

CHEMISTRY & BIOCHEMISTRY

SPRING 2020

LONG BEACH STATE UNIVERSITY

California State University Campus



DR. STEPHEN MEZYK RECEIVES WANG FAMILY AWARD

Left to right: CSU Chancellor White, Professor Emeritus Dr. Stanley Wang, Dr. Stephen Mezyk, and CSU Board Chairman Adam Day

Dr. Douglas McAbee

Senior Editor



Dr. Douglas McAbee

As this issue of the newsletter is going to print, the university is in the midst of an unprecedented closure as a result of the COVID-19 pandemic. Our department faculty and staff are laboring mightily to continue instruction by non-traditional methods. To say this has been challenging—completely retooling instructional delivery

in a matter of 10 days mid-semester—would be an understatement. Yet students have been accommodating and patient during this time of upheaval, and for this we are grateful. And while online instruction can be effective, I have found I very much miss the in-person interactions with students, particularly in teaching labs, and I regret I will not meet with my students again this semester.

This has been particularly difficult for me as I am retiring at the end of the spring 2020 semester, having completed 23 years as a professor at Cal State Long Beach. The abrupt suspension of in-person classes in mid-March for the rest of the spring term has prevented me from saying “Good-bye” in an appropriate and satisfying manner to my students and colleagues. I have greatly enjoyed my time in this department and this college. It’s been my pleasure to know and work with so many fine students over the years, to have been (I hope) an ingredient in their success. I also wish to thank my department and college colleagues, past and present faculty and staff, for their professionalism, energy, intelligence, good humor, and commitment to our students and to each other.

I am particularly grateful to my past and current biochemistry colleagues—Dr. Roger Acey, Dr. Jeff Cohlberg, Dr. Margy Merrifield, Dr. Paul Weers, Dr. Vasanthi Narayanaswami, Dr. Deepali Bhandari, Dr. Jason Schwans, Dr. Elena Grintsevich, Dr. Surya Manandhar, and Mr. Pat Pierce. Over the years, they have helped me in innumerable ways, and their camaraderie has made my professional life most enjoyable. In the very best ways, they embody and practice daily what it means to be a faculty member at a research-driven teaching-intensive university. Working with them has been a real pleasure—they are terrific people, and I am deeply honored to call them friends. I will miss them greatly.

It has been my privilege to serve the department in various ways over the years and as editor of the newsletter for the last four years. I look forward to reading in future newsletters all about the department’s accomplishments in the years ahead. Farewell!

REMARKS BY THE CHAIR



Dr. Chris Brazier

Greetings to all alumni and friends of the Department of Chemistry and Biochemistry. The department is currently undergoing review, a process that occurs every seven years. Below are some highlights from the first step, a self-study. This fall we again accepted a large new freshmen and transfer class, similar to last year. The number of students in the popular biochemistry program while still below its peak is growing again, and the BS Chemistry program has continued to grow reaching new record levels. Graduation rates continue to rise especially the four-year rate for freshmen and two-year rate for transfer students. A few years ago, it was very rare for any transfer student to graduate in four years but now more than a quarter do. On average over the 2013-18 period the faculty in the Department of Chemistry and Biochemistry published 40 papers, made 100 presentations, and brought in \$2.4M in grant funding each year to support research.

At the University Achievement Awards luncheon this year Prof. Jason Schwans received the Outstanding Faculty Mentor for Student Engagement in Research, Scholarly, and Creative Activity Award recognizing his dedication to helping his students develop as independent scientists, and for the excellent support and encouragement he provides. Jason is also an outstanding teacher and his overall accomplishments were recognized with the CNSM Faculty Award for Excellence, aka *The Pretty Darn Good Professor Award*. At the Achievement Awards Prof. Stephen Mezyk received the Distinguished Faculty Scholarly and Creative Achievement Award, one of many he has received. Stephen was also the recipient of the Wang Family Award for Excellence as the Outstanding Faculty Innovator in Student Success. The Wang Awards are CSU systemwide and highly competitive, Stephen is the first CSULB faculty member to receive one, Congratulations. Continuing at the University Achievement Awards Mr. Jordan Ngo was recognized as the Outstanding Undergraduate Research Student for his studies on somatic mutation in cyclin-dependent kinase 5, which is associated with prostate cancer. This is the fourth year in a row that a Chemistry and Biochemistry student has been recognized as the top undergraduate research student at CSU Long Beach. Mr. Jordan Ngo was also selected by the CSU Long Beach Alumni Association as the Outstanding Graduate in CNSM, this was the fourth year in a row a graduate of the department was recognized as the top student in CNSM. His award was presented at the Alumni Awards banquet and his mentor, Prof. Deepali Bhandari, was recognized as the Most Valuable Professor in the college.

The university’s Student Excellence Fee program has continued to be a valuable resource for keeping our instructional laboratories up to date with the latest equipment. We received about \$226K for new or replacement equipment in the biochemistry, general chemistry, organic chemistry, and physical chemistry laboratories. The major items were a laser fluorimeter capable of providing time resolved measurements,

dynamic light scattering particle size analyzer to measure light loss due to scattering, and a tabletop ultracentrifuge.

I would like to express my sorrow on the deaths of Professors Dot Goldish and Roger Acey. Dot passed suddenly on Dec 21, 2018. Dot joined CSULB in 1958 and was one of the founding faculty of the Department of Chemistry, she retired in 2008. Besides her outstanding contributions to the department, Dot was a leader in faculty governance, serving as Chair of the Academic Senate and in numerous interim administrative positions across campus, whenever there was a problem in a department or college Dot was the one called in to help. I greatly appreciated Dot's advice and assistance when I joined the faculty and she helped inspire me to become involved in faculty governance. Roger Acey passed on November 15, 2019 as a result of complications from diabetes. Roger joined the department in 1984 and fully retired in 2017. He continued his research striving to develop a "heavy metal-sponge" complex that absorbed heavy metals from water. Both Dot and Roger are missed by all in the department.

At the CSU systemwide Student Research Competition Phil Ly from the Nakayama lab earned second place for his talk on "Rapid Enantiomer Ratio Determination of P-Chiral Compounds with Eu(hfc)₃" At ABRCMS four of our students received best poster awards: Michael Lam of the Schwans lab for "Fmoc-Dipeptides as a Scaffold to Systematically Investigate Inhibitors of Butyrylcholinesterase, an Enzyme Implicated in Alzheimer's Disease", Robert Mejia of the Narayanaswami Lab for "Development of Apolipoprotein AI Chimera for Targeted Drug Delivery to Breast Cancer Cells", Reema Shinh of the Mezyk Lab for "Monochloramine Reactivity with Amino Acids in Wastewater: Kinetic and Temperature Dependence", and Angela Tran of the Weers Lab for "The Role of Lysine 52 and 54 in the Stability of Apolipoprotein III via Salt Bridge Formation". At the FACSS SciX meeting two students from the Slowinska lab won best poster awards, Darian Gamble for In Situ Flow Measurements of Thermoresponsive Nanocarrier Delivery in Targeting-Free Cell Selection", and Phelicita Bell for "New Two-Step Method of Targeting GRP78 Cancer Receptor Using Collagen/Cell Penetrating Hybrid Peptide Heterotrimers as Carriers. Congratulations on their outstanding research presentations.

Finally, I would like to once again thank our alumni and friends whose continued support provides a critical enhancement to the quality of our programs.

Dr. Chris Brazier

Chemistry & Biochemistry is published annually for past and present students and friends of the Department of Chemistry and Biochemistry. The opinions expressed on these pages do not necessarily reflect the official policies of the CSULB administration or those of the California State University Board of Trustees.

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CELLS IN STRESS: SURVIVING AND THRIVING

By Dr. Douglas McAbee

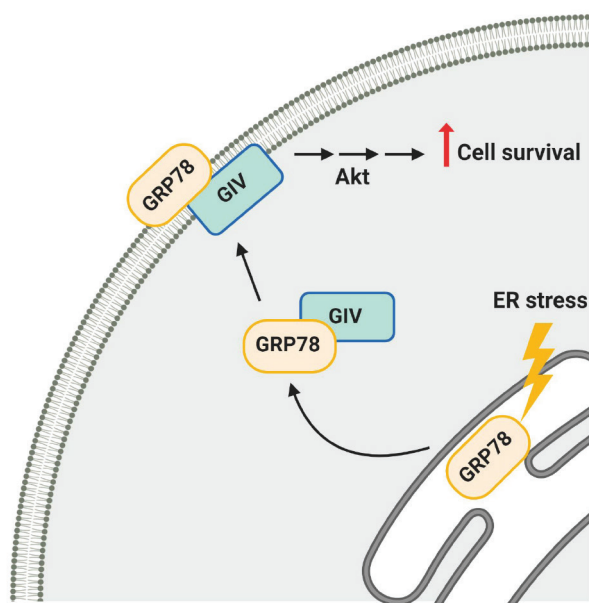


Dr. Deepali Bhandari

Cell homeostasis describes the set of physical and chemical conditions that allow cells to survive and thrive. Invariably, cells experience *stress* when various factors push them away from homeostasis, but cells are equipped with systems that restore homeostatic balance. Dr. Deepali Bhandari, associate professor in our department, studies crucial homeostatic mechanisms in normal and cancer cells focusing on stress as it occurs in the key biogenic compartment, the *endoplasmic reticulum* (ER). All membrane lipids are synthesized in the ER, and all membrane and secretory proteins (about one-third of all proteins made in a cell) move through the ER where they are modified, folded, find polypeptide companions to make larger ensembles, then packaged for export to other destinations. Sets of residential ER proteins process these events smoothly as well as detecting and dispatching hopelessly damaged or misfolded proteins. Some situations induce a spike in protein synthesis causing the ER processing systems to be overwhelmed by the sheer increase in the number of client polypeptides. In such ER stress, the cell reacts by both increasing the handling capacity of the ER and decreasing new protein production, a quality control process known as the *unfolded protein response* (UPR). The UPR normally allows the cell to regain homeostasis, but if protein overproduction is not curbed within a reasonable time, the UPR will lead the cell to kill itself. For example, pancreatic β -cells make and release insulin in response to elevated blood glucose levels, but chronically-high blood glucose in persons with type-II diabetes leads to sustained overproduction of insulin, which if unchecked ultimately leads to the UPR-dependent destruction of these cells.

Dr. Bhandari's group has been studying ER stress in cancer cells. Cells in a tumor undergo ER stress for many reasons including

their very high growth rate and increased metabolism. In particular, her group has focused on two key proteins that enhance the ability of cancer cells to survive such stressful conditions. These proteins are *glucose regulatory protein-78* (GRP78)—an ER-resident molecular chaperone that aids proper folding of new proteins—and GIV (aka, G_{α} -interacting vesicle-associated protein or girdin), a signaling protein important for many cellular functions including survival and migration. Many tissues normally have relatively high levels of cell growth and division (e.g., epithelial cells), and onset of the UPR in these cells increases GRP78 to aid the ER's protein handling capacity. GIV aids this process by regulating the UPR as well as increasing the pro-survival signaling to delay cell death. In cancer cells, however, this process is shifted into overdrive. Dr. Bhandari's group has discovered that cancer cells make a super-abundance of GRP78, which appears to leak out of the ER compartment either extruded into the cytoplasm or shipped to the cell surface by the secretory pathway. GIV aids in cell surface translocation of GRP78, which Dr. Bhandari believes activates a potent cell "survival script" (Fig. 1). GIV is a large protein composed of over 1800 amino acids, and her group has demonstrated that GIV's ability to bind GRP78 resides in the C-terminal domain of 200 amino acids. Working with collaborators at UCSD, Dr. Bhandari's group has demonstrated a very strong correlation between concurrent high expression of both GIV and GRP78 with chemo-resistance of cancer cells in patients with breast cancer or colorectal cancer. Mechanisms that promote cell surface GRP78/GIV complexes are now possible targets for therapeutic anticancer agents. Low-dose aspirin and anti-cholesterol statin drugs reduce the UPR and lower the risk of certain cancers (e.g., colorectal cancers), and



Model of GRP78/GIV activation during UPR. Increase in protein production or misfolded proteins lead to ER stress and activate the unfolding protein response (UPR). In cancer cells, UPR leads to a large increase in GRP78 expression, some of which is directed toward the plasma membrane with the help of GIV, eliciting signaling pathways leading to enhanced cell survival.

Dr. Bhandari is currently investigating the mechanisms by which these drugs alter ER stress in cultured cells.

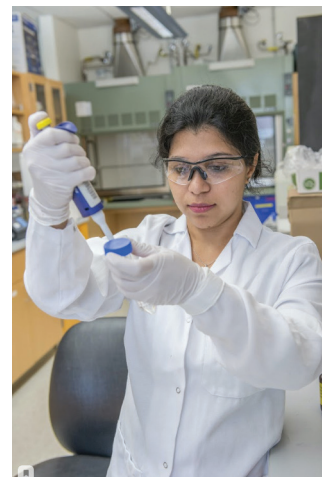
Two hallmarks of cancer cells are their enhanced ability to proliferate and migrate, but the metabolic demands of these two behaviors makes them mutually exclusive. The ability to move requires a lot of energy, such that cells direct metabolites toward breakdown pathways to generate sufficient ATP. Proliferation, on the other hand, requires cells to use metabolites as raw materials needed for build-up pathways. Thus, understanding the molecular mechanisms that allow cancer cells to switch their metabolic budgets between these two behaviors is critically important. Dr. Bhandari showed that activation of GIV in response to growth hormone directs epithelial cancer cells to migrate rather than proliferate. The stimulator of GIV is a protein called CDK5 (*cyclin-dependent kinase-5*), a key regulator of cell migration. Her group recently reported that phosphorylation of a specific amino acid on CDK5 reversibly inactivates CDK5-dependent migration in cells in culture. This is an important clue to unraveling the “Go vs Grow” (migrate v. proliferate) mechanism in cancer cells.

The work accomplished thus far in Dr. Bhandari’s lab has used mammalian cells in culture. She plans to broaden her research to examine ER stress in yeast cells. Yeast cells possess a UPR system, but unlike mammalian cells which have multiple ER stress-sensing

systems, yeast have a single stress sensor. Research into ER stress in this simpler genetically-tractable single-cell organism will allow discovery of mechanisms underlying integration of ER stress into various signaling pathways that will enhance our understanding of how such processes work in mammalian cells.

Dr. Bhandari has attracted a fairly large number of undergraduate and MS students who have been involved in all phases of her research here at CSULB from setting up the lab and generating initial studies on ER stress to where the program is now. Students have presented their work at numerous regional and national conferences, and all papers published by the lab have student co-authors. Her students have received awards for the high quality of their research and many have gone on to outstanding PhD programs and professional schools. Dr. Bhandari is very proud of what her students have accomplished.

Dr. Bhandari did her undergraduate and Masters’ work in microbiology at Panjab University (Chandigarh, India), completed her PhD studies at Loyola University Chicago Stritch School of Medicine with Dr. Adriano Marchese, then did post-doctoral work at UCSD with Dr. Susan Ferro-Novick and Dr. Marilyn Farquhar. She joined our department as assistant professor in 2014 and was granted early tenure and promoted to associate professor this past year by the



Dr. Deepali Bhandari

university. Her teaching assignments include the undergraduate biochemistry course (CHEM 441A/B), biochemistry lab (CHEM 443), a graduate course on ER stress (CHEM 542), and a new course for second year students, *Explorations in Biochemistry* (CHEM 241). As a member of the *American Society of Cell Biology*, she has been an advocate for basic biomedical research with the society’s congressional liaison committee including hosting visits to our department by Congressman Alan Lowenthal, representative of California’s 47th district. She is also a strong voice for women and underrepresented minority students seeking careers in biomedical research. In her leisure time, she enjoys music and dancing (she was the “Dancing Queen” in college!) and traveling with her husband and son.

CAL STATE LONG BEACH CHEMISTRY PROFESSOR EARNS AWARD FOR HELPING STUDENTS SUCCEED

The award comes with a \$20,000 prize.

By Emily Rasmussen | erasmussen@scng.com Long Beach Press-Telegram

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Dr. Stephen Mezyk

A Cal State Long Beach science professor will receive a statewide award for innovation on Tuesday, Jan. 22, for helping students understand chemistry and developing their careers.

The Board of Trustees for the California State University system will present professor Stephen Mezyk with the CSU's Wang Family Excellence Award and a \$20,000 cash prize at its meeting in Long Beach Tuesday. Mezyk is one of five university professors throughout the state who will receive the award, though all in different categories.

Mezyk will be honored as the Outstanding Faculty Innovator in Student Success.

"Dr. Mezyk is a leader in transforming students' lives by giving them outstanding research experiences," Curtis Bennett, dean of the College of Natural Sciences and Mathematics, said in a statement. "Under his guidance, students participate in solving real-world problems with scientific leaders across the country. The College of Natural Sciences and Mathematics integrates undergraduate research into student learning to ensure success, and Dr. Mezyk takes that commitment to another level."

Mezyk has taught undergraduate and graduate students at Cal State Long Beach

for more than 18 years. He has researched radiation and other types of chemistry for more than 30 years. He's mentored more than 600 students during his career.

Mezyk's general chemistry class can carry up to 200 students per lecture. But his method of "watch one, do one" — showing students how to solve a chemistry problem and then asking his class to perform a similar task — keeps students engaged, according to the statement.

"When a student watches me do a problem on the board, or in PowerPoint, it's very passive," Mezyk said. "They sit and watch and say, 'Oh, that makes sense.' It's only when they are doing a problem themselves that they realize it's not easy. Then, if I can individually point out what they are missing, it's a 'eureka!' moment as they get what I was trying to say all along.

"It's very rewarding to see that moment too," he added. "It makes my job worthwhile."

The professor also leads a research group, made up primarily of underrepresented students in STEM (science, technology, engineering and math) fields. The group of some 15 students research topics such as cancer-causing chemicals and how radiation affects recycling nuclear waste.

Mezyk's also overseen more than 100 peer-reviewed articles and 250-plus conference presentations featuring student co-authors.

The chemistry professor will be the first from Cal State Long Beach to earn the award since 2001.

"Student success is at the heart of all of Dr. Mezyk's work," President Jane Close Conoley said. "He has created a unique pathway for students to persist and excel in science majors and distinguish themselves after graduation."

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It has always been Dr. Mezyk's philosophy as a mentor to foster complete success for every student, to assist them all to achieve their goals both at CSULB and after graduation. His innovation begins by getting his students to do far more than just achieving a high classroom GPA. His exceptionally successful approach is to provide all his students with a wide range of additional opportunities, including being involved in chemistry tutoring and Supplemental Instruction, and scholarship success through peer-reviewed journal manuscripts and conference presentations.

Dr. Mezyk's research interests are centered in the study of condensed-phase radical reactions, incorporating many different facets of chemistry, biology, health sciences, engineering and mathematics. This allows him to have a large number of diverse students working with him, each being part of group efforts as well as running their own project. Having these opportunities allows his students to learn collaborative research project management skills, obtain, analyze, and present their research findings at conferences, obtain their own research funding, publish their data in leading journals, all in an effort to ultimately find their desired employment or be admitted into their top graduate or professional school upon graduating from CSULB. His record of success is outstanding: 164 student co-authors on his 141 peer-reviewed publications from this university, 317 student co-authors on his over 300 conference presentations, and \$334 thousand in student scholarships and awards, plus over \$8 million in external grant funding.

Stephen Mezyk's record of success attracts some of the best students but then he works with those students to make them even better. His research group has featured four CSULB Outstanding Graduates from CNSM in the past 8 years and 8 national merit Arnold and Mabel Beckman Scholar undergraduate students since 2006. This corresponds to about half of those awards given. This is an outstanding achievement for one faculty member among over 100 in our college. We celebrate with Steve for this unique recognition of excellence by the Wang Family award.

"MY ROLE IS TO PROVIDE STUDENTS WITH OPPORTUNITIES AND GUIDE THEM TO ACHIEVE MAJOR SUCCESSES, BOTH WITHIN THE CLASSROOM AND ALSO FOR THEIR LIVES AFTER GRADUATION"

DR. VASANTHY NARAYANASWAMI RECEIVES THE CSU FACULTY RESEARCH AWARD

by Dr. Paul Weers



Dr. Narayanaswami receives the 2020 Faculty Research Award from CSUPERB awards chairman Dr. Howard Xu, CSU Los Angeles.

Dr. Vasanthi “Vas” Narayanaswami, a biochemist in the Department of Chemistry and Biochemistry at CSU Long Beach, was recipient the prestigious Faculty Research Award for 2020 from the *CSU Program for Education and Research in Biotechnology* (CSUPERB). This annual award honors a California State University faculty member who has done significant work and built an outstanding biotechnology-related research program.

Dr. Vas’ first research experience was in the Indian Institute of Technology (Madras) in Chennai, India, where she received her PhD training. She received the *Alexander von Humboldt Fellowship* and moved to Heinrich Heine University, Dusseldorf, Germany to carry out her post-doctoral training, after which she moved across the Atlantic and landed at the University of Alberta, Edmonton, Canada. There, she started to build her impressive research career in the field of lipoproteins and lipid transport. Lipoproteins are responsible for the distribution of lipids through the circulation in our body, and have been implicated in several disease states, most notably cardiovascular disorders and Alzheimer’s disease. In 2000 she relocated to Oakland, California, where she took a position as an Assistant Scientist in the *Children’s Hospital Oakland Research Institute* (CHORI). In 2008, Dr. Vas joined our department, received early tenure and promotion to associate professor in 2012, and was promoted to the rank of professor in 2017. Her

research investigates the role of lipoproteins in cholesterol homeostasis in the plasma and the brain, and understanding the biology of the high-density lipoprotein, HDL (the “good” cholesterol). Dr. Vas’ has a long history of external funding from the American Heart Association (AHA), Alzheimer’s Association, and Parkinson’s Disease Foundation. She is currently funded by the NIH.

During her research career, Dr. Vas has taken leadership roles in various activities of the AHA in scientific reviewing, promoting excellence amongst women in science in the *Arteriosclerosis, Thrombosis & Vascular Biology* group, fostering leadership in women through the Women’s Leadership Committee, and in promoting diversity in biomedical research areas. In 2017, the AHA recognized Dr. Vas for her contributions to science, women’s leadership and her service to the scientific community by naming her a *Fellow of the AHA*. She has also been a strong advocate to support science for underrepresented groups, for which she has obtained federal funding to promote the participation of students in research, most notably through the NIH

has been cited more than 3,500 times. Thus far, she has procured ~ \$ 6 million in external funding, of which ~ \$ 1 million for research and \$ 1.7 million for training at CSULB.

Dr. Vas was presented the *Faculty Research Award* by Dr. Howard Xu of CSU Los Angeles, chair of the award committee at the 32nd CSU Annual Biotechnology Symposium, Santa Clara Marriott. The symposium was attended by many of her students at CSULB and by biochemistry faculty and their students, who celebrated the achievements in science with Dr. Vas. In her award seminar titled “*A Tale of Two Diseases: Role of Apolipoprotein E in Cardiovascular Disease and Alzheimer’s Disease*”, Dr. Vas also provided an overview of her passion for science and research that dictated her academic and career itinerary that took her on a global journey. She shared her personal quest to right the wrongs of societal inequity, especially in the area of biomedical research and to impact people’s lives, one person at a time. In her signature humble way, she attributed her overall success to the contribution of hundreds of students, whose lives have been positively impacted by her



CSUPERB attendees, left to right: Sargis Srapyan, Dr. Elena Grintsevich, Dr. Paul Weers, Andrew Alvarez, Dr. Deepali Bhandari, Diego Alcalá, Jude Khatib, Abbas Abdulhasan, Nairuti Patel, Alex Klotz, Angela Bui, Kyla Anderson, Patrick Allen, Dr. Vasanthi Narayanaswami, Vernon Benedicto, Anh Nguyen, John Burdick, Lee Macklin, Rohin Basi, Muhammad Abeer, Art Zavala, Monica Lounsbury, Tilini Wijeratne, and Dr. Jason Schwans.

summer research program in CHORI, and as a director of the NIH-MARC program at CSU Long Beach.

Dr. Vas has published her work in more than 70 peer-reviewed publications, and her work

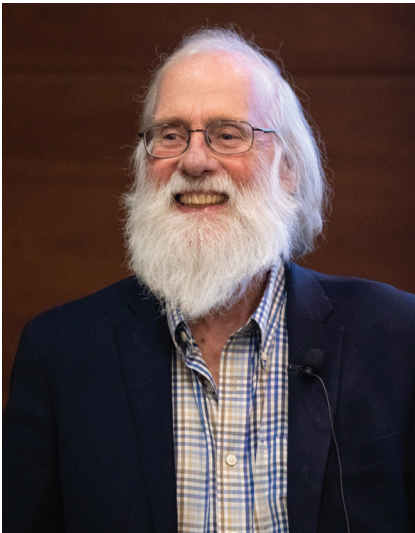
mentoring. The *Faculty Research Award* is a fitting recognition of Dr. Vasanthi Narayanaswami’s body of research and an honor for the department and CSU Long Beach.

Dr. Tony Hunter

2019 Allergan Distinguished Lecturer

BIOLOGICAL SIGNALING BY REVERSIBLE PROTEIN PHOSPHORYLATION

By Dr. Deepali Bhandari and Dr. Douglas McAbee



Dr. Tony Hunter

Dr. Anthony (Tony) Hunter, Professor and Renato Dulbecco Chair in Cancer Research at the Salk Institute of Biological Sciences (La Jolla), visited our department on February 13, 2019, as the Allergan Distinguished Lecturer. We were honored by his visit as Dr. Hunter is a world-renowned biochemist who has made many significant and noteworthy discoveries, the most prominent of which is the identification of role of protein phosphorylation in cell proliferation and growth. Dr. Hunter was born and raised in England, where he obtained his B.A., M.A. and Ph.D. from the University of Cambridge, England. He first came to the United States for his postdoctoral studies at the Salk Institute for Biological Studies in 1971. He returned to England for a brief period before joining the Salk Institute as an Assistant Professor in 1975 where he has been a Professor since 1982.

Dr. Hunter started his lecture for the general audience titled "**Phosphorylation as a paradigm for reversible post-translational modification of proteins**" by discussing the special properties of phosphate that make it a favored building block for all self-replicating life forms on our planet. He talked about its unique chemical properties and versatility, its high abundance and availability around us, and the enormous stability of phosphate esters in water at pH 7, all of which allowed for its evolutionary selection to be part of our genetic material (DNA and RNA). He then discussed the emergence of phosphate modification in proteins and its selection as the most-prominent type of reversible post-translational modification (PTM) to add functional diversity to our proteins. Dr. Hunter has spent his illustrious career of more than 40 years devoted to studying protein phosphorylation with identification of "*Tyrosine phosphorylation*" as his most famous discovery that he

made quite early in his career. Up until then, only two amino acids – serine and threonine – were thought to be the sole targets of phosphor-modification. Interestingly, Dr. Hunter and his team discovered tyrosine phosphorylation accidentally by using an old buffer which had changed its pH slightly that allowed for separation of phosphorylated threonine from phosphorylated tyrosine which would have been indistinguishable if the buffer was fresh. The audience, especially students, had a great time looking at Dr. Hunter's hand-written notes from 1979 and a couple of very famous autoradiograms that served as the irrefutable evidence for tyrosine being a *bona fide* target for phosphorylation. Dr. Hunter's work was instrumental in showing that tyrosine phosphorylation was responsible for cancerous transformation of *Rous Sarcoma* virus infected cells. A serendipitous discovery made through such a simple yet elegant experimental plan led to the identification of an entire family of tyrosine kinases (enzymes that catalyze addition of the phosphate group to tyrosine) many of which are overexpressed and/or overactivated in cancer cells.

It is now known that in addition to serine, threonine and tyrosine, phosphorylation of six other amino acids (arginine, lysine, histidine, cysteine, aspartate, glutamate) is also chemically feasible. In his technical lecture titled "**New Signal Transduction Targets for Cancer Therapy**", Dr. Hunter detailed his recent work on histidine phosphorylation where his lab is pioneering the development of methods to study this highly unstable, labile and challenging-to-detect phosphomodification. He also talked about the importance of basic research in science and how his own fundamental discoveries made decades ago have now led to development of many drugs

for cancer treatment including Gleevec - the most commonly used and very effective drug for treatment of leukemia.

Dr. Hunter has served/is serving in editorial capacity for many high impact journals including *Cell*, *Journal of Cellular Biochemistry*, *Molecular Cell*, and *eLife*. He has delivered keynote and distinguished seminars on more than 120 occasions, has organized several



Dr. Tony Hunter

scientific meetings and symposia, and serves on advisory boards of many companies. He is a Fellow of the Royal Society of London, Royal Society of Arts, American Academy of Arts and Sciences, and American Association for Cancer Research. He is a member of the National Academy of Medicine, National Academy of Sciences, American Philosophical Society, and the European Molecular Biology Organization. Dr. Hunter has authored 581 articles and has received multiple awards and honors - too many to include all of them here! Most recently, he received the 2020 Tang Prize in Biopharmaceutical Science from *American Society for Biochemistry and Molecular Biology*, the 2018 Triumph Award from the *American Cancer Society*, the 2018 Pezcoller Foundation-AACR International Award for Extraordinary Achievement in Cancer Research, and the 2017 Sjöberg Prize for Cancer Research.

Dr. Hunter is a true pioneer of research, and an inspiration to many of us who have followed his work since the beginning of our scientific careers. It was a pleasure to host him and an honor to have him visit our department as the 2019 Allergan Distinguished Lecturer. He left a deep impression on the young minds, who most certainly were motivated by him to follow their passion and seek their own path to discovery.

The Allergan Distinguished Lecturer event was funded by the generous support from the Allergan Foundation. The department community is grateful to the Allergan Foundation for their continued support of the annual Distinguished Lecturer series, which provides our students and faculty wonderful opportunities to meet and hear with outstanding investigators whose research has made global impacts.

DISTINGUISHED VISITING LECTURERS

Department of Chemistry and Biochemistry
California State University Long Beach
1980-2019

1980	Takeru Higuchi (Pharmaceutical Chemistry), Univ. Kansas
1981	Charles Casey (Organometallic Chemistry), Univ. Wisconsin
1982	Albert Lehninger (Biochemistry), Johns Hopkins University
1983	Kenneth Raymond (Bio-Inorganic Chemistry), UC Berkeley
1984	Ephraim Racker (Biochemistry), Cornell University
1985	Harold Weintraub (Biochemistry), Fred Hutchinson Cancer Research Center (Seattle)
1986	Paul Saltman (Biochemistry), UC San Diego
1987	Joan Valentine (Bio-Inorganic Chemistry), UCLA
1988	Donald Cram (Organic Chemistry, Nobel Laureate), UCLA
1989	Harry Gray (Inorganic Chemistry), Caltech
1990	Ignacio Tinoco (Physical Chemistry), UC Berkeley
1991	Bruce Ames (Biochemistry), UC Berkeley
1992	Jerrold Meinwald (Organic Chemistry), Cornell University
1993	Ralph Adams (Analytical Chemistry), Univ. Kansas
1994	Jacqueline Barton (Bio-Inorganic Chemistry), Caltech
1995	Nelson Leonard (Bio-Inorganic Chemistry), Univ. Illinois, Caltech
1996	F. Sherwood Rowland (Physical Chemistry, Nobel Laureate), UC Irvine
1997	Leslie Orgel (Physical-Inorganic Chemistry), Salk Institute (San Diego)
1998	Ahmed Zewail (Physical Chemistry, Nobel Laureate), Caltech
1999	C. Grant Wilson (Physical Organic Chemistry), Univ. Texas
2000	Dudley Herschbach (Physical Chemistry, Nobel Laureate), Harvard University
2001	Catherine Fenselau (Analytical Chemistry), Univ. Maryland
2002	Marc Kirschner (Biochemistry), Harvard University
2003	Barry M. Trost (Organic Chemistry), Stanford University
2004	Peter C. Ford (Bio-Inorganic Chemistry), UC Santa Barbara
2005	Andrew Ewing (Bio-analytical Chemistry), Penn State Univ.
2007	Jennifer Doudna (Biochemistry), UC Berkeley
2008	Carlos Bustamante (Biophysical Chemistry), UC Berkeley
2009	Julius Rebek (Organic Chemistry), Scripps Institute
2011	Stephen Lippard (Bio-Inorganic Chemistry), MIT
2012	James Heath (Bio-Analytical Chemistry), Caltech
2013	Ronald Evans (Molecular Biology) Salk Institute
2014	Richard Zare (Physical Chemistry) Stanford
2015	David Tirrell (Bio-organic Materials) Caltech
2016	Eric Anslyn (Organic Chemistry) Univ. Texas, Austin
2017	Nathaniel Lewis (Materials/Analytical Chemistry) Caltech
2018	Peidong Yang (Inorganic Materials) UC Berkeley
2019	Tony Hunter (Biochemistry) Salk Institute



FACULTY REPORTS

DR. DEEPAI BHANDARI

It was a fantastic and very productive year with the highlight being numerous awards and fellowships won by my students. Undergraduate student, Jordan Ngo went on an award-winning spree and received the 2019 CNSM Outstanding Graduate award, 2019 CSULB ORSP Undergraduate Research and Scholarly Activities award, and the first place award for his poster presentation at the 2019 American Society for Cell Biology (ASCB)-European Molecular Biology Organization (EMBO) joint meeting. In addition, he was the 2019 Glenn Nagel undergraduate research award finalist at the CSUPERB annual symposium. Jordan closed the account by receiving the 2019 NSF Graduate Research Fellowship and joining the Ph.D. program at UC Berkeley after receiving offers from many prestigious schools including Caltech, UC San Diego, and Duke University. Undergraduate student, Stephanie Leal was awarded the 2019 Robert H. Henderson Memorial Scholarship, the 2019 Biochemistry Award, and the 2019 Sally Casanova *aka* California Predoctoral Fellowship. Stephanie was also the recipient of the 2019 ASCB-EMBO annual meeting travel award and won the first place award for best poster presentation at the meeting. Undergraduate student, Anh Nguyen received the 2019





Standing, left to right: Dr. Tom Maricich, Dr. Michael Schramm, Dr. Young-Seok Shon, Dr. Eric Sorin, Dr. Stephen Mezyk, Dr. Kasha Slowinska, Dr. Hadi Tavassol, Dr. Kensaku Nakayama, Dr. Shahab Derakhshan, Dr. Xanhui Bu
Seated, left to right: Dr. Douglas McAbee, Dr. Deepali Bhandari, Dr. Vasanthi Narayanaswami, Dr. Lijuan Li, Dr. Paul Weers, Dr. Chris Brazier, Dr. Jason Schwans, Dr. Enrico Tapavicza, Dr. Fangyuan Tian, Dr. Eric Martinez

Leslie K. Wynston Award in Biochemistry and is one of the finalists for the 2020 CSUPERB Glenn Nagel undergraduate research award. Undergraduate student, Jude Khatib was awarded the 2020 CSUPERB-Howell research fellowship. Graduate students, Noemi Castro and Iris Marquez received the 2019 Robert H. Henderson Memorial Scholarship and the 2019 Monahan Memorial Summer Research Fellowship, respectively. Also, my students made a total of 19 presentations at various meetings and we published a research article in FEBS Letters on a project which was a team-effort of five students. To say that I am proud of my students is an understatement!

Dr. Bhandari lab group



Another highlight of the year was Congressman Alan Lowenthal's visit to our lab on November 9, 2018. I had met the Congressman's staffers at the Capitol Hill in May 2018 as part of the Science Advocacy delegation from the American Society for Cell Biology. Coincidentally, before transitioning to politics, Congressman Lowenthal was a professor of Community Psychology at CSULB and this connection made a great conversation point between his staffer and me, which ultimately culminated in the Congressman's visit to my lab. During his visit, we discussed the role of NIH and NSF in supporting the independent research programs of CSULB faculty as well as the impact of various student-training programs such as BUILD, MARC, and RISE on success of our students. I gave him a tour of the lab including some hands on action for the congressman looking at cancer cell lines under the microscope. We followed it up with a discussion on the benefits of maintaining a diverse and global population of students in our laboratories. As one of the many individuals who came to the United States as international students and are now serving as teachers and mentors in U.S. institutions, I made a case for the positive influence and role immigration plays in our higher education system. Finally, he interacted with my students and listened to their concerns about the affordability and accessibility of a college education. Overall, it was a very fruitful visit and the congressman assured me of his continuing support to research funding and programs that promote research opportunities for students from all backgrounds.

Finally, this year also marked an important milestone in my career – I was awarded early tenure and promotion to Associate Professor. I am fortunate to be a part of the Department of Chemistry and Biochemistry, which provided ample amount of support, opportunities, and mentoring I needed to achieve my professional goals. I look forward to keep positively contributing to the department by practicing inclusive pedagogy, carrying out cutting edge

research with student trainees, and serving the academic community to the best of my ability.

DR. ELENA GRINTSEVICH

It was an exciting year for me as a new faculty member at CSULB. I started in a pretty much empty lab space and with just one research



Dr. Elena Grintsevich

volunteer – Yajaera Ramirez. Since then we grew into 8 member lab with 2 graduate students (J. Luis Martin and Aaron Miller), 4 undergraduate researchers (Sargis Srapyan, Estrella Ramirez, Jocelyn Ortega, and Christina Truong), and 1 research volunteer (Vicente Velasquez of UCLA). In less than one year my lab became proficient in a variety of molecular biology and biochemistry techniques which makes me proud of my students. Setting up the lab presented me with more challenges than I expected, and I am happy (and also amazed) that my lab's hard-core biochemistry research program is up and running by now.

In April 2019 I was awarded a CSUPERB New Investigator Research Grant that was one of the year's highlights. This award is in support of our work on regulation of cytoskeletal dynamics by neuron-specific protein drebrin A. We already made good progress on this project, and Sargis Srapyan is about to present his data at the 2020 CSUPERB annual symposium.

This year's American Society for Cell Biology (ASCB) meeting was special for me because I was selected to organize and co-chair a Special Interest Subgroup session ("New frontiers in multifactor regulation of cytoskeleton") and was awarded an ASCB travel grant. My conference talk was very well received and prompted stimulating discussions with my colleagues from all over the world. I hope 2020 will be the first year my CSULB students present their work at the ASCB meeting - fingers crossed for a mild winter in Philadelphia in December of 2020!

Overall, becoming a part of the CSULB community was a wonderful experience. I'm very grateful to my senior colleagues for their continuous support and, of course, to my students for their hard work.

DR. MARGARET MERRYFIELD

After 12 years working at the CSU Chancellor's Office, I retired at the end of June and returned to the CSULB campus as a participant in the Faculty Early Retirement Program (FERP). This program offers faculty the opportunity to gain the benefits of retirement while continuing to work on a half-time basis for up to five years; therefore, I rejoined the Department of Chemistry and Biochemistry department in the fall 2019 semester.



Dr. Margaret Merryfield

Some of you may have read Doug McAbee's profile of me in last year's newsletter – a "where is she now?" look at my rather unusual career path. I definitely enjoyed my time at the Chancellor's Office, especially the opportunity to make positive change across the campuses. However, last year involved major changes in my life. My husband of 41 years, Kent, died suddenly, and as I navigated the challenges of my newly altered life, the opportunity to step back from an all-consuming job and work a little less (but still with passion) became very attractive. And so I find myself back on campus after all this time.

My current role is Equity Advisor to the College of Natural Sciences and Mathematics. In that capacity, I am working with all of the faculty search committees in the college to reduce bias in our screening and selection process and help the committees develop screening criteria that assure that the new faculty hired are well-aligned to the university's mission and well-equipped to support the success of our students. I will also be working on other projects related to equity and inclusion. This spring, I will be joining representatives from the other colleges who are serving as Equity

Advocates; we'll be learning from each other as we each develop a multi-year plan specific to our college. These activities align well with the work I was doing at the Chancellor's Office (and that I care about), so I am grateful for the opportunity. I'm enjoying life on campus, and can report that some things have changed a lot, while others have hardly changed at all.

DR. STEPHEN MEZYK

This year just seemed to fly past but again it was an incredibly productive and fun time for the CSULB RadKEM™ research group. For the second year running many long-time lab members completed their stay at CSULB, moving on to begin new phases of their lives. Leaving amid all the successes that we enjoyed together Kristian Larsson finished his 3-year postdoctoral position with me and moved back to Sweden to begin work in a mining company. My MS students Chetna Vaseduva, My Luong and Tin Do all got their degrees and began real-world employment in industry and junior college teaching. Amir Lechner left his MS program to pursue a PhD degree at UC Davis, Priscilla Prem left to pursue employment in Colorado, and Jennifer Castillo is now enjoying her forensic work position in LA. As for my research undergraduates, three of them began Ph.D. programs; Michael Chin at UC Santa Barbara, Liam Twilight at the University of Oregon and Landon Watts is about to leave us to begin his program at the University of Colorado. Richard Tran also left us to pursue materials research. As always, we wish all our former RadKEM™ students the best for their future endeavors. Remaining students include Elaine Walker is now working on aqueous pesticide remediation research, Luis Armenta who is studying chlorine atom reactions in different quality waters, and Reema Shinh who is working on monochloramine thermal reactivity. Six new students joined this lab this past semester, so the rebuilding has started. The new lab students are excited and working hard to continue to great traditions of the lab.

With such a large group turnover it was again time for completing projects, amidst my writing multiple grants for external funding. Over the past 12 months our lab had 12 peer-reviewed papers published/in-press, several more currently under review, and we combined for 18 conference presentations at venues across the world, notably the American Chemical Society Orlando meeting where six of us attended and presented.

My teaching load finally got reduced this year, as my 2017/2018 CSU GRIF award ended. In Fall 2018 I taught the CHEM377B Physical Chemistry lecture course, as well as the CHEM373 Physical Chemistry laboratory. In Spring 2019 I had a double General Chemistry assignment, along with the regular CHEM111B lecture and shared coordination duties, I had a new CSULB course, CHEM112 – Advanced General Chemistry B. Both these courses were a lot of fun, especially CHEM112B where I was able to introduce a greater depth and understanding of the General Chemistry course material to this small, select, group. It was also the first time I ever had a 100% pass rate in a class! In Fall 2019 I am not teaching, thanks to a buyout and a CSULB RSCA grant, so instead I'm writing grants and papers. My two Department of Energy grants finished in September this year, and so I am looking for other opportunities in both the Environmental and Nuclear Fields.

Lastly, 2019 has been an incredible year for me personally at CSULB. I received the CSULB Distinguished Faculty and Scholarly and Creative Achievement Award, which was based on the incredible research success of the RadKEM™ members over the past decade. In this period we had 93 peer-reviewed articles/113 student co-authors, plus 275 conference presentations/256 student coauthors. This award followed my Wang Family Excellence Award for Outstanding Faculty Innovator in Student Success in January 2019, a CSU-wide award recognizing my efforts at mentoring and promoting student successes at CSULB during my 18 years at this university. It was an incredible honor to receive this award, as it gave me a chance to reflect and remember the fantastic students I've worked with during this time, and especially to recall why I became a faculty member in the first place.

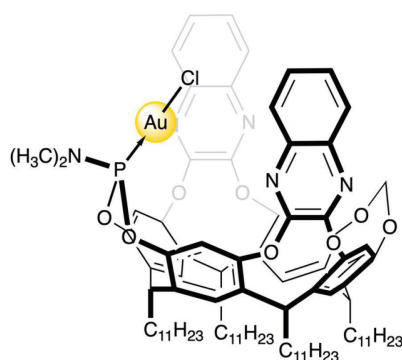
So as 2019 comes to an end, it is very gratifying to be able to say that the RadKEM™ group has continued to be fun, busy, and productive, and that we continue to look forward to another successful year in 2020.

DR. KENSAKU NAKAYAMA

I would like to report on the progress of some recent research students in my group. Phillippe Ly (MS student), Thanh Mai (MS student) and undergraduate Kayla Landers, following up on the work initiated by MS student Trina Tran (MS 2016), completed the synthesis of a library of cholinyl group-containing organophosphate

inhibitors of butyrylcholinesterase, an enzyme known to be over-active in Alzheimer's patients and research into which Roger Acey and I began a collaboration some years ago. These compounds have been studied by the groups of both Drs. Jason Schwans (enzyme kinetics) and Eric Sorin (computational chemistry). Mandy Wei (now with Chirogate International Inc., Taiwan) who defended her MS thesis in March of 2018, worked on the difficult problem of kinetically resolving a stereoisomeric mixture of organophosphorus compounds using chiral Lewis acid catalysts. This work is being followed up by four undergraduate students, Codi Pace, Kayla Landers, and Hazel Nguyen (UCI volunteer). Phillippe is also currently wrapping up various loose ends of several projects to put them into publication form. As of mid-January, he has received acceptance letters from Ph.D. programs at NYU, University of Wisconsin Madison and the Swiss Federal Institutes of Technology at Lausanne (EPFL).

I also received some updates from past research group students, each of whom I am very proud. Jonathan Hua (BS, 2016) has been accepted to Western School of Pharmacy. Ramsey To (BS, 2017) will be finishing his MS degree in biomedical science this summer at the U. of Pittsburgh. Trina Tran (MS, 2016) is an adjunct faculty at Chapman College and Golden West Community College. Silvia Cervantes (BS, 2013) is doing well in the Ph.D. program in biochemistry and molecular medicine at USC. Astor Suriano (MS, 2013) is working for Fortive Corp, a divestiture firm by J&J, and will finish a Ph.D. in education this year. Dr. Lulu Chen (HHMI scholar) is in her 2nd



Sandoval (HHMI scholar) is now working at Kite Pharma, a Gilead Sciences subsidiary. Thank you all for keeping in touch and best wishes in your endeavors.

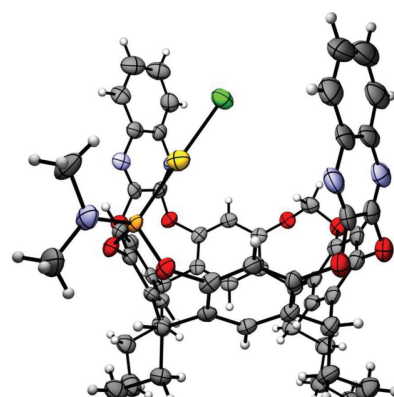
Finally, one very sad news is the sudden passing of my longtime colleague and research collaborator, Professor Roger Acey in November. Roger was well-liked by all who knew him and was always supportive when the institution was often not. He will be missed by all whose lives intersected his.

MICHAEL P. SCHRAMM

"Suppose you take an apple pie and cut it in half, take one of the two pieces, cut it in half, and continue... How many cuts before you are down to a single atom?" – Carl Sagan

Molecular recognition is the study of how and why molecules interact. At its essence lies the attraction of molecules at energy levels "weaker than covalent." Truly this is a paradigm of host and guest, or host and visitor should the stay be short. How then does the guest treat the host? Of course it does something, as together they arrive at an energetic minima each doing for the other.

We've been using these principles to study the reactivity of *specifically sized* molecules with Gold functionalized resorcinarene cavitaands; a mouthful for sure, but they have a small binding pocket and a reactive metal center near one another. To an abstraction, the arrangement is very similar to enzymes: 1) predefined binding pocket and 2) reactive



Crystallographic structure of a two-wall gold-containing cavitaand; Dr. Michael Schramm

year of her tenure track position at UCI (Dept. of Anatomy and Neurobiology). Dr. Salamiz

functional groups matched for entering substrates. We had many notable presenta-

tions this year with Lisa Rusali and Teodora Nedic leading the charge (SACNAS in Hawaii, ABRCMS in Anaheim), Vy Vo and Grace Kim also presented their work at the CNSM poster session. Finally, I presented our group's work in Shanghai, China on the occasion of Prof. Julius Rebek Jr.'s 75th Birthday.

Tam Ho, who recently joined the Ph.D. program in Chemistry at U.T. Austin and I published her work, receiving the editorial acknowledgement of "very important paper" and longstanding collaborators in Japan shared authorship with us on a second work. Grant Bostwick worked very hard on preparing new two wall cavitands and his efforts led Vy Vo and Grace Kim to the arrival of a new one which with the help of Huajun Yang, we were able to characterize using XRD (see insert). This new 2-wall Gold cavitand forms a binding pocket that can entice guests, but can these aromatic walls do more? We are in pursuit of the stabilization of reactive intermediates inside! Diane Sun, Alex Malhotra and Angel Wei contributed to many facets of substrate and cavitand design over the course of the year.

DR. JASON SCHWANS

It was another busy year in our lab continuing on our quest to further our understanding of how enzymes work. Overall, the lab is engaged in several projects: 1) in collaboration with Drs. Nakayama and Sorin we are synthesizing and evaluating cholinesterase inhibitors; 2) we are using the enzyme triosephosphate isomerase to investigate the role of conserved 'near active site residues' and how they affect the positioning of residues through side chain and backbone interactions; 3) we are continuing in our synthesis of unnatural amino acids for biochemical studies; 4) we are evaluating model small molecule systems to investigate the energetics of oxyanion hole catalysis (a feature often found in enzyme active sites); and 5) we are continuing in our collaboration with Dr. Berlemont (CSULB Biological Sciences) to identify multidomain glycoside hydrolases for the development of biofuels.

The lab is continually full of dedicated members. All current members are moving forward in their projects and contribute to an excellent environment for us all to develop as scientists. Over the past year multiple members graduated and are pursuing various career paths. Tim Chang and Anh Colquhoun earned their MS Biochemistry degrees in the past ~1 year and

are working in biotech. Four lab members who graduated in spring are now in PhD programs: Noel Chau (PhD in Chemistry at Michigan State University), Christian Loo (PhD in Biochemistry and Molecular Biophysics at the University of Pennsylvania), Noelle Alexa Novales (PhD in Biochemistry at UCLA), and

student, Khin Aye San (Ph.D. student at UCSD) was also a co-author in one of these articles. Another article was first-authored by Mohammed Mahdaly, who successfully finished his M.S. studies at CSULB in March. Mohammed will be joining a Ph.D. program at Sophia University in Japan in upcoming year.



Dr. Schwans lab group

Bianca Pingul (PhD in Biochemistry and Molecular Biophysics at the University of Pennsylvania). Caly Chu, Abraham Flores, and Martin Yau graduated and are working, and Uenah Yun graduated and is pursuing medical school.

In addition to mentoring students in the lab and moving forward in enzymology, it has been an exciting time in the classroom. I continue to teach organic chemistry (CHEM 220A/B), sections of a class to promote success for first-year students in STEM (NSCI 190A), and part of the biochemistry graduate core class (CHEM 541), and a graduate class focused on organic chemistry in biology (CHEM 582).

DR. YOUNG SHON

We have continued our NIH-funded colloidal nanoparticle catalysis projects in addition to newly started photoenhanced nanoparticle hybrid catalysis project. A total of four research papers and three review papers/chapters were published in this past year from our research group. My former graduate students, Ting-An Chen (Ph.D. student at Georgetown University), Serena Low (Natron Energy), and Hanqing Pan (Postdoc at University of Nevada Reno) were the main authors of four publications. Two articles published in *Journal of Materials Chemistry B* and *ACS Applied Nano Materials* were first-authored by recently graduated M.S. student, Kevin Vargas, who have begun his Ph.D. studies at University of Southern California in September. My former M.S.

This article was co-authored by a former graduate student, Jackson Zhu (Postdoc at Stanford University) and an undergraduate student, Vincent Nguyen. New undergraduate students, John Blanco, Saba Dalaub, and Cooper Bahr are working on the chemical catalysis of various colloidal nanoparticle catalysts. Dominick Ortega and Faraz Hussain have begun their graduate studies in our lab in Fall 2019. Both students are studying the catalytic activity of colloidal nanoparticles including liposome-bilayer embedded palladium nanoparticles. I am looking forward to another exciting year with both new and continuing students (Bingli Wang, Nicholas Pavlakovich, Christos Nixarlidis, Edwin Avila, and Quinn Tufono) in the upcoming year.

DR. ERIC SORIN

The past couple of years have been a whirlwind for Sorin Lab researchers, many of whom received awards and honors before moving on to continue their careers in academia and industry. Walter Alvarado (MS Physics) completed and published his thesis work with support from the Johnson and Heeb Scholarships, and entered the Biophysics PhD program at the University of Chicago. MS Computer Science major Vardo Barsegyan, who was supported by a CSULB Summer Research Stipend and a CoE Engineering Alumni Scholarship, interned at Panasonic before taking a position with The Aerospace Corporation. Parker Bremer (MS Chemistry), who completed his thesis with the support of a

CSULB Summer Research Assistantship and a Robert B. Henderson Award, is now in the process of publishing his second peer-reviewed article and was recently admitted to the Chemistry PhD program at UC Davis. While these recently departed leaders of our research team will be missed, I am very excited for the many experiences and opportunities that lie ahead of them.

Sorin Lab undergraduates were also quite productive and successful in recent years. Boeing Scholar Angela Choy (BS Chemical Engineering) completed her honors thesis and entered the industrial sector, while BS Computer Science majors Aingty Eung and Xavier Martinez both earned co-author credit on recent Sorin Lab publications, completed their degrees, and entered the workforce. BS Chemical Engineering graduate Nick Humphrey, who also received a CSULB Summer Research Assistantship, entered the Materials Science PhD program at USC, and CAMS high school student Jocelyn Hsu, who earned co-author credit on an upcoming collaborative effort, entered the BS Biomedical Engineering program at Johns Hopkins University. I look forward to watching each of these talented young minds continue to thrive and serve as examples of both the practical and scholarly nature of our work at The Beach.

Many of the students noted above presented their work at a number of venues across the country in recent years including ACS Regional (Pasadena) and National Meetings (Washington DC, New Orleans, Boston), regional meetings of the American Physical Society (Fullerton) and the American Association for the Advancement of Science (Pomona), and the Annual Meeting of the Biophysical Society (San Francisco). Indeed, our recently departed alumni set amazing examples and did a great job of preparing their junior labmates to take the reins in 2019, and we all wish our departed teammates the best as their professional careers continue to unfold.

In the wake of the exodus outlined above, several new faces have joined our team this past year including BS Biology majors Mariell Abad and Italia Dutton; BS Information Systems major Jake Bremer; BS Chemistry major Danna De Boer, who is currently revising her first peer-reviewed manuscript; BS Chemical Engineering majors Will Epton, Jia Mao, and Women & Philanthropy Scholar Nguyet Nguyen; BS Computer Science major Justin Mabutis; BS Biomedical Engineering major and President's Scholar Jessica Moore;

and, most recently, CAMS high school junior Lydia Neguse. I am quite thrilled to be working with this team of talented and motivated young scientists and engineers, and I am eager to see them realize their aspirations in 2020.

DR. HADI TAVASSOL

This year marked our 3rd year at CSU Long Beach. Our group has been active in exploring interfacial effects across chemical and electrochemical processes in nature and energy devices. During this past year one graduate and 12 undergraduate students participated in our research program. This year was particularly especial, since several students, from our first cohort graduated and continued their career pursuing advanced degrees. Andrea Nelson, Peter Santiago, and Calum Sheldon graduated and are continuing their career in U of Arizona (Optics), UC Irvine (Materials Science), and UC Davis (Materials Science) PhD programs respectively. One of our students also spend a summer internship in UC Santa Barbara NSF REU program. Research findings of several of our members was also acknowledged with following awards. Lynn Nguyen won the ORSP summer fellowship award, Andrea Nelson won the American Chemical Society Award in Physical Chemistry, Morgan Carman-Giles won the John H. Stern Summer Research Award. This past summer we also had summer research visitors as part of the HSI STEM Bridges and



Dr. Tian lab group

Bridges to the Baccalaureate programs which are funded by Department of Education and NIH. Several students working in the group were supported through BUILD, MARC, LSAMP and Rise programs, which we greatly appreciate. We were also active in presenting

our research, and four of our students participated and presented their work in Southern California Undergraduate Research Conference (SCURC) and two presented in the American Chemical Society Meeting in San Diego CA this past summer.

DR. FANGYUAN TIAN

Our lab had another productive year with great student success. Four lab members, including Daniel Lu, Ernesto Lozano, Mark Weber, and Michael Chin, graduated with excellent academic records. Among all, Michael Chin was admitted to the PhD Program in Chemistry at UC Santa Barbara and Mark Weber joined the PhD Program in Physics at Georgia Tech. Our volunteer student, Hao Pham from Long Beach City College, successfully transferred to the Biochemistry BS program at UC San Diego. Additionally, our proud previous lab members, Hadiyah Fattal (Class of 2017, BA in Chemistry) started her PhD study of chemistry at the University of Oklahoma; Wen-Jin Chai (Class of 2018, BS in Biochemistry) was admitted to the MB Program in Biotechnology at the University of Pennsylvania. We wish them continued success in their future careers!

We continue to work on adsorptive phenomenon and chemical reactions at the surface and interface of porous solid materials. Since last summer, we have published three peer-reviewed articles with our own undergraduate

and graduate students! Additionally, Dr. Tian, as one of the 25 awardees, received the Undergraduate New Investigator (UNI) grant from the ACS Petroleum Research Fund in 2018. With financial support, we will explore new materials for gas adsorption and separa-

tion.

In the last year, several lab members attended national meetings to present our research. Among all, Angela Bui (MARC Scholar) gave an oral presentation in the 256th ACS meeting in Orlando on the topic of using metal-organic frameworks for drug delivery. MS student Kristi Ishihara and undergraduate student Mark Weber presented their own poster in the same conference with both posters being selected for the SciMix session!

Lastly, we welcome several new lab members: Tiffany Nguyen (BUILD Associate), George Alfarhat, Steven Guillen, Leonardo Barajas, and Sebastian Marroquin (UROP Researchers). We look forward to another exciting year!

DR. PAUL WEERS

The Weers research group aims to understand the structure-function relationship of a group of lipid transporting proteins named apolipoproteins. This year our NIH SCORE SC3 grant was renewed, and we can continue to support the research of our students for another four years. The main focus of the grant is to elucidate the contribution of the N- and C-terminal helices of human apolipoprotein A-I to lipid binding interactions and self-association. This to better understand how apolipoprotein A-I forms high density lipoproteins, which play a crucial role in cholesterol transport in the vascular system. High cholesterol levels in the blood lead to formation of plaques in our artery walls, block blood flow and restrict supply of sufficient oxygen to the heart, eventually resulting in a heart attack. The Weers group welcomed several new members: Joe Yamauchi, Blair Russell, Lindsey Ondieki, Dylan Blaauw, Andrew Fowler, Juliette Jauregui, and Judy Rodriguez, while Melissa Saluta, Bahareh Haeri, James Horn and Andres Cuellar graduated from CSULB. The project from former undergraduate student Tilini Wijeratne, who is now a PhD student at UC Santa Cruz, was published in *Molecular and Cellular Biochemistry*. We presented our research progress at several meetings: Vascular Discovery: From Genes to Medicine Scientific Sessions (Boston, MA), Protein Society (Seattle, WA), CSU Biotechnology Symposium (Garden Grove, CA), ABRCMS (Indianapolis, IN & Anaheim, CA), and our own CNSM student research symposium. Joe Yamauchi became a UROP scholar, John Burdick received the 2019 CSULB Student Summer Research Award, and Angela Tran received an award for her poster presentation at the

ABRCMS meeting.

DR. VASANTHY NARAYANASWAMI

I am thankful and privileged to be surrounded by a group of smart, fun-loving and talented young student researchers in my lab.

Siobanth Cruz graduated and defended his thesis titled "Oxidative Stress and Apolipoprotein E3 in Brain Endothelial Cells" in Oct 2018. His major finding is the identification of oxidized apoE as a hitherto unidentified ligand for the scavenger receptor family of proteins SRB1 and LOX. His work was rightfully recognized when he received the 2019 Outstanding Thesis award. He published his findings in the *International Journal of Molecular Sciences* (2019) 20, 4582. We were sad to see him leave and hope that he stays in touch with us. We also bid farewell to Devan Abhari, who did a lot of heavy lifting to successfully complete former graduate student Kai-Han Tu's work and took it to the finish line with a publication (*FEBS J.* (2019) 286, 1986), and to Tina Nguyen who has been accepted to pharmacy school at USC.

In summer, we were delighted to welcome new graduate students Daanish Kulkarni (NIH RISE MS-to-PhD trainee) and Jessica Shin, and undergraduates, Abbas Abdulhasan (NSF LSAMP and UROP trainee), Kristina Dela Cruz, Kyla Anderson, Kevin Seo (DOE HSI-STEM trainee) and Robert Meija (NIH MARC T34 trainee).

We celebrated Abeer's Richard D Green Dean's Graduate Research Fellowship award, Robbie Meija's Best poster presentation award (Biochemistry) at the 2019 ABRCMS meeting, Anaheim, CA, and Kyla Anderson's 2020 CSU-PERB Howell Research Scholar award.

We formed small subgroups as students continued investigations on: (i) structure function analysis of apoE and its role in cardio- and cerebrovascular disease (Mani), (ii) use of high density lipoprotein nanodiscs as vehicles for drug transport and targeted drug delivery (Vernon, Brendan, Kyla, Kevin, Daanish and Robbie), (iii) the effect of oxidative stress on structure and function of apoE (Abeer, Abbas, Joseph), and, (iv) transendothelial transport of HDL (Kyle, Kristina and Jessica).

We wrapped up fall semester by hosting a visit and seminar by one of our own: Dr. Arti Patel, the first graduate student from my lab. Arti

was an MS Biochemistry student in my lab (2008-2011) before which she was an undergraduate student researcher in Paul Weers' lab (BS Biochemistry, CSULB).

She went on to Tufts University, Boston, to do her PhD after which she moved on to do her post doctoral work in the Neuroscience program at Novartis Institutes for BioMedical Research, Cambridge, MA. Arti received a 4-year industry post doctoral fellowship at Novartis and is currently in the 3rd year of her fellowship.



Dr. Arti Patel

Dr. Patel presented a seminar "Probing TAR DNA binding-binding protein 43 (TDP-43) pathobiological mechanism: An arrayed CRISPR kinome-wide screen in human neurons" for the Department of Chemistry and Biochemistry.

It was truly heart warming to hear Arti's arduous journey from Zambia, where she was born, to her initial education in De Anza Community College, Cupertino, in 2003, then to American River College, Sacramento, and subsequently her transfer to CSULB. She described her education as an undergraduate and graduate student from our department, and her publications as a student researcher at CSULB as life changing and valuable experiences. She went on to detail her struggles and successes during her PhD work and discussed her amazing current experience with the Big Pharma. She is not done yet.... Let's keep our eyes open and watch her career progression. Arti is on a steep and strong upward trajectory. Her journey is representative of many graduates from our department and is a path that many will adopt in the future.

All in all, it is easy to understand why I feel thankful and privileged with my job. I am very proud of our students -they make us look good!



Jordan Ngo

JORDAN NGO EARNS HIGHEST COLLEGE HONOR

By Dr. Douglas McAbee

Jordan Ngo, a BS biochemistry major, was named the Outstanding Graduate for the College of Natural Sciences and Mathematics for 2019. This is the most prestigious distinction given by the college and the university Alumni Association, and is awarded to the college undergraduate who best demonstrates the highest ideals of the college for academic and research excellence. Jordan graduated in May 2019 magna cum laude. He worked as a research student in the lab of Dr. Deepali Bhandari, who by virtue of Jordan's award was named the "Most Valuable Professor" in the college for 2019. Notably, Jordan is the fourth consecutive biochemistry student who has received this highest distinction from the college (Brittany Daws, 2016; Lukas Fuentes, 2017; Roxanne Jacobs, 2018).

Jordan grew up with his family in the Fresno area, and he and his brother are first generation college students from their family—his brother attends San Diego State University (kinesiology). Jordan opted to attend CSULB over other colleges or universities because of the accreditation of the BS biochemistry program by the *American Society for Biochemistry and Molecular Biology* and also because of CSULB's very strong music performance programs. Jordan had long-standing interests

in music, biology, and chemistry and thus planned to double-major in music and biochemistry as a freshman starting in fall 2015. In his first semester, Jordan spent considerable time in the *Student Access to Science (SAS) Center* in the college, mainly to get advice on course scheduling and how to be successful as a science major. SAS Center staff strongly urged him to consider doing research as a way to augment his college experience, and in his first year, he took NSCI 190A (*Experience Success Program*), a course that required him to spend an extended time in a research lab. His choice of Dr. Bhandari's lab for this activity was fateful, because he was so taken with what he saw and experienced there he joined the Bhandari lab in his second semester. This was an immersive experience for him because he had not even finished the general chemistry sequence much less general biology or organic chemistry before starting work in a lab doing research in biochemistry and cell biology! He thrived nonetheless.

Jordan worked on multiple projects in the Bhandari lab. He helped study the molecular interaction of two proteins important for cell survival during periods of stress—GIV (aka girdin) and glucose-regulatory protein (GRP) 78 (aka BiP). This involved detecting Grp78 binding to full length and truncated variants of GIV by pull-down assays and immunoblot detection of the binding partners, thereby mapping the GRP78-binding domain on GIV. He also examined the changes in cellular distribution by Grp78 during episodes of induced cell stress. A portion of this work was published recently, with Jordan as second author: Limso C, Ngo JM, Nguyen P, Leal S, Husain A, Sahoo D, Ghosh P, Bhandari D (2019) The α -interacting vesicle-associated protein interacts with and promotes cell surface localization of GRP78 during endoplasmic reticulum stress. *FEBS Lett*, doi: 10.1002/1873-3468.13685.

Jordan also worked with graduate student Brent Roach on a project involving a key regulatory kinase termed CDK5, which essential for embryonic development whose overactivation has been implicated in several pathologies including neurodegeneration, cancer cell metastasis and type II diabetes.

This work identified a novel phosphoregulatory site on CDK5 that appears to act as a molecular switch altering cell behavior between migration v. proliferation. Again, Jordan was second author on this paper: Roach BL, Ngo JM, Limso C, Oloja KB, Bhandari D (2018) Identification and characterization of a novel phosphoregulatory site on cyclin-dependent kinase 5. *Biochem Biophys Res Comm*, 504:753-758—the only undergraduate coauthor on this paper. Dr. Bhandari indicates that he will be a coauthor on a third paper stemming from his contributions to a project very recently begun in the lab.

Jordan was active in presenting his work at several regional and national meetings, including the ABRCMS meeting (2017, 2018), the annual CSUPERB meeting (2018, 2019), the *Experimental Biology* meeting (2018), and the annual meeting of the ASCB-EMBO (2018). Notably, he received the *Outstanding Poster Award* at the 2017 ABRCMS meeting, and he was one of 8 finalists for the *Glenn Nagel Undergraduate Research Award* (CSUPERB, 2019). He won the undergraduate competition for Outstanding Poster at the ASCB-EMBO (2018), competing against 160 domestic and international students, many from R1 institutions, earning a perfect score from both judges for the quality and scientific merit of his work and presentation.

In summer of 2018, Mr. Ngo received the highly prestigious Amgen scholar fellowship and worked with Nobel laureate Dr. Randy Schekman, UC Berkeley, investigating the interaction of a cytoskeletal protein *tau* and its involvement in membrane aggregation. As a reflection of the quality of Mr. Ngo's work and overall abilities, Dr. Schekman extended an offer to Jordan to join his lab as a Ph.D. student at UC Berkeley for graduate work. Jordan accepted as began his PhD work there in fall 2019. His advice to university freshman? "Invest time and effort in your interests! Be the best version of who you are! Sound advice, indeed! We look forward with anticipation to his future success and contributions and wish him all the best.

2019 M.S. THESES

MASTER OF SCIENCE BIOCHEMISTRY

LULADEY AYALEW

Thesis: *Hybrid collagen/cell penetrating peptide carrier for combinational chemotherapy.*

Advisor: Dr. Katarzyna Slowinska

TIMOTHY CHAO YAN CHANG

Thesis: *Evaluating the role of Glu97 in triosephosphate isomerase.*

Advisor: Dr. Jason Schwans

ANH N COLQUHOUN

Thesis: *Investigating the role of glutamate 97 in triosephosphate isomerase from Homo sapiens.*

Advisor: Dr. Jason Schwans

SIOBANTH CRUZ

Thesis: *Oxidative stress and apolipoprotein E in brain endothelial cells.*

Advisor: Dr. Vasanthi Narayanaswami

TIN HOANG DO

Thesis: *Understanding the biological activity of products undergoing advanced oxidation process (AOP) antibiotics.*

Advisor: Dr. Stephen Mezyk

BAHAREH SADAT HAERI

Thesis: *Reconstituted high density lipoprotein is less active in binding to lipopolysaccharides and phosphatidylglycerol compared to lipid-free apolipoprotein A-1.*

Advisor: Dr. Paul Weers

KEVIN HO

Thesis: *Interaction of hybrid peptides with the FaDu cell line.*

Advisor: Dr. Katarzyna Slowinska

JAMES VANTIRAK CHIN HORN

Thesis: *Chimeras provide insight into apolipoprotein domain organization.*

Advisor: Dr. Paul Weers

CLARISS ANN LEE LIMSO

Thesis: *Characterization of GIV-GRP789 interaction during endoplasmic reticulum stress: a promising target to curb cancer cell survival.*

Advisor: Dr. Deepali Bhandari

BRETT LEE ROACH

Thesis: *Identification and characterization of a novel phosphoregulatory site on cyclin-dependent kinase 5.*

Advisor: Dr. Deepali Bhandari

MASTER OF SCIENCE CHEMISTRY

STEPHANIE M. ARAIZA

Thesis: *Novel phosphors based on ordered olivine metal oxide type: CaYGaO₄.*

Advisor: Dr. Shahab Derakhshan

CHARLES JOSEPH BLOED

Thesis: *Catalytic properties of transition metal oxides.*

Advisors: Dr. Shahab Derakhshan and Dr. Hadi Tavassol

PARKER LADD BREMER

Thesis: *Identification and characterization of protein-ligand binding modes via molecular dynamics.*

Advisor: Dr. Eric J. Sorin

JENNIFER PAULINE CASTILLO

Thesis: *Investigation of the NCl₂ radical chemistry in advanced oxidative processes.*

Advisor: Dr. Stephen Mezyk

ARASELI CORTEZ

Thesis: *Synthesis and thermoelectric properties of lanthanum-filled and heavy-element transition metal doped CoSb₃-based skutterudites.*

Advisors: Dr. Shahab Derakhshan and Dr. Sabah K. Bux

MARIE FRANCES DONATO

Thesis: *Magnetic properties of NaCl structure type ruthenium-based magnetic oxides.*

Advisor: Dr. Shahab Derakhshan

JING JIN

Thesis: *A cooperative pillar-template strategy as a generalized synthetic method for flexible homochiral porous frameworks.*

Advisor: Dr. Xianhui Bu

CYRUS ANDREW KORONI

Thesis: *Synthesis and characterization of dinitrosyl iron complexes containing phenanthroline derivatives.*

Advisor: Dr. Young-Seok Shon

MOHAMMAD A.M. MAHDALY

Thesis: *Thiolate-capped palladium nanoparticles for selective catalytic hydrogenation of alkenes in the presence of another reactive functional group.*

Advisor: Dr. Young-Seok Shon

ANDY SUA

Thesis: *Using metal organic framework film as a drug-eluting stent coating.*

Advisor: Dr. Fangyuan Tian

THUONG XINH TRIEU

Thesis: *Syntheses and characterizations of new metal-organic framework materials.*

Dr. Xianhui Bu

KEVIN M. VARGAS

Thesis: *Reversed alkyl thiosulfate addition synthesis of mono- and binary ligand-capped palladium nanoparticles: isolating the catalytic influence of surface ligand density and surface morphology.*

Advisor: Dr. Young-Seok Shon

CHETNA VASUDEVA

Thesis: *Evaluation of N-nitrosodimethylamine (NMDA) at varied pH and conditions in treated wastewater.*

Advisor: Dr. Stephen Mezyk

MY THANH VO LUONG

Thesis: *A kinetic study of the removal of synthetic musks, phthalates, and nitrosamines under advanced oxidative process conditions.*

Advisor: Dr. Stephen Mezyk

JIE S. ZHU

Thesis: *Unsupported thiolate-capped palladium nanoparticles as selective hydrogenation catalysts.*

Advisor: Dr. Young-Seok Shon

FACULTY PUBLICATIONS, 2018-2019

DR. DEEPALI BHANDARI

Limso C, Ngo JM, Nguyen P, Leal S, Husain A, Sahoo D, Ghosh P, Bhandari D. (2019) The Gα-interacting vesicle-associated protein interacts with and promotes cell surface localization of GRP78 during endoplasmic reticulum stress. *FEBS Lett* doi: 10.1002/1873-3468.13685.

DR. XIANHUI BU

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Gai Y, Chen X, Yang H, Wang Y, Bu X, Feng P, (2018) A new strategy for constructing a disulfide-functionalized ZIF-8 analogue using structure-directing ligand-ligand covalent interaction, *Chem Commun* 54:12109-12112

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DR. PAUL WEERS

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NEW STAFF JOIN THE DEPARTMENT

By Dr. Chris Brazier

Over the last year the department has welcomed two new members of staff, Alex Long as Equipment Technician, and Yaneth Bravo as Director of Laboratories. Both have proved to be excellent additions to the department, indeed they have turned out better than we could possibly have hoped for. Besides excelling in their respective positions they both have smooth and harmonious interactions with the faculty and staff. Both earned bachelor's degrees in biology and their personal interests and skills developed at that time led them to their current rather different careers.



Alex Long

Alex Long grew up in Sacramento and is a graduate of Cal State Chico, coincidentally I was briefly a member of the chemistry faculty at the same time but our paths never crossed. After working at the Cabrillo Marine Aquarium for a while Alex joined the biology master's program at CSULB. His research with Prof. Zed Mason involved applying instrumental chemical analysis techniques to biological problems. This is where he first became familiar with instruments like ICP-MS, GC-MS, and HPLC. As a side job Alex started helping Rich Gossett of the college IIRMES sample analysis center with their analytical instrumentation. Eventually this transitioned into a full time position with IIRMES running samples and maintaining instruments. Nine years later Alex was looking for new challenges and jumped at the chance to move to a state employee position as the chemistry department equipment technician in December 2018. A year later I can safely say that we are all very happy that he made the transition.

Alex is married with three children ages 9, 7, and 4, and his personal time is consumed handling their needs. At work he enjoys how everyone is so fantastically friendly and helpful. His position involves new challenges to fix different types of instruments and he

likes getting to work with different faculty and staff, both in the department and the college.



Mayra "Yaneth" Bravo

Mayra "Yaneth" Bravo has been known as Yaneth since she was a child growing up in nearby Los Alamitos. She and her husband now live in Seal Beach. Yaneth was a summer Bridges to the Baccalaureate student in 2010 in Eric Sorin's group at CSULB before attending UCLA where she received her bachelor's degree in Ecology and Evolutionary Biology in 2013. She started her career as a student lab tech trainee at UCLA but she could not handle having to kill the research animals. After graduating she worked at West Coast University prepping anatomy, nursing, and chemistry labs. She was responsible for everything from purchasing the chemicals and lab supplies to handling the chemical waste. When Joyce Kunishima retired as the director of laboratories at the end of 2018 we were all afraid how we would manage without her. After an extensive search and interviews with several excellent candidates Yaneth joined the department in March 2019. She quickly mastered the intricacies of the university purchasing system and we are really happy that we hired her.

Yaneth likes to go hiking, especially in the Lake Tahoe area, and is interested in anything related to nature, science, or the climate. Yaneth enjoys the student centered environment focused on expanding knowledge at a university that is so different from the corporate world. She loves the sciences and enjoys any opportunity to learn and grow. She likes helping students and likes to project a warm friendly face to those who might be intimidated by the sciences.

The toughest parts of her job are unknowns as chemistry can be complex and dangerous, and the need to get everyone to work together. Her advice "It is important to put yourself out there and ask questions, and do not be afraid to grow."

YOUR DONATIONS AT WORK

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STUDENT TRAVEL AWARDS

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DEPT HONORS/SPECIAL AWARDS

7

SCHOLARSHIPS

4

SUMMER RESEARCH AWARDS

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SEMINARS IN FALL AND SPRING 19, VISITING SPEAKERS FROM SALK INSTITUTE, UC RIVERSIDE, UCLA, UC IRVINE, OCCIDENTAL COLLEGE, CSU FULLERTIN, CSU NORTHRIDGE, CSU LOS ANGELES, CSU SONOMA, SAN DIEGO STATE UNIVERSITY, UNIVERSITY OF TEXAS DALLAS, UNIVERSITY OF DELAWARE, AND NORTHEASTERN UNIVERSITY.

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To learn more, contact Maryanne Horton, Senior Director of Development, College of Natural Sciences and Mathematics, 562.985.1687, maryanne.horton@csulb.edu.

ROGER A. ACEY, PH.D

By Dr. Douglas McAbee



Roger A. Acey

Roger A. Acey passed away on November 15, 2019, in Long Beach, California, at age 73.

Roger was born in Detroit, Michigan on July 16, 1946. He attended public schools in the Detroit area, graduating from Cass Technical High School in 1965. He attended Wayne State University in Detroit earning a BS in biochemistry, then completed his PhD studies at Wayne State University School of Medicine in biochemistry in 1977 working with Dr. Danica Dabich. For the next few years, he stayed on at the medical school as a post-doctoral fellow while lecturing in general chemistry at Wayne County Community College. During his post-doctoral work, he started using *Artemia salina* (brine shrimp) as a model to study neuronal development. Wanting to leave the Midwest, he took a lecturer position in the Department of Chemistry at Cal State University Bakersfield in 1982. The following year, at the encouragement of Dr. Ken Marsi, he joined our department as a lecturer. He then applied for a tenure-track position in the department the next year and was hired and started as an associate professor at CSULB in fall 1984. He was promoted to the rank of professor with tenure in 1991, and he retired from the university (but not from research!) in 2016.

When Dr. Acey first started at CSULB, faculty had to account for 15 units of instruction each semester, so his relatively heavy teaching duties included parts of general chemistry as well as biochemistry lecture and lab courses. He also taught a graduate course in nucleic acids (CHEM 547), which he taught his entire career in the department. Nonetheless, he got his research laboratory up and running, aided by an equipment grant from the State of California to develop an immunoblotting technique for the early detection of the virus that went on to decimate the citrus industry in Orange County during the early 1980s. Roger was instrumental in the major overhaul of the biochemistry teaching lab

(CHEM 443), and collaborating with colleagues Dr. Cohlberg and Dr. Merryfield, he helped develop a CHEM 443 lab syllabus focused on his research model system of *Artemia*. This lab curriculum was used in CHEM 443 for over 25 years. Roger was passionate about teaching and student learning. He had high standards for his own instruction and for student performance in his classes yet was always willing to go the extra mile for students who made an effort. He set a premium on the ability of students to think critically of what they were learning. Over his career, he taught thousands of students, mostly in biochemistry, and he maintained contacts with many of these students long after they graduated from the university.

Dr. Acey had a long research interest in mammalian development but his initial model system for research brine shrimp—a small marine invertebrate that possesses a mammalian-like adrenergic nervous system. *Artemia* are easy and inexpensive to grow and maintain, and they have a relatively short development window, suitable for experimentation. In later years, he expanded his research to include studies on neuronal differentiation in pluripotent human stem cells. Two early findings shaped Roger's future research to a great extent. One was his discovery that the enzyme butyrylcholinesterase was important for normal *Artemia* neuronal development. Second was his observation that early stages of neuronal development in *Artemia* were deranged by brief exposure to heavy metals. These findings led to an expansion of his research on butyrylcholinesterase as a key enzyme in early development as well as its hyperactive role in Alzheimer's disease. His work on the butyrylcholinesterase inhibition by plasticizers commonly found in plastic food and beverage containers led him to connect butyrylcholinesterase inhibition with autism. His cholinesterase work led to a collaboration with two department colleagues, Dr. Kensaku Nakayama and Dr. Eric Sorin for the development and analysis

of a wide variety of organophosphate compounds as selective inhibitors of butyrylcholinesterase as an Alzheimers treatment. In addition, he developed a metallo-thionein-based technology for the removal of heavy metals from water. The outcomes of these avenues of research included multiple U.S. patents and two start-up companies, MGP Biotechnologies and JAL Therapeutics, which he cofounded with colleague Dr. Nakayama. He was actively engaged in research and company work right up to the time of his passing.

When I joined the department in 1997, Roger eagerly assisted me with my transition to the department and getting my teaching and research underway. I was very grateful for his help, always offered with a can-do smile. His

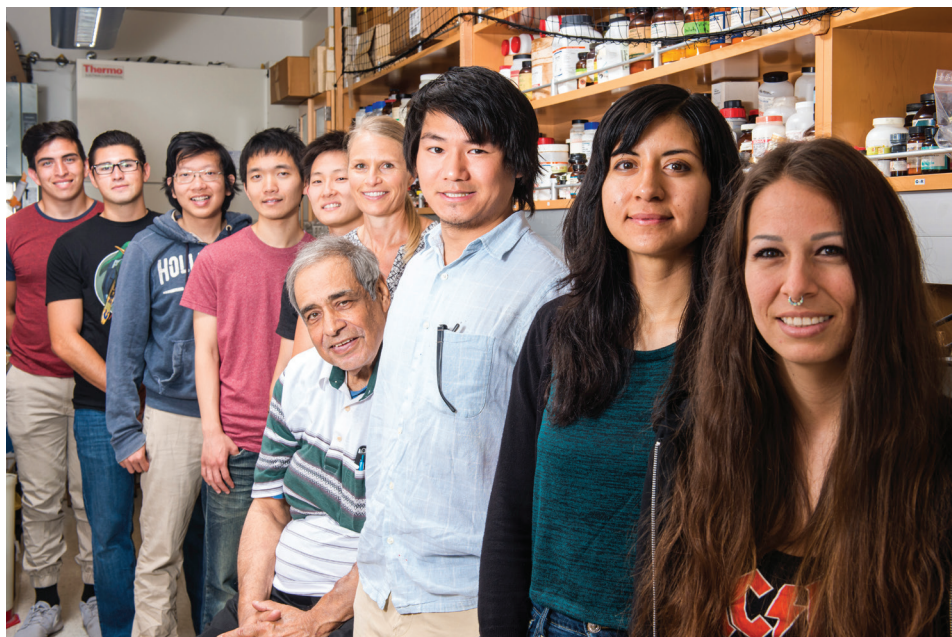
I once came across a box labeled "Acey" in the MLSC cold room that contained a case of bottled media that had expired ten years previously. "Roger", I asked, "why do you keep all this expired media? You can't use it for culture work!" "Oh, that," he shrugged "we use it to wash cells!" Roger never met a box of culture flasks he didn't like, thinking, I'm certain, they would be useful some day in a way the manufacturer never intended.

Outside of his professional life, Roger had many interests and hobbies. He enjoyed playing cards and indulged a fancy for gambling with not-infrequent trips to Las Vegas. He also was an active day trader. When he was younger and able, he enjoyed cooking and entertaining, and according to his brother Joe, "[Roger] was a mean cook back

encouraging all six of the kids.. and they loved him." Roger's absence is sorely felt by his family, missed by all.

The following was contributed by Ms. Gwen Jordaen

Dr Roger Acey was my professor, mentor, employer, and friend. I first met Roger when I enrolled in his biochemistry class. He had a passion for science which was evident in his approach to teaching. He emphasized the big picture, and how and where each molecule fit into the biochemical world. Roger had high expectations of his students and required them to learn, think and apply their knowledge so they would become successful scientists, doctors or pharmacists. His dedication to his students continued into the research laboratory. He designed projects which required a commitment from the student and which provided a sense of achievement for the student. I remember how his face lit up when he discussed a research project, or when students presented him with ideas or exciting data. Some of his favorite phrases when discussing research projects included "I'm naively optimistic", "You should learn to walk away for a day or two" or "Back in my day...". Roger was affectionately named The Big Cheese by his students, a name which he adopted when he addressed himself as "Hi...this is the Big Cheese". Roger had a genuine concern for the well-being and future careers of his students. He was always available for counsel on schoolwork/life balance or just a casual conversation about life in general. Roger will be greatly missed.



Roger Acey Lab

research lab was adjacent to mine, situated in the old Peterson Hall 3 building. He had a small army of students working in his lab, and nearly every square inch of his lab space was taken with instruments, equipment, and the standard flotsam of the research lab, some of which crept over into my lab space. When we moved to the new Molecular Life Sciences Center in summer 2004, I wondered how Roger would ever find space for all his stuff in his new lab, which was a third of the size of his space in PH3. We marveled how he managed this only to discover that all cabinets in the common areas and many in the biochemistry teaching lab were occupied with Roger's stuff!

in the day—hospitality was something we both learned from our mother." He enjoyed sports and played varsity football in high school and loved and played hockey (goalie) even as an adult. Despite numerous attempts by his family to get him to return to Michigan, he never seriously considered going back having many dear friends and his professional life in California, and he *never* missed Michigan winters. Even so, he visited his Michigan family often. According to his brother Joe, "[Roger's] greatest pleasure and joy was my grand children. With every trip to Detroit, he stayed with my daughter and son-in-law and spent most of his time playing with and

The following was contributed by Dr. Tom and Suzanne Maricich

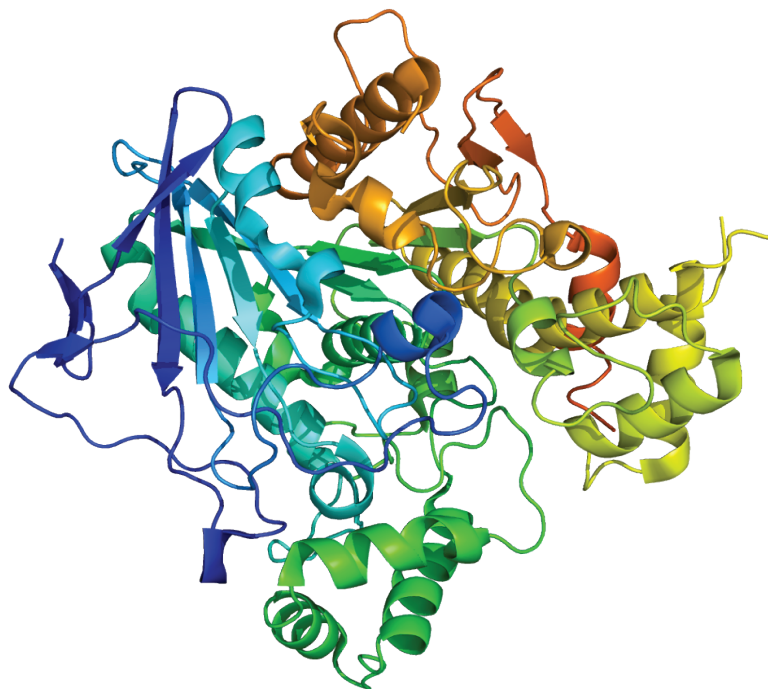
My wife, Suzanne, and I were close friends of Roger for decades. We knew him when he first arrived at CSULB, residing in various places until he bought and restored his beloved home on Rutgers Avenue in Long Beach.

His immediate and extended family in Detroit was the most important thing in Roger's life. He spoke of them often, sharing details about their lives, and it was obvious he cared deeply for them.

Roger especially enjoyed dinners with us and other university people. In the early days, we'd get together for large, informal department dinners often arranged by Lily Lim Berryhill at various restaurants in Long Beach. Thai food was one Roger's favorites then. Lately, he liked New England clam chowder and fish and chips at the Fish Company. Dinner conversation

family, friends, his collaborators, and barber. He spent months in acute-care hospitals and sub-acute nursing homes, managing against all odds to keep his research projects moving along, and always returning home. Amazingly, during all this time, he rarely complained (except about medical errors, chicken every day for dinner, and sloppy care) and often

during that period. Roger helped me navigate the political landscape at The Beach, got me involved in advising our incoming undergraduates, and brought me into his collaboration with our colleague Dr. Kensaku Nakayama, which has since grown to be a productive part of my research program. Roger was quite the character, frequently offering a laugh-worthy anecdote "from the old days" about one of our colleagues or a sobering moment of reflection on the many changes taking place within our department, college, or university.



Structure of human butyrylcholinesterase; <https://commons.wikimedia.org/w/index.php?curid=8763114>

was always interesting and rolled along with no effort. Roger was a talented cook who entertained like a chef. For department get togethers, his specialty was large, crab-stuffed mushrooms. Roger's own parties were a labor of love for him and great fun for his guests.

On the professional side, he directed a large research group over the years and considered his students as part of his family. Roger was a hard taskmaster with high standards who really cared about his students as individuals. He believed in training them to be successful in the workplace.

In his last few years, Roger suffered from several medical conditions, which limited his mobility, but not his enjoyment of

remarked how visits from friends were the fuel that kept the fire burning for him.

Suzanne and I were blessed by his friendship. On our last visit with him at Mission Hospital, two days before he died, he sat up, gripped my hand strongly, and said "Don't go!" Little did we know then what he meant. He has been, and always will be, missed. There will never be another Roger.

The following was contributed by Dr. Eric Sorin

I first met Roger Acey while moving into my new office on the second floor of MLSC in August 2007. He would be my office neighbor for several years at CSULB and served as an informal faculty mentor

During those first few years, I learned a great deal by observing Roger's teaching practices. His frank, and often stern, interactions with his students certainly informed my own responses to struggling students, as did his patience and empathy. His high expectations, for which he was both appreciated and feared by our majors, validated my own expectations as a teacher. Most importantly, his jovial spirit, particularly when on display during interactions with his students, always reminded me that while we came here to pursue our respective careers, we were also here to provide an optimal learning environment for a diverse student body, and one tool Roger had mastered to achieve that ideal was levity. I should note that when my students and I got similarly audible, he had no reservations about sticking his head into my office to grunt "Hey, let's keep it down in here, OK?"

Roger Acey loved his job; he loved teaching and working alongside his students and peers, and we are all better for having had his presence in our lives.

The following was contributed by Dr. Jeff Cohlberg.

[Roger] just loved being in the lab -- he couldn't imagine a life without it. He was a dreamer, always working on a project: to get our 443 lab manual published with reagents listed in the Sigma catalog (we had a contract, for what that's worth), to commercialize metal-removal products based on brine shrimp metallothionein (he had several patents), to develop new

Alzheimer drugs. He was always brimming with enthusiasm about his progress toward those goals, and success was always just around the corner. Finally, he was a really sweet good-hearted guy, not without a temper that could be directed at things he objected to, but basically a softie.

The following was contributed by Roger's collaborator Dr. Kensaku Nakayama.

I remember the day I first talked with Roger, when he dropped by my old research lab in PH3 soon after I was hired. I appreciated that he visited to simply ask how I was doing, getting my lab set up. Since that day, I always felt free to visit his office any time and chat about our work or department politics. Over the years, Roger has always been a colleague and a friend

who never forgot to ask "How are you doing?"

Roger and I worked on the cholinesterase project for several years. The collaboration started after a chat when we happened by each other one early evening in the old PH building hallway. We used to later chuckle about some early enzyme inhibition assays his students carried out using our organophosphates. When the data showed a flat baseline for enzyme activity after using the inhibitors, Roger was convinced that the assays were done incorrectly, and asked his students to repeat the experiments by making sure that the enzyme was added this time! Neither of us really expected such high inhibitory properties of these early compounds. Our work since uncovered a wide structural range of compounds showing interesting inhibitory

properties. I am very grateful to Roger for opening my eyes to the interesting interplay of organic chemistry and biochemistry. The work is now being continued with my colleagues, Drs. Jason Schwans and Eric Sorin.

Roger struggled with various health problems for a long time. His passing came as big shock to me though, especially since I thought he had finally gotten out of the woods from a recent serious medical condition. I will continue to miss him as a colleague and a friend.

Our enduring memory of Dr. Acey is his passion about research and teaching, his energy and optimism, particularly in the face of personal difficulties, his "happy warrior" spirit, and as a strong, caring, and loyal colleague.

BIOCHEMISTRY LAB T-SHIRTS

("BIOCHEM OUTFITTERS")

The CHEM 443 t-shirts for fall 2019 and spring 2020 continue the tradition of incorporating pop culture themes with a whimsical take on life in the biochemistry lab. LabAid 2019 announces the upcoming concert tour to benefit biochemistry lab students, highlighting the band Queen and what some of their popular music titles might have been if Freddie Mercury had been a biochemist!. The spring 2020 t-shirt theme "Lab Wars, The Laboratorian" is a biochemistry parody of the hugely successful Star Wars series The Mandalorian. Many thanks go to our artist Lilit Grigoryants (lilit.Grigoryants@gmail.com) for her creative input into the design of these shirts, our 18th and 19th original-designs for the ever-fresh line of CHEM 443 laboratory apparel begun in 2010.

Coldroom Concerts Present
LAB AID 2019
QUEEN
Performing...
Autoradio-Gaga
We Will Blot You!
Lab Partner to Love
Post-doc Me Now!
Krebs-cycle
Fat Bottomed Flasks
BovAlbumin Rhapsody

CHEM 443
Student Relief

with Special Guests:
Thanh Mai and the
Fizzing Whizbees
Bhandari Bad Inoculum

Executive Producers:
Manandhar
McBee
Pierce

ROADIES
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Jocelyn
Kindra
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Dante
Brittany
Jennie
Diego

SPECIAL EFFECTS
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Terenz
Lawrence
Mario
Marisol
Michael
Lynn
Lili

SECURITY
Kimberly
Gabrielle
Cindy
Andrew
Raylyn
William
Sara
Shayne

CONCESSIONS
Brendan
Dennis
Koga
Adrian
Michelle
Lauren
Vincent
Timothy

THE FEDERAL UNDERGROUND Long Beach 16 DEC
WHISKEY A GO GO West Hollywood 18 DEC
THE KNITTING FACTORY Boise 20 DEC

THIS IS THE WEIGH BOAT

LAB WARS
TO THE
LABORATORIAN

FOUNDLING-BESKAR STUDIOS PRESENTS LAB WARS THE LABORATORIAN, A CHEM 443 FILM STARRING STEPHEN ANNA, ROHIN DYLAN, PAOLA DANTE, ANGELA ELSA, WHITNEY GABRIEL, DARIAN ISAJAH, ISABELLE JUDE, KATIE SHANIA, LINH NGUYEN, EMMANUEL. MUSIC BY ALEANNA. COSTUME DESIGNERS REBEKAH HANNAH. FILM EDITOR MELISSA. PRODUCTION DESIGNERS TRISHIA DARIO. VU SPECIAL EFFECTS BRENDAN ESTRELLA. DIRECTORS OF PHOTOGRAPHY VATTANAK ALAN. SCREENPLAY BY SARGIS MICHELLE ANH. EXECUTIVE PRODUCERS MANANDHAR, MICABEE, PIERCE. CATERING THANH MAI.

STREAMING SPRING 2020

AWARDS & SCHOLARSHIPS

Chemistry and Biochemistry Students



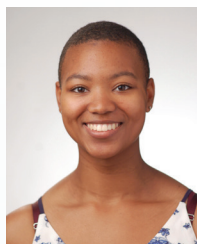
DAANISH KULKARNI



ANH NGUYEN



CODI PACE



CIAIRRA RILEY



BINGLI WANG



IRIS MARQUEZ



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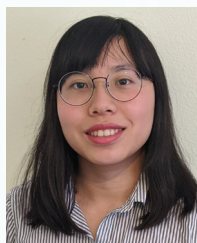
MORGAN CARMAN-GILES



JOHN BURDICK



MUHAMMAD ABEER



LYNN NGUYEN



VINH Q. TRAN



ANDREW BESHAY

DEPARTMENT SCHOLARSHIPS

McAbee-Overstreet Award

Recipients: **DAANISH KULKARNI**

Leslie K. Wynston Scholarship

Recipients: **ANH NGUYEN**

Kenneth L. Marsi Award

Recipients: **CODI PACE, CIAIRRA RILEY**

Monahan Memorial Summer Research Fellowship

Recipients: **BINGLI WANG, IRIS MARQUEZ**

Robert B. Henderson Memorial Scholarship

Recipients: **STEPHANIE LEAL, NOEMI CASTRO**

John H. Stern Summer Research Award

Recipients: **MORGAN CARMAN-GILES**

ORSP Summer Research Fellowship

Recipients: **JOHN BURDICK**

Richard D. Green Fellowship

Recipients: **MUHAMMAD ABEER**

ORSP Summer Research Fellowship

Recipients: **LYNN NGUYEN**

SUBJECT AWARDS

Biochemistry Award

Recipients: **STEPHANIE LEAL**

Inorganic Chemistry Award

Recipients: **VINH Q. TRAN**

Freshman Chemistry Award

Recipients: **ANDREW BESHAY**

Spyros Pathos IV Award

Recipients: **MAX CHANG**



ADAM SMITH



AARON CHAVARRIA



GRANT BOSTWICK



THIEN KIM HUYEN



JOEL MONROY



JORDAN NGO



LIAM TWIGHT



CHRISTIAN LOO



DENYS RUJCHANARONG



TINA NGUYEN

Hypercube Award

Recipients: **ADAM SMITH**

John H. Stern Award in Physical Chemistry

Recipients: **LEMUEL LI**

American Chemical Society Award in Physical Chemistry

Recipients: **ANDREA NELSON**

American Chemical Society Polymer Chemistry Award

Recipients: **AARON CHAVARRIA**

American Chemical Society Organic Chemistry Award

Recipients: **GRANT BOSTWICK**

Organic Chemistry Award

Recipients: **INHA JUNG**

American Chemical Society Analytical Chemistry Award

Recipients: **THIEN KIM HUYEN**

Analytical Chemistry Award

Recipients: **JOEL MONROY**

AWARDS

Undergraduate

CNSM Outstanding Graduate Award

Recipients: **JORDAN NGO**

Richard D. Green Dean's Award

Recipients: **LIAM TWIGHT**

American Institute of Chemists Baccalaureate Award

Recipients: (Biochemistry) **CHRISTIAN LOO**, (Chemistry) **JOEL MONROY**

Departmental Undergraduate Honors

Recipients: **THIEN KIM HUYEN, VINH TRAN, DENYS RUJCHANARONG**

David L. Scoggins Memorial Award

Recipients: **TINA NGUYEN**

Toni Horalek Award

Recipients: **CHRISTIAN LOO, MICHAEL CHIN**



KEVIN VARGAS



PARKER BREMER



MY VO LUONG

Graduate

Graduate Dean's Honor List of Scholars & Artists

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PHIL LY



ARASELI CORTEZ



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SIOBANTH CRUZ



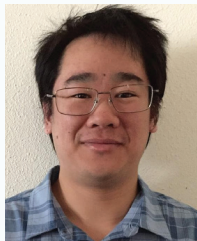
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JIAM VUONG



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(JULY 1, 2018-JUNE 30, 2019)

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