

What's New with BB
(July 1, 2024 – September 30, 2024)

Dear BB Community,

Happy Fall 2024. I am pleased to welcome back Afua Nyarko and Dave Hendrix from their sabbaticals. I also welcome the incoming graduate class, and the incoming undergraduate class - all 161 of them!

I hope the beginning of the year has been good to all of you. It has been especially tough for me and my family. I appreciate your words of sympathy and thank you to those who stepped up to cover for me and who sent condolences and for giving me grace and time to adjust to this loss. Between my dad's passing and the invasion of Lebanon and destruction of Beirut, the past month has been quite challenging.

I have spent considerable time reflecting on my father's life and his success, impact, and bravery in starting out in multiple different countries and cultures and persisting despite adversities. I recognize that I learned a lot from him about the value of hard work. My father was a teacher and administrator, and as he liked to say, "a different kind of teacher, first to teach from heart to heart, then to teach with compassion, on a friend-to-friend basis". Teaching was his mission and passion. His joy in giving, his optimism, and his always being someone you can count on never wavered.

My father has been my role model, in his positive energy, always seeing the good in people, and always remembering only the good things, and never taking no for an answer. More than ever, we need people like him to respond enthusiastically to any task, whether academic, administrative, or practical, to rise above political differences, and to care about people first. I will miss him dearly.

I am looking forward to a successful fall quarter, and hopefully to receiving funding for some of the many proposals that we all submitted this summer. We will take a break from hiring new faculty this year, and instead we will focus on strengthening the current faculty by investing in department facilities, fundraising for new equipment, and making the available space more efficiently used. We will also be revamping the Biophysics series, introducing an online lab (developed by Nate) and creating an e-campus major.

In this election year it is imperative that we vote to elect a president who embodies our values in respecting our diversity, who does not exploit people's fears of immigrants, and who will work to negotiate a peaceful solution in the middle east and the rest of the world.

Below I list some of our activities and successes this past summer compiled by Kimberly. Enjoy reading.

Funded Grants

Alysia Vrailas-Mortimer is a co-PI on a grant titled “Modeling the Genetic Basis and Evolution of Insecticide Resistance in Spotted-Winged *Drosophila*” for \$75,000, from OSU College of Science SCIRIS.

Alysia Vrailas-Mortimer is a co-PI on a grant titled “Novel Use of SGLT2 Inhibitors to Improve Human Health” from the OSU Foundation in the amount of 100,000.

Myriam Cotten is a co-PI on a grant titled “Unlocking the full potential of seaweed as a sustainable, multi-functional commodity”, funded by OSU’s SciRIS program.

David Hendrix as lead PI along with **Elisar Barbar** and **Juan Vanegas** has received funding from the OSU Foundation on a proposal titled “Artificial intelligence and art integration for the prediction and visualization of RNA 3D structures” in the amount of \$100,000.

Grant Proposals Submitted

Elisar Barbar submitted an NSF proposal titled “Regulation of dynamic protein complexes: Focus on dynein molecular motor” to the Division of Molecular and Cellular Biosciences of NSF, in the amount of \$1,276,000.

Colin Johnson and **Juan Vanegas** submitted an NSF proposal titled “Characterization of the shared and divergent functions of the ferlin protein family” to the Division of Molecular and Cellular Biosciences of NSF, in the amount of \$605,399.

Alysia Vrailas-Mortimer, in the role of MPI, submitted an NIH R01 proposal titled “Neuronal Mechanisms of Copper Transport and Toxicity” in the amount of \$590,720.

Alysia Vrailas-Mortimer, in the role of co-PI, submitted an NSF IUSE III proposal titled “Taking Flight: Expanding and Adapting the Fly-CURE for Broader Implementation and Student Impact” in the amount of \$2,000,000.

Jessica Siegel was the lead PI on a Murdock Partners in Science proposal (Vanegas and Barbar as mentors) for training teachers.

David Hendrix as lead PI with Siva Kolluri submitted a proposal to the NIH titled “Molecular mechanisms of blue light-induced human cell death”.

Dan Liefwalker submitted a proposal to the MRF OHSU Foundation titled “Reinstating cell death in MYC-dependent malignancies” in the amount of \$50,000.

Patrick Reardon with Jennifer Fields as lead PI submitted a proposal to the Dept of Defense titled “Destruction of AFFF Concentrate and PFAS-Impacted Soil Mixtures using Thermal Desorption and Plasma Oxidation” in the amount of \$1,000,177.

Ryan Mehl submitted to the NSF a proposal titled “Ideas Lab: CFIRE: PRESENT: PROtein Evolution in Spore-Enabled TXTL System” in the amount of \$634,794.

Publications:

From the *Cooley/Mehl* Group

Eddins AJ, Pung AH, **Cooley RB**, **Mehl RA**. *Tetrazine Amino Acid Encoding for Rapid and Complete Protein Bioconjugation*. *Bio Protoc.* 2024 Aug 20;14(16):e5048. doi: 10.21769/BioProtoc. 5048. PMID: 39210952; PMCID: PMC11349492.

From the *Cotten* Group

Oludrian A ; Malik A, Zourou, AC, Wu Y, Gross SP, Siryapon A, Poudel A, Alleyne K, Adams S, Courson DS, **Cotten ML**, Purcell EB. *Host-defense piscidin peptides as antibiotic adjuvants against Clostridioides difficile*. *PlosOne*, 2024, 22:e0295627. Doi.org/10.1371/journal.pone.0295627.

Bepler T, Barrera MD, Rooney MT, Xiong Y, Kuang H, Goodell E, Goodwin MJ, Harbron E, Fu R, Mihailescu M, Narayanan A, and **Cotten ML**. *Antiviral Activity of the Host Defense Peptide Piscidin 1: Investigating a Membrane-mediated Mode of Action*. *Front. Chem.*, 2024, 26:12:1379192. doi: 10.3389/fchem.2024.1379192.

Cotten ML, Starich MR, He Y, Yin J, Yuan Q, and Tjandra N. *NMR chemical shift assignment of Drosophila odorant binding protein 44a in complex with 8(Z)-eicosenoic acid*. *Biomol. NMR Assign.*, 2024. doi: 10.1007/s12104-024-10178-2.

Miceli RT, Allen NG, Subramaniam B, Carmody L, Dordick JS, Corr DT, **Cotten ML**, Gross RA. *Synergistic Treatment of Breast Cancer by Combining the Antimicrobial Peptide Piscidin with a Modified Glycolipid*. *ACS Omega*, 2024, 9:33408-33424. doi: 10.1021/acsomega.3c09902.

From the *Franco* Group

Nguyen KT, Sathler AR, Estevez AG, **Logan IE**, **Franco MC**. *ProDiVis: a method to normalize fluorescence signal localization in 3D specimens*. *Front. Cell Dev. Biol.* 22 September 2024. Sec. Cellular Biochemistry. Vol 12-2024. <https://doi.org/10.3389/fcell.2024.1420161>

From the *Freitag* Group

Lax C, Mondo SJ, Osorio-Concepción M, Muszewska A, Corrochano-Luque M, Gutiérrez G, Riley R, Lipzen A, Guo J, Hundley H, Amirebrahimi M, Ng V, Lorenzo-Gutiérrez D, Binder U, Yang J, Song Y, Cánovas D, Navarro E, **Freitag M**, Gabaldón T, Grigoriev IV, Corrochano LM, Nicolás FE, Garre V. 2024 [Symmetric and asymmetric DNA N6-adenine methylation regulates](#)

[different biological responses in Mucorales](#). Nat Commun. 15: 6066. doi: 10.1038/s41467-024-50365-2. PMID: 39025853

From the *Mehl* Group

Mott TM, Wulffraat GC, Eddins AJ, **Mehl RA**, Senning EN. *Fluorescence labeling strategies for cell surface expression of TRPV1*. J Gen Physiol. 2024 Oct 7;156(10): e202313523. doi: 10.1085/jgp.202313523. Epub 2024 Aug 20. PMID: 39162763.

From the *Vrailas-Mortimer* Group

Lane, A.R., Scher, N.E., Bhattacharjee, S., Zlatic, S.A., Roberts, A.M., Gokhale, A., Singleton, K.S., Duong, D.M., McKenna, M., Liu, W.L., Rivera Moctezuma, F.G., Tran, T., Patel, A., Clayton, L.B.U., Petris, M.J., Wood, L.B., Patgiri, A., **Vrailas-Mortimer, A. D.**, Cox, D.N., Roberts, B.R., Werner, E., and Faundez, V. *Adaptive protein synthesis in genetic models of copper deficiency and childhood neurodegeneration*. 2024. BioRxiv

Note: underlined is Lauren Clayton, an undergrad working in Vrailas-Morimter lab.

From the *Vanegas* Group

Poudel, B. & **Vanegas, J. M.** *Structural Rearrangement of the AT1 Receptor Modulated by Membrane Thickness and Tension*. J. Phys. Chem. B (2024) doi:[10.1021/acs.jpcc.4c03325](https://doi.org/10.1021/acs.jpcc.4c03325).

Leverant, C. J., Richards, D., Spoerke, E. D., Alcalá, R., Jiang, Y-B., Percival, S., **Vanegas, J. M.**, Rempe, S. B. *Nanoconfinement of Carbon Dioxide within Interfacial Aqueous/Ionic Liquid Systems*. Langmuir 40, 10615–10622 (2024).

Prignano, L. A., Stevens, M. J., **Vanegas, J. M.**, Rempe, S. B. & Dempski, R. E. *Metadynamics simulations reveal mechanisms of Na⁺ and Ca²⁺ transport in two open states of the channel rhodopsin chimera, CIC2*. PLOS ONE 19, e0309553 (2024).

Faculty Talks

Myriam Cotten gave a talk in March 2024 titled “Host defense at biological membranes: Investigating synergistic effects based on the antimicrobial peptide piscidin” at the American Chemical Society Spring 2024 Conference in New Orleans, LA.

Juan Vanegas gave a talk titled “Energetics and Transport of Carbon Dioxide in Ionic Liquids and Aqueous Interfaces” at the Center for Integrated Nanotechnologies Annual User Meeting (Los Alamos and Sandia National Laboratories, DOE) in Santa Fe, New Mexico, September 16-17, 2024.

Juan Vanegas gave a talk titled “Tension mediated activation of transmembrane protein receptors and ion channels” at the Biological Membranes and Membrane Proteins: Challenges for Theory and Experiment Symposium (Organized by the University of Chicago) in Santa Fe, New Mexico, June 16-21, 2024

Nate Mortimer gave a plenary talk titled “Functional and comparative genomics of parasitoid wasp venom proteins” at the Genomics Education Partnership meeting at Washington University in St. Louis in late June/early July 2024.

Elisar Barbar gave two talks at Technical University in Munich, and at Ludwig Maximilians University in Munich in July 2024.

Teaching and Learning News

Nate Mortimer's lab launched a new website that will be a repository for their venom protein data. The link is: <https://venome.cqls.oregonstate.edu/> with a lot of the work being done by BB graduate student **Michael Youkhateh** and undergraduate researchers from the College of Engineering.

Toni Doolan, Dean of Honors College and Professor at the School of Mechanical, Industrial and Manufacturing Engineering tracks Honors College student progress towards completing their honors thesis, and noted the following faculty who supported *multiple* honors students in the last academic year: **Elisar Barbar, Tory Hagen, David Hendrix, Victor Hsu, Phil McFadden, Afua Nyarko, Kate Shay, and Kari van Zee.**

Awards

Congratulations to Elisar, recipient of the 2024 Alumni Association Distinguished Professor Award!!

Awarded to a faculty member who demonstrates outstanding professional achievement through teaching and scholarship, service to the university and the community, and professional leadership, nationally and internationally.

<https://universityday.oregonstate.edu/2024-award-recipients#toc-alumni-association-distinguished-professor-award>



Conferences and Poster Presentations

The Mehl/Cooley labs attended our 2024 GCE Conference, hosted here at OSU Aug 8-10th. Listed below are those that gave talks and/or presented posters at the conference:

- **Rick Cooley**, session talk “Decoding the Dark Proteome: Innovation in Genetic Code Expansion for Phosphorylated Proteins” and poster “Shedding new light on the “dark proteome”: enhancing Genetic Code Expansion for biologically relevant phosphorylated proteins”.
- **Divyansh** (undergrad), poster “Two New Resources Supporting the GCE Community: the GCE Bulletin Board (GCEbb) and the GCE4All KnowledgeBase (GCEkb)”.
- **Hung Mahn Nguyen** (undergrad), poster “Computational design of tRNA/synthetase pairs for Amino-Acridone”.
- **Donovan McAfee** (undergrad), poster “Triazine-Pyridyl Amino Acids for Bioorthogonal Click Chemistry and Metal Ion Binding”.
- **Moriah Mathis** (grad student) poster “A novel, phosphorylation-dependent 14-3-3/cereblon protein complex may regulate protein degradation”.
- **Ian Noonan** (grad student), poster “Selecting Synthetases for the Genetic Encoding of Acetyllysine”.
- **Sarah McGee** (grad student), poster “Unveiling the Phosphatase and Denitrase Dual Functionality of Protein Tyrosine Phosphatase Receptor T’s Tandem D1/D2 domains”.
- **Sarah Louie** (grad student), poster “Differential roles of tyrosine nitration sites in ERK1 protein function and fate in HEK 293 cells”.
- **Cat Vesely** (grad student), posters “Unraveling The Structure, Interactions And Dynamics of Phosphorylated Bcl-xL Using Genetic Code Expansion” and “Unlocking the chaos: A Versatile Approach to Producing Site-Specifically Phosphorylated Intrinsically Disordered Proteins”.
- **Patrick Allen** (grad student), poster “Molecular basis for tetrazine-3-butyl M. Alnus tRNA synthetase binding: a case for the binding of both redox states”.
- **Alex Eddins** (grad student), poster “Highly efficient protein labeling in living cells by controlling the redox state of encoded tetrazines”.
- **Hannah Stuwe** (grad student), poster “Phosphorylation in the Ser/Arg-Rich Region of the Nucleocapsid of SARS-CoV-Regulates Phase Separation by Inhibiting Self-Association of a Distant Helix ”
- **George Augustin** (post-doc), poster “Virus-mediated delivery of orthogonal facile-labeling of human cells through genetic code expansion”.
- **Yogesh Gangarde** (post-doc), poster “A universal GCE system for efficient tetrazine amino acid encoding and protein labeling”.
- **Riley Bednar** (post-doc), poster “Towards an Untargeted, Continuous Evolution Platform for the Optimization of Genetic Code Expansion Machinery”.
- **Anamika Singh** (post doc), invited talk and poster “Targeted Protein Degradation: From PROTACs to Genetic Code Expansion (GCE)”.
- **Kishor Mutyala** (post-doc), poster “A genetic code expansion tool kit for metal binding amino acids”.
- **Abi Pung** (faculty research assistant), poster “Advancing Expression Conditions for Fully Reactive Tetrazine-Encoded Antibody Fragments”.

- **Nathan Alexander** (faculty research assistant) poster “Forging a toolset for site specific ^{19}F NMR and precise control of electrostatic p- p interactions using variably fluorinated amino acids”.
- **Subhashis Jana** (post-doc), poster “Studying the dynamics of transcription factor Sox2 – DNA binding interaction using site-specifically installed DNA-Intercalating fluorogenic probe”.



Riley Bednar and **Subhashis Jana** each took home poster awards from the conference!

GCE News

GCE Workshop: Selecting your Synthetase – Expanding GCE Chemistries (Aug 2-8th 2024)

This 7-day intensive lecture and laboratory course focused on the theory and practice of engineering amino-acyl tRNA synthetase (RS)/tRNA pairs for encoding non-canonical amino acids (ncAAs). All 18 of our attendees performed selections with an ncAA of their choice and model ncAAs provided by the Center. A great time was had by all!

GCE Conference (Aug 8-10th 2024)

The GCE4All Research Center, along with conference chairs, Abhishek Chatterjee and Kathrin Lang, hosted the 3rd ever GCE Conference. The GCE Conference is meant to bring together GCE users to catalyze a more rapid expansion of the use of noncanonical amino acids in biomedical research. Over 120 attendees from industry, academia and other research institutions

convened to discuss the latest techniques and approaches that are applicable to a broad variety of fields.

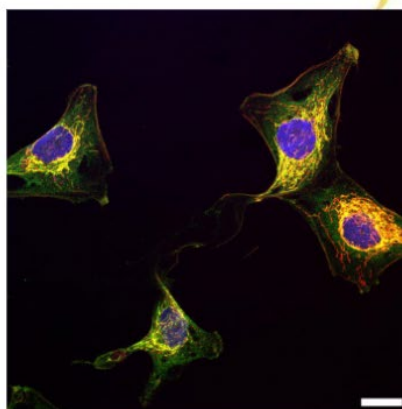
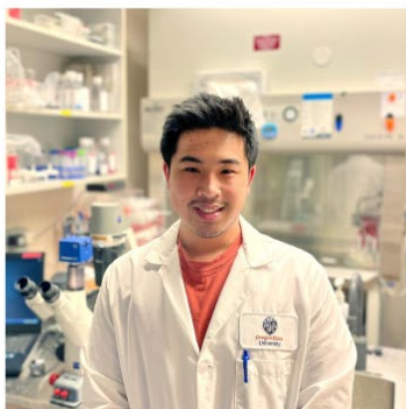


Riley Bednar is leaving the Mehl/Cooley lab. We've enjoyed having Riley first as a PhD student (2015-2021) and most recently as a postdoc (2021-2024). Retaining Riley after the completion of his PhD proved critical for the launch of the GCE4All Center in 2022. We will miss having Riley as one of the lead researchers in the Center and as a lecturer and mentor for our annual international workshops. Riley is leaving with 10+ publications during his time in the lab. He's made incredible strides developing and applying biorthogonal GCE technologies. Riley was also an easy first-choice when funding from Amgen was received by the lab. These projects required a great deal of tenacity and creativity, characteristics that Riley contains in bounds. We wish him the best as he embarks as a postdoc in the Petersson Lab at Univ of Penn.



The **International GCE Webinar** series will begin again soon! See our upcoming schedule and register for future webinars [here](#).

Grad Specific News



Kyle successfully defended his PhD thesis "The role of nitrotyrosine and nitrated Hsp90 in glioblastoma multiforme pathophysiology" on September 4th!

Hannah Stuwe presented at the Protein Society Annual Meeting and received the best poster award and \$250 cash prize for her poster presentation titled "*Phosphorylation in the Ser/Arg-Rich Region of the Nucleocapsid of SARS-CoV-2 Regulates Phase Separation by Inhibiting Self-Association of a Distant Helix.*"

Nick Bretz was accepted to, and attended, the annual NCQBCS Mass Spectrometry School in Madison, Wisconsin.

Patrick Allen traveled to San Diego in August and gave a talk to the company Light Horse, an industry collaborator, about the research he did during his 23/24 GCE4all Fellowship.

Welcome our new first-year graduate students!



From left to right: Sarah Perkel, Abraham Kpirikai, Ethan Beffert, Tepary Cooley, Nadia Gonzalez, Johnathan Dutra, Davis Sharts

Undergrad News

This Fall we are welcoming 160+ first year and transfer students into our major! This means our undergraduate student population of BB and BMB majors and minors is nearing 500 students!

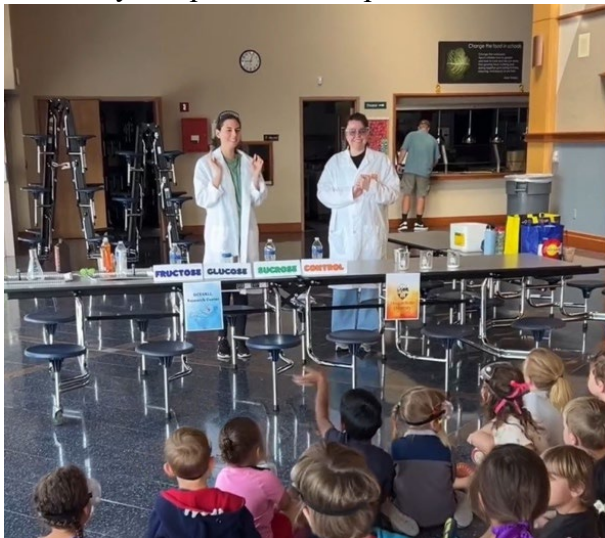
AJ (Arielle) Damiana is an undergrad in the Vrailas-Mortimer Lab who received a PRAX fellowship last year for an outreach art piece on cellular aging that was on exhibit in the Spring. She submitted that art piece to the ASBMB (American Society for Biochemistry and Molecular Biology) 2024 Molecular Motifs bioart competition, and it was selected to be featured in their 2025 calendar!

<https://www.asbmb.org/asbmb-today/people/090324/winners-of-the-molecular-motifs-bioart-contest>



Outreach

On July 30th, **Abi Pung** and **Kayla Jara-Weber** visited Ashbrook Independent School as guest speakers for their 'Goosey Science' themed week of summer camp. Abi and Kayla demoed many yeast-involving experiments, ending with the hit of the day, Elephant's Toothpaste!



Nate Mortimer gave guest lectures at UNC Pembroke, Oklahoma Christian University, and University of San Diego, and ran a professional development session for genomics instructors at the Genomics Education Partnership meeting at Washington University in St. Louis.

Dan Liefwalker and **Tilo Chatterjee** presented in the COS LSAMP Bridge program. This is a program dedicated to increasing the number of traditionally underrepresented students successfully completing science, technology, engineering and mathematics (STEM) baccalaureate degree programs.

2024 BB Retreat



September 18th, the BB Department traveled to Hatfield Marine Science Center for a day full of faculty talks, grad student talks, and fun games planned by Alysia Vrailas-Mortimer and the graduate students!



Fall Events

October 2 – Seminar Speaker Dr. Arden Baylink
October 4 – Faculty Meeting
October 9 – Patrick Allen 3rd Year Talk
October 18 – Faculty Assessment Meeting
October 30 – Seminar Speaker Dr. Ellen Lanager
November 1 – Department Function
November 6 – Seminar Speaker, Emergency Evacuation Procedures
November 11 – Veteran’s Day
November 28-29 – Thanksgiving
December 4 – Rotation talks
December 6 – Department Function
December 11 – Finals Week
December 18 – BB Holiday Party
December 25 – Christmas

There will be a coffee hour open to all on the second Friday of every month, from 9:30 to 10:30 am, so for this term, we meet Nov 8th, and Dec 13th in the BB library. We will serve coffee and pastries. Please make sure to come to say hello and bring your questions and ideas.

Thank you for reading this far, and we will catch up again at the beginning of Winter term. Please let Kimberly know if your event/activity was not included so we add it in the next issue.

Elisar