BENCHMARKS

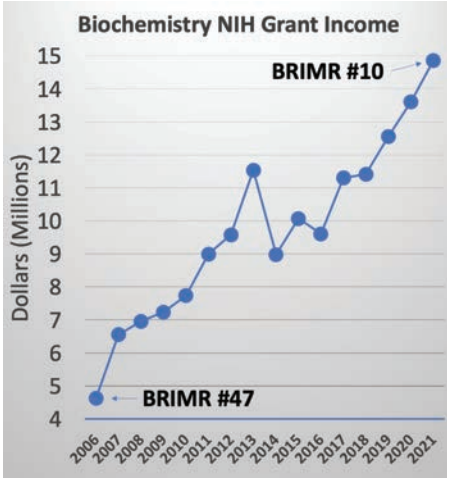
A newsletter from the Department of Biochemistry

Spring/Summer 2022

HOW DO WE MEASURE SUCCESS? Chair's Message from Wes Sundquist

As our department grows, this seems like a good time to think about what success should look like, how we best measure and celebrate it, and how we can identify emerging challenges that need our attention.

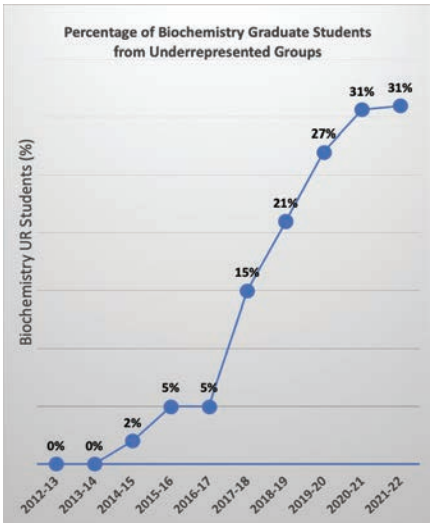
Our department and health system compile a lot of metrics that I find useful, but only to a point. One important departmental metric is our annual level of grant funding from the National Institutes of Health (NIH), and our associated ranking vs. the other ~100 US biochemistry departments (which is compiled by the Blue Ridge Institute for Biomedical Research (BRIMR)). NIH is the largest funder of biomedical research in the US, and they support most of the research in our department, so we simply can't succeed without strong NIH funding. Several other attributes also contribute to making NIH funding an important metric: 1) it is peer reviewed, 2) it comes with associated Facilities and Administrative (overhead) funding, which is needed to support many critical activities like our graduate programs and core facilities, and 3) it's commonly used as the "coin of the realm" for measuring success and comparing research programs. For example, funding levels from NIH and other federal agencies comprise ~40% of the metric used to create the influential US News and World Report ranking of medical schools. It is important to realize, however, that BRIMR rankings have major technical limitations. For example, they do not correct for faculty numbers, which tends to disadvantage smaller departments like ours, and they unfairly credit large programmatic grants to single Principal Investigators (PIs), which tends to favor our department because we have PIs on several major NIH grants. Moreover, even if NIH funding were to be credited perfectly, it would still be an imperfect measure of what we really care about, which is producing and disseminating high-impact research that fundamentally changes scientific understanding and medical practice, and training a diverse new generation of scientists and physicians for satisfying and effective careers. Despite these limitations, however, we simply can't excel in our research and training missions without strong NIH funding, so we track our trends. As our department has grown, we have seen significant increases in our total NIH funding, our per capita NIH funding, and our BRIMR ranking. This year, we cracked the BRIMR top 10 for the first time ever. That feels good and our overall trajectory is clearly positive, but we should always remember the limitations.



Once you start measuring things, it becomes tempting to assign numerical values to many different aspects of faculty and trainee performance. For example, the University of Utah School of Medicine provides us with annual departmental "dashboards" that measure many different activities across our missions in research, medical education, graduate education, academic affairs, and faculty development. A significant fraction of our annual department operating budget is also allocated based upon our aggregate department activities in the first three categories. It's a bit daunting to have so many aspects of our performance measured each year, but I generally like our system because I believe that: 1) it makes sense to incentivize high levels of activity across our different missions, 2) it is useful to consider our trends, even if we end up deciding that some are irrelevant, and 3) our administration and peer reviewers (who are other department chairs) generally do a good job of evaluating the data sensibly. This is important because our dashboards tend to do a good job of quantifying activity (e.g., levels of funding, teaching loads, faculty promotion rates, etc.), but are not as effective at evaluating less tangible aspects of quality (e.g., how creative and useful is our research?, how well are our trainees learning?, etc.). As Audrey Hepburn aptly noted, "There is more to sex appeal than just measurements".

Fortunately, our department budget report also has narrative components that allow us to explain what we are trying to accomplish in our different missions, and how we evaluate our successes and shortcomings. Our department budget also has a significant component called the "Department Agreement", which supplements our activity-based funding levels in order to cover our actual needs, promote institutional priorities, and reward qualitative assessments of excellence. We have just signed a new Department Agreement that I believe fairly rewards our past accomplishments and sets us up for success in the next 5-year cycle. We also have many other mechanisms for evaluating and rewarding excellence. For example, four of our faculty members are truly outstanding MD and MD/PhD educators (Janet Lindsley, Tim Formosa, Amy Hawkins, and Michael Kay), yet their contributions can be difficult to quantify and reward adequately. It was therefore truly gratifying this year to see Tim Formosa join Janet Lindsley as a recipient of the University of Utah Distinguished Teaching Award, and it was similarly satisfying when Michael Kay and Janet Shaw were each selected to receive the UU Distinguished Mentor Award.

The recent spotlight on disturbing racial and socioeconomic inequities across our society has helped us to realize that we have historically undervalued measurements of equity, diversity and inclusion. Fortunately, this situation is changing rapidly and we are now tracking and placing greater value on metrics that assess our diversity and percentages of scientists from traditionally underrepresented groups. Many department members have contributed to improving our diversity, and we have all benefited from some truly amazing



work by several community members. These efforts have increased graduate student diversity significantly, which is making us a richer and more effective department, but we still have more work to do to achieve similar advances in our postdoctoral and faculty pools. We also need to do more than just increase raw numbers - we must make sure that we are providing a supportive and inclusive environment that helps every department member succeed to their full capacity.

In the end, the health and success of our department inevitably reflect complex sums of many different individual and community accomplishments, both large and small. We are therefore making an effort to highlight and celebrate such advances through a variety of different mechanisms, including at our Research in Progress meetings, on our departmental webpage, on social media, in our Newsletters, and at our annual department Awards Night/ Picnic (as highlighted elsewhere in this publication). We are also experimenting with a new department Awards Committee focused on nominating our faculty and staff members for local and national awards that appropriately recognize their amazing contributions. Finally, there is great power in creating stories and traditions. We have therefore created a new "Research Advances" webpage that documents and explains the most significant research discoveries made each year in our department. The University has created similar digital systems that document discovery and innovation at University of Utah Health and publicize pioneering advances in different subdisciplines. I find these stories educational and inspirational, and I continue to be energized by the different ways in which members of our department are expanding the boundaries of science, education, and community service.

THE 2021 MARJORIE RICHES GUNN AWARD FOR GRADUATE STUDENT EXCELLENCE

Paul Sigala

Each year the Department of Biochemistry selects an outstanding PhD student to receive the Marjorie Riches Gunn Award for Graduate Student Excellence in Biochemistry. This year's awardee was Megan Okada, who defended her PhD thesis in April. In her graduate studies, Megan made two exciting and foundational discoveries about fundamental organelle biology in *Plasmodium falciparum* malaria parasites, both of which have important therapeutic implications and led to two impactful first-author eLife papers. Megan's major thesis work involved a challenging project to understand the functional properties of a curious and essential chloroplast-like organelle retained by parasites, called the apicoplast. Since human cells lack this organelle, there has been great hope that understanding essential apicoplast functions will reveal new antimalarial drug targets. In this project, Megan discovered a novel essential arm of isoprenoid metabolism required for apicoplast division and inheritance by daughter parasites. This discovery unveils a critical new piece of essential apicoplast biology and identifies a previously unknown enzymatic function that can serve as a novel therapeutic target.

In addition to her scientific interests in biomedicine and global health, Megan is also passionate about graphic art and illustration and is highly regarded for her abilities in science illustration. For each of the last two years Megan spear-headed and constructed dazzling graphical presentations of *Plasmodium* and apicoplast evolution that she and other lab members presented at our departmental retreat. Both years, they received a "best-presentation award" for both keen communication and scientific intrigue. She also designed the new banner image for the Biochemistry website, and in 2021 she won the "Art as Science" contest at the annual 3i Symposium. We are proud of Megan's accomplishments and wish her the very best as she progresses in her career!

From left to right: Paul Sigala, Megan Okada, and Marjorie Riches Gunn.

THE 2021 EVELINE BRUNGER AWARD FOR POSTDOCTORAL EXCELLENCE

Jared Rutter

The Eveline Bruenger award for Postdoctoral Excellence was established in 2018. Eveline was a dear friend of the Biochemistry Department, a distinguished scientist, a gifted artist, an avid hiker, and a lifelong learner. When Eveline passed away in April 2018, the Department sought to continue her legacy with a Departmental Postdoctoral Award that bears her name. In honor of her scientific excellence, her love of learning, and her commitment to supporting the community, we were very pleased to present the 2021 award to Ahmad Cluntun, a postdoctoral fellow in Jared Rutter's lab.

Ahmad completed his PhD studies with Rick Cerione and Jason Locsale at Cornell University, where he focused on cancer metabolism. He joined the Rutter lab in the department of biochemistry with the goal of deploying his considerable metabolism expertise in a new area, the study of heart failure. Heart failure is a massively important medical problem in our society with only limited effective therapies. Ahmad has made great strides in understanding the normal metabolism of the heart and how it changes in a heart that is failing. He published a beautiful paper in Cell Metabolism last year and is nearing submission of another paper. Ahmad plans to apply for faculty positions at leading institutions in the next year or so and establish an independent laboratory.

EVA NOGALES PRESENTS THE 2022 PACE LECTURE

Wes Sundquist

On May 16, Eva Nogales, PhD, presented the J.W. and Wanda Pace and Nick and Sheryl Pace Lecture in the Department of Biochemistry. Dr. Nogales is Professor of Biochemistry, Biophysics, and Structural Biology and Professor of Molecular and Cell Biology at UC Berkeley, and Investigator of the Howard Hughes Medical Institute. Her lecture on "Mechanistic insight from the visualization of complexes involved in the regulation of human gene expression" highlighted her groundbreaking studies using cryoelectron microscopy to image native DNA-protein complexes that regulate transcription. Dr. Nogales described a series of complexes that show the modularity and the stepwise buildup of the pre-initiation complex, which ultimately loads RNA polymerase onto promoters to initiate transcription. She also described elegant structural analyses of the regulatory interactions of the Polycomb Repressive Complex and explained the molecular principles underlying how this key "silencer" of gene expression is regulated by cofactors, histone modifications, and auto-methylation. Her studies have been a technical, biological, and intellectual tour-de-force, and have dramatically advanced our understanding of how human cells regulate gene expression. We also appreciate her willingness to spend time interacting with the "Graduate Student Rising Stars" and with our faculty, all of which she clearly enjoyed.

Wes Sundquist, Eva Nogales, and Minna Roh-Johnson. Photo credit: Michael Kay

THE GRADUATE STUDENT RISING STARS SYMPOSIUM

Minna Roh-Johnson

The Department of Biochemistry has a long-standing history of implementing innovative strategies to highlight and recruit talent from around the world. The department has hosted "Rising Stars Symposia" for over ten years – these symposia feature postdoctoral fellows who are rising stars in their fields of expertise – and these inspiring scientists are now faculty mentors at institutions around the world, including at the University of Utah. The success of this program led the department to initiate a similar Rising Stars symposia for scientists at earlier stages of their training, and thus this year marked the first Graduate Student Rising Stars Symposium, with keynote speaker Dr. Eva Nogales, who was also the Department of Biochemistry Distinguished Pace Lecturer.

Graduate Student Rising Star speakers with Minna Roh-Johnson (leftmost) and Pace speaker Eva Nogales (fifth from left). Photo credit: Michael Kay.

The Graduate Student Rising Stars Symposium featured talented graduate student scholars from around the country. Together with the Department of Nutrition and Integrative Physiology and the Diabetes and Metabolism Research Center, the Department of Biochemistry made a call for applications in the Fall of 2021, and received a number of applications from highly qualified graduate students from underrepresented backgrounds. From this competitive group, ten senior-level graduate students were invited to come to Utah, share their research, and meet with our community. In addition to the symposium, there was a parallel symposium hosted by the Department of Neurobiology, and a number of career development events that were also open to students and postdocs at the U of U, aimed to provide skills to facilitate the next step of their training. The symposium and associated career development events were a terrific success, with great attendance and engagement with students, postdocs, and faculty across several departments. The event created an inspiring energy, and social events allowed for impactful and positive interactions, not just with the Graduate Student Rising Stars, but also between members of our own community, many of whom had not had substantial personal interactions due to the on-going COVID-19 pandemic. The success and energy of this inaugural event will carry forward to this Fall 2022, when there will be another call for applications, with the goal of continuing to provide dedicated training, and enriching our community with outstanding scientists from diverse backgrounds.

FUNDING SUPPORT FOR TRAINING STUDENTS AND ENHANCING DIVERSITY

Paul Sigala

From left to right: Deirdre Mack, Elliott Paine, Claudia Consalvo, Bernard Scott, Helen Donelick, Jesse Velasco, Shai-anne Nalder, Jessica PIta Aquino, and Faith Bowman

Over the past five years, Biochemistry has achieved remarkable, sustained success at increasing the diversity of PhD students working within our department. Currently, over 30% of Biochemistry students come from racial/ethnic backgrounds that are strongly underrepresented in the sciences, including black (African or African American), Hispanic/Latin American, Native American, and Pacific Islander. This diversity is a reflection of the broader success of our umbrella Bioscience PhD Programs and the dedicated efforts of faculty, students, and staff across many departments at enhancing and supporting the diversity of our incoming PhD-student body. Our ability to recruit these diverse students to Biochemistry also reflects the scientific excellence and the positive and inclusive mentoring environment within our department that we have worked hard to achieve and strive to continue improving.

Achieving equitable diversity and creating an inclusive training environment that fosters the scientific and professional success of Biochemistry PhD students are core values of our department and a key part of our mission and identity. This diversity has also introduced important opportunities to enhance the funding and training support available to our students, especially those coming from underrepresented (UR) backgrounds. Multiple training awards and fellowships from the National Institutes of Health (NIH) and National Science Foundation (NSF) target or prioritize support of diverse students from UR backgrounds. These awards include individual predoctoral fellowships from the NIH and NSF, diversity supplements to existing NIH research grants, and individual fellowships on institutional NIH T32 training grants.

Since 2018, students in our department from UR backgrounds have been awarded over $1 million in training fellowships. Beyond the tangible financial benefit of such awards, these grants in most cases require the mentor and student to assemble a detailed training and development plan customized to each applicant. Although assembly of these plans involves considerable time and thoughtful effort, such tools are an invaluable mechanism to foster the scientific training success and professional development of each student. We would like to highlight the Biochemistry students from UR backgrounds who have received training awards since 2018.

The NSF Graduate Research Fellowship Program (GRFP) is one of the most selective and prestigious graduate science fellowships in the country. Although science and engineering students in main-campus departments at the University of Utah have enjoyed historic success at winning NSF GRFP awards, students in our health-sciences labs have had difficulty attracting such fellowships. In 2020, we were thrilled to learn that Biochemistry student Faith Bowman was awarded the coveted three-year NSF fellowship. Faith is also the current president of our Utah chapter of SACNAS, a national organization that fosters the professional development and inclusive success of UR scientists. In 2021, our Utah SACNAS chapter was awarded a national "Chapter of the Year" distinction in recognition of the transformative chapter impact. In 2022, Shai-anne Nalder continued this positive trend when she also received the NSF fellowship. Shai-anne is an alumna of and current student mentor with the Utah Native American Summer Research Internship. We were also joined this year by PhD student Jessica Pita Aquino, who transferred to our department from the University of Wisconsin-Madison and will be funded by her 2018 NSF GRFP fellowship.

Biochemistry graduate students from UR backgrounds have had considerable recent success obtaining research training support from the NIH. In 2020, Elliott Paine was awarded a three-year NIH/NIGMS F31 individual predoctoral fellowship. From 2018-2020, five UR students were awarded two-year positions on NIH T32 training grants: Claudia Consalvo, Helen Donelick, Tanya Espino, Deirdre Mack, and Jaime Sepulveda. Claudia has made key contributions to building and improving the diversity page on our Biochemistry website, Helen has spearheaded a Biochemistry mental-wellness committee, and Deirdre is a current officer in our Utah SACNAS chapter. Over this same period, five students were supported by diversity supplements to existing NIH grants. Claudia Consalvo, Shai-anne Nalder, Bernard Scott, and Jesse Velasco received awards funded by NIH, while Jessica Pita Aquino received a University of Utah-funded supplement. Jesse is the current vice-president of our Utah SACNAS chapter.

Beyond these research fellowships, we would also like to highlight additional diversity-oriented training awards received by Biochemistry students. Seyi Falekun and Onyeka Obidi have received training support from the Utah African American Doctoral Scholars Initiative. We are also grateful to the estate of Sherman R. and Deborah Ann Dickman for endowing a travel award that supports scientific meeting attendance by current students in the department, with prioritization of UR and international students. To date, seven Biochemistry students have received Dickman travel awards.

As a department, we are proud of these funding successes by our current students. More importantly, we strongly value the tremendous contributions these diverse students make to our department and the broader community. Achieving equitable diversity in our trainees, fellows, staff, and faculty and fostering an inclusive and supportive environment are major priorities of Biochemistry. We look forward to strongly supporting the continued scientific and professional success of our students!

FUNDING FOR THE SCIENTIFIC BREAKTHROUGHS OF THE FUTURE

Brenda Bass

It is a big day when a young scientist gets their own lab. It is not an overnight process, and typically is preceded by a decade of long hours in the lab, where 80-hour weeks are not uncommon. Five or six years are needed to complete classes, do experiments, and publish the original thesis research required to get a Ph.D., and this is followed by about 4 years of additional "postdoctoral" training. For those destined for a scientific career, these long hours are mostly exciting and fun, and by the time the young scientist walks into their own lab, they are well prepared and chocked full of ideas for experiments they want to do and the team they want to build.

And what could be more fun? There are the sparkling clean lab benches, the shelves waiting to be filled, the centrifuges waiting to run. For goodness' sake what else could the young scientist want?

Oh. Money. Funding.

Being an academic scientist is not cheap—experiments require expensive equipment, chemicals, someone to help do the experiments, and with few exceptions, an academic scientist must pay at least part of their own salary. The university recruiting the young scientist provides a start-up package to help pay the bills for the first few years, but everyone knows those years pass quickly. Soon after arriving in that sparkling lab, the young scientist starts writing grants. The bread and butter for most labs comes from the National Institutes of Health (NIH), and the typical modular grant is $250,000. Most agree that it takes at least two modular grants to run an average-sized laboratory.

And to get that grant requires preliminary data-- NIH wants to have confidence that your experiments are going to work. Where is the fun in that! Discovery takes risk!

Fortunately, there are nongovernmental organizations that place a premium on funding new and untested ideas and the young scientists they deem will make the future breakthroughs in biomedical science. The two most well-known are the Pew Scholars Program and the Searle Scholars Program. Both are dedicated to providing funding for scientists within the first few years of their academic appointment and place a premium on projects judged to be risky but potentially high impact. The competition is stiff: the applicant must first be selected as the sole nominee from their university, and then compete to be one of the 15-20 awardees selected from about 200 institutions. Both programs tout the achievements of their awardees, which include Nobel Laureates and National Academy of Science members.

If you have read this newsletter before, you know we have a lot of stars in the Biochemistry Department, so it is not surprising that our faculty have a long history of success at acquiring these coveted grants (see inset list). And continuing this tradition, we are extremely proud to note that our new recruit, Dr. Matthew Miller, was a recipient of a Pew Scholars Award in June 2022. And importantly, as noted in the quotes below from our Scholars over the years, it is not only funding that Matt will enjoy, but introduction to a rich community of future scientific leaders that will be his colleagues for the rest of his scientific career.

Brenda Bass (Pew, 1990) *It is wonderful to have financial support for risky science, and Pew meetings are in exotic places (like Costa Rica!) that encourage bonding and emphasize how important relaxation and late nights talking science are to creative ideas and discovery.*

Wes Sundquist (Searle, 1993) *Getting a Searle was a life saver for me because I literally got it the week that our lab ran out of startup funds. We were switching research directions, and I was struggling to get NIH funding, whereas Searle was much more willing to invest in our lab and trust us to figure things out. The rich interactions with Searle colleagues, some of whom are still close friends, were really wonderful but if I'm honest the most important aspect of the Searle Award was that it provided us with funding to do new research at a time when we really needed it.*

Jared Rutter (Searle, 2004) *The Searle award made a big difference for me in three ways: First, it provided funding for us to initiate projects that were speculative, but turned out to be impactful. Second, it introduced me to a network of scientists that greatly impacted my thinking then and now. Third, it gave me confidence that perhaps I could succeed in this business. All were pretty important for me at the time.*

Adam Hughes (Searle, 2015) *For me, the most important benefit of the Searle Award was being able to attend the annual meeting each year where I developed many close friendships and collaborations that have been so important to the development of my scientific career. I see many of these colleagues regularly at meetings, and being able to lean on others at the same stage of my career for advice has been invaluable. I also really appreciate the very flexible funding, which allowed us to pursue more risky research directions that I may not have otherwise.*

Erhu Cao (Pew, 2017) *Being a Pew scholar provided a wonderful opportunity to interact with members in the Pew community. It also allowed us to pursue some riskier projects that we would otherwise not consider focusing on. On a more personal note, I am proud to carry on a tradition of my postdoctoral mentor, David Julius, being the third Pew scholar after David Julius, and Diana Bautista.*

Paul Sigala (Pew, 2018) *The most transformative impact of the Pew award is the rich interaction with the diverse community of Pew scholars at the annual Pew meetings. The funding is helpful, especially as it is flexible and can support new directions, but the fertile exchange of ideas and perspectives with the Pew community that stimulates the imagination and catalyzes new directions is undoubtedly the most exciting aspect of the Pew award.*

Matthew Miller (Pew, 2022) I*t's a tremendous honor to be included in this year's Pew Biomedical Scholars class. In addition to the generous financial support, our work will vastly benefit from interactions with the other Pew Scholars and the potential collaborations these relationships may spark.*

Matt Miller, Ph.D., joined the Biochemistry Department in 2019 and is our newest recipient of the Pew Scholars Award. Chromosomes contain the DNA that encodes our genes, and each time a new cell is created, this genetic material must be accurately divided between the new and old cell. Matt received his Pew Award to investigate how this process occurs, and specifically, how a protein complex known as the kinetochore attaches chromosomes to the spindle that pulls them into the daughter cells. Matt's work is expected to lead to tools for reducing the chromosomal segregation defects that give rise to many human diseases, including cancer and developmental disorders such as Down syndrome.

Matt is originally from Denver, Colorado. He earned his bachelor's in biology from Carleton College (2001), his Ph.D. from MIT (2012), and performed his postdoctoral training at the Fred Hutchinson Cancer Research Center in Seattle. Outside of lab, Matt enjoys outdoor activities including skiing, hiking, and biking, and also loves spending time with his wife and two young children.

AWARDS TO BIOCHEMISTRY DEPARTMENT FACULTY

1988	Tom Alber (Pew)
1990	Brenda Bass (Pew)
1993	Wes Sundquist (Searle)
2004	Jared Rutter (Searle)
2013	Adam Frost (Searle)
2015	Adam Hughes (Searle)
2017	Erhu Cao (Pew)
2018	Paul Sigala (Pew)
2022	Matthew Miller (Pew)

STRUCTURAL DETERMINANTS OF HEALTH OUTSIDE MY FRONT DOOR: WHY I RAN FOR OFFICE

Amy J. Hawkins

We are here on earth to do good unto others. What the others are here for, I have no idea. — W.H. Auden

> Dear Neighbor,
> My name is Amy J. Hawkins, and I'm a candidate for Salt Lake City Council for District 5. I'm asking for your vote because of my experience and commitment to our community.

In 2021, in the middle of a pandemic, I ran for public office. Spoiler alert: I did not win.

It was not my first experience in local politics or community advocacy.

Amy Hawkins (center) with supporters during her campaign.

In 2018, I sat in a classroom in Saratoga Springs, Utah, observing how ninth grade students handled the evolution and heredity materials that our curriculum design team at the Genetic Science Learning Center had recently drafted. The teacher, April Thompson, was a dream: gifted to the point that without prompting, her ninth graders were posing questions like "Does that mean there can be more than one polymerase on the transcript at the same time?" My attention came to a record-scratch halt one Friday morning when April started a classroom discussion using a newsclip about the opioid crisis. Whereas she typically addressed the classroom with the cheerful demeanor of a sports coach telling her team what the day's game plan would be, today she visibly teared up and said to her kids: "This is serious. I've had to visit former students in prison. I've had to go to former students' funerals. I need you to be careful around these drugs and the way they can affect your brain." Where was I? This was a public school deep in the Utah County suburbs. I had passed horses that morning on my way to get there. This school had serious resources. Their student-to-teacher ratio was tiny. The school even had a "space simulator" that they used for narrative science curricula that could be rented out on weekends for birthday parties. How was I supposed to reconcile that with student prison and funerals?

A few days later, I stood up in a community meeting and addressed my state representative, a former educator himself,

> "The state is putting tens of millions of dollars into homeless resource centers and a lot of that has to do with the opioid problem," Hawkins said. "If we're putting that much into the back end of the epidemic in terms of treatment and facilities…where's the funding for student education?" — ***The science of addiction***, November 26, 2018.

We developed an appropriations request to secure state funding for high school educational materials about the science of opioids, and were awarded the funding.

In 2019, my activism took on a different tone when I brought attention to public safety issues in the Ballpark neighborhood. As chair of the Ballpark Community Council, I wrote a post on the group's Facebook page that four homicides had taken place within a two-block radius in the Ballpark neighborhood in less than a year.

Within an hour, a reporter called me to ask if I was the person who had written the Facebook post.

"We checked your sources, and you're right." he said, sounding incredulous.

"I should be, three of them are your sources," I replied.

In the post's comments, under my own name, I wrote:

> I don't know what else can be done. But I also can't accept this as the new normal. I'm angry and activated. I walked by the Maverik [where the previous night's homicide had been committed] at 9:30 last night, and there was already a police car parked there with its lights on. We knew that property had a crime problem. The police knew. Someone from the neighborhood had contacted the corporate office before and asked for them to enforce policy changes at that location, but I will do it again. And I'll ask for neighbors' help in collecting photos to send them to show what's happening.

I was hit with the sense that no one had been counting the homicides that were taking place in Ballpark on behalf of the neighborhood before. Apparently, the reporter felt similarly. The story was published in the local press. (*Clerk at Salt Lake City gas station dies in stabbing, another person injured. This is the fourth homicide in the same area in the past year.* July 3, 2019). I wrote a letter asking for then-Salt Lake City Mayor Biskupski and Salt Lake City Police Chief Mike Brown to meet with our community representatives to propose practical, measurable solutions to our neighborhood's problems with homicide and violence. We suggested that the city use nuisance ordinances and other policy mechanisms to change practices in our neighborhood's crime-ridden businesses. Sixty-three community leaders signed the letter, including then-Council Member Erin Mendenhall, now Mayor. We circulated the letter to the local press before holding an Anti-Violence Forum in September 2019, attracting further media attention. (*After 4 homicides in a year, Salt Lake neighborhood asks city, police to 'do something'*. September 5, 2019). While this was a start, sometimes building a narrative over the course of years is necessary to create the political will to drive change.

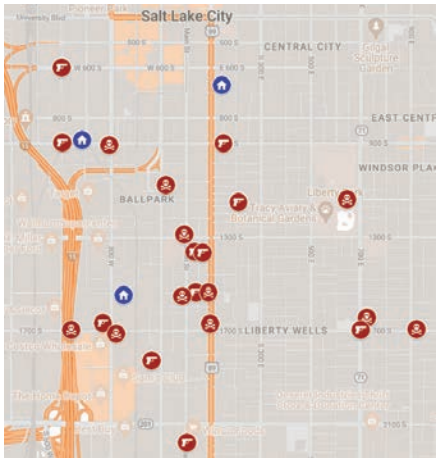
The pandemic brought disproportionate increases in violent crime to our neighborhood.

> Salt Lake City's District 5, which encompasses the Ballpark, Central Ninth, East Liberty Park and Liberty Wells neighborhoods, has seen a 59.6% increase in violent crime offenses compared to 2019. Citywide, violent crime is up by about 22%. — ***Violent crime and property crime surge in Salt Lake City, up more than 20% in 2020***, December 10, 2020; ***Ballpark residents demand action after one man dead, two wounded in Salt Lake City shooting***, December 22, 2020.

2021 did not bring much relief:

> "Last year, we had four murders in our boundary; we're on track to meet that again because we've already had two this year," said Amy Hawkins, chair of the Ballpark Community Council. "It concerns me, not just for the lives that have been lost, but because when people perceive themselves to be less safe in their neighborhood, they're less likely to visit local businesses, to engage, to exercise outside." — ***The 'world cried out for a revolution' in policing last summer. Here's how Salt Lake City responded.*** May 26, 2021.

Since that fourth killing in less than a year in July 2019, I've kept track of the murders that occur in Ballpark and in Salt Lake City's District 5 on a google map: Ballpark Homicides, 2018 – 2022. I believe that compassion requires that we track the lives we've lost and where and how. Homicides are a major crime that can't be ignored, or rounded down. A dead body has to be accounted for. Salt Lake City tracks crime and homicide data for each of its seven Council districts through an interface called CompStat used by cities around the world. Because Salt Lake City's District 5 varies so much in terms of socioeconomics and other demographics, tracking some of the issues by address, and not just by Council district, would provide a level of granularity that would be more helpful to understand east-west disparities in our city. At the time of writing this piece, Salt Lake City, a city of about 200,000 residents, has had 7 homicides so far this year. Two of those 7 homicides have occurred in my neighbor-



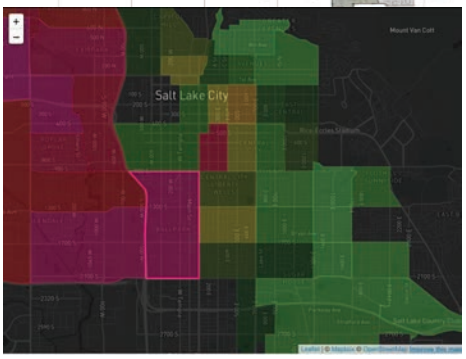
hood of 6,000 residents. In other words, Ballpark continues to bear a disproportionate burden of the city's worst violent crime.

It's probably important to recognize that larger forces are at work. According to the 1940s redlining maps of Salt Lake City that are being republicized in *Not Even Past: Social Vulnerability and the Legacy of Redlining*, the area that is now the Ballpark neighborhood was then a mix of what the Home Owners' Loan Corporation, a federal agency, classified as "Definitely Declining" and "Hazardous" neighborhoods.

> In this area are some good bungalow and cottage type of houses in a part of the city which could be classed as 'still desirable' were it not located as it is, adjoining a business district and the undeveloped industrial site on the west and south of it.
>
> Both of these areas are sparsely settled tracts occupied by working people. Much railroad trackage passes between and through these areas. The houses are old, poorly kept up and practically not saleable.

In contrast, what is now the east side of District 5 was largely classified as "Still Desirable" in 1940:

> Houses are the cottage and bungalow type, many of them practically new and ranging in age up to 25 years. The "average" type of business and professional people live in this area. Its only detrimental influence is that the western one-half of it lies in the "smoke belt". At the southern parts of the area are two golf courses. The areas around Liberty Park are, in appearance, very good. There has been very little business or apartment house encroachment in this section.



Perhaps it's not realistic to expect a few years of civic activism, local media coverage, and neighborhood watch groups to reverse the detrimental effects of decades of zoning policies, decaying and boarded homes, and businesses whose licenses aren't given much scrutiny. The effects of these policies still manifest in Salt Lake City in the form of other striking east-west disparities: housing costs, and the Center for Disease Control's Social Vulnerability Index (SVI) scores that are calculated per census tract. SVI scores range from 0 to 1 (lowest to highest vulnerability) and combine fifteen different factors, including social and economic, housing and transportation, minority status and language, household composition, and disability to provide a metric of a community's resilience when confronted by external stresses on human health. With a score of 0.938, Ballpark has one of the worst SVI scores in Salt Lake City.

I ran for public office because I believe that my neighborhood needs leadership and a voice to improve its public safety situation. But I also ran because I believe that we need more representation by scientists in the public sphere. We need to come out of the lab and show up at every level of government, from community advocacy organizations, to city councils, state legislatures, and federal representation. My ideas aren't unique. In 2017, some folks wanted to take a big, visible stance against what they perceived to be anti-science rhetoric, and they Marched for Science. Others ran for Congress. Shaughnessy Naughton, a former candidate for the U.S. House of Representatives in Pennsylvania, formed 314 Action, a political action committee dedicated to recruiting, training, and electing scientists and other STEM leaders to public office. "There's nothing in our Constitution that says we can only be governed by attorneys," founder Shaughnessy Naughton said. "Especially now, we need people with scientific backgrounds that are used to looking at the facts and forming an opinion based on the facts."

How do scientists stack up against other kinds of professionals, when it comes to what makes someone a good communicator, or electable? Though some readers may find this surprising, Americans consistently rank scientists as one of the professions that the general public trusts the most. Even data collected by the Pew Research Institute as recently as December 2021 support this: large majorities of Americans continued to have at least a fair amount of confidence in medical scientists (78%) and scientists (77%) to act in the public's best interests. These ratings placed scientists at the top of the list of nine groups and institutions included in the survey. But it's important to note that this confidence breaks down along partisan lines:

> There has been a steady decline in confidence in medical scientists among Republicans and Republican leaners since April 2020. In the latest survey, just 15% have a great deal of confidence in medical scientists, down from 31% who said this in April 2020 and 26% who said this in November 2020. There has been a parallel increase in the share of Republicans holding negative views of medical scientists, with 34% now saying they have not too much or no confidence at all in medical scientists to act in the public's best interests – nearly three times higher than in January 2019, before the coronavirus outbreak
>
> Republicans' views of scientists have followed a similar trajectory. Just 13% have a great deal of confidence in scientists, down from a high of 27% in January 2019 and April 2020. The share with negative views has doubled over this time period; 36% say they have not too much or no confidence at all in scientists in the latest survey.

Can scientists play a role in addressing this political discrepancy by engaging with non-expert audiences?

While it may be difficult to remember, most people don't personally know a scientist. What does this mean for you as a potential science communicator, someone seeking to make connections? It may be helpful to acknowledge, at least to yourself, that some people feel their values and broader social identities are pitted against what they perceive to be the values of experts within the scientific and medical establishment. That may mean your best strategy for building credibility with non-expert audiences—for example, your next-door neighbor—isn't to flash your credentials or to describe your current research project. If you truly want to pique someone's interest in a scientific idea or have them reconsider their position, you shouldn't aim to shift their whole identity, and certainly not before you've laid the groundwork. Your best strategy for breaking down barriers and building credibility with someone from the opposite side of the cultural aisle may be to first create trust by building a relationship around other less polarizing issues. I recommend aiming for something basic, and concrete. Consider borrowing a line from one of our local experts in public engagement, Professor Dana Carroll: it's hard to go wrong with bringing up how we ought to fill the potholes.

We Need You, but the System Doesn't Know It. Please Show Up Anyway.

I asked a senior policy advisor: "How do you sell local engagement to folks who care, but know they may be here in Utah, or the country, temporarily? My thesis (not a unique one) is that a career path that places such emphasis on scientists and other academics moving around for each step in their careers has made the political process impoverished of folks who are both engaged locally and passionate about science."

The advisor responded:

> It is vitally, critically, and almost desperately important that our community hear their voices, understand their perspectives, and witness their engagement. Their temporary stay is something that our community needs to bear witness to and vice versa. I honestly can't think of a group of folks with a perspective that is more important at this time.
>
> They are needed. Their presence, their voice, their opinions, their passing through, why they are doing that, who they are professionally. Trust me.
>
> Your thesis is correct.

Amy J. Hawkins, Ph.D. is an Assistant Professor (Lecturer) in the Department of Biochemistry. She teaches in the School of Medicine and directs the Graduate Certificate in Personalized Medicine. She also serves on the Science Outreach and Communication Committee for the American Society for Biochemistry and Molecular Biology, where she is part of the team that designs and teaches The Art of Science Communication.

STAFF HIGHLIGHT: MEET BRIAN ALLEN

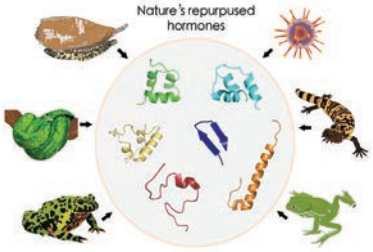
Brian Allen joined Biochemistry in 2015 and has worked for the University since 2010. As the Senior Buyer, Brian handles all of the purchasing for the department. In addition, he tracks the department's capital equipment inventory and keeps the University's space planning software up to date. He enjoys helping lab members get the items they need as efficiently as possible.

Brian has been married to his wife Tonya for 21 years and together they have 3 kids, Eric (11), Lucas (9) and Ivy (6). As a family they enjoy off-roading in their jeep around southern Utah, hiking, exploring national parks and attending each other's activities. Eric plays basketball, Lucas loves baseball and Ivy is a dancer.

FACULTY HIGHLIGHT: MEET HELENA SAFAVI

Helena Safavi was born in Isfahan, Iran, and lived there for five years before moving to Germany with her family. During her youth in Welschen Ennest, Helena discovered a love of nature and ecosystems, and remembers poring over books detailing the rich biodiversity of rainforests and coral reefs. Helena attended the University of Cologne as an undergraduate, where she explored different fields, including medicine, law, and business, before settling on biology. During her fourth year, Helena had the opportunity to volunteer in a lab studying corals and sea anemones, and was quickly hooked. She worked with Anke Klueter at the Australian Institute of Marine Sciences in Queensland, Australia, for her Master's degree, which focused on looking at the impact of heat and excessive sedimentation on the symbiosis between corals and their resident algae. For graduate school, Helena worked with Anthony Purcell at the University of Melbourne, where she used mass spectrometry to identify peptide toxins used by marine cone snails to capture prey. During this time, Helena met Greg Bulaj (now in the Pharmtox department) and Toto Olivera (U of U Biology), the founder of the cone snail toxin field. She began a collaborative project between the Olivera/Bulaj and Purcell groups, and eventually obtained funding to continue this work as a postdoctoral fellow. Later, Helena received a Marie Curie fellowship for a collaborative project with Lars Ellgaard's group at the University of Copenhagen in Denmark where she worked on identifying enzymes involved in the biosynthesis of cone snail toxins.

Helena joined the Biochemistry department as an Assistant Professor in June 2018. Later that summer, she returned to Europe to visit family and renew her visa, but, as a result of new federal policy changes and her Iranian citizenship, she was unable to obtain a multiple-entry visa. Due to the immigration difficulties she knew she would face if she were to stay in the U.S., Helena decided to pursue a faculty position at the University of Copenhagen. During her time in Copenhagen, Helena launched a lab, obtained research grants, and was granted tenure, but also retained ties to Biochemistry. Starting in the fall of 2022, Helena will transition back to Utah, where her lab will investigate the biochemical basis for interspecies biological interactions. She has found that cone snails, which produce a plethora of peptide-based venoms, are the perfect model system for studying how organisms can manipulate the physiology and behavior of other organisms and how the peptides they produce can serve as drug leads for disease.



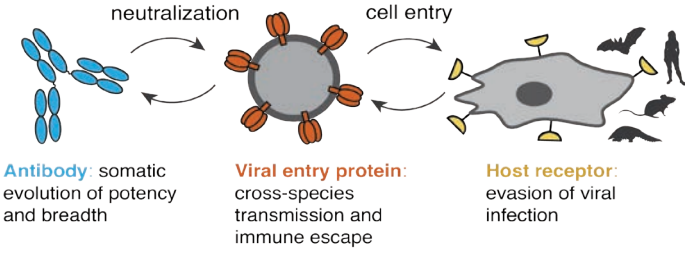
When not in the lab, Helena enjoys spending time with her family (Robert, and kids Jannu, 8, and Nilas, 10). She loves nature, traveling, and exploring different cultures and landscapes. In Utah, Helena enjoys biking, hiking, backcountry skiing, and camping.

FACULTY HIGHLIGHT: MEET TYLER STARR

Tyler (R) and husband Devon (L) exploring Zion NP.

Tyler Starr grew up in Hopkins, Minnesota, not far from Minneapolis. While in high school, he became interested in science, attracted in part by how organizational principles could be used to make sense of the world. He was introduced to evolutionary biology while attending Willamette University, and became fascinated by the intricate organization of the tree of life. After a brief stint studying the evolutionary biology of Joshua Trees, Tyler decided to enter the field of molecular evolution after a research conference piqued his curiosity.

During his graduate training at the University of Chicago in the Thornton lab, Tyler studied steroid receptors and molecular chaperones to better understand the role of chance versus determinism in protein evolution. He also became interested in thinking about ways that he could apply molecular evolution techniques towards practical applications.



With these ideas in mind, Tyler moved to Jesse Bloom's lab at the Fred Hutchinson Cancer Center and quickly began to set up an experimental system to study the evolutionary landscapes that guides affinity maturation of antibodies against HIV. Just as data began to roll in during his first year, the COVID-19 pandemic began. Tyler realized that the platform he developed for studying HIV antibodies would also work for studying the evolution of the SARS-CoV-2 spike protein, and he quickly transitioned to study the evolution of SARS-CoV-2 and related bat coronaviruses. The Starr lab, which will continue to focus on protein evolution at the host-virus interface, officially opens in July 2022.

In his free time, Tyler enjoys hiking and cooking as a 'sous chef' with his husband, Devon, who is a surgical resident in the U of U Urology department. They have a Jack Russell Terrier named Bishop.

FACULTY HIGHLIGHT: MEET DEBBIE ECKERT

Debbie Eckert grew up in Spring, Texas, a suburb outside of Houston. In college at Texas Christian University, Debbie initially focused on majoring in social work. As a prerequisite for the major, she took a non-majors biology course. Debbie enjoyed this course so much that she ended up switching her major to biology, and later became the course TA. Preparation for lab courses, she recalls, included incubating chicken eggs for dissections and sea urchins for observing fertilization. As an undergrad, Debbie had two research experiences, including one at the University of Texas MD Anderson Cancer Center, and her senior thesis work at TCU.

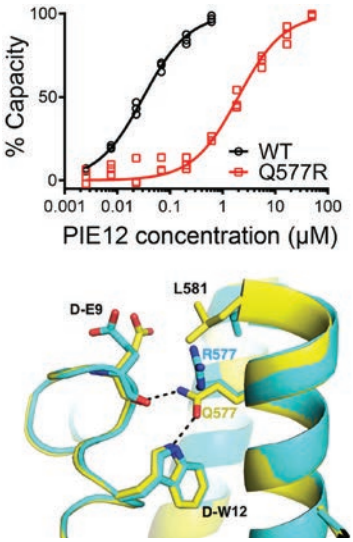
Debbie and family on a ziplining trip.

Debbie applied for a number of graduate programs across the U.S. towards the end of college, and decided to attend MIT, where she joined Peter Kim's lab at the Whitehead Institute. It was in the Kim lab where Debbie first met Michael Kay. As a new postdoctoral fellow, Michael was interested in further developing Debbie's thesis work on D-peptide inhibitors of HIV entry. After graduating from MIT, Debbie spent a couple of years in industry, working in Merck Research Labs where she continued working on HIV therapeutics.

Traveling west for a wedding of a former Kim lab member, Debbie and her husband, Jeff, spent some time exploring Montana and Wyoming, and also visited Michael who had since moved to SLC to start his faculty position. Six months later, in 2003, Debbie moved to Utah and joined the Kay lab. She had fallen in love with the outdoor offerings of the West, and also was excited to return to her thesis work which she cared deeply about.

Debbie's role in the Kay lab has changed during her time here. At first, she mainly worked at the bench, but is now focused on coordinating the biophysical core facility, supporting Kay lab and CHEETAH members, in addition to taking on administrative roles (she is currently vice chair of the Institutional Biosafety Committee at the U).

In her free time, Debbie enjoys spending time with her family, which includes her husband, Jeff, two boys (Milo, 13, and Joey, 15), two cats (Yummi and Sonic) and a dog that the family adopted just a month ago (Luci). She gives back to the community by serving on the school board at City Academy, the downtown charter school (grades 7-12) Joey attends.



Top: SPR binding data of a monomeric version of the Kay Lab's lead anti-HIV D-peptide trimer shows the effect of a resistance mutation (Q577R) in the drug binding pocket of gp41. Bottom: overlaid x-ray crystal structures show the loss of hydrogen bonding interactions contributing to the reduction in D-peptide affinity.

HONORS, GRADUATIONS, AND TRANSITIONS

MAJOR FACULTY AWARDS & RECOGNITIONS

Erhu Cao was promoted to Associate Professor with Tenure.

Amy Hawkins was promoted to Assistant Professor (Lecture Track).

Heidi Shubert was promoted to Full Professor (Research Track).

Matt Miller was selected for a Pew Scholar Award.

We received a $28M NIH U54 grant award to support the CHEETAH Center for HIV Structural Biology for another five years. The Center includes 7 PIs from the University of Utah (**Eckert, Elde, Hill, Iwasa, Johnson, Kay, and Sundquist**) as well as 13 other groups from across the country.

Tyler Starr's paper on the evolution of ACE2 binding in sarbecoviruses appeared in Nature, and he was featured in a New York Times piece explaining coronavirus evolution – past and present.

Erhu Cao received a NIH R03 grant entitled "Develop enabling biochemical and structural tools for dissecting the roles of PKD2L2 in metabolism."

Demián Cazalla received a new NIH R35 grant entitled "Novel functions for Sm-class RNAs in the regulation of gene expression".

Keren Hilgendorf received a new NIH R01 grant entitled "Ciliary signaling mechanisms regulating white adipose tissue expansion".

Chris Hill and **Eric Schmidt** received a new NSF Chemistry of Life Processes Program grant entitled "Structure and function of animal polyketide synthases: bridging lipid and polyketide biology".

Peter Shen received a competitive renewal of their multi-PI R01 entitled "Poxvirus manipulation of the host cell protein synthesis machinery".

MAJOR GRADUATE STUDENT & POSTDOC AWARDS

Adedeji Aderounmu (Deji), a graduate student in the Bass lab, was selected to receive a Graduate Fellowship from the Immunology, Inflammation and Infectious Disease Initiative.

Shai-Anne Nalder, a graduate student in the Sigala lab, was awarded a National Science Foundation Graduate Research Predoctoral Fellowship to study iron metabolism in the Plasmodium apicoplast.

Shuxin Wang, a graduate student in the Shen lab, received a Sherman R. and Deborah Ann Dickman Graduate Student Travel Fellowship from the department.

Zach Wilson, a postdoctoral fellow in the Hughes lab, successfully obtained an NIH supplement to the lab's R35. This funding supports undergraduate Bridget Ward's participation in the SPUR program this summer.

Joey Casalini, a graduate student in the Roh-Johnson lab, was selected for the HCI Rising Stars award. This award recognizes outstanding trainees working in the field of breast and gynecological cancers, and comes with funds for training and research.

GRADUATIONS & TRANSITIONS

The following students completed their degrees since the last publication of the newsletter in Fall 2022: TK Coody (Hughes lab, PhD 2022), Jake Winter (Rutter lab, PhD 2022), Jordan Berg (Rutter lab, PhD 2022), Seyi Falekun (Sigala lab, PhD 2022), and Megan Okada (Sigala lab, PhD 2022) . We also wish farewell to the following Biochemists: Dennis Winge, David Timm, Osiris Martiniz-Guzman (Hughes lab), Agnieszka Lewandowska (Hughes/Shaw labs), Bri Stavaas-Jamack (Miller lab), Sam Tilley (Rutter lab), Surbhi Verma (Hilgendorf lab), and Peter Hackett (Sundquist lab).

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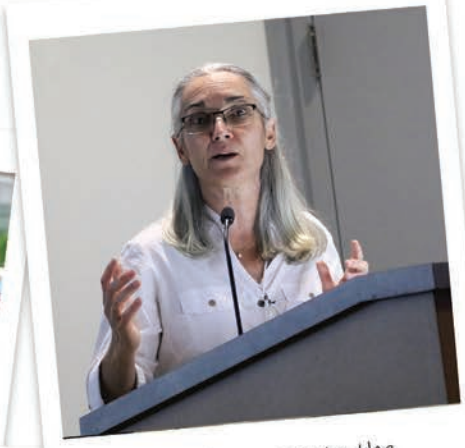
HEALTH
UNIVERSITY OF UTAH

Heidi Schubert shares the joy of biochemistry at Emerson Elementary's STEM night



Eva Nogales presents the 2022 Pace Lecture