

M C B TRANSCRIPT

DEPARTMENT OF MOLECULAR & CELL BIOLOGY, UNIVERSITY OF CALIFORNIA, BERKELEY

Eric Betzig: Berkeley Attracts Its 22nd Nobel Laureate

According to Eric Betzig, the best science often occurs when things collide – or, more specifically, when scientists of different disciplines bump into each other. He should know about

innovative science: Betzig won the 2014 Nobel Prize in chemistry for his work developing super-resolution fluorescence microscopy, which allows scientists to look inside cells and see the pathways of individual molecules.

This summer, he'll become UC Berkeley's eighth active Nobel Laureate, bringing its list of lifetime faculty members to 22. He'll perform research at Lawrence Berkeley National Laboratory (Berkeley Lab) and will join the

faculty in the Molecular Biophysics and Integrated Bioimaging Division of the Biosciences Area. He'll also serve as a professor in the Departments of Molecular & Cell Biology and Physics and as a member of the Helen Wills Neuroscience Institute.

Betzig, who describes himself as an inventor with a physics education, comes to campus from the Howard Hughes Medical Institute's Janelia Research Campus in Ashburn, Virginia. He was drawn to Berkeley because of its reputation as a world leader in imaging, and for its extremely broad disciplinary reach. Ultimately, he'd like to help create an advanced imaging center to attract scientists from all over the world, promoting creative collaboration on the Berkeley campus and beyond.

After winning science's highest honor, Betzig wants to find a new direction that's both impactful and risky. "There's nothing left for me to prove in microscopy," he says. "At Berkeley I want to feel scared again. I have nothing to lose."



Eric Betzig Photo: Matt Staley

Na Ji: Biophysicist Alumna Returns to Campus as Faculty

This summer, UC Berkeley will also welcome biophysicist Na Ji, renowned for her development of optical imaging technology and its application in neurobiology. In addition to serving as

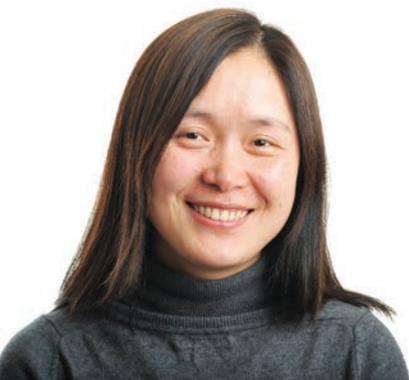
an associate professor in the Departments of Molecular & Cell Biology and Physics, Ji will be a member of the Helen Wills Neuroscience Institute.

Ji, too, comes from the Howard Hughes Medical Institute's (HHMI) Janelia Research Campus, but for her the move to Berkeley is a kind of homecoming. She earned her PhD here in chemistry and looks forward to returning not only to the excellent research community but also to "the idealism and freedom of

thought" the campus is known for. And there's another key reason she's attracted to Berkeley: the high caliber of its graduate students.

Ji has made major advances in sharpening microscopy images using adaptive optics for studying the activity of neural circuits. "This method can be applied to many other systems, including plants, materials, and cancer cells," Ji says. "I'm excited by the potential collaboration here to broaden applications of my technology."

Together, this dynamic duo will be involved in new imaging initiatives that have the potential to revolutionize both basic and translational life sciences. "Having Eric and Na at Berkeley will have a transformative impact on our efforts to establish a super-resolution live cell imaging center that will serve the entire Bay Area science community," says Robert Tjian, professor of biochemistry and molecular biology and former HHMI president.



Na Ji Photo: Matt Staley

Undergraduate Research and Discovery: Brenda Cruz

Growing up in the tiny agricultural town of Delhi in California's Central Valley, Brenda Cruz didn't have many role models for higher education. Few of her high school peers planned to go to college, and no one else in her family had done so. But when Cruz decided to pursue her bachelor's degree, she chose not to attend UC Merced nearby, but Berkeley – seemingly a world away.

Once she arrived on campus as a pre-med student however, the range of options felt a bit overwhelming. She'd hear her



Brenda Cruz

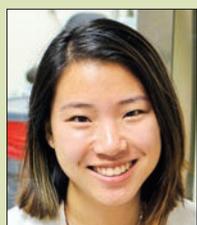
graduate student instructors talking excitedly about their research, but “it all felt abstract and intimidating,” she remembers. Cruz began applying as a sophomore for undergraduate research positions and last fall, as a third-year MCB major, she was funded through the Biology Scholars Program to work for a year in the cell and developmental biology lab of Professor David Weisblat.

Cruz now spends three afternoons a week studying the embryogenesis of leeches to characterize how the species grows in life stages from eggs to adult. Why leeches? “Since their embryos are so big, we can see the cells more clearly,” Cruz explains. “Our main focus is studying genes that regulate development.” Gene cloning, with its many steps, and embryo microinjections are among the procedures she's become experienced with.

Undergraduate research programs like the Biology Scholars Program benefit everyone involved, from students to mentors and departmental culture as a whole. “Undergrads bring a fresh enthusiasm, and sometimes even new ideas, to a project,” says Weisblat. “They provide valuable extra hands, and equally valuable mentoring experience for graduate students and postdocs. And, of course, they keep us up to date on current slang and social media trends.”

A grant from the National Science Foundation Summer Research Experience for Undergraduates will enable Cruz to continue her work through the summer. After graduation, she plans to attend graduate school or medical school.

Undergraduate Research Spotlights



< **Jessica Hong**, Drubin Lab, MCB-CDB senior. Working in the Drubin Lab since freshman year, Hong has earned authorship on a research publication for her contributions to the analysis of force-generating mechanism during endocytosis. She says, “Learning from my mentors in the Drubin-Barnes Lab has easily been my most valuable experience at Cal.”



< **Stacie Ong**, Bateup Lab, MCB-NEU senior. After transferring from City College of San Francisco, Ong got the highest grade in MCB 160: *Introduction to Neurobiology* in her first semester at Berkeley. Ong says lab experience provides “perspective on the constant collaboration, debate, creativity, and dedication that is involved in the research process.”



< **Lucian DiPeso**, Vance Lab, MCB-I&P senior. DiPeso developed live-microscopy methods to monitor the process of pyroptotic cell death in real time. Regarding his undergraduate research experience, he says, “I'm hard-pressed to think of a better, friendlier group of people from whom to learn the ins and outs of scientific research than the people at the Vance Lab.”

Photo on masthead: from Lucian DiPeso's research



< **Daniel Cardozo Pinto**, Lammel Lab, MCB-NEU and Psychology senior. Pinto wrote a peer-reviewed article that was accepted for publication in *Pharmacology Biochemistry and Behavior*. He's earned multiple honors and awards, including an Amgen Scholarship, SURF fellowship, Phi Beta Kappa membership, and ABRCMS and SACNAS travel grants to present his work at meetings.



< **Nazineen Kandahari**, Dillin Lab, MCB-I&P and Public Health senior. Professor Dillin describes her as very intelligent with a deep commitment to serving underrepresented and immigrant communities through medicine and scientific research. Kandahari says, “Researching in the Dillin Lab has been the highlight of my undergraduate career,” an experience that enabled her to “transition from student to scientist.”



< **Grant Schroeder**, Harland Lab, IB senior. Harland lab Postdoc Amy Shyer says Schroeder has “designed and successfully carried out multiple pivotal experiments in the lab – one earned our paper a chance to be reviewed in a top journal, and the other formed the basis of an NIH grant.”

Entrepreneurship at MCB: The Bakar Fellows Program

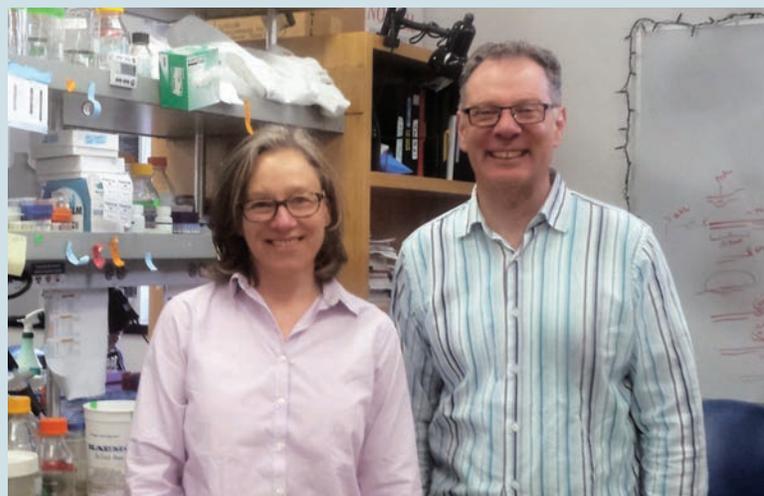
According to *Forbes* magazine, UC Berkeley is ranked as one of the nation's most entrepreneurial universities. It rates first for serial founders and second for venture-capital-backed start-ups. Over the past decade, it's estimated that Berkeley spin-off companies have raised more than \$14 billion, which has positive impacts on state, national, and global economies.

One reason for this entrepreneurial achievement is the Bakar Fellows Program, an innovative Berkeley initiative started in 2012 to promote STEM+ research with commercial promise. To date, seven companies have been launched by Bakar Fellows and several more are underway.

With the startup KarnaTeq, Kathy Collins – a professor of biophysics, biochemistry, and structural biology and Walter and Ruth Schubert Family Chair – is developing and marketing a technology to capture genetic information embedded in cancer cells' RNA. Her techniques may lead to scalpel-free "liquid biopsies" that could eliminate surgeries, speed up diagnoses, and reduce medical costs.

James Hurley – a professor of biophysics, biochemistry, and structural biology and Judy C. Webb Chair in MCB – is studying autophagy (which literally means "self-eating") to develop a new drug that can help neurons and other cells clear out damaged mitochondria and other debris – a process essential to the survival of our cells. Neurons are most vulnerable to damage when autophagy slows down due to aging or illness, and a reduction in autophagic capacity is linked to such neurodegenerative conditions as Parkinson's Disease.

For both Collins and Hurley, the Bakar Fellows Program has enabled them to bring their science much closer to the marketplace. "From learning about the economy of information



Bakar Fellows Kathy Collins and James Hurley

to legal advice, QB3 incubators, and options for space and budget, the program has taught me how to consider the market, not just scientific breakthrough," says Collins. "And because of its track record, the Bakar Fellows award brings attention from angel investors."

Hurley agrees. "The Bakar fellowship funding has allowed my lab to carry out small molecule screens for inducers of key enzymes that activate autophagy," he says. "This provides the proof of principle that we need to attract investors and leverage these discoveries into drug development."

MCB Industrial Affiliates Program

The Molecular & Cell Biology Industrial Affiliates Program (IAP) offers innovative companies the opportunity to recruit outstanding students and postdocs from a top-ranked department, exposure to cutting edge research, and rewarding scientific exchange with our faculty.

Engage with our outstanding community by:

- **Networking** with our acclaimed department of 100 faculty, 250 postdocs, 250 graduate students, and 1,000 undergraduates.
- **Recruiting** entrepreneurially minded students and postdocs who are pursuing bold new ideas to transform outcomes for our health, our environment, and our economy.
- **Discovering** the breadth of our department's groundbreaking research across a broad range of specialized disciplines.

To become an IAP member or to learn more, visit our website at:
<http://mcb.berkeley.edu/iap>



MCB Giving Back: The Prison University Project

Berkeley's reputation for academic rigor often extends to unexpected places. One of the most unexpected may be at San Quentin State Prison, which lies just across the San Francisco Bay. For the past five years, Emma Carroll, Shion Lim, Brock Roberts and Adam Williamson have worked with incarcerated students through the Prison University Project (PUP), which enables inmates to earn an Associate of Arts degree. Many PUP alumni have gone on to matriculate at other colleges and universities after their release from San Quentin.

Carroll, Lim, Roberts, and Williamson are just a few of the current and former MCB graduate students and postdocs who volunteer their time with PUP, teaching such classes as chemistry with lab, physics with lab, English, and math. Recently the group even collaborated with two neurobiologists – Moe Turner of Berkeley and Charlie Gross of Princeton – to develop a team-taught biology with lab course supported by the University of California, San Francisco Science Education Partnership.

A typical class period doesn't differ much from one at Berkeley, says Williamson: lively lectures and discussions, pre-labs and lab report write-ups, and projects or presentations. Carlos is one of the program's enthusiastic participants. "Biology with lab was by far the most exciting and thought-provoking class I've ever taken," he recently wrote. "It's hard to imagine how you guys got the approval to bring in microscopes and human organs!" He closed with the news that he hopes to pursue a science career upon his release, as he waits for final sign-off on his impending parole.

Launched in 1996, the Prison University Project is the only on-site, degree-granting college program in the entire California State prison system. It currently serves about 330 students, two-thirds of whom are enrolled in college-level courses. The recidivism rate for new offenses among PUP graduates who leave prison is just 4 percent, compared to 19 percent for all prisoners released statewide in the same timeframe. In 2015, the program received the 2015 National Humanities Medal.

Carroll joined PUP in order to share her passion for science and to give back to the community. She's been impressed by her students' enthusiasm and "how deeply they think about what they're taught. They always show up at study hall prepared and with a list of questions about the homework. One student asked me if there were actually jobs in science." On a personal level, Lim has enjoyed the way her experience has "opened up conversations about teaching, science, and the country's prison system in unexpected ways. I've enjoyed sharing my experience in an educational environment that most of the public may not have any experience with."

Above: Phil, Eddie, Rosario, Carlos, and Adam Williamson (PhD MCB 2012) watch living cells move around a slide.

Danny, Jerome, and Brock Roberts (PhD MCB 2015) check out a sample on a microscope.



Marion Nestle, Food Maven

Marion Nestle calls herself “a long-lapsed molecular biologist.” The renowned food writer originally set her sights on a career in bench science but switched to the classroom when she found postdoc work hours too much to balance while raising two small children. After a few years of teaching, “I was assigned a nutrition course and it was like falling in love,” she remembers. “I’ve never looked back.”

The years since then have been filled with innumerable achievements. Coauthoring the 1988 *Surgeon General’s Report on Nutrition and Health*. Creating the field of Food Studies at New York University. Writing the seminal *Food Politics* (2002) and seven subsequent books. Appearing in seven documentaries, including *Supersize Me* (2004) and *Food, Inc.* (2008). In 2011, *Forbes* magazine listed Nestle second among “the world’s seven most powerful foodies.”

“When we started Food Studies in 1996, everyone thought we were crazy – why would anyone want to study food?” she says. “Now most American universities, and many worldwide, have some kind of food program.”

Nestle received her BS from UC Berkeley, Phi Beta Kappa, in 1959, before pursuing her PhD (molecular biology) and MPH (public health nutrition), also from Cal. She was named Public Health Hero by the School of Public Health in 2011.

“As I look back, what I learned at Berkeley was how to think critically about science,” she says. “I can read and assess nutrition research quickly, then offer opinions based on what I know within a broad scientific context – and nobody messes with me about science. I may be criticized for my opinions, but never for their scientific foundations.”



Marion Nestle Photo: Bill Hayes

CLASS NOTES

- **Joanne Adamkewicz** (PhD 1999) is a Biomarker Scientist at Genentech, where she focuses on understanding disease biology and developing new medicines in hematology.
- **Kevin Berlin** (BA 2011) is a Privacy Engineer at Google, where he has been working for the past six years.
- **Kristina Byers** (BA 2015) is currently working in pharmaceuticals and was recently accepted into medical school.
- **Laura Corral** (PhD 1997) co-founded Freya Bioscience, Inc., a company focused on improving women’s health care, and is currently working to develop a diagnostic test for early-stage ovarian cancer.
- **Michael Espino** (BA 2015) is matriculating into an MD/PhD program this summer at either UCLA or Icahn School of Medicine at Mount Sinai.
- **Chris Lew** (BA 2016) works at a biotech strategy consulting firm, DeciBio Consulting, in Santa Monica.
- **John Maa** (BA 1990) is a General Surgeon at Dignity Health in San Francisco and Chair of the Tobacco Related Disease Research Program at the UC Office of the President.
- **Joanna Maltbaek** (BA 2014) is currently a PhD student in Immunology at the University of Washington.
- **Jakob von Moltke** (PhD 2012) is a new Assistant Professor of Immunology at the University of Washington.
- **Babak Razani** (BA 1996) is an Assistant Professor of Medicine and Pathology/Immunology at Washington University where he researches atherosclerosis, obesity, and diabetes and sees cardiology patients in the clinical setting.
- **Jeremy Rock** (BA 2004) will be starting his own lab next year as an Assistant Professor at Rockefeller University in NYC.
- **Umeet Sajjan** (BA 2016) is a Litigation Paralegal at Computer-Law Group LLP.

*MCB Transcript welcomes stories from our alumni.
Let us know what you’ve been up to!*

Email us at transcript@mcb.berkeley.edu

NEW & NOTEWORTHY

Faculty News



< Professors **Jamie Cate** and **Christopher Chang** were elected to the American Academy of Arts and Sciences.

Cate Photo: BerkeleyLab / Roy Kaltschmidt



< Professor **Rebecca Heald** received the UC Berkeley 2016 Faculty Award for Excellence in Postdoctoral Mentoring. This marks the second time she has received the award during her tenure at Berkeley.



< Professor **Diana Bautista** has been appointed the Class of 1943 Memorial Chair. This chair is rotated among UC Berkeley disciplines and departments at the discretion of the Chancellor.



< Physics and MCB affiliate Associate Professor **Ahmet Yildiz** was honored with the Michael and Kate Bárány Award from the Biophysical Society. He also received a Vilcek Prize for Creative Promise, which was established to encourage and support young immigrants who have already demonstrated exceptional achievements, and who often face significant challenges early in their careers.



< Professors **Russell Vance** and **Matthew Welch** were named new fellows of the prestigious American Academy of Microbiology by the American Society for Microbiology, an honor bestowed on only 15 other MCB faculty since the early 1990s.



< Assistant Professor **Polina Lishko** received the 2017 Matthew P. Hardy Young Andrologist Award of the American Society of Andrology. This prestigious award recognizes individuals who are young scientific leaders and rising stars in the field of andrology.



< UC Berkeley alumnus (PhD 1983, Thorner Lab) and UCSF Professor **David Julius** has been awarded the 2017 Canada Gairdner International Prize for his groundbreaking pain research.



< After departmental and campus Budget Committee review, **Craig Miller** was granted tenure. Congratulations Associate Professor Miller!



< Assistant Adjunct Professor **Jacob Corn** has received a \$4 million grant from the California Institute for Regenerative Medicine (CIRM) to develop CRISPR-Cas9 genome engineering into a cure for sickle cell disease. Funding will support the ongoing collaboration between the Corn lab, physicians, and sickle cell experts Mark Walters and David Martin of UCSF Benioff Children's Hospital Oakland Research Institute (CHORI), and stem cell and gene therapy specialist Don Kohn of UCLA.



< Professor **John Kuriyan** has been honored with the 2017 Stein and Moore Award of the Protein Society, which recognizes eminent leaders who have made sustained, high-impact research contributions to the field. Photo: Kevin Wolf



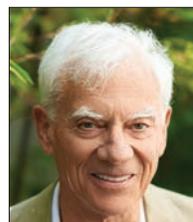
< Assistant Professor **Gloria Brar** received an American Association of Anatomists Young Investigator Award and presented the R.R. Bensley Award Lecture at the association's April 2017 meeting.



< Assistant Professors **Elçin Ünal** and **Stephen Brohawn** received 2016 NIH Director's New Innovator Awards, which support "exceptionally creative, early-career investigators who propose innovative, high-impact projects."



< Chair of the Bioengineering Department and MCB Affiliated Professor **Dan Fletcher** was one of the thirteen UC Berkeley faculty who were named Chan Zuckerberg Biohub Investigators. Photo: Bruce Coo



< Professor of the Graduate School **Frank Werblin** will receive the eighth annual Jay Pepose '75 Award in Vision Sciences from Brandeis University.



< Professor **Jennifer Doudna** was presented with the Luminary Award at the 2017 Precision Medicine World Conference. She also received the Japan Prize in the Life Sciences, the BBVA Foundation Frontiers of Knowledge Award in Biomedicine, and was runner-up for TIME's 2016 Person of the Year Award. The European Patent Office announced its intent to issue a broad patent for the CRISPR-Cas9 gene-editing technology to UC Berkeley, the University of Vienna, and Emmanuelle Charpentier. She was named a 2017 Miller Senior Fellow, and also received the 2017 Cotton Medal from Texas A&M University. Photo: Keegan Houser



< Professors **Randy Schekman, David Drubin, and Douglas Koshland** were named ASCB Fellows by the American Society for Cell Biology. They are recognized for their lifetime achievements



in advancing cell biology. Professor David Drubin was also recently appointed as a Senior Fellow of the Allen Institute for Cell Science. Schekman Photo: Elena Zhukova

Graduate Student & Postdoc News

The Outstanding Graduate Student Instructor (OGSI) Awards:

Across campus, this award annually honors more than 200 UC Berkeley GSIs for their outstanding work in the teaching of undergraduates. In MCB, the honors went to:

Liliya Gabelev, Lishko Lab; **Mathew Summers**, Feller Lab; **Kelsey Van Dalfsen**, Brar Lab; **Helen Vander Wende**, Brar Lab; **Mark Stepaniak**, C. Miller Lab; **Gilberto Garcia**, Dillin Lab; **Zichong Li**, Zhou Lab; **Frederick Ward**, Cate Lab; **Eduardo Ansaldo Gine**, Barton Lab.



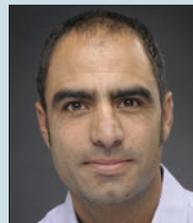
< MCB Postdoctoral Researchers **Michelle Antoine**, in Professor Daniel Feldman's lab, and **Adam Perez** in Professor Jeremy Thorner's lab, have both received prestigious Ford Foundation Fellowships.



< **Benjamin Oakes**, a graduate student working in the labs of Professor Jennifer Doudna and Assistant Professor David Savage, received one of the IGI Entrepreneurial Fellowships. This new fellowship catalyzes the translation and commercialization of transformative scientific products by supporting critical foundational research and professional networking for two years.



< **Ryan Morrie**, a graduate student in Professor Marla Feller's lab, was awarded the 2017-2018 University of California Dissertation-Year Fellowship.



< Assistant Professor at Montana State University, **Blake Wiedenheft**, a former postdoctoral scholar in the Doudna Lab, received a Presidential Early Career Award for Scientists and Engineers (PECASE).



< Professor Nipam Patel's graduate student, **Aaron Pomerantz**, was one of four awardees from around the world that the iBiology video site recognized with its 2017 Young Scientist Seminars (YSS) award. This award recognizes outstanding young scientists who are talented communicators.



< Postdoctoral researcher **Thibaut Brunet**, in Professor Nicole King's lab, has received a 2017 HFSP Fellowship, which supports high-risk, ground-breaking projects.

Graduate Students in MCB faculty labs who have received 2017 NSF Graduate Research Fellowships:

Congratulations to **Holly Gildea**, Dillin Lab; **Davis Goodnight**, Rine Lab; **Daniel Saxton**, Rine Lab; **Kyle DeMarr**, Patel Lab; **Henry Pinkard**, Fletcher Lab; **Tiama Hamkins-Indrik**, Fletcher Lab; **Emily Powers**, Brar Lab; **Kristen LeGault**, Komeili Lab; **Joseph Aman**, Feldman Lab; **Mathew Summers**, Feller Lab; **Fernando Alvarez**, Nomura Lab.

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IN MEMORIAM

William K. Bowes, Jr.

On December 28, 2016, MCB lost a great friend and ally when William K. (Bill) Bowes, Jr. passed away at the age of 90. He was known as a Silicon Valley and venture capital pioneer, as well as a philanthropist who supported biomedical research, college access, and the arts.

As one of Berkeley's most generous benefactors, he supported the recruitment of outstanding early-career scientists to MCB through the Bowes Research Fellows Program that has supported four researchers to date, and for undergraduate scholarships for students from underserved communities. As one of the founding donors to the Incentive Awards Program (now known as the Fiat Lux Scholarship program), Bowes invested in one of California's greatest assets: highly talented undergraduate students from the state's most underserved communities.

He also championed the importance of basic scientific research, quietly providing Berkeley with resources to recruit outstanding early-career faculty to be part of the Bay Area's scientific community. Professor Robert Tjian remembers "inspirational and always stimulating" lunches with his friend, whose humble, unassuming demeanor belied his sharp mind, clear vision, and uncommon generosity.

Bill Bowes will be remembered for his leadership, vision, modesty and warmth, and for championing students, faculty and researchers with ambition and bold ideas. He is survived by his wife, Ute, and extended family.



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