman
Microbial Ecology of Sulfur Metabolism

Betül Kaçar
Reconstructing Ancient Enzymes to Study the Origins of Life

Daniel Amador-Noguez
Biofuels and Human Health via Microbial Metabolomics

Kerri Coon
Combining Entomology and Microbiology in the Study of Vector Biology

Jae-Hyuk Yu
Eliminating Fungal Toxins via Innovative Biotechnology
Katrin Forest • Tim Donohue • Jean-Michel Ané • Karthik Anantharaman

The Kaçar Lab investigates the origins of life, the biology of early Earth and how understanding life’s emergence and early mechanisms may assist finding life beyond Earth. The lab is home to the NASA Astrobiology Center. Early Life and Evolution that focuses on understanding the evolution of metal utilization over geologic time. Their integrative approach enables the study of biomolecular-scale macroevolutionary trends that span billions of years of history and is a fundamentally new methodology with which to study the origins and early evolution of life. Specifically, her group currently focuses on understanding the impact of bacterial variation and evolution during active immunity, 2) investigating the mechanism by which key cellular processes, such as transcription, modulate bacterial immunity, and 3) studying how variation and different selective pressures mold the activity of bacterial defense systems.

Outside of the lab, Charlie enjoys tennis, birding, and cheering on his favorite football team, Bayern Munich.

Betül Kaçar - September 2021

Charlie Mo - January 2023

Charlie Mo is a citizen of the world, arriving in the U.S. in 2003 after early years in China, England and Germany. He received his PhD from the University of Pennsylvania and completed postdoctoral training in Luciano Marraffini’s lab at the Rockefeller University.

The Mo Lab focuses on the following broad areas: 1) Examining how anti-phage defense systems, such as CRISPR-Cas, impact bacterial variation and evolution during active immunity, 2) investigating the mechanisms by which key cellular processes, such as transcription, modulate bacterial immunity, and 3) studying how variation and different selective pressures mold the activity of bacterial defense systems.

Betül Kaçar joined the Bacteriology faculty in September 2021. Previously, she held an assistant professor appointment at the University of Arizona. Dr. Kaçar obtained her PhD from Emory University. Department of Chemistry, after which she conducted postdoctoral research at NASA Astrobiology Institute and Harvard University.

Betül Kaçar joined the Bacteriology faculty in September 2021. Previously, she held an assistant professor appointment at the University of Arizona. Dr. Kaçar obtained her PhD from Emory University. Department of Chemistry, after which she conducted postdoctoral research at NASA Astrobiology Institute and Harvard University.

Recent Faculty Awards 2018-2022

Karthik Anantharaman • ASM Early Career Award for Environmental research (2022) • Kavli Fellow, National Academy of Sciences (2022) • NIH-NIGMS Outstanding Investigator Award (2021) • NSF CAREER Award (2021) • Jean-Michel Ané • UW Postdoctoral Mentor Award (2020) • Brian Burton • UW Online Course Development award (2020) • UW Educational Innovation Grant (2020) • Cameron Currie • Canadian Institute for Advanced Research Fellow (2021) • Tim Donohue • Director of the Wisconsin Energy Institute • Sara L. Baldwin Professorship in Bacteriology (2020-25) • Katrina Forest • Einstein Foundation Visiting Professor (2018-22) • E.B. Fred Professor of Bacteriology (2020-25) • Rick Gourse • WARF Named Professorship (2019-2024) • Betül Kaçar • NASA Early Career Faculty Award; NASA Science Mission Director (2019) • Sicilang Fallow, Kavli Foundation & Hsing Simons Foundation (2020) • Stanley L. Miller Young Investigator Award (2021) • Rosalind Franklin Medal Finalist, Rosalind Franklin Society (2022) • Hypothesis Fund Award (2022) • Trina McMahon • Skaggs Award for Excellence in Mentoring (2021) • Elcated Fellow of the American Academy of Microbiology (2018) • Federico Rey • ASM Distinguished Lecturer (2022-2024) • Jade Wang • UW-Madison Vilas Associate (2022) • Jack Kenney Award for Outstanding Service on the Editorial Board of the Journal of Bacteriology (2022)

Transitions

Rick Gourse - After 33 highly productive and rewarding years as professor in Bacteriology, Rick Gourse retired from active professional life in January 2022. Rick, along with his long-term colleague, Wilma Ross, was continually funded by the NIH since 1986, published 150 peer-reviewed papers, and taught or mentored thousands of students. Rick and Wilma plan to spend much of their time with their family’s farm, which includes two grandchildren. Rick also plans to continue his research program as an emeritus professor, mentioning that he’d be attending faculty meetings when he can, “Because I like them.”

Betty Slinger first taught for the Bacteriology Department in Fall of 2021, on a temporary assignment for Prokaryotic Molecular Genetics (Micro421) after her long-time instructor Rick Gourse retired. She then applied for the open instructional faculty position vacated upon Robin Kurtz’s retirement and was selected from a competitive pool of candidates. Betty joined the Department full time for the Fall 2022 semester. Betty was postdoctoral fellow at UW-Madison Chemistry Department in the lab of Helen Blackwell and taught at Madison College previously.

If I finish my last semester, I cannot help but have very ambivalent feelings. I have been affiliated with the Department of Bacteriology for a very long time. Starting as an undergraduate, then graduate student in the Bacteriology Ph.D. program, doing post-doc work with affiliates, and then the last 32+ years as an instructor.

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Robin Kurtz retired from the Department in May of 2022, and provided these thoughts for her last Department Awards Ceremony.

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Robin Kurtz - From taking a position in the CALS Human Resources Division. She remains a friend of the Department and is readily reachable by email when we have historical questions.

Jennifer Heinritz joined the Bacteriology Department as Masters Program Coordinator in January 2021. She has a background in laboratory research and management, having spent first 7 years in the Yale lab of Christine Jacobs-Wagner and three years as laboratory manager in the Wisconsin Institute for Discovery. Jen is skillfully steering the master’s program and has initiated new in-person student networking and professional development opportunities.

Katy France, our former Student Services Coordinator, earned a professional certificate from the Society for Human Resources Management (SHRM-CP) in addition to her full-time work in the Department. This was part of her motivation for taking a position in the CALS Human Resources Division. She remains a friend of the Department and is readily reachable by email when we have historical questions.

Cameron Currie accepted a faculty position at McMaster University in Ontario Canada in August of 2022. He still holds a partial appointment in Bacteriology to continue student mentoring and work on existing research projects.

Eric Johnson retired from the University of Wisconsin in December 2020 with a career spanning 35 years, first in the Department of Food Microbiology and Toxicology and then in the Department of Bacteriology.
### PhD Graduates

#### 2022

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Thesis Work</th>
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<tbody>
<tr>
<td>Edna Chang</td>
<td>GSA Lab</td>
<td>Gut microbiome response to nutritional changes in a high-fat diet mouse model and a ground squirrel hibernator.</td>
</tr>
<tr>
<td>Madison Cox</td>
<td>SCA Lab</td>
<td>Influencing rumen microbial communities to improve bovine milk production efficiency.</td>
</tr>
<tr>
<td>Charlotte Franciscoe</td>
<td>Combe Lab</td>
<td>The ecology of secondary symbionts: Exploring the diversity and function of bacterial and viral associations with fungus-growing ants.</td>
</tr>
<tr>
<td>Kristopher Keft</td>
<td>Anomenclary Lab</td>
<td>Metagenomics-enabled viral ecology to advance our understanding of human and environmental microorganisms.</td>
</tr>
<tr>
<td>Bryan Lakey</td>
<td>Donca Lab</td>
<td>Coordination of cell envelope biosynthesis and cell division by an essential two-component signaling system in Alphacontobacteria.</td>
</tr>
<tr>
<td>Heugyn (Harrison) Moon</td>
<td>Yu Lab</td>
<td>Gene regulatory network underlying fungal development and metabolism.</td>
</tr>
<tr>
<td>Zachary Keyser</td>
<td>Anel Lab</td>
<td>Connecting signaling mechanisms for symbiotic associations: from mooses to legumes.</td>
</tr>
<tr>
<td>Julia Martien</td>
<td>Amador-Noguer Lab</td>
<td>Physiological Responses to Changing Environmental Conditions in Zymomonas mobilis: Implications for Biofuel Production.</td>
</tr>
<tr>
<td>Elizabeth McDaniel</td>
<td>McMahon Lab</td>
<td>Ecology and Evolution of Enrichment Microbial Communities Performing Biological Nutrient Removal.</td>
</tr>
<tr>
<td>Lucas Onder</td>
<td>Wang Lab</td>
<td>Genetic interactions of 3P:4 transcription global regulator in quality control of central dogma processes.</td>
</tr>
<tr>
<td>Tewfiq S. Alsulami</td>
<td>Yu Lab</td>
<td>Development of a novel homogenous immunoreagent using the engineered luminescent enzyme NanoLuc for the quantification of the mycotoxin fumonisin B1.</td>
</tr>
<tr>
<td>Anthony Bortolazzo</td>
<td>Combe Lab</td>
<td>Elucidating the signaling roles of CGMPK and IP0 in early diverging plant lineages.</td>
</tr>
<tr>
<td>Jenny Brubrad</td>
<td>Combe Lab</td>
<td>Host-microbe interactions impacting pathogen and mutualist colonization within defensive sponges.</td>
</tr>
<tr>
<td>Daren Gineti</td>
<td>Goodrich-Bier Lab</td>
<td>Antagonistic factors impact strain specificity in host-symbiont associations.</td>
</tr>
<tr>
<td>Christina Giramma</td>
<td>Wang Lab</td>
<td>Bacterial regulation of DNA replication elongation.</td>
</tr>
<tr>
<td>Alba Kataria Gonzalez-Rivera</td>
<td>Forest Lab</td>
<td>Characterization of the interaction between the Type IV Pilus Assembly Motor Protein and the Accessory Protein (PAM).</td>
</tr>
<tr>
<td>Kemarion Henry</td>
<td>Gruoe Lab</td>
<td>Lack of a vital RNA polymerase recognition feature results in coordinated control of the majority of R. spharoides promoters.</td>
</tr>
<tr>
<td>Kai Hillman</td>
<td>Goodrich-Bier and Thomas Lab</td>
<td>X. nematophila type VI secretion systems mediate ecologically relevant interactions.</td>
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#### 2021

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<tbody>
<tr>
<td>Ahmad F. Alshanaq</td>
<td>Yu Lab</td>
<td>Application of the food fermenting fungus Aspergillus oryzae to control aflatoxin contamination and foodborne pathogens.</td>
</tr>
<tr>
<td>Albert Chen</td>
<td>Gruoe Lab</td>
<td>Mechanistic studies on transcription regulation by DksA and ppGpp.</td>
</tr>
<tr>
<td>Karla Esquillin-Lebron</td>
<td>Thomas Lab</td>
<td>Investigations into overcoming the challenges associated with the MbtH-like protein dependence of non-ribosomal peptide synthetases.</td>
</tr>
<tr>
<td>Heidi Horn</td>
<td>Combe Lab</td>
<td>Small Molecule Dynamics and Partner Fidelity in an Ancient Host-microbe Symbiosis.</td>
</tr>
<tr>
<td>Michelle Keller-Pearson</td>
<td>Anel Lab</td>
<td>Impacts of drought on carrots and their symbiotic fungi from field interactions to gene expression.</td>
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<tr>
<td>Angela Myers</td>
<td>Grouse Lab</td>
<td>ppGpp Binds to E. coli RNA Polymerase with Similar Affinity at Both Sites.</td>
</tr>
<tr>
<td>Eliot Stanton</td>
<td>Kasper Lab</td>
<td>The impact of mobile genetic elements on the diversification of Escherichia coli DH1?</td>
</tr>
<tr>
<td>Brent Anderson</td>
<td>Wang Lab</td>
<td>Variations on a theme: how a shared (ppGpp binding pocket) affects bacterial adaptation in fluctuating environments.</td>
</tr>
<tr>
<td>Jeffrey Dwiit-Smith</td>
<td>Forest Lab</td>
<td>Experimentally Defining the Physiology of Freshwater Ultrasimobacteria: aCt Actinobacterial Light Utilization and Peptide Degradation.</td>
</tr>
<tr>
<td>Julia Kernis</td>
<td>Ray Lab</td>
<td>Elucidation of host genetics - gut microbiome interactions, and the consequences to metabolic health.</td>
</tr>
<tr>
<td>Alexander Reau</td>
<td>Scaen Lab</td>
<td>Elucidating the diversity, distribution and function of the gut bacterial symbiont Ruminococcus.</td>
</tr>
<tr>
<td>Terra Mauer</td>
<td>Goodrich-Bier Lab</td>
<td>Investigating the distribution and function of the bacterial DUP/560 superfamily of outer membrane proteins using Xenorhabdus bacteria as a model.</td>
</tr>
<tr>
<td>Peter Newhouse</td>
<td>Forest Lab</td>
<td>Spatiotemporal Dynamics of DNA in Live Bacterial Cells.</td>
</tr>
<tr>
<td>Niraladzinski</td>
<td>Boran lab</td>
<td>Lipo-oligosaccharides: from specific microbial signals to newly ubiquitous fungal quorum sensing molecules.</td>
</tr>
<tr>
<td>Tommas Rush</td>
<td>Anel Lab</td>
<td>Dissecting substrate recognition of natural product biosynthetic enzymes using sidereophore systems.</td>
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<td>E. coli</td>
<td>The impact of mobile genetic elements on the diversification of Escherichia coli DH1?</td>
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<td>Eliot has received a APHL-CDC Antimicrobial Resistance Fellowship and will be working at the Minnesota Department of Health.</td>
<td>ppGpp Binds to E. coli RNA Polymerase with Similar Affinity at Both Sites.</td>
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PhD Graduates (continued)

Alex Linz
McMahon Lab
From microbes to ecosystems: time series provide insight into how microbial metabolisms scale to ecosystem functions.
Alex is an Associate Research Scientist at Marshfield Clinic Health System.

Marian Lund-Bolton
Ant Lab
Estimating the Contribution of the Soil Microbial Community to the Crop Rotation Effect
Marian is a Plant Pathologist at Eurofins BioDiagnostics, Inc.

Erin Nawrocki
Johnson Lab
Mechanisms underlying the transfer of plasmid borne BoNTs in Group I C. botulinum.
Erin has accepted a postdoc at Penn State in the Food Science Department.

Tony Neumann
Suen Lab
Ecology of Fibrobacter in the herbivore gut.
Tony is a Staff Scientist in Molecular Biology and Microbiology at Novozymes.

Erin Ostrem-Loss
Ishikawa Lab
Genome-wide effects of pgl encoding to RNA Polymerase on E. coli gene expression.
Erin has accepted a postdoctoral position in the Venturrelli lab at UW-Madison.

Patricia Sanchez Vazquez
Goute Lab
Two approaches to dissecting the role of MdtH-like proteins in nonribosomal peptide synthesis.
Patricia is a Senior Organism Engineer at Ginkgo Biosciences, Inc.

Rebecca Schomer
Thomas Lab
Rebecca has accepted a position at the University of California–Davis.

Sarah Stevens
McKee Lab
Genomics as a Lens into the Population Structure and Evolution of Freshwater Microbes.
Sarah has accepted a position as the Data Science Facilitator at the WIS UW-Madison.

Taylor Wahlig
Kasper Lab
Salmonella enterica stress tolerance: genetic redundancy and pleiotropy.
Taylor is a CCREP Clinical Microbiology Fellow at University of Nebraska Medical Center, as well as a MIT Catalyst Fellow.

Ponlkrit Yeesin
Wang Lab
Mechanistic insights into resolution and repair of DNA damage caused by head-on replication-transcription conflicts in bacteria.
Ponlkrit is now a professor in the Department of Microbiology, Faculty of Science, Srinakharinwirot University, Bangkok, Thailand.

Graduate Student Awards

William H. Peterson Predoc Fellow:
2019: Kemiwe Henry
2020: Harrison Myron
2021: Christopher Kiefi
2022: Andrew Starberg

Sigurd Lein Memorial Award:
2021: Elizabeth McDaniels
2022: Joanna Hau

Herman A. Smythe Award:
2019: Tannis McManus
2020: Madison Cox
2021: Bryan Lakey
2022: Jacob Zabel

Undergraduate Student Awards

Bacteriology Underrepresented Minority Scholarship:
2022: Karmen De La Cruz
2019: Christian Loy
2018: Ethan Boynton
2020: Michael Gui
2022: David Liu

Wright Undergraduate Scholarship:
2019: Isabelle Ludkowska
2018: Zach Prieser
2020: Jacob Zabel
2022: Misa Kawamatsu
2022: Anna Lippert

M.S. Student Performance Award:
2019: James Finn
2020: Dino Staredbati
2021: Lisa Liu & Brittige Flammary
2022: Erik Myers

Michael and Winona Foster Wisconsin Idea Fellowship:
2019: Jennifer Bradburn
2020: Bryan Lahey
2021: Alex Laffour
2022: Charlotte Francoeur

Ira L. Baldwin Distinguished Predoctoral Fellowship:
2021: Patricia Tran
2022: Dazil Choi

Girolozi Fellowship:
2021: Benjamin Peterson
2022: Zachary Morschman

Betley-Allen Lee Predoctoral Fellowship:
2021: Elizabeth McDaniel
2020: Charlotte Francoeur

Molson Coors Scholarship:
2021: Kaitlyn Allen
2022: Zachary Maschmann

Hirschl High Achievement Award:
2019: Rachel Gershon
2020: Jacob Zabel
2022: Anna Kawamatsu

Sarles Undergraduate Scholarship:
2019: Michael Gu
2021: Jeremy Fleck

Gouker Poster Award

The Nancy J. Gouker Award recognizes the achievements of outstanding research by a graduate student. The Nancy J. Gouker Award is made possible through the Molson Coors social justice initiative—an effort that directs funds to organizations focused on social justice, community building, equality and empowerment.

This year’s winner of the Nancy Gouker Award is Mariama Carter, from the Caitlyn Allen Lab, for her poster “Sticking to Thrive: Carbohydrate-binding proteins contribute to biofilm formation and host colonization in Ralstonia solanacearum.”

An award of honorable mention went to Ruth Isenberg in the Mandel Lab for her poster, “High levels of cyclic diguanylate interfere with initiation of a beneficial symbiosis.”

Microbiology Student Receives Diversity in Brewing Award

Babayosimisi (Simi) Fadiran, a microbiology major in his second year, is the recipient of the first-ever Jake Leinenkugel Diversity in Brewing Award, which supports students from underrepresented groups pursuing studies in brewing or fermentation sciences at the University of Wisconsin–Madison.

“I was thrilled to be selected for this,” said Fadiran, who learned of his award last spring. “This program has provided me the opportunity to observe and assist in conducting research, aiding me in my future career goals.”

The Jacob Leinenkugel Brewing Company announced the launch of the Jake Leinenkugel Diversity in Brewing Award in June 2021 in partnership with UW–Madison. The Molson Coors Beverage Company, the parent company of Leinenkugel’s, donated $50,000 to endow the award, which is open to students who identify as Latino, Black/African American, American Indian, Asian, Pacific Islander, and/or LGBTQ+.

“We are thrilled to have Simi as our first recipient of this award,” said Dick Leinenkugel, President of the Jacob Leinenkugel Brewing Company. “On behalf of all our Leinenkugel employees, we congratulate Simi and look forward to supporting this scholarship to bring further diversity to our brewing industry for many years to come.”

In addition to financial assistance, recipients of the award are encouraged to take up a paid summer internship at the Leinenkugel’s Brewery in Chippewa Falls, Wisconsin, where they can apply what they have learned in the lab working at one of Wisconsin’s most historic breweries.

The award is housed in the Department of Food Science. Chair Dr. Scott Rankin offered: “The Jake Leinenkugel Diversity in Brewing award enables our developing fermentation program to help foster diversity within an industry and discipline that have been key parts of Wisconsin for centuries.”

Funding for the scholarship program is made possible through the Molson Coors social justice initiative—an effort that directs funds to organizations focused on social justice, community building, equality and empowerment.

Molson Coors Scholarship:
2021: Raja Mailk
2020: Jacob Zabel
2019: Kemardo Henry

Gouker Poster Award

The Nancy J. Gouker Award recognizes the achievements of outstanding research by a graduate student.

This year’s winner of the Nancy Gouker Award is Mariama Carter, from the Caitlyn Allen Lab, for her poster “Sticking to Thrive: Carbohydrate-binding proteins contribute to biofilm formation and host colonization in Ralstonia solanacearum.”

An award of honorable mention went to Ruth Isenberg in the Mandel Lab for her poster, “High levels of cyclic diguanylate interfere with initiation of a beneficial symbiosis.”

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Our period of teaching online courses resulted in creation of novel practices and policies that ultimately allow us to engage a wider range of our learners and provide the best educational experience for UW – Madison undergraduates. Nonetheless, it is fantastic to be back face-to-face with our students! Relationship building is critical to student learning. The energy and excitement of students getting together, leaving distractions outside the classroom, and working toward shared learning goals is more palpable and manageable now that we have come back into the same physical space.

All instructors developed new teaching practices as the pandemic forced our modality to shift to (mostly) an asynchronous virtual learning format. There are benefits to this format; it allows students to access content at their convenience, self-pace, and review ad libitum. This increase in flexibility was a boon for many and made virtual courses more accommodating to diverse backgrounds and life situations. However, there was also a tangible shift in motivation in asynchronous classes and the onus fell on each student to learn course material in a more individual, solitary setting. For many, gaining help with technology, Wi-Fi, and tutoring or coursework was a huge challenge. Unfortunately, there was also an uptick in academic misconduct, for example, with online posting of quiz or exam questions. As instructors, some practices we adopted were (i) to be extra explicit with instructions, (ii) help our students develop a studying routine for themselves, and (iii) communicate consistently. As we transitioned in-person classes, many of these skills and teaching practices have remained beneficial.

The shift to remote learning forced us to use technology in unfamiliar ways. Instructors adopted a “can-do” attitude, ready to get the job done. We were grateful for students’ patience during hiccups such as soundless video or system delays in content posting. Many of our new skills, such as video production, will be useful long after the pandemic fades. For example, with little prior experience, Dr. Roll self-produced high-quality video demonstrations of techniques for Micro 102 and 304 laboratory classes. This library of standalone videos will be an invaluable resource for future students to watch an expert perform common laboratory techniques. Dr. Paustian became proficient with Camtasia video editing software for production of high-quality lecture videos. The ability to zoom in or highlight certain aspects of content as it is presented makes for an engaging experience for students. Active learning can be added using SCORM technology to allow learners to test understanding in real time. From video-making skills, to finding new apps or widgets, to organizing our learning management system (Canvas) sites efficiently, these skills improve our teaching effectiveness.

We have seen both possibilities and limitations to an online-only setting, and we plan to make the best of both worlds. One future possibility is the use of our high-quality pre-recorded lectures to “flip the classroom” in lecture classes. Students use their own time to learn lecture material via a pre-recorded video, while during in-person time we practice those new concepts. This is something Dr. Christopherson did effectively in her Spring 2022 Micro 303 class. We have also learned the limitations of virtual labs. Not surprisingly, the online setting and videos fail to fully capture physical manipulations, and practical hands-on knowledge gained by having students perform experiments safely in our laboratory classrooms.

We are cognizant of the disparate impacts of the COVID-19 pandemic on students - the education gaps that existed before the pandemic are widening. The pandemic has also had pronounced impacts on our students’ mental health. We are mindful of these challenges and continually working to ensure all our students have an equal and safe opportunity to participate, learn, and thrive in our classrooms.

We return to in-person classes with a revitalized appreciation for in-classroom experiences. The switch to online-only forced all educators to expand their toolset, and we have developed new and beneficial practices and policies that will help us deliver our content more effectively and equitably. We are so grateful and excited to be back in-person in the classroom to work with our students!
Astrobiologist Betül Kaçar devised a molecular time machine to help us understand the origins and evolution of early life on Earth. Her life, and her approach to the journey, are just as remarkable.

Betül Kaçar is a self-described gözü kara. The Turkish term refers to people from the Black Sea region of the country, but it has another translation as well.

“It means bold-eyed or fearless,” says Kaçar, an assistant professor in the Department of Bacteriology. “It means that I don’t know my place. I never did, and I think that served me well. It put me in a mindset that I could do anything.”

That dauntless disposition propelled Kaçar from her humble roots in Turkey to the forefront of astrobiology. A highly interdisciplinary field, astrobiology examines the origin, evolution, and distribution of life in the universe. Through groundbreaking approaches in her research group and leadership roles in prominent NASA initiatives, Kaçar is rewinding Earth’s clock billions of years ago, oxygen started building up in the seas and atmosphere of an anaerobic planet. Without that event, our current oxygen-rich environment — and life as we know it — might not exist.

[...]. The acceleration of space exploration technology increases the significance of Kaçar’s work. “We are able to see further, see clearer, visit planets in our solar system, and bring samples back to our own world,” she says. “We will be facing so much data over these next two decades. We will be tested to interpret what it all means.”

Kaçar’s research methods and results have established her as one of astrobiology’s shining stars. She has received the Stanley Miller Early Career Award from the International Society of the Study of the Origin of Life, the NASA Early Career Faculty Award, and the Scaligro Fellowship for Signatures of Life in the Universe. Her work has received funding support from NASA, the National Science Foundation, the Human Frontiers in Science Advance Program, and the John Templeton Foundation. She’s even featured in an issue of NASA’s graphic novel series Astrobiology: The Story of Our Search for Life in the Universe. Her cartoon avatar rides a T. Rex, climbs the phylogenetic “Tree of Life” (which graphically illustrates evolutionary relationships among biological entities), and scoops up Rubisco samples from ancient Earth.

[...]. Outreach has always been a top priority for Kaçar. She is eager and always willing to spread the word about the astrobiology field and to encourage young women of all ages around the globe to believe in themselves and pursue STEM fields. “I never thought I would end up on this journey,” she says. “It is my responsibility to give back.”

In 2012, as her astrobiology career was taking off, she cofounded SAGANet, an online education platform that offers curious minds a way to ask fundamental questions about life in our universe. SAGANet connects students worldwide with summer astrobiology programs, online mentors, and the latest research in the field. One of Kaçar’s current undergraduates found her way into the astrobiology field through SAGANet.

Kaçar has delivered talks everywhere from the Boston Science Festival to the Smithsonian’s “The Scientist Is” series and appeared on numerous TV shows and online education platforms, including a PBS documentary on the origins of life. She frequently participates in STEM mentoring meetings and, as the parent of a four-year-old, connects with other women and mothers in science.

One of her proudest moments came last year when she made a presentation on the future for women and girls in science to the United Nations Commission on the Status of Women. She pointed out how the COVID-19 pandemic further deprived girls around the world of learning opportunities that could advance their educational path. “We should not forget that there is a part of the world that will pay the price of the pandemic throughout their lifetime,” she says. “So many girls over the past two years have missed out on perhaps a once-in-a-lifetime opportunity. I think about that summer I attended the scientific conference in Istanbul. What if there was a COVID outbreak that year and I couldn’t go? That turning point would have been gone.”

Kaçar encourages leaders to create even more opportunities for that “invisible population” to make up for lost time. And to girls, she speaks as a gözü kara, from experience and from the heart: “Your knowledge will be your power. Fight for your right to receive an education and an equal future for everyone. There will be a lot of roadblocks along the way. Stay true to yourself, surround yourself with people who inspire you and who get you. When in doubt, be your own role model, and make decisions that your childhood self will be proud of.”

Read the full article in GROW Magazine at grow.cals.wisc.edu

Microorganisms and Poop Coffee

Several years ago, a relatively unusual topic of collaboration began out of international connections between Dr. Jon Roll (Teaching Faculty) of the Bacteriology Department with colleague Ajan Jomkhwon Meekar from Chiang Mai (University Teacher) University in Chiang Mai, Thailand.

While directing his study-abroad programs in Thailand, Dr. Roll was introduced to the unusual and much sought-after Civet Coffee. Civet coffee is made from coffee beans after they have been eaten as coffee cherries and disposed of by the large, ferret-like rodent, the civet.

This coffee is sold at a premium for its smooth flavor and health benefits, and is a lucrative highly sought after product. Therefore there has been a trend to produce this coffee on a larger scale, unfortunately leading to capturing and farming coffee-cherry fed civets, sometimes in less-than-civet resort conditions.

As scientists, the obvious curiosity is to know what is happening (if anything) in the gut of the civet that leads to the desired organoleptic and health-benefit qualities. To this end, Dr. Meekar established a collaboration with Dr. Garret Suen’s lab to sample civet poop and see if there was something unique about the microbiome of coffee-fed vs. non-coffee fed civets.

Time Travel – continued

Civet-excreted coffee ‘cherries’

In 2013, several of the research team members were in in the Jakarta area of Indonesia, working on scaling up production in the middle of typical resort conditions.

Results? Dr. Meekar has since identified and isolated relevant strain(s) of lactic acid bacteria, carried out fermentations using these organisms in the presence of coffee beans, identified unique associated metabolites (through further collaborations with Dr. Daniel Amador-Noguez) and is now pursuing biochemical and biological aspects. She is also working on scaling up production in order to be able to market the coffee and products associated with this new unique civet-friendly civet coffee.

How to Time Travel Without Fear

By Kristin Baird Rattini

Excerpted from GROW Magazine, Summer 2022

Betül Kaçar, left, and graduate student Kortlyn McGrath look at and discuss Petri dishes containing cultures of ancient DNA molecules in Kaçar’s research lab. Photo by Jeff Miller

Microbiomes and Poop Coffee

by Jon Roll and Jomkhwon Meekar

Civet

By Kristin Baird Rattini

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The Colorful Intersection of Science and Art
by Kari Straus

Residents and visitors to the UW Microbial Sciences Building have probably seen vibrant works of art appearing in public spaces over the past several years, most notably in the Faculty Meeting room, Chamblys conference room, and in the administrative suite. These prints are the works and donations of Microbiology PhD graduate Edward M. Hale (Bacteriology MS 1972; Bacteriology PhD 1974).

Following his undergraduate studies, Hale worked at Abbott Labs as a research biologist for about a decade. During this time, his thoughts often turned toward advancing his education, and he eventually applied to several PhD programs in the Midwest. “Wisconsin’s program, even at that time, was considered the best. I didn’t think I would get accepted there,” he said, presuming his 10-year hiatus from formal education might inhibit his application’s acceptance. Nevertheless, the review committee saw promise in this non-traditional student, and he was accepted into the PhD program for the 1969 term. That ‘promise’ was realized, accepted into the PhD program for the this non-traditional student, and he was turned toward advancing his education biologist for about a decade. Hinsdill, was the study of a bacteriocin obtained his PhD in Bacteriology in 1969 term. That ‘promise’ was realized, which self-assemble inside the infected cell before the cell releases them. Using cardboard, Elmer’s glue, and rubber-stamped images of whales, he created a 3D model of these structures to further the students’ understanding of the concept. Seeking a more polished version, he showed his model viruses to an art professor at Ball State who, impressed with the initial versions, encouraged him to continue to develop his artistic talents. He proceeded to do just that, and his later works — of which Bacteriology has several examples — were created using a process called serigraphy, which is a method of silkscreen printing (seri coming from serico, which is Latin for silk). The process starts with an artist’s vision for the piece, in Hale’s case, pencil on paper, which is then broken down into individual steps or processes by color, shape, and layer. The design elements are cut into a lacquer sheet with an X-Acto blade, and this lacquer is then applied to a silk-covered frame, masking areas of the silk that are not part of the printed design. The artist then draws paint or ink over the lacquer, using a brush, pushing the paint through the exposed silk and onto paper or canvas. Many frames are constructed and used in the building design, layering colors and elements of the design to develop the final vision.

Dr. Hale gifted the department several artworks that depict scientific machines, such as Phase Contrast Microscope, DNA Sequencing Machine, and Spectrophotometer, as well as those showing molecular structures like Restriction Enzyme. The colors he uses are bold and his shapes crisp. In a Spectrophotometer, you see a beam from the blue-, red-, and green-colored machine cutting into a rainbow spectum. Restriction Enzyme, a roadblock of ribbons weaving through a central column, has been reprinted as a series in varying color combinations: yellow and green, magenta and blue, and yellow and magenta to name a few examples. Phase Contrast Microscope, is an almost symmetrical design with an abundance of colors, curved figures, dots, and drips representing the condenser, objective, plates, and other parts of the complex machine.

Dr. Hale retired from Ball State University in 2004 and occasionally comes to Madison with his wife, Lynn, to see long-time friends, explore campus and visit our ‘new’ Microbial Sciences Building. We invite our readers to do the same. Check out these beautiful works of art yourselves!

Virus models, constructed of paper and glue.
In Memoriam

Marcin Filutowicz
Our friend and colleague, Marcin Filutowicz died at the start of 2022 after a decades-long battle with cardiovascular disease. Marcin was born in Poland where he completed his schooling and earned a Ph.D. in Molecular Biology from the Polish Academy of Science. He then moved to the University of California, San Diego for postdoctoral study and joined the faculty of the Bacteriology Department in 1987.

Marcin’s early research was on proteins involved in bacterial DNA replication. But his most creative research endeavors revolved around his novel approaches to using harmless microbes to combat pathogenic organisms. He conceived of the idea of deploying bacteria equipped with “killer plasmids” that would conjugate with pathogens and kill them. This idea spawned his first biotech venture, ConjuGon. A second innovation was Marcin’s idea to deploy strains of the amoeba Dictyostelium discoideum to ‘eat’ pathogenic organisms. He founded a second biotech company, AmebaGone, aimed at developing these organisms to combat skin infections and diseases that afflict food crops (e.g., potato soft rot).

Marcin did not just deploy microbes to advance science; he was an expert in the fermentation arts. He became an accomplished wine-maker, and then advanced to liqueurs, turning out exquisite brandy, grappa, and even Sauterne. He was very proud when his Sauterne defeated a 200 Chateau d’Yquem in a blind tasting. Marcin could ferment almost anything, from beets to cucumbers to Kambucha. Shortly before he died, he was experimenting with fermented kale.

Marcin was also a master gardener and a superb cook. He delighted in preparing elaborate dinners for his friends that show-cased traditional Polish dishes and lovingly roasted meats. He once prepared an exquisite Borscht soup made with a mix of fermented and fresh beets and pierogies filled with rare mushrooms he had picked in Poland. If one did not praise his food quickly enough, he more than made up for it. Marcin was not known for modesty.

Marcin embraced life fully—thinking, writing, eating, drinking, and loving as much as he could. He was bright and illuminating, sometimes blindingly brilliant, and packed full of all the colors of the rainbow, making him as complex as anyone we have ever known. He is missed.

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Bacteriology Fall/Winter 2022 Newsletter

In Memorium (continued)

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Bacteriology Fall/Winter 2022 Newsletter
History and Future of Women in Bacteriology
by Melissa Christopherson and the Diversity, Equity and Inclusion Committee

Our Strengths
Women make up a majority of our department

Women in Bacteriology

<table>
<thead>
<tr>
<th>Role</th>
<th>Staff</th>
<th>Undergraduate</th>
<th>Graduate</th>
<th>Post-docs</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>56%</td>
<td>62%</td>
<td>52%</td>
<td>53%</td>
<td>46%</td>
</tr>
</tbody>
</table>

Women in Bacteriology comprise 46% of faculty, well above the nationwide trends in life sciences.

The problem
Women leave science before reaching its highest ranks

Women earn 60% of all PhDs in Microbiology but account for less than 30% of faculty. Nationally, women earn over 50% of all PhDs in science for less than 30% of faculty.

Possible causes (nationally)
- Bias and hiring committees
- A lack of mentors or role models
- Women bearing the brunt of domestic duties
- Tenure clock conflicts with female fertility limits
- Women earn 80% of men’s salaries in life sciences
- Elite male scientists not training women

Our History
The first woman to attain the rank of full professor outside of the fields of home economics and nursing at UW was in Bacteriology.

Dr. Elizabeth McCoy 1943

Though rare nationally, we have women serving in key roles: chair of Bacteriology, Dean (CALS), and Chancellor. Women chairs are correlated with narrowing the gender gaps in publication, tenure, and pay.

Dr. Katrina Forest current chair

Seminar Speakers in Bacteriology

30 20 10 0

10 0 10

Male | Female | Underrepresented Minority

Bacteriology invites a number of women seminar speakers and is currently working to invite more URM.

Nursing-Friendly

MSB was among the first in the nation to have a dedicated lactation room.

What can be done?
- Blue training for hiring committees
- Mentoring post-docs
- Flexible on-site childcare
- Advocating for parental leave policy
- Strengthening connection between women and department identity
- Supports for domestic responsibilities for new faculty or post-docs
- Consider setting up an intradepartmental babysitting wiki
- Consider donating to Bacteriology to help fund these efforts by contacting bactdonate@wisc.edu

Consider submitting a departmental women for the “Microbiologists we admire” in the Microbe Place

For references and more information see https://diversity.bact.wisc.edu

Contact Information and Acknowledgements

We would love to hear from you! We can be reached in the following ways:

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Many thanks to the following individuals who provided content for our 2022 winter newsletter (please forgive any omissions as they were unintentional): Katrina Forest, Kari Straus, Erica Majumder, David Hershey, Kerri Coon, Betul Kazic, Edward Hale, Betty Slinger, Anna Lippert, GLBRC, Jo Handelsman, Alan Attie, Trina McMahon, Melissa Christopherson.

Images and graphics were sourced from Faculty, article subjects, University Communications, UW-Archives, GLBRC Communications and Bacteriology Archives. All may be subject to U.S. Copyright Law.

Giving to Bacteriology

We are grateful to many alumni and friends who generously support Bacteriology programs. Your gifts help us attract, reward, and support promising undergraduate and graduate students. They position us for excellence in research, often by providing seed money for new and exciting areas or by honoring our most deserving faculty members. Gifts fund our excellent seminar series, bringing nationally and internationally renowned speakers to UW-Madison. Donations help us expand our outreach efforts, and energize our work in Diversity, Equity, and Inclusion. All donations are welcome.

Please consider making a tax-deductible gift to the University of Wisconsin Foundation in support of our research, instruction, and outreach missions by designating your gift to the “Department of Bacteriology General Fund” (Fund Number 112149050).

Between now and Feb. 28, 2023, as a thank you for your gift of $100 or more, we will send you one of our beautiful Bacteriology mugs! A great way to kick off 2023 charitably.

Ways to Give

Online: Visit www.supportuw.org

Click on “Give Now” then type Bacteriology in the Find Your Cause search field to contribute to the general Bacteriology Fund 112149050.

Alternatively, if you have a specific fund in mind, click on the link “Write in your own designation” directly under the Find Your Cause search field.

Call UW Foundation at 1-800-443-6162

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