The Johns Hopkins University
School of Medicine

46th

ANNUAL

YOUNG INVESTIGATORS' DAY

Thursday, April 20, 2023 • 3 to 5 p.m.

Reception to follow

Preclinical Teaching Building
Mountcastle Auditorium

JOHNS HOPKINS
SCHOOL of MEDICINE

WELCOME

Welcome to the 46th annual Young Investigators' Day awards. It has been my pleasure to chair the committee that selected this year's awardees. It was a challenge because all the entries were so impressive. Congratulations to everyone who entered the competition — you represent the future of biomedical research.

Regards,

Zhaozhu Qiu, Ph.D.
Director, Young Investigators' Day Program
The Johns Hopkins University
School of Medicine

YOUNG INVESTIGATORS' DAY

Young Investigators' Day, established in 1978, recognizes student investigators at the school of medicine and provides them with a forum to present their work.

The Michael A. Shanoff Research Award was created in 1977 in memory of Shanoff, who received his M.D. and Ph.D. from the Johns Hopkins Medical Institutions in 1973.

The David Israel Macht Research Award was established in 1982 to commemorate the centenary of Macht's birth. He was a 1906 school of medicine graduate and a faculty member in the pharmacology and medicine departments.

The Martin and Carol Macht Research Award was established in 1993 to honor Martin Macht, who received his M.D. and Ph.D. from Johns Hopkins and was a trustee of the university for many years. Carol Macht obtained an M.A. and Ph.D. from Johns Hopkins in history of art and archeology.

The Alicia Showalter Reynolds Research Award was established in 1996 in memory of Showalter Reynolds, who was a Ph.D. student in the Department of Pharmacology and Molecular Sciences.

The Mette Strand Research Award, established in 1998, honors Strand, who was a professor of pharmacology and molecular sciences.

The Hans J. Prochaska Research Award was created in 1998 in memory of Prochaska, who earned his M.D. and Ph.D. at Johns Hopkins.

The Paul Ehrlich Research Awards are given to candidates in the Ph.D., M.D. and master's programs, and clinical and research fellows, in recognition of their contributions to research.

The Nupur Dinesh Thekdi Research Award was established in 2002 in memory of Thekdi, an M.D.-Ph.D. student at Johns Hopkins.

The Bae Gyo Jung Research Award was created in 2006 by friends and family in memory of Jung, who was a predoctoral student in the biological chemistry department.

The David Yue Research Award was established in 2015 in memory of Yue, a professor of biomedical engineering and neuroscience.

The Paul Talalay Research Award was established in 2017 to honor Talalay, a professor of pharmacology and molecular sciences. Talalay started the Young Investigators' Day program 46 years ago.

The Johns Hopkins Medical and Surgical Association Awards for Postdoctoral Investigation were established in 1981 by the school of medicine to recognize excellence in research by clinical or research fellows at the school. The awards are designated for clinical and laboratory research with direct clinical relevance, and basic laboratory research. The awards are:

The Alfred Blalock Research Award

The A. McGehee Harvey Research Award

The Albert Lehninger Research Award

The Daniel Nathans Research Award

The Helen B. Taussig Research Award

The W. Barry Wood Jr. Research Award

The Claude and Barbara Migeon Postdoc Research Award recognizes outstanding basic research by graduate students and postdoctoral fellows. Claude Migeon (1923–2018) was the director of pediatric endocrinology at the Johns Hopkins University School of Medicine from 1961 to 1994. His early focus on steroid metabolism established the norms of adrenal function during infancy and childhood. He also discovered the genetic cause of some endocrine disorders. Barbara Migeon (1931–2023), a professor emeritus of genetic medicine and pediatrics, was known for her pioneering work on the mechanisms and consequences of X chromosome inactivation among females and its relevance to human disease, and for being the founding director of the school of medicine's Ph.D. program in human genetics. This award honors the contributions of Barbara and Claude Migeon as scientists and devoted mentors of many trainees throughout their careers.

Acknowledgments: The 46th annual Young Investigators' Day program is made possible by generous contributions from the Johns Hopkins Medical and Surgical Association; the office of the dean; friends and family of Michael Shanoff; friends and family of David, Martin and Carol Macht; family of Hans J. Prochaska; friends and family of Drs. Paul and Pamela Talalay; the Department of Pharmacology and Molecular Sciences; Dr. Emanuel Libman; Dr. and Mrs. Dinesh C. Thekdi; Dr. and Mrs. John Vela; friends and family of Bae Gyo Jung; friends, family and colleagues of Dr. David Yue; and many friends and members of the Johns Hopkins University School of Medicine.

3 P.M. WELCOME

Theodore L. DeWeese, M.D.
Interim Dean of the Medical Faculty
CEO, Johns Hopkins Medicine

STUDENT LECTURES

3:05 P.M. THE PAUL TALALAY RESEARCH AWARD

Ultrasound foreign object (UFO) detection: from ex vivo to in-human trials
Haley G. Abramson, Ph.D. Candidate
Biomedical Engineering Program
Department of Biomedical Engineering
Sponsors: Amir Manbachi, Ph.D.,
Nicholas Theodore, M.D.

THE MICHAEL A. SHANOFF RESEARCH AWARD

Investigating Cas9 autoregulation in CRISPR-Cas bacterial immunity
Rachael Workman Sparklin, Ph.D. Candidate
Biochemistry, Cellular and Molecular Biology Program
Department of Molecular Biology and Genetics
Sponsor: Josh Modell, Ph.D.

THE MARTIN AND CAROL MACHT RESEARCH AWARD

Novel biosensor identifies ruxolitinib as a cardiac CaMKII inhibitor
Oscar E. Reyes Gaido, M.D., Ph.D. Candidate
Cellular and Molecular Medicine Program
Department of Medicine
Sponsor: Mark Anderson, M.D., Ph.D.

THE DAVID YUE RESEARCH AWARD

One-dimensional target search processes of chromatin remodelers
Claudia Carcamo, Ph.D. Candidate
Biochemistry, Cellular and Molecular Biology Program
Department of Biophysics and Biophysical Chemistry
Sponsor: Taekjip Ha, Ph.D.

PRESENTATION OF STUDENT AWARDS

3:45 P.M. THE PAUL EHRLICH RESEARCH AWARD

Plasma proteomewide analysis of cerebral small vessel disease identifies novel biomarkers
Gabriela T. Gomez, M.D. Candidate
Neurology Program
Department of Medicine
Sponsors: Rebecca Gottesman, M.D., Ph.D.,
Keenan Walker, Ph.D.

THE METTE STRAND RESEARCH AWARDS

Using computational pathology to investigate tumor microenvironment
Haoyang Mi, Ph.D. Candidate
Biomedical Engineering Program
Department of Biomedical Engineering
Sponsor: Aleksander Popel, Ph.D.

Bispecific Abs promote NK cell-mediated elimination of the HIV-1 reservoir
Nathan Board, Ph.D. Candidate
Biochemistry, Cellular and Molecular Biology Program
Department of Medicine
Sponsors: Robert F. Siliciano, Ph.D.,
Janet D. Siliciano, Ph.D.

THE MICHAEL A. SHANOFF RESEARCH AWARD

Repeated exposure to heterologous hepatitis C viruses is associated with induction of broadly neutralizing antibodies
Nicole Frumento, Ph.D. Candidate
Cellular and Molecular Medicine Program
Department of Medicine-Infectious Diseases
Sponsor: Justin Bailey, M.D., Ph.D.

THE ALICIA SHOWALTER REYNOLDS RESEARCH AWARD

Trafficking of SARS-CoV-2 spike: the early evolutionary genetics of SARS-CoV-2 and the engineering of an exosome-based spike vaccine platform
Chenxu Guo, Ph.D.
Biological Chemistry Program
Department of Biological Chemistry
Sponsor: Stephen Gould

THE DAVID ISRAEL MACHT RESEARCH AWARD

Dynamics of inner membrane surface charge regulates cell polarity and migration
Tatsat Banerjee, Ph.D. Candidate
Chemical and Biomolecular Engineering Program
Department of Cell Biology
Sponsor: Peter Devreotes

THE BAE GYO JUNG RESEARCH AWARD

Quantifying the context-dependent sensorimotor rules underlying web-making
Abel Corver, Ph.D. Candidate
Neuroscience Program
Department of Neuroscience
Sponsor: Andrew Gordus

THE NUPUR DINESH THEKDI RESEARCH AWARD

Gene dynamics of maturation in endogenous and pluripotent stem cell-derived cardiomyocytes
Suraj Kannan, M.D., Ph.D. Candidate
Biomedical Engineering Program
Department of Biomedical Engineering
Sponsor: Chulan Kwon, Ph.D.

THE HANS J. PROCHASKA RESEARCH AWARD

Hypermetabolism in mice carrying a near complete human chromosome 21
Dylan Sarver, Ph.D. Candidate
Cellular and Molecular Physiology Program
Department of Cellular and Molecular Physiology
Sponsor: G. William Wong, Ph.D.

POSTDOCTORAL LECTURES

4 P.M.

THE HELEN B. TAUSSIG RESEARCH AWARD

Identifying mechanisms of peripheral neuropathy: PMP22, CMT1A and HNPP
Kathryn R. Moss, Ph.D., Postdoctoral Fellow
Department of Neurology
Sponsor: Ahmet Höke, M.D., Ph.D.

THE DANIEL NATHANS RESEARCH AWARD

Pathologic mTORC1 signaling and mRNA translation in Parkinson's disease pathogenesis
Mohammed Repon Khan, Ph.D., Postdoctoral Fellow
Department of Neurology
Sponsor: Ted Dawson, M.D., Ph.D.

THE PAUL EHRLICH RESEARCH AWARD

Spatiotemporal macrophage subtype specification guides the formation of tissue regeneration zones in physiological and chronic inflammation
Andreas Patsalos, Ph.D., Postdoctoral Fellow
Department of Medicine and Biological Chemistry
Sponsor: Laszlo Nagy, M.D., Ph.D.

PRESENTATION OF POSTDOCTORAL AWARDS

4:25 P.M.

THE W. BARRY WOOD JR. RESEARCH AWARD

LHFPL5 establishes maximal force-sensitivity of MET channel at cochlear hair cells through an evolutionary conserved mechanism
Xufeng Qiu, Ph.D., Postdoctoral Fellow
Department of Neuroscience
Sponsor: Ulrich Mueller, Ph.D.

THE PAUL EHRLICH RESEARCH AWARDS

A molecular trap inside microtubules probes luminal access by soluble proteins
Yuta Nihongaki, Ph.D., Postdoctoral Fellow
Department of Cell Biology
Sponsor: Takanari Inoue, Ph.D.

Multitarget CRISPR reveals chromatin dynamics during DNA repair
Alberto Marin Gonzalez, Ph.D., Postdoctoral Fellow
Department of Biophysics and Biophysical Chemistry
Sponsor: Taekjip Ha, Ph.D.

THE A. MCGEHEE HARVEY RESEARCH AWARD

Cell-specific regulation of gene expression using splicing-dependent frameshifting
Clayton Pio Santiago, Ph.D., Postdoctoral Fellow
Department of Neuroscience
Sponsor: Seth Blackshaw, Ph.D.

THE ALFRED BLALOCK RESEARCH AWARD

Next-generation miniscopes for multicontrast neuroimaging in awake animals
Janaka Senarathna, Ph.D., Postdoctoral Fellow
Department of Radiology and Biomedical Engineering
Sponsor: Arvind P. Pathak, Ph.D.

THE ALBERT LEHNINGER RESEARCH AWARD

Oxysterol misbalance critically contributes to Wilson disease pathogenesis
Som Dev, Ph.D., Postdoctoral Fellow
Department of Physiology
Sponsor: Svetlana Lutsenko, Ph.D.

THE CLAUDE AND BARBARA MIGEON POSTDOC RESEARCH AWARD

Molecular mechanisms required for AMPA receptor trafficking, learning and memory
Qianwen Zhu, Ph.D., Postdoctoral Fellow
Department of Neuroscience
Sponsor: Richard Huganir, Ph.D.

POSTER PRESENTATION AND RECEPTION

Haley G. Abramson

The Paul Talalay Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
I work in the HEPIUS (Holistic Electrical, Ultrasonic and Physiological Interventions Unburdening Those with Spinal Cord Injury) Innovation Lab with Amir Manbachi and Nicholas Theodore, where I created a technology to perform automatic detection of surgical items that may be retained in the brain during neurosurgery. For example, with hundreds of cotton balls used every day, one may accidentally be left behind and lead to potentially life-threatening immunologic responses in the patient. Cotton balls must be manually counted as they are placed in and removed from the brain, but as they soak up blood to clear the surgeon's field of view, they become visually indistinguishable from the surrounding brain tissue. We discovered that ultrasound can discern these two materials when our own eyes cannot. I developed a deep learning algorithm with 99% accuracy, sensitivity and specificity that identifies cotton balls and other surgical items in ultrasound images of the brain. This technology is paired with a smartphone application that can be used intraoperatively without saving patient health information.

Why did you choose Johns Hopkins for your work?
When I came to Johns Hopkins during my interview weekend, I received the warmest welcome from students who were clearly excited to be there. I was thrilled to join this community at a top research institution, where I have also had incredible opportunities to work side by side with clinicians to solve biomedical challenges.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
I feel so honored to be recognized as a young investigator here at Johns Hopkins and encouraged to continue pursuing biomedical research throughout my career in industry.

What contributed to your project's success?
For each of my thesis projects, I had a clinical mentor and an engineering mentor. Being able to work with neurosurgeons Henry Brem, Judy Huang and Nicholas Theodore on this project put me on the path to success. They allowed me to observe in the operating room so that I understood how best to develop an intraoperative technology. In addition, I have been able to work with Johns Hopkins Technology Ventures to file a patent application on this project, for which we have already licensed an option agreement.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
I love to celebrate the remarkable work done by Johns Hopkins graduate students, and I have been inspired by the successes of previous Young Investigators award winners. It is excellent that Hopkins finds it important to recognize high caliber student research.

What has been your best/most memorable experience while at Johns Hopkins?
As a biomedical engineering Ph.D. student, I had the opportunity to take anatomy with the medical students my first semester. I found this course to be tremendously informative and fascinating, and I enjoyed being able to meet the medical students — some of whom I ended up working with a few years later.

What are your plans over the next year or so?
I just graduated in March! In August, I will join the technology leadership development program at Becton Dickinson, which will help to accelerate my career in the medical device industry.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
I've had some fun jobs. I performed research in a biomechanics lab in France, taught entrepreneurship to high school students in Israel, worked at a health care startup in South Africa, helped develop a bionic eye in Australia and served as a taste-tester for gourmet food groups in New York City.

Tatsat Banerjee

The David I. Macht Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?

Cell migration is a fundamental process that plays a crucial role in a wide array of physiological and developmental scenarios, such as immune response, wound healing, stem cell homing and embryogenesis. On the other hand, its dysregulation often results in different detrimental outcomes, including autoimmune diseases, cognitive deficits and cancer metastasis. As an upshot of extensive research for the past three decades, many signal transduction and cytoskeletal molecules have been identified that collectively work to sense and process different external cues, generate proper polarity and help the cell to correctly navigate via coordinated protrusions and contractions. While numerous specific interactions among many such signaling and cytoskeletal molecules have been deduced through biochemical and genetic analyses, how the activities of so many different components are spatially and temporally coordinated at the subcellular scale has remained unclear. In other words, little was known about the global scale organization mechanisms that determine when and where the next protrusions will form or how polarity will be organized in a migrating cell.

My research, carried out in the labs of Peter N. Devreotes and Pablo A. Iglesias, answered these fundamental questions on cell migration and signal transduction. We demonstrated that the dynamic regulation of inner membrane surface potential is sufficient and necessary to regulate the cell polarity and migration mode. We developed novel monitoring tools and optogenetic actuators that can work in conjunction with standard live-cell imaging setup and genetic/pharmacological perturbations. Using these systems, we established that surface charge on the inner leaflet of the plasma membrane, a biophysical property — not some coincidental congruence of stepwise specific biomolecular interactions — spatially and temporally orchestrate signal transduction activities in the cell to control protrusion formation. Our experiments in Dictyostelium amoeba and different mammalian cells demonstrated that surface charge is dynamically altered during signaling network activation and, in turn, its generic perturbation can induce or inhibit signaling activities that mediate cell migration. It is well known that during propagation of nerve impulse, transmembrane potential can regulate the opening of the specific ion channels, which in turn collectively define the transmembrane potential. Our results indicated that transiently lowered inner membrane surface potential, which we termed "action surface potential," can analogously propagate and interact with signaling network activation.

Why did you choose Johns Hopkins for your work?

I was excited to join Johns Hopkins because it is one of the world's premier biomedical research institutions. Hopkins has cutting-edge research facilities and perhaps more importantly, a close-knit intellectual community, where many of the members are pioneers in their respective research fields. Moreover, I believe the Hopkins ecosystem has a sincere appreciation for the fundamental biomedical research that is curiosity-driven and simply tries to understand the basic rules of life, but often has an incidental impact in developing advanced therapeutics. Overall, Johns Hopkins offers a unique conducive environment to pursue novel ideas in basic sciences. And, I think Baltimore is cool!

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?

I am honored and humbled to receive the David Israel Macht Research Award. I have found that many of the previous awardees went on to have illustrious research careers, and I feel truly privileged to join that exceptional list of Ph.D., M.D, and M.D.–Ph.D. students. Dr. Macht helped establish multiple new biomedical research domains, and I am excited to follow in his footsteps.

What contributed to your project's success?

It is a real privilege to work in Devreotes' and Iglesias' labs. Peter's and Pablo's sagacious guidance in experimental and computational science, respectively, was one of the biggest reasons for the project's success. They offered ample scientific freedom to pursue new ideas while providing unwavering support when difficulties were encountered. All the lab members deserve special thanks as well for their constructive criticisms. I also think that my previous

training in engineering has helped me to think from a different perspective and form new hypotheses. My thesis review committee members, Konstantinos Konstantopoulos and Shigeki Watanabe, have always asked the right questions and provided substantial guidance. Several other faculty members, especially Douglas Robinson, Miho Iijima, Deborah Andrew and Chuan-Hsiang Huang, also generously provided valuable input. And, of course, my co-authors were amazing, and working with them was really exciting!

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
Young Investigators' Day is a fantastic platform that provides tremendous encouragement to graduate students and postdoctoral fellows. Research is often difficult, and hence, recognition always helps! During my time here, I have looked up to many previous Young Investigators' Day award winners, and it feels great to join that cohort. Also, I think the presentations and poster sessions during the event provide wonderful opportunities to discuss science with Hopkins community members from broadly varied research and clinical backgrounds.

What has been your best/most memorable experience while at Johns Hopkins?
It is always fascinating to see experiments actually work after hours of planning, preparation and troubleshooting! Other than that, I vividly remember that I was really excited when I first got the opportunity to join Devreotes' and Iglesias' labs. That was one of my most memorable moments. Additionally, I will always cherish the discussions I regularly had with my lab mates, who came up with fresh viewpoints — on numerous topics, ranging from science to politics, and everything in between!

What are your plans over the next year or so?
I am planning to graduate within a few months and then continue to work in basic biomedical research domains, while fostering a diverse and inclusive environment.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
When I was in school, I was a recitation/elocution artist and a theater actor — I performed in many major auditoriums in our state. Right now, when I have free time, I listen to different types of hip-hop music, read the history of India (and the world), and tinker with my Linux servers and desktops. I also love to watch cricket and soccer. And, last but not least, I sometimes just love to take a quick (or long) nap!

Nathan Board

The Mette Strand Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
For over 38 million people worldwide living with HIV-1, antiretroviral therapy (ART) must be continued indefinitely to prevent progression to AIDS. Although ART can effectively suppress viral replication and prevent or reverse immunodeficiency in most individuals, it is not curative due to the persistence of a rare population of infected cells harboring integrated and transcriptionally inactive HIV-1 genomes referred to as the latent reservoir. A promising therapeutic approach to achieving a cure for HIV-1 is known as "shock and kill." This approach involves selectively inducing HIV-1 gene expression ("shock") followed by immune-mediated elimination of infected reservoir cells ("kill"). Despite therapeutic advances in reversing HIV-1 latency, no significant reduction in the latent reservoir has ever been clinically observed. Prior studies suggest that this apparent lack of reservoir elimination following latency reversal may stem from inefficient killing of reservoir cells by cytolytic immune effector cells. Therefore, to ensure effective clearance of HIV-1-infected cells in the context of "shock and kill," novel immunotherapies must be developed to enhance HIV-1-specific cell-mediated cytolytic activity.

My research in Robert and Janet Siliciano's lab focuses on the development and functional characterization of novel bispecific antibodies, a type of immunotherapy used to enhance cell-mediated killing of specific target cell populations. These bispecific antibodies were designed to promote targeted engagement and lysis of HIV-1-infected cells by cytolytic natural killer (NK) cells. My colleagues and I have demonstrated the ability of the bispecific

antibodies to mediate robust killing of HIV-1 reservoir cells using both primary cells from persons living with HIV-1 and animal models of HIV-1 infection. Thus, these bispecific antibodies represent promising preclinical candidates for therapeutic HIV-1 reservoir size reduction in combination with other agents for latency reversal.

Why did you choose Johns Hopkins for your work?
I chose Johns Hopkins for my graduate training because of the outstanding quality of its research into human diseases and the delightfully collegial nature of its research environment. At Johns Hopkins, I have had the opportunity to engage and collaborate with world leaders in the fields of immunology and infectious diseases. These interactions have greatly influenced how I think about science and helped provide me with confidence to pursue a career in academic research. My experiences at Johns Hopkins throughout my graduate training have made incredibly positive impacts on both my personal and professional lives.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
I am honored and excited to receive this award recognizing the hard work that I, other trainees in the Siliciano lab and our collaborators have contributed to this research project. For me, it is particularly rewarding to receive the Mette Strand Research Award. Strand's early insights into HIV pathogenesis and pioneering usage of antibodies for immune-mediated killing of tumor cells undoubtedly helped to shape the modern bodies of research that this work drew its inspiration from. Moving forward in my scientific career, I will take motivation from Strand's dedication to advancing our understanding and treatment of human diseases.

What contributed to your project's success?
A major factor in the success of my project was the excellent mentorship of my advisers, Drs. Robert and Janet Siliciano. From the very start of my graduate research, they have strongly encouraged and supported my project, despite it representing a new direction for the lab outside their traditional area of expertise. The freedom in direction they have afforded me has ingrained strong senses of independence, creativity and innovation in research that will persist with me for the rest of my career in science. I must also thank the highly collaborative environment of the Siliciano lab for my project's success. This project was a team-based effort and would not have been possible without the contributions of several other graduate and undergraduate students. Having the opportunity to regularly work with and bounce ideas off of other talented and bright-minded trainees ultimately had important constructive influences on the long-term direction and outcomes of this project.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
Young Investigators' Day is a wonderful means of recognizing and showcasing the research of the talented community of students and fellows here at Johns Hopkins. This program speaks volumes to the commitment Johns Hopkins has to supporting the growth of its trainees and inspiring future generations of scientists.

What has been your best/most memorable experience while at Johns Hopkins?
My most memorable experiences at Johns Hopkins were those involving my fellow graduate students. Throughout my training, I have been privileged to meet so many exceptional young scientific minds who have continually challenged me to be my best self and who I am confident will help to shape the future of science. The professional and personal relationships I have developed during my time at Johns Hopkins are certain to last throughout my lifetime.

What are your plans over the next year or so?
I plan to graduate this summer and am currently looking into possibilities for exciting future career paths in research science.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
I've always had a deep appreciation of tabletop games (board games, card games, role-playing games, etc.) for their ability to bring people together to have fun, share meaningful experiences, and inspire diverse creative and critical modes of thought. I currently own over 100 games and don't plan to stop buying new ones anytime soon.

Claudia Carcamo

The David Yue Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?

We discovered that certain cellular factors responsible for altering the way in which the genome is packaged can find their targeted packaging elements by sliding around of DNA like a train on a track, helping these genomic factors locate their targets, which, following the train analogy, are like the destination cities. This is important because without the use of sliding on DNA, the main mechanism by which these cellular factors would find their targets is via random collision in space, which would greatly reduce their targeting efficiency. As a collaboration between the labs of my thesis adviser, Taekjip Ha, and my co-mentor, Carl Wu, we studied the dynamics of several chromatin remodelers when bound to DNA using single particle tracking on optically stretched DNA. Our discoveries are important to the field of chromatin remodeler biology because they expanded the model for how specificity and directionality of nucleosome remodeling events are encoded in eukaryotic genomes. Remodelers active on promoter proximal nucleosomes have been shown to be recruited to nucleosome depleted promoter DNA via nonspecific affinity to free DNA. We show that once bound to this DNA, remodelers perform a 1D search on DNA, and upon encountering nucleosome substrates can exhibit highly processive activity with directionality and specificity that is biased by having encountered the nucleosome via a 1D search process.

Why did you choose Johns Hopkins for your work?

I chose to study at Johns Hopkins because the research community stood out to me as the most collaborative, kind and open of any school I had visited for recruitment. I owe my success to the support I received from the Hopkins community.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?

I feel incredibly honored to have received the David Yue Research Award. It is very clear from having read accounts by those fortunate enough to have gotten to know professor Yue that he made a deep impact on the Johns Hopkins community for having been an outstanding mentor, teacher and scientist. I feel inspired and empowered by this award to challenge myself to craft even more engaging and clear scientific presentations, and hope I should be so fortunate as to mentor a future generation of scientists one day. As a young biophysicist myself, I look up to David Yue as an accomplished and highly regarded biophysicist and am truly honored and humbled to be acknowledged with an award named in his memory.

What contributed to your project's success?

I received a great deal of support during my Ph.D. from my faculty mentors, Taekjip and Carl, and from other lab members, without which my success wouldn't have been possible. A former postdoctoral researcher, Matthew Poyton, initially had the idea of investigating SWR1 chromatin remodeler dynamics on DNA and introduced me to this project. A recent Ph.D. graduate of Carl Wu, Dr. Jee Min Kim, then took the initiative of expanding work I had done on a different remodeler to study diffusion of RSC and ISW2 on DNA. Without Jee Min, the work I submitted for the Young Investigators' Day award would not have been possible. She and I are joint first authors of a manuscript that we are currently preparing for submission on this topic. I am also thankful for the BCMB (biochemistry, cellular and molecular biology) program and to former deputy director, Arhonda Gogos, for supporting me as I searched for my thesis laboratory. I was funded by an NSF GRFP (National Science Foundation graduate research fellowship program) fellowship. Last, but not least, my husband's tireless support was the added push I needed to persevere though many failed experiments.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?

I feel very appreciate for the Young Investigators' Day celebration of young researchers. This award is creating an invaluable network for award recipients, helping connect outstanding young Hopkins researchers, both present and past.

What has been your best/most memorable experience while at Johns Hopkins?
My most memorable experience while at Johns Hopkins has been a personal one. In 2019, I met an outstanding young scientist, Alberto Marin Gonzalez, whom I married in the fall of 2022. Amazingly, he was also recognized with a Young Investigators' Day award this year.

What are your plans over the next year or so?
My plan over the next year is to start postdoctoral research in the Boston area, where I will be moving in August. I am interested in expanding my skill sets further and hope to write successful applications for postdoctoral funding.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
Both of my parents immigrated to the U.S. when they were teenagers — my mother from Italy and my father from Colombia. I connect very deeply with the immigrant experience and can speak both Italian and Spanish fairly well. I spent most of my childhood with my maternal grandmother, with whom I learned to speak a dying dialect of Italian from Calabria. With her, I also developed a love of cooking delicious food. I have one brother, David, whom I am very proud of and who is in a doctoral program in theoretical physics at Yale University.

Abel Corver

The Bae Gyo Jung Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
Many complex behaviors, from language to navigation, consist of the sequential execution of smaller behavioral subunits. It remains poorly understood how animal brains orchestrate such sequences simultaneously at short and long timescales. Spider web-making offers a particularly interesting model in which to study complex sequential behaviors. Orb webs are built in five sequential and distinct phases of construction that collectively span multiple hours, requiring the coordination of subsecond motor actions at the multihour timescale. In the Gordus lab, in collaboration with my co-mentor, Sridevi Sarma, we have developed automated leg and web tracking algorithms that allow us to reconstruct the precise sequencing of motor actions, as well as identify the touch events between the spider and the silk that triggered a given action. These analyses have shown that the geometric stages of web-making emerge due to variations in the transition patterns among smaller motor actions (e.g., leg sweeps, locomotion), and that the triggers for these motor actions are not fixed across stages but are context-dependent. These insights suggest considerable cognitive ability in the spider, and lay the groundwork for probing the neural circuit mechanisms that give rise to these behavioral rules.

Why did you choose Johns Hopkins for your work?
I chose Johns Hopkins for my graduate work because of the quality of faculty research and the department's track record of rigorous graduate education. My initial visits to the school also conveyed a friendly department culture, which has made Johns Hopkins a great place to work these past years.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
I am incredibly grateful to receive the Bae Gyo Jung Award for our research. Web-making is an incredibly beautiful behavior, and like any research project, the technical execution of our analysis posed interesting challenges along the way. It is rewarding to know that the results of our efforts are of interest to the broader scientific community.

What contributed to your project's success?
Our approach to understanding spider web-making combines insights from previous careful manual observations and recent advances in computational tools for modeling animal behavior. This project would not have been possible without my adviser, Andrew Gordus, setting out to establish our spider, U. diversus, as a behavioral, genetic and neural circuit model system, as well as his mentorship over the years. It has been a pleasure to interact with faculty members who have diverse expertise across departments and institutions, from my co-supervisor Sridevi Sarma's expertise in control theory (a collaboration supported by the Johns Hopkins University Kavli Neuroscience Discovery Institute) to the invaluable guidance of my thesis committee,

consisting of Christopher Potter (Department of Neuroscience), Jeremiah Cohen (Allen Institute for Neural Dynamics) and Vivek Jayaraman (Janelia Research Campus).

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
I think Young Investigators' Day is a great tradition. It recognizes the significant efforts invested by graduate students and postdoctoral fellows in their research. I am excited to hear more about the work of my peers face to face and to share our own work.

What has been your best/most memorable experience while at Johns Hopkins?
I have been greatly influenced and inspired by discussions with fellow lab mates, graduate students, postdocs and faculty at Johns Hopkins and collaborating institutions, which have broadened my interests and appreciation for research areas that were previously unfamiliar to me. These connections will continue to influence my thinking and research going forward.

What are your plans over the next year or so?
I am planning to complete my dissertation in the coming year, and will continue to work toward an understanding of arthropod cognition as a postdoctoral researcher.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
Before I became interested in neuroscience, I completed a bachelor's degree in linguistics. Human language is a particularly impressive example of a cognitive ability that is internal-state driven, meaning our language faculty uses different forms of short-term memory to generate sequences with hierarchical structure largely unconstrained by events in our sensory environment. There is a large gap in our understanding and imagination of the types of brain circuits that are capable of implementing such computations. Though my current work on arthropods may seem far removed from such questions, I believe many complex behaviors can be understood in terms of smaller "building blocks." Understanding such building blocks across model systems will likely yield general insight into the computational mechanisms brain circuits use to implement cognitive behavior.

Som Dev, Ph.D.

The Albert Lehninger Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
Wilson disease (WD) is a metabolic disorder of copper (Cu) homeostasis that can present significant diagnostic and treatment challenges. Despite the well-established cause, the mechanisms behind WD pathologies remain only coarsely defined, hindering enhanced therapies' development. At the Lutsenko lab in the Department of Physiology, we have identified specific molecular links connecting Cu overload to changes in the activity of liver X receptor (LXR) in the mouse model of WD.

In Atp7b−/− mice with established liver disease and human WD, Cu overload activates the stress-sensitive transcription factor Nrf2. Nrf2 targets, especially sulfotransferase 1e1 (SULT1E1), are strongly induced and cause elevation of sulfated sterols, whereas oxysterols are decreased. This sterol misbalance results in the inhibition of the LXR and upregulation of LXR targets associated with inflammatory responses. Pharmacological inhibition of SULT1E1 partially reverses oxysterol misbalance and LXR inhibition. Contribution of this pathway to advanced hepatic WD was demonstrated by treating mice with an LXR agonist. We further showed that after the onset of metabolic changes, inflammation, and fibrosis in the WD liver, treatment with an LXR agonist can lessen these manifestations. Thus, our findings indicate that the identified pathway is an important driver of WD pathogenesis downstream of elevated Cu. Modulation of LXR activity should be investigated as a therapeutic approach to supplement chelation in WD.

Why did you choose Johns Hopkins for your work?
My interest in understanding the role of redox metals, especially copper and iron, in Wilson disease led me to join Johns Hopkins. Johns Hopkins is one of the best research universities in the world. In addition, the lab was a perfect fit for me and proved an excellent choice.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
The award means a lot to me, and I hope it will help my career in the future. Having a master's degree in biochemistry, I used to read and study the textbook Lehninger Principles of Biochemistry. I feel honored to receive an award named after the great biochemist Albert Lehninger.

What contributed to your project's success?
The work environment in the lab is the main contributor to my project's success. I continuously receive great support from my mentors (professor Svetlana Lutsenko and Dr. James P. Hamilton) and colleagues, and I appreciate every one of them.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
Motivation is one of the many things that keep us going and let us continue to strive for our dreams. Young Investigators' Day sparks this motivation by recognizing and encouraging young researchers for their outstanding contributions to research excellence at Johns Hopkins. I am grateful to have been selected and will keep working untiringly to contribute to significant research advances in science.

What has been your best/most memorable experience while at Johns Hopkins?
I think it was when my paper was finally published after more than three years of work.

What are your plans over the next year or so?
I want to stay in academia. I am looking for a faculty position.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
I grew up in the mountains (Northwest Himalaya region) in India and was the first person with a doctorate in my village to pursue a career in medicine and science. In my free time, I love reading novels and traveling.

Nicole Frumento, Ph.D.

The Michael A. Shanoff Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
In Justin Bailey's lab, we study the broadly neutralizing monoclonal antibodies' responses against hepatitis C virus (HCV) in individuals who naturally and repeatedly control infection to understand the basic biology behind successful immunity. We discovered potential vaccine antigens for the development of a successful prophylactic HCV vaccine, which is urgently needed to help achieve the World Health Organization's goal of eliminating HCV as a public health problem by 2030.

Why did you choose Johns Hopkins for your work?
I chose Johns Hopkins for the collaborative environment and for the opportunity to do translational and clinical research. The prospect of working at the interface between science and medicine and being able to positively impact patients' health is what drew me to this institution.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
This award recognizes the value and impact of my discoveries and motivates me to keep pursuing important and rigorous research. I have been inspired by previous awardees and consider myself very fortunate to join them this year.

What contributed to your project's success?
Unwavering support from my mentors and fellow scientists helped me tremendously in planning and successfully completing my project. Patience, a positive attitude and teamwork were the keys to my project's success.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
I think the Young Investigators' Day initiative is important to inspire other young researchers, share innovative ideas and recognize the effort of those who drive impactful research forward and often do not receive the credit they deserve.

What has been your best/most memorable experience while at Johns Hopkins?
My most memorable experience while at Hopkins was attending the international HCV conference in Ghent, Belgium. There, I had the chance to present my work in front of many experts in the field and was awarded the best oral presentation prize. It was exciting and fun to travel with my colleagues and connect with international collaborators face to face.

What are your plans over the next year or so?
I recently received my Ph.D., and I will be a postdoctoral researcher in a viral hepatitis lab at the University of Oxford in the U.K., where I will be characterizing vaccine candidates in pre-clinical models and assessing the immunological response of vaccines in patient populations. My long-term goal is to keep expanding my vaccine development knowledge.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
I am an international student from Italy and the first one in my family to go to college and graduate school. I love practicing yoga, visiting friends and family all around the world and reading historical fiction novels.

Oscar Reyes Gaido

The Martin and Carol Macht Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
I performed my thesis research in Mark Anderson's lab, which studies a heart enzyme called CaMKII. Hyperactivity of this enzyme is implicated in many forms of cardiovascular disease, and thus, CaMKII blockade has become an exciting yet unexplored therapeutic strategy. CaMKII inhibitor discovery has been hamstrung by a lack of biosensors suitable for high throughput drug discovery. To solve this, we created a new sensor that reports CaMKII activity with unparalleled sensitivity and kinetics. This new tool enabled us to discover that CaMKII inhibitors already exist among drugs that are safe for human use. We found that ruxolitinib, an FDA-approved drug, is a potent CaMKII inhibitor capable of preventing models of acquired and congenital arrhythmias with minimal toxicity. Our results suggest that ruxolitinib is an ideal candidate for cardiac repurposing, and that it provides a new tool for precise measurement of CaMKII activity in living cells.

Why did you choose Johns Hopkins for your work?
During my time as a Johns Hopkins University undergraduate, I was awestruck with the camaraderie and kindness that permeates our school of medicine. In addition to the world class research, and clinical and educational opportunities, I valued the compassion and collegiality of our faculty. This sentiment proved to be true, for throughout my M.D.-Ph.D. training, I have yet to encounter anything other than selfless mentorship, humility and teamwork from my colleagues and professors. Beyond our institution, Baltimore has become my home, and I was thrilled to continue my service to the Latino community and bolster what our university does for underserved communities.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
It is an utmost honor to receive the Martin and Carol Macht Award. Established three decades ago, it has become a prognosticator of success, and its ranks include world renowned scientific and medical leaders. I am humbled to be included in such an illustrious group, and this bolsters my passion to change the way medicine is practiced through science.

What contributed to your project's success?
I credit my success to the incredible mentors that have supported me. Chief among these, Dr. Mark Anderson is a stellar adviser who has encouraged me through patience, open communication, scientific curiosity and well-being. His unwavering support and trust in my abilities allowed me to explore ideas that many would have deemed too ambitious. This mentality has permeated everyone in our lab and has created a culture of collaboration, mutual guidance and joy. Research is a human endeavor, so finding people that share your passions, enthusiasm and values is pivotal to create a nurturing environment for yourself. In terms of skills, I am a believer that curiosity is the linchpin of scientific success. This hunger for discovery is what drives my motivation to consume literature, plan creative experiments and enjoy every day regardless of the results.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
Young Investigators' Day is a fabulous celebration of the trainees that make up the backbone of this great institution. It also celebrates the mentors that go above and beyond to support their students. This program not only recognizes the passion and creativity fostered at our institution, but it also crystalizes that the research enterprise is only possible through collaboration, collegiality and mutual support.

What has been your best/most memorable experience while at Johns Hopkins?
There are simply too many to count. While there are many memorable scientific moments (including unexpected late-night discoveries or finding out that a monthslong experiment worked), my fondest experiences are ones where colleagues and collaborators transcend to family. Over my 12 years at this institution, I am proud to intertwine with the lives of my colleagues and witness their major life and professional successes. Sharing these moments with people that share my passion for science and medicine is what makes my time here very special.

What are your plans over the next year or so?
I have one year left in my medical school training. After that, I plan on pursuing residency training to become a physician-scientist, spending my time pursuing research and seeing patients.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
Most of my free time is spent caring for my dog, Murphy, alongside my fiancée. I also enjoy playing soccer, nightscape photography and cooking.

Gabriela T. Gomez

The Paul Ehrlich Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
Cerebral small vessel disease is a major cause of stroke and a significant contributor to cognitive decline and dementia. My research with the SCAN (Stroke and Cognitive Impairment Analysis Using Neuroepidemiology) lab involved a data-driven analysis of the plasma proteome to facilitate a deeper understanding of peripheral biological changes that promote small vessel disease and to identify plasma biomarkers that can noninvasively identify individuals at risk for vascular cognitive impairment and dementia. From a panel of nearly 5,000 proteins, we identified 13 that were associated with neuroimaging characteristics of small vessel disease in a large, community-based cohort. Nine of these proteins replicated in one or more external cohort and two proteins remained associated with late-life small vessel disease when measured during midlife. These findings provide the field with select plasma biomarkers

and possible mechanistic mediators that can inform the development of novel therapeutic approaches.

Why did you choose Johns Hopkins for your work?
I first moved to Baltimore for the Johns Hopkins premedical post-baccalaureate program. I chose Johns Hopkins because of the collegial environment and because it is a world renowned center of excellence in aging research and geriatric clinical care. I stayed at Johns Hopkins for my medical and master's degrees not only because of the world class clinical and research training but also due to the nurturing environment for trainees and the empathic mentorship and delivery of health care.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
Receiving the Paul Ehrlich Award is both humbling and meaningful, as it marks the scientific, professional and personal growth I have experienced as a result of the outstanding, longitudinal mentorship of Dr. Keenan Walker and Dr. Rebecca Gottesman.

What contributed to your project's success?
This project's success was largely due to the brilliance of my mentors, Dr. Keenan Walker and Dr. Rebecca Gottesman, and their support of my independence and leadership as a student investigator. The collaborative environment within the SCAN lab — which brings together clinicians and scientists from the Johns Hopkins Department of Neurology, the National Institute on Aging and the National Institute of Neurological Disorders and Stroke — enhanced the innovation and impact of this work. Additionally, my fruitful partnerships with the Cardiovascular Health Study, the Baltimore Longitudinal Study of Aging and the Generation Scotland study throughout this project broadened the generalizability and scope of our work.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
The Young Investigators' Day typifies the culture ubiquitous at Johns Hopkins of nurturing learners and amplifying the work of trainees.

What has been your best/most memorable experience while at Johns Hopkins?
I have had so many memorable experiences throughout my time at Johns Hopkins. One particularly memorable experience was taking a small seminar course, Biological Basis of Aging, led by Joseph Margolick in the Johns Hopkins Bloomberg School of Public Health. Engaging with giants in the field of aging research — including Luigi Ferrucci, Linda Fried and Edward Lakatta, whom I have looked up to for years — on the mechanisms of aging, and even my own research, was very inspiring.

What are your plans over the next year or so?
During the upcoming year, I will be entering my fourth year of medical school and applying to residency.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
I am an avid powerlifter! Powerlifting requires dedication, patience and a focus on holistic health — all qualities that also strengthen my research and growth as a physician in training. Surrounding myself with strong women who are eager to take up space — in and outside of the gym — is very important to me.

Alberto Marin Gonzalez, Ph.D.

The Paul Ehrlich Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
Double-strand DNA breaks are among the most toxic lesions that happen in our genomes. These lesions can cause irreversible genome modifications that have been linked with diseases such as cancer and neurodegenerative disorders as well as aging. To prevent this, our cells have developed sophisticated mechanisms to repair double-strand breaks. In Taekjip Ha's lab, we developed a method to controllably induce double-strand breaks in human cells in high throughput.

This method, which uses multitarget CRISPR (clustered regularly interspaced short palindromic repeats), enabled me to trace DNA repair processes with high temporal resolution over multiple genomic locations. In particular, I have shown how chromatin actively participates in the repair process at different length scales. In the immediate vicinity of the lesion, nucleosomes are quickly and transiently evicted, whereas at longer (megabase pair) scales, the genome undergoes extensive 3D reorganization and folds around the lesion. These findings could potentially guide the discovery of new drugs that target DNA repair pathways in diverse diseases.

Why did you choose Johns Hopkins for your work?
In 2019, I visited Taekjip Ha's lab as a short-term exchange graduate student from Madrid. I was impressed by the high quality of research being done in the lab, the department, and the university in general. Also, I found the environment extremely friendly and collaborative. As a result, once I completed my Ph.D., I decided to return to Hopkins and join Taekjip Ha's lab as a postdoctoral researcher.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
I feel extremely grateful to receive the Paul Ehrlich Award. Professionally, this award feels like an important stepping stone toward my goal of leading a lab doing cutting-edge science. And from a personal perspective, I am very honored to be selected as a Young Investigators' Day awardee. I have met awardees from previous years whom I deeply admire.

What contributed to your project's success?
My mentor, Taekjip Ha, gave me the freedom to explore the topic I found most interesting and the support to take a new direction that no one in the lab was pursuing. My colleague, Roger Zou, was also critical to the project's success — he provided me with the training I needed to perform sequencing experiments, and openly shared his discoveries and tools with me.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
I think it is an excellent initiative to acknowledge the students and fellows here at Hopkins.

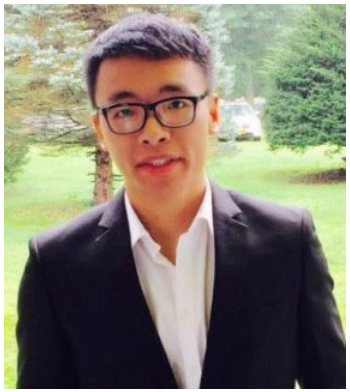
What has been your best/most memorable experience while at Johns Hopkins?
I met my wife here at Hopkins in 2019, and will always feel grateful to the university for that. Incidentally, she is also a Young Investigators' Day awardee this year.

What are your plans over the next year or so?
I will move to Harvard Medical School this coming summer to further my postdoctoral training in Taekjip Ha's lab, and I hope to continue finding excellent collaborators with whom to conduct exciting cutting-edge science.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
I love traveling around the U.S. — I recently traveled to New Orleans, Denver and Shenandoah National Park. I hope to get to know even more cities and national parks in the near future. I love reading history books and spending time with my friends. I am also an avid chess player.

Chenxu Guo, Ph.D.

The Alicia Showalter Reynolds Research Award



Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
I conducted my research in Stephen Gould's lab, where we focus on advancing science at the intersection of organelle biogenesis and human diseases, specifically in the areas of biogenesis and engineering of small extracellular vesicles, including exosomes, viruses and virus-like particles. My research spans a broad spectrum. I have made original scientific discoveries in the areas of exosome biogenesis and mammalian cell transgenesis, advancing our understanding of a fundamental cell biological process and using these advances as a road map for the design and manufacture of exosome-based vaccines and therapeutics. Moreover, I have made significant contributions to the fight against SARS-CoV-2 by elucidating the molecular mechanisms underlying the evolution

of its spike mutations. These studies revealed that the furin cleavage site insertion disrupted spike sorting and functions, while the D614G mutation acts as an intragenic suppressor of these deleterious effects. Investigation of spike trafficking also provided me with information to synergize my projects and create exosome-displayed SARS-CoV-2 Spike and influenza hemagglutinin vaccines that allow for rapid production at high efficiency and induce strong immune responses at low antigen dose.

Why did you choose Johns Hopkins for your work?
I chose Johns Hopkins for my work because of its rich history and unparalleled reputation in the field of biomedical research. Johns Hopkins has played a significant role in shaping the landscape of medical education and research and has served as a model for numerous other medical schools. Its commitment to excellence and innovation, coupled with its world renowned faculty and cutting-edge resources, provided an ideal environment for me to pursue a Ph.D. degree via groundbreaking research. In addition, the collaborative atmosphere, along with the Johns Hopkins-AstraZeneca Scholars Program, fosters a dynamic intellectual community, enabling me to learn from and contribute to the ongoing advancement of biomedical science.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
Receiving the Alicia Showalter Reynolds Research Award is an incredible honor to me, both personally and professionally. It validates my efforts and signifies that my research is contributing to the scientific community. Although I don't have a direct connection to Alicia Showalter Reynolds, I deeply appreciate the significance of this award named in her memory. Alicia was a dedicated and talented Ph.D. candidate at Hopkins when her life was tragically cut short. This award serves as a reminder of her passion for research and her contributions to the Hopkins community. Being a recipient of this award motivates me to continue striving for excellence in my work and to honor her memory through my own achievements in biomedical research.

What contributed to your project's success?
The success of my project can be attributed to several key factors. First and foremost, I am deeply grateful for the exceptional mentorship and guidance from my adviser, Dr. Stephen Gould. His unwavering support and encouragement were instrumental in shaping my research journey. I also want to acknowledge the failures and challenges I encountered along the way, as they provided invaluable learning experiences and ultimately contributed to my discoveries. My commitment to the scientific community has been a driving force behind my work, especially during the early days of the pandemic. Instead of staying home, I chose to step up and have been actively engaged in the fight against COVID-19, leveraging our expertise in protein trafficking and the collaborative team efforts to develop COVID-19 vaccines and serology tests, and to elucidate the genetic and molecular mechanisms underlying the early evolution of the SARS-CoV-2 spike.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
Young Investigators' Day is a wonderful opportunity to celebrate the dedication and hard work of students and fellows at Johns Hopkins. It highlights the crucial roles they play in advancing research and facilitating a culture of innovation. As a recipient of the Alicia Showalter Reynolds Research Award, I am incredibly proud to be part of this vibrant scientific community and feel a deep sense of gratitude and responsibility. I am inspired to continue making meaningful contributions to its ongoing success in the field and to be one of the next generation of researchers shaping the future of biomedical science.

What has been your best/most memorable experience while at Johns Hopkins?
One of my most memorable experiences at Johns Hopkins was the opportunity to collaborate with leading biopharmaceutical companies, like AstraZeneca, AbbVie and Capricor Therapeutics. These collaborations not only provided me with valuable industry insights, they also reinforced my passion for translational research. I am also deeply grateful for the friendships and connections I made during my time at Hopkins, which have enriched my life and will continue to inspire me in my future endeavors.

What are your plans over the next year or so?
I am still weighing my options between pursuing a senior scientist position at a leading pharmaceutical company or continuing my research as a postdoctoral fellow at a university.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
In addition to my diverse educational background in economics, chemistry and biology, I have a wide range of interests that extend way beyond sciences. I am passionate about playing basketball, which has not only kept me physically fit but also helped me develop teamwork and leadership skills that translate well into the research environment. My love for driving and exploring new places has led me to travel extensively, exposing me to different cultures and broadening my perspective on the world. This sense of exploration and curiosity also fuels my passion for scientific discovery.

Suraj Kannan

The Nupur Dinesh Thekdi Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
The clinical motivation for our work in Chulan Kwon's lab is the need for cardiac cells for regenerative therapies, particularly for patients who have suffered heart attacks and have damaged heart muscle, as well as for drug screening purposes. One highly promising approach under investigation is the use of cardiac cells derived from pluripotent stem cells (PSCs), including patient-derived induced PSCs. However, PSC-derived cardiac cells have thus far been immature, resembling fetal instead of adult cardiac tissue. This, in turn, has significantly limited their clinical use. My project studied developmental processes underlying cardiac maturation, and identified a transcription factor regulatory network that controls this maturation process. We are hopeful that by targeting this network in the future, we can develop mature cardiac tissues that can benefit patient cardiac health.

Why did you choose Johns Hopkins for your work?
Everyone says this, but that's because it's true — it's the people! From the moment I stepped into my interviews — one of them with David Yue, the namesake of another Young Investigators' Day award — through the ups and downs of medical and graduate school, I have been surrounded by a vibrant community of brilliant and collaborative thinkers. And it's not just the medical acumen, of course, but the collegiality and kindness — there have always been people to provide me with the support I needed to push through professional and personal challenges and succeed.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
The M.D.–Ph.D. program at Johns Hopkins is a very tight-knit family — you feel an instant bond, whether it's with someone a couple of years below you or someone who graduated 20 years ago. This award is named for a beloved member of our program, and I'm incredibly grateful to have the chance to be touched by his legacy.

What contributed to your project's success?
Something I have tried to develop over my research career is an appreciation of different perspectives and expertise in tackling challenging problems. In the case of my dissertation work, a lot of the prior research in cardiac maturation had been approached from a tissue engineering angle, and indeed, that was where my initial interests began. However, my project really took off when we instead applied a developmental biology approach, thinking about how tissue maturation differed in the dish versus over normal development. This was a very new field to me, and so I was heavily guided by my P.I., Dr. Chulan Kwon, who is very much a development biology wizard.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
Science relies on constant innovation, excitement and rejuvenation — and it's often young investigators who are poised to bring thrilling new ideas to the forefront. As a bastion of scientific excellence, Hopkins has done a tremendous job cultivating young scientists, and the resumes of the Young Investigators' Day winners are a clear testament to that. I'm thrilled to be a part of this celebration.

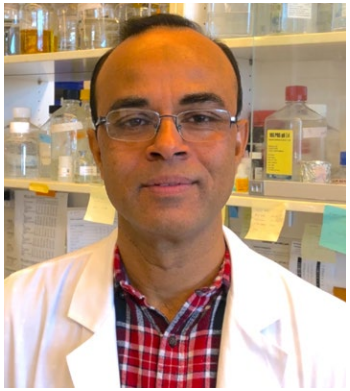
What has been your best/most memorable experience while at Johns Hopkins?
Too many to name — I've formed so many wonderful memories! But a particularly sweet memory has been lifting the school of medicine Olympics banner three times with my beloved Daniel Nathans college — the most excellent college.

What are your plans over the next year or so?
I will complete my M.D.-Ph.D. this spring and start internal medicine residency on the Osler service at Johns Hopkins. From there, I am hoping to pursue a clinician-scientist career in cardiology and heart failure, with the goal of developing regenerative cardiac therapies.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
Music is a big part of my life. In addition to playing guitar, I'm an avid music listener, and I love heading down to Fell's Point to check out the latest local bands (the Cat's Eye is my favorite hang). I have also been having fun recently setting up my vinyl record collection — I've been fiddling with old turntables from the '70s and '80s, and stocking up on records at some of Baltimore's lovely local stores.

Mohammed Repon Khan, Ph.D.

The Daniel Nathans Research Award



Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
We discovered the function of toxic α-synuclein (α-syn) protein aggregates in the pathogenesis of Parkinson's disease (PD). Pathologic α-syn aggregation is a central event in Parkinson's disease progression. Therefore, understanding the function of pathologic α-syn aggregates makes a significant conceptual advancement toward finding drug and biomarkers for this disease. We report that pathologic α-syn binds tuberous sclerosis complex 2 (TSC2) protein and disassembles TSC1-TSC2 complex that leads to persistent mTORC1 activation and mRNA translation. Inhibition of mTOR and translation by pharmacological and genetic approaches rescue pathology and neurodegeneration in PD models. I performed this research in the lab of Ted and Valina Dawson at the Institute for Cell Engineering in the Department of Neurology.

Why did you choose Johns Hopkins for your work?
Johns Hopkins Medicine is the leader in biomedical research. After getting a Ph.D. in neuroscience, my goal was to pursue research in neurodegenerative disease, and I found the best Parkinson's disease research lab here at Johns Hopkins.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
Receiving the Daniel Nathans Research Award is truly inspiring and encouraging — I really feel honored. When I joined Johns Hopkins Medicine, I saw successful trainees and postdocs receive these awards. Certainly, this award will be a great motivation for me to pursue a career in academia.

What contributed to your project's success?
I am particularly thankful for my mentors, Ted and Valina Dawson, for the opportunity to pursue this interesting project, and their unconditional support and guidance from beginning to end. I had strong graduate training at Kausik Si's lab in the Stowers Institute, which tremendously complemented this research project. Additionally, collaboration with Taekjip Ha's lab has significantly advanced our understanding in this project. Lastly, I am grateful to my family and friends for their sacrifices and continuous support.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
It is really hard to be successful without recognition and encouragement, whatever job you do. Young Investigators' Day at Johns Hopkins is truly a great way to recognize trainees, fellows and students.

What has been your best/most memorable experience while at Johns Hopkins?
One of the best memorable experiences at Hopkins was the independence in choosing and accomplishing my postdoctoral training project. And, of course, tremendous support from mentors, colleagues and collaborators.

What are your plans over the next year or so?
Currently, I am a research associate in neurology and am looking for an independent faculty position in academia.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
I was born and grew up in a rural Bangladeshi village, where I enjoyed enough freedom to do whatever I wanted. That might have contributed to my current effort and originality. I also love to play sports — soccer, cricket and many others.

Haoyang Mi

The Mette Strand Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
My research projects focus on the quantitative characterization of the tumor microenvironment (TME) to better understand the mechanism of cancer progression and anti-tumor immunity. Specifically, I am fascinated by the crosstalk of different cell populations within the TME in the spatial domain. Using multiplexed tissue imaging and image processing techniques, I was able to distinguish single-cell identities and their spatial locations from pathological samples of various cancer types. Using a combination of spatial statistics and machine learning, I was able to distill key spatial features that can be used to predict cancer patients' likelihood of response to therapy and survival term. For example, my approaches revealed that the proximity of a rare subtype of myeloid — CD163- Arginase+ macrophage — to helper T cell favors improved anti-tumor immunity in hepatocellular carcinoma. Remarkably, the immunosuppressive role of myeloid cells was also observed in pancreatic cancer and non-small cell lung cancer. These findings suggest novel therapeutic candidates in immune-oncology research may benefit the design of future clinical trials and facilitate precision medicine. I conducted my research in Aleksander Popel's lab. Our lab is devoted to applying systems biology approaches to solve problems related to cancer and ocular and cardiovascular diseases.

Why did you choose Johns Hopkins for your work?
I chose Johns Hopkins for its multidisciplinary community of biomedical research and the close relationship to clinical care. This diverse environment encourages me to keep open minded and pursue novel ideas.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
I have always looked up to past award winners. I followed Chen Zhao's footprint — one of our lab's recent alumni, who won the Bao Gyo Jung Research Award in 2020 — to dive deep and pursue serious science. It is a great honor to receive this award, and I consider it a very encouraging acknowledgement of my work. It also motivates me to continue my research in the field of digital pathology.

What contributed to your project's success?
I owe most of my achievements to my incredible mentor, Aleksander Popel, who provided support and understanding over these years. He inspired me with his unique perspective gained from rich experience as a cancer researcher and engineer. Dr. Popel has been a role model for me. His dedication to science motivates me to pursue my career seriously. In addition, I am fortunate to work with many prominent researchers within and outside of Johns Hopkins, including Dr. Elizabeth Jaffee, Dr. Lisa Coussens from Oregon Health and Science University and Dr. Tricia Cottrell from Queen's University. Their guidance is invaluable to me. Finally, I would like to thank my family for their unconditional support throughout my academic journey, which has been crucial to my success.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
I think the program provides a great platform for students and fellows to showcase their research. The biomedical research community at Johns Hopkins has become stronger and larger each year, and Young Investigators' Day offers an opportunity for members to be aware of current frontiers and new achievements.

What has been your best/most memorable experience while at Johns Hopkins?
The white coat ceremony was my most memorable experience at Hopkins. I felt so honored the moment I wore the coat and took the oath with my cohort, and I was so proud that I was officially among those who fight for human lives with our knowledge and devotion.

What are your plans over the next year or so?
I am planning to finish my Ph.D. in the next two years. After that, I envision myself working as a research scientist at pharmaceutical companies in the field of digital pathology to promote new drug discovery and development.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
Just as I enjoy exploring the sophisticated environment of human cancer, I am also obsessed with the mystery of the universe. I am an astrophotographer — that is, I bring the beauty of stars, planets and nebulae, which are invisible to human eyes, to life with my telescopes and cameras.

Kathryn R. Moss, Ph.D.

The Helen B. Taussig Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
It is remarkable that both increased and decreased dosage of the peripheral myelin protein 22 (PMP22) gene causes peripheral demyelinating neuropathy. PMP22 duplication causes Charcot-Marie-Tooth disease type 1A (CMT1A), and PMP22 deletion causes hereditary neuropathy with liability to pressure palsies (HNPP). Charcot-Marie-Tooth disease (CMT) is the leading cause of inherited peripheral neuropathy, with a prevalence of 1:2,500, and CMT1A and HNPP account for the majority of CMT cases (~62%). CMT1A and HNPP symptoms vary regarding age of onset and severity, but both diseases cause peripheral nerve deficits, which most commonly include muscle weakness, reduced sensation and neuropathic pain in distal limbs. Although CMT1A and HNPP dramatically impact patient quality of life and burden the health care system, only supportive treatments are currently available to patients. My research in the Höke lab has focused on advancing our understanding of CMT1A and HNPP pathophysiology and identifying pathomechanisms causing these diseases in order to facilitate therapy development. My results suggest that primary myelin dysfunction drives CMT1A pathogenesis because muscle atrophy occurs prior to evidence of secondary axon degeneration. Additionally, I identified Schmidt-Lanterman incisure density and organization defects in CMT1A myelin that appear to begin during development and are likely detrimental to peripheral nerve function. These findings provide important insight into CMT1A pathogenesis and reveal novel targets for designing candidate therapeutics.

Why did you choose Johns Hopkins for your work?
The neuromuscular division of the Department of Neurology at Johns Hopkins is one of the best places in the world to train as a scientist studying peripheral nerve diseases. The abundant resources available at Johns Hopkins to support my research were also a draw.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
I am honored to have been selected to receive the Helen B. Taussig Research Award, and I am grateful to be recognized as I am nearing the completion of my postdoctoral studies at Johns Hopkins. My research is not directly related to Taussig's work in pediatric cardiology, but she is an inspiration given that the goal of my research is to facilitate therapy development for CMT1A and HNPP.

What contributed to your project's success?
My project has been successful thanks to my adviser, Dr. Ahmet Höke, amazing colleagues in the neuromuscular division, critical collaborations with cell adhesion experts, access to cutting-edge equipment through Johns Hopkins core facilities and my determination to improve the lives of patients with CMT1A and HNPP.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
Young Investigators' Day is a wonderful tradition that celebrates the discoveries of up-and-coming scientists and brings the Johns Hopkins community together to exchange new ideas and technology. I am excited and honored to participate in the Young Investigators' Day program this year.

What has been your best/most memorable experience while at Johns Hopkins?
Immersing myself in the field of peripheral nerve disease research and being surrounded by experts in this field have been the highlights of my postdoctoral studies at Johns Hopkins.

What are your plans over the next year or so?
I am planning to transition to an independent faculty position in the near future. My research program will be focused on understanding how altered PMP22 gene dosage causes peripheral nerve dysfunction and identifying novel therapeutic targets for CMT1A and HNPP.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
My research interests stem from my personal history with CMT1A as a patient. This experience has been the primary driver of my scientific career and has provided me with unwavering motivation and a unique perspective for tackling key research questions.

Yuta Nihongaki, Ph.D.

The Paul Ehrlich Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
Microtubules, a dynamic network of protein filaments, are involved in many essential cellular functions, and the dysregulation of microtubule regulation is often associated with a wide range of human diseases, such as cancer and neurodegeneration. Because of their unique hollow structure, microtubules have luminal space, and there is accumulating evidence that microtubule properties are modulated by protein interactions on their luminal surface. This raises a primitive question: How can proteins enter the microtubule lumen, which is surrounded by densely packed tubulin dimers? Under the mentorship of Dr. Takanari Inoue, I developed "luminal molecular trapping," which for the first time allowed for real-time visualization of molecular accessibility to microtubule lumens. By utilizing this technique, I discovered that soluble proteins efficiently enter the lumen through their peripheral ends and side lattice openings. The present luminal trapping strategy laid the foundation for probing luminal microtubule biology and has potential in extending the study to uncovering regulations of effector proteins and tubulin post-translational modifications.

Why did you choose Johns Hopkins for your work?
I chose Johns Hopkins for its reputation as a leading research institution and its strong commitment to both biology and engineering. I was particularly

drawn to Dr. Takanari Inoue's group, which provided an ideal environment for my research at the interface between cell biology and chemical biology.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
Receiving this award is a tremendous honor and validation of the hard work and dedication I have put into my research. Professionally, it will help to establish me as a recognized leader in my field and open up new opportunities for collaboration and advancement. Receiving the Paul Ehrlich Award is particularly meaningful to me because Ehrlich had a profound impact on modern chemical biology.

What contributed to your project's success?
Several factors contributed to the success of my project. One of the most important was the guidance and mentorship I received from Dr. Takanari Inoue, who helped me to develop the technical skills and scientific knowledge necessary to conduct high quality research. Additionally, I was deeply supported by my lab mates in both formal and informal ways.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
I think Young Investigators' Day is a fantastic opportunity to showcase the outstanding work being done by students and fellows at Hopkins. It is a celebration of the next generation of scientists and a chance to recognize the important contributions they are making to research in a variety of fields. I am honored to be a part of this tradition and excited to see the incredible work being done by my peers.

What has been your best/most memorable experience while at Johns Hopkins?
I have had many opportunities to work with diverse scientists, from biophysicists to chemical engineers. It really helped me expand my thoughts and technical skills.

What are your plans over the next year or so?
I am finishing up my job search and will start my own lab in this year.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
I enjoy playing mahjong, a tile-based game popular in East Asia. It is a skill-based game, but it also involves luck. I believe science is also a game of both, and this belief makes me uniquely productive as a scientist.

Andreas Patsalos, Ph.D.

The Paul Ehrlich Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
Duchenne muscular dystrophy (DMD) is a lethal, X-linked, childhood-onset degenerative disease caused by mutations in the dystrophin protein, which is responsible for maintaining muscle integrity and function. The prolonged occurrence of degeneration events in dystrophic muscle leads to chronic inflammation, insufficient repair and the progressive loss of muscle mass that is replaced by fibrosis and fat, leading to significant mobility impairments and loss of ambulation. There is currently no cure for DMD, but there are drug and gene therapy efforts to convert the disease to a milder but more inflammatory form of dystrophy. One novel approach we have been studying is to modify immune cells, particularly macrophages, to prevent muscle loss and promote regeneration. Finding effective and targeted immunomodulatory treatments that can re-program inflammation and bias it toward regeneration without systemically suppressing the immune system is a major unmet clinical need.

Our research aims to understand the mechanisms controlling regenerative inflammation in acute injury and dystrophy, specifically focusing on the role of recently discovered macrophage subtypes and their secreted growth factors. One of the highlights of our work is the discovery that these macrophage subsets guide the formation of structurally distinct damage-clearing and regenerative inflammation tissue zones. Our compelling high-dimensional

data — single-cell and spatial transcriptomics — and advanced imaging techniques indicate that these layered regenerative tissue zones are sensitive to intermittent glucocorticoid immunosuppression (current DMD standard of care), and that they can be easily detected using a validated antibody panel and thus warrant the reevaluation of other current DMD-focused treatments on muscle regeneration. The work performed in Laszlo Nagy's lab at the Institute for Fundamental Biomedical Research at the Johns Hopkins All Children's Hospital highlights the importance of macrophage-organized regenerative inflammation tissue zones, and their targeting can be potentially exploited to improve outcomes in DMD.

Why did you choose Johns Hopkins for your work?
I chose Johns Hopkins for my postdoctoral training because of its exceptional reputation as a research institution that conducts world renowned, groundbreaking research while fostering a collaborative environment. Johns Hopkins offers an extraordinary environment, great infrastructure and abundant resources to do top-notch research. Moreover, my research interests were aligned with professor Nagy's research topics, and the Department of Medicine features a diverse group of labs that investigate the role of the innate immune system in disease and disease progression. I am immensely proud to be part of this supportive scientific community.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
It is an incredible privilege to receive this award in honor of Paul Ehrlich, a Nobel laureate who conducted groundbreaking research in the fields of hematology, immunology and chemotherapy. Ehrlich's enormous contributions to understanding immune responses have influenced the fields of immunology and medicine for generations, leaving behind an enduring legacy. This award inspires me to continue my academic journey in harnessing the power of the immune system to resolve tissue injury and promote regeneration. Being in the company of great scientific minds who have received this award humbles me.

What contributed to your project's success?
In my view, mentorship and collaboration are two critical factors for achieving success in science. My mentor, professor Laszlo Nagy, has been an unwavering source of support both personally and professionally, offering invaluable advice, training and collaborative opportunities, and resources. Professors Nagy and Timothy Osborne, our institute's directors, have consistently demonstrated the importance of maintaining curiosity and enthusiasm for academic research. Additionally, I have had the privilege of collaborating and working alongside exceptional graduate students, lab technicians, postdoctoral fellows and senior faculty from multiple labs across various universities, such as Laszlo Halasz, Darby Oleksak, Xiaoyan Wei, Lee Sweeney and David Hammers, among many others.

What thoughts do you have about Young Investigators' Day itself as a celebration of the roles students and fellows play in research at Johns Hopkins?
Young Investigators' Day is a special occasion in the Johns Hopkins community, dedicated to celebrating the accomplishments of trainees. Such events play a significant role in fostering a sense of recognition and appreciation among trainees. It's worth noting that the success and impact of research are often attributable to the perseverance of students and fellows who relentlessly push forward. While the journey can be both rewarding and thrilling, it demands unwavering dedication and countless hours of hard work. Therefore, I am thrilled that Young Investigators' Day acknowledges and honors the tireless efforts of trainees who contribute to pioneering research at Johns Hopkins.

What has been your best/most memorable experience while at Johns Hopkins?
One of my most memorable experiences at Johns Hopkins was when my colleague, Laszlo Halazs, and I successfully implemented our high-dimensional data integration pipeline into our workflow. It took us months of rigorous testing, coding, debugging and troubleshooting to find the right parameters and bioinformatic tools that could overcome the technical constraints of the technology. Ultimately, our efforts bore fruit, enabling us to enhance our data set's resolution and uncover the immune cell landscape of acute injury and DMD-associated pathology. I cannot stress enough the significance of Laszlo Halasz's bioinformatic expertise in driving this project forward.

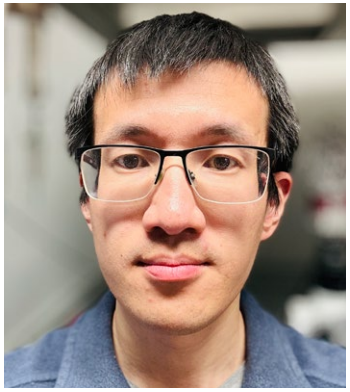
What are your plans over the next year or so?
In the short term, I intend to publish the research findings presented here, wrap up other ongoing projects and submit applications for development grants that will facilitate my transition toward independence. As a recent recipient of my U.S. permanent resident card, I am looking forward to advancing on the academic ladder, and I am optimistic about the prospect

of seeking faculty positions in the next year. My ultimate goal is to establish my own laboratory, advance the field of tissue repair and regenerative inflammation, and continue making significant contributions to the scientific community.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
Practicing archery is a passion of mine. I have competed at an international level with the Cyprus national Olympic recurve team, and archery serves as my primary leisure activity outside of the laboratory to maintain my mental and physical well-being. Archery allows me to hone my focus, clear my mind and remain committed to achieving my future objectives.

Xufeng Qiu, Ph.D.

The W. Barry Wood Jr. Research Award



Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
The mechano-electrical transduction (MET) by the sensory hair cells of the inner ear is crucial for sound perception. Over the last several decades, studies on hair cell MET have demonstrated that the channel machinery is assembled from an astonishing number of diverse molecules, yet the molecular and cellular functions of those proteins in MET remain uncharacterized. I've been working in the laboratory of Uli Mueller in the Department of Neuroscience, where my research has focused on uncovering the mechanisms by which various MET channel subunits assemble and cooperate to sense mechanical stimuli in cochlear hair cells. We believe the studies are fundamentally important for understanding the molecular mechanism of sound sensation in physiological and pathological conditions.

Why did you choose Johns Hopkins for your work?
The Johns Hopkins University School of Medicine is one of the best places for research, with great opportunities to collaborate with the best scientists from various backgrounds.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
It's really a great honor, and I am so excited to receive this award. I feel genuinely inspired by W. Barry Wood Jr. for his contributions to science and to the university. Receiving this award inspires me to continue pursuing my own academic journey.

What contributed to your project's success?
My project is really a long-time journey overcoming challenges. I am so lucky that I could work together with my mentor, Uli, and my colleagues, whose hard work and determination to never give up led to the success of this project.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
I believe Young Investigators' Day is a valuable platform for trainees to share their incredible work, and it helps motivate young investigators at the early stages of their careers.

What has been your best/most memorable experience while at Johns Hopkins?
My most memorable experience at Hopkins was the moment we proposed and confirmed a new model for my project, which had been trapped there for three years. The moment makes the years of hard work and persistence valuable and inspires me to move forward in my career.

What are your plans over the next year or so?
I am going to seek a faculty position to continue my future research.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
I grew up in a small town in the southeast of China. I left my hometown after high school, since I was inspired by the old Chinese phrase, "Read 10,000

books and travel 10,000 miles," which means read extensively and experience as much as possible. My most special experience in Baltimore was becoming a father, which is filled with challenges and happiness.

Clayton Santiago

The A. McGehee Harvey Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?

The use of gene therapy has the potential to treat a variety of diseases, including those affecting the retina. However, it's essential to have precise control over the expression of the therapeutic gene to avoid any harmful side effects. One possible approach is to use minimal promoters and enhancers to regulate gene expression through cell-specific transcription factors. However, this strategy has drawbacks, such as unpredictable and leaky expression patterns across cell types and possible suppression during disease. We developed a novel approach called splicing-linked expression design (SLED) to address these limitations in gene therapy. SLED involves linking cell-specific splicing events with robust constitutive promoters to control gene expression. We successfully demonstrated the potential of SLED for gene therapy by creating an SLED vector that can effectively rescue photoreceptors in an animal model with retinal degeneration. We believe this approach could pave the way for more effective and safer gene therapy strategies to treat a variety of diseases.

Why did you choose Johns Hopkins for your work?

The research environment at Johns Hopkins is truly exceptional and unparalleled. The institution provides cutting-edge facilities and abundant resources — a clear indication of their unwavering commitment to supporting researchers. Hopkins also fosters a culture of collaboration, attracting some of the most gifted scientists globally. Among them is Seth Blackshaw, a pioneering researcher in the field of retinal development, whom I have known since my graduate days. Throughout my time knowing him, I have been struck by his exceptional research skills and innovative use of technology to address scientific questions. When I was given the opportunity to join his lab, I was thrilled to embark on research aimed at unraveling the molecular mechanisms that control retinal development and disease.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?

With his distinguished career as a researcher, clinician and teacher, Harvey was a true pioneer in his field. As a postdoctoral fellow, I am both honored and humbled to be selected for the A. McGehee Harvey Award from among so many talented peers. This recognition is a wonderful acknowledgement of my hard work and serves as motivation to continue striving for excellence in my research and teaching endeavors.

What contributed to your project's success?

Seth has been an incredibly inspiring and supportive mentor for my research projects. I cannot overstate how much I benefited from his wealth of experience and expertise. He provided me with the freedom to explore scientific questions that interest me, which has been invaluable for my growth as a researcher. I am also incredibly grateful for members of the lab, who have been a great source of support, offering constructive feedback and encouragement. I have worked with some fantastic undergraduate and post-baccalaureate students, such as David Espinoza, Megan Gimmen and Taqdees Gohar, who have helped advance the projects I've worked on. Finally, collaboration has been a critical component of my success as a scientist. I have had the privilege of working with some exceptional researchers, such as Jonathan Ling, Mandeep Singh, Robert Johnston and Edward Levine, among many others. Their contributions have been instrumental in advancing my research and furthering my understanding of the field.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?

I think Young Investigators' Day is a fantastic opportunity for the Hopkins community to celebrate and recognize students and fellows who play critical roles in cutting-edge research that further advances the field of medicine. These distinctions will inspire young scientists to continue to push boundaries and make groundbreaking discoveries.

What has been your best/most memorable experience while at Johns Hopkins?
I am very lucky to have many memorable experiences while at Hopkins, including obtaining incredible scientific data and meeting some fantastic people that shaped my career. Having said that, my most significant experience was the birth of my son, which was truly life changing.

What are your plans over the next year or so?
In the near future, my goal is to complete several ongoing projects in the lab and prepare them for publication. Afterward, I plan to seek out faculty positions with the ultimate aim of establishing my own research program focused on investigating the mechanisms that regulate late-stage retinal fibrosis and developing innovative therapies for the treatment of retinal disorders.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
I love collegiate athletics, and I am a big fan of the Florida Gators. During my time as a graduate student, I went to every possible sporting event on campus. It is an incredible experience to be in a college stadium filled to capacity with thousands of other fans cheering on your team.

Dylan Sarver

The Hans J. Prochaska Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
In Dr. G. William Wong's lab, I uncovered a biological process that can effectively prevent high-fat diet-induced weight gain and progression toward type 2 diabetes. While initially studying the effects trisomy of the 21st chromosome (Down syndrome) has on systemic metabolism and the development of metabolic disease, I serendipitously discovered the presence of an extremely strong futile cycle within the skeletal muscle of one of our mouse models. Quite amazingly, the presence of this particular futile cycle directly promotes continuous energy (ATP) depletion. This, in turn, drives the energy production pathways of the body, which results in massive calorie utilization and energy expenditure. The resultant organism is almost completely resistant to gaining weight and does not develop many of the hallmark signs of type 2 diabetes. This work provides very helpful insight and proof-of-concept to this anti-obesity pathway, which could be harnessed as a treatment for obesity and diabetes.

Why did you choose Johns Hopkins for your work?
The Department of Cell and Molecular Physiology was the leading reason I chose Johns Hopkins to pursue my graduate training. The combination of a wealth of intellectual resources and the great people that make up the department won me over. I absolutely made the right choice. Dr. G. William Wong has been nothing but an amazing source of scientific inspiration. Our constant diving into the unknown has fostered my creative and critical thinking skills immensely. It has been a great honor to learn and grow alongside him throughout my time as a Hopkins graduate student.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
The Hans J. Prochaska Award recognizes outstanding research contributions to the biomedical community. I feel extremely thankful and very lucky to have received such a meaningful award. I will continue my path in science with the great enthusiasm, creativity and scientific rigor Dr. Prochaska showed in his.

What contributed to your project's success?
Some of the key factors driving the success of this research would have to be luck, effort and curiosity. Without any one of these, the project would have been nearly impossible.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
It's nice to have a day like this to highlight some of the great work happening at Hopkins. I feel this event only scratches the surface of great things happening on campus.

What has been your best/most memorable experience while at Johns Hopkins?
This is a nearly impossible question to answer because there have been so many. It cannot be narrowed down to a simple technical feat nor a day or month that went my way. I believe the memory that will stick with me the longest is the feeling that accompanies an environment created to foster creativity and discovery. Dr. G. William Wong did an amazing job making sure my passion for science only grew with time. I am extremely grateful for this and will do my best to stimulate the passion and enthusiasm of my future trainees in the same manner.

What are your plans over the next year or so?
In the next year, I will be pursuing a postdoc to expand my scientific training. My goal is to one day have a lab of my own, and this will keep me moving in that direction.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
I have a number of hobbies. Some of my favorite include training jujitsu, making music and graphic design. These all help keep my mind healthy and creative.

Janaka Senarathna

The Alfred Blalock Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
Neuroscientists rely on small animal models to study the brain in exquisite detail. However, today's brain imaging devices are massive, require anesthesia and often limit imaging to less than an hour. While miniature devices that allow brain imaging in behaving animals exist, they can only image neuronal or vascular function, not both, and only permit imaging for a few hours. These limitations significantly diminish our capacity to study brain function and restrict our understanding of the neurovascular unit and its role in brain diseases. To address this critical gap, with the mentorship of Drs. Arvind Pathak and Nitish Thakor, I developed a new class of miniature and implantable brain imaging devices dubbed "multicontrast miniscopes," which for the first time enables studying both neuronal and vascular activity in freely behaving animals continuously over a 24-hour period. Multicontrast miniscopes would be tools of choice for the modern neuroscientist and enable an entirely new class of neuroimaging experiments, making possible breathtaking neuroscientific discoveries.

Why did you choose Johns Hopkins for your work?
I chose Johns Hopkins because it offered a unique combination of expertise in the core fields of biology and engineering. This invaluable "para-disciplinary amalgamation" of research thinking enabled me to create cutting-edge biomedical devices that tackled critical biological problems with fundamental engineering principles.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
I can still remember watching the movie Something the Lord Made 10 years ago as a young graduate student. This was the story of how Alfred Blalock and Vivien Thomas pioneered a surgical solution to the blue baby syndrome at Johns Hopkins, which was based on their extensive preclinical research of similar disease models. The movie spoke volumes to me, especially as I was going through similar struggles to what Blalock and Thomas faced, designing my own biomedical imaging devices. Later on, I used to look up the portraits of Blalock and Thomas hung near the main loop of the hospital and made a point to describe them any time I took a new student on a campus visit. At times when I wandered through the corridors of the research buildings, I have often seen hanging on the walls various faded grayscale photographs of previous residents at the hospital with Blalock posing as their proud mentor, and the residents have signed their name and thanked Blalock for his mentorship. This has been a pleasant sight to me, as I also consider it a great virtue to mentor students, and have proudly mentored more than 20 thus far. For these reasons, receiving the Alfred Blalock Research Award means a lot to me and inspires me to reach greater heights.

What contributed to your project's success?
There have been so many failures, and I believe many more are to come, but great mentorship, collaborators, amazing students and sheer perseverance are what keep us going as a team.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?
Students and fellows invest an unbelievably massive amount of physical and mental effort, and valuable time in their research. I believe events like Young Investigators' Day play a vital role in acknowledging these sacrifices and investments, and create a platform for us to grow both professionally and personally.

What has been your best/most memorable experience while at Johns Hopkins?
I am an engineer by profession and was a newbie to biology at the beginning of my research career. Therefore, watching for the first time a movie of in vivo neuronal calcium activity in the mouse auditory cortex obtained using the imaging device I built is a memory I will never forget.

What are your plans over the next year or so?
I am actively looking for faculty positions and am excited to start my own research program.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
I grew up in Sri Lanka, where there was a two-decade-long brutal war. Although we were in the city, far away from the war zone, I lived in anticipation of suicide bombers and realized firsthand the value of human life and lasting peace. As I look at what's happening in today's world, it gives me a unique perspective on life and humanity. In the past, I've also been a stage actor, mainly directing and acting small comedies, and was an avid toastmaster.

Rachael Workman Sparklin

The Michael A. Shanoff Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
Just like humans, bacteria utilize immune systems to detect, evade and eliminate infectious elements such as viruses. In Dr. Joshua Modell's lab, we study many bacterial immune mechanisms, but my research focuses on the prokaryotic adaptive immune system CRISPR-Cas. The quandary that drove my thesis work is how bacteria can balance the benefits of immunity with the inevitable costs of carrying an immune system. We discovered that some bacteria repurpose the immune effector Cas9 to auto-regulate the production of the CRISPR-Cas system components. Furthermore, we found that this auto-regulatory mechanism, although it reduced immunity overall, was ultimately beneficial to the cells in minimizing autoimmune costs. Our work reveals an important mechanism through which bacteria can stably maintain immune systems while providing insights into novel functions of Cas9, as well as insight into regulators that could shape next-generation Cas9 therapeutic applications.

Why did you choose Johns Hopkins for your work?
Prior to beginning my Ph.D., I was a technician in the Johns Hopkins biomedical engineering department, developing methods and analysis techniques for long-read sequencing applications in the lab of Dr. Winston Timp. During my technician years, I got to know the broader JHU (Johns Hopkins University) community and collaborated with researchers in many departments. One thing that really stuck with me was how my opinions and insight were valued by P.I.s, postdocs and Ph.D. students throughout the campus, even though I did not have a Ph.D. myself. Overall, I found the collegiality and the resources available at Johns Hopkins to be unparalleled and didn't want to be anywhere else for my Ph.D. research.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
Receiving this award is incredible validation of the work I have done and continue to do, and it is an honor to be included in the list of Michael A. Shanoff and other Young Investigators' Day award winners whom I respect and admire.

What contributed to your project's success?
Beginning my Ph.D. with expertise developing sequencing applications and troubleshooting molecular assays allowed me to hit the ground running with my thesis work. What kept me motivated day to day was the excitement of assembling a molecular puzzle and poring over new data to see how it fit into or reshaped that puzzle. But most importantly, my lab mates and P.I. were all inextricably linked to my project's success. The world class guidance, insight and mentoring provided by my thesis adviser, Josh Modell, the hard work of lab technicians Teja Pammi and Binh Nguyen, and the unconditional support, humor and baked goods from my friend and bay mate, Marie Stoltzfus, all greatly contributed to my project's success.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
Students and fellows are both the backbone and heart of research at Hopkins. Any opportunity to celebrate their dedication, resilience and accomplishments is important, inspirational and motivating to future students and fellows.

What has been your best/most memorable experience while at Johns Hopkins?
Our cohort's coating ceremony was postponed and virtual because of COVID, so my friends and I had a picnic lunch and did our own white coat photo shoot in Patterson Park near the pagoda. It was wonderful to be able to celebrate this accomplishment together, think about how far we had come, and to get great pictures out of it as well.

What are your plans over the next year or so?
I hope to graduate this year and will be pursuing a research career in industry.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
Throughout my time as a Ph.D. student, I have been involved in fostering cats and kittens for the Baltimore Animal Rescue and Care Shelter (BARCS). I have been able to help over 40 animals get out of the animal shelter and into their new homes, several of which are the homes of Hopkins students and P.I.s.

Qianwen Zhu, Ph.D.

The Claude and Barbara Migeon Postdoc Research Award

Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?
A significant challenge in neuroscience is identifying the cellular and molecular processes underlying learning and memory formation. Decades of remarkable research have found that synaptic plasticity, especially long-term potentiation (LTP), is a highly compelling cellular model of learning and memory, which requires ionotropic glutamate receptor (AMPA receptor [AMPAR]) insertion into synapses. Many AMPAR interactors have been discovered to involve the regulation of AMPAR trafficking, but less is known about their necessity in contributing to learning and memory. In Richard Huganir's lab, my research investigates whether AMPAR interactors (GRIP1, NSF and PKMζ) are required for synaptic plasticity and memory formation, by using powerful genetic manipulations combined with electrophysiological and behavioral approaches. We have found that GRIP1 is necessary for hippocampal LTP and memory by facilitating AMPAR trafficking, and this provides insights into designing a potential therapeutic target for autism spectrum disorder. In two other studies, we proved the well-known molecules NSF and PKMζ are not required for synaptic plasticity and hippocampus-related memory. Our discoveries expand and revise the current molecular model of synaptic plasticity and help to develop comprehensive understandings of cell signaling events that contribute to learning and memory.

Why did you choose Johns Hopkins for your work?
I chose to work as a postdoc at Johns Hopkins because I was inspired by many significant research discoveries here, and I was attracted by the collaborative research environment and cutting-edge techniques.

What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?
It's my great honor to have the Claude and Barbara Migeon Award. I think it's a professional milestone that will encourage me to follow my research interests and pursue my scientific career. After reading Dr. Migeon's biography, I admire her persistence and contribution to fundamental biological research in both roles of a female scientist and a mother, and she has become one of my scientist role models.

What contributed to your project's success?
I'm very grateful for all the support and guidance I received from my mentor, Dr. Huganir, and team members. This work required multiple techniques in the fields of genetics, physiology, biochemistry and behavior. In particular, I owe a great deal of appreciation to my graduate mentor, Jianyuan Sun, and past colleague, Shu-Ling Chiu, for the electrophysiology training they have provided while in the lab.

What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles student and fellows play in research at Johns Hopkins?
I really appreciate Young Investigators' Day because it is an important event that highlights the cutting-edge research being conducted at the university and recognizes the hard work and dedication of graduate students and postdocs.

What has been your best/most memorable experience while at Johns Hopkins?
My most memorable experience at Hopkins was a celebration in 2018 for my mentor, Dr. Huganir, who had been working at Johns Hopkins as an investigator for 30 years. Many fantastic researchers in neuroscience were invited to present their work. During the ceremony, I had professional chats with speakers and past lab members that benefited my networking.

What are your plans over the next year or so?
After publishing my current work, I will look for a research position at biotech/pharmaceutical companies to pursue my career in translational science.

Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?
Learning new skills gives me lots of fun in my daily life. I enjoy baking fancy cakes that I serve to family and friends. I completed a marathon and won a swim competition while in college. Recently, I've been addicted to learning ice skating and skiing.