# What's New with BB (October 1, 2023 – December 31, 2023)

Dear BB Community,

Warm greetings and best wishes for a productive and peaceful 2024.

Last year was very eventful for the department! We celebrated the retirement of Joe Beckman, Tory Hagen, and Andy Karplus, we honored the legacy of Chris Mathews, and we paid tribute to the memory

of Ken van Holde. We onboarded and hired five new faculty, most recently in Fall of 2023, and have ongoing searches for three more.

We formed a new partnership with OSU Cascades, with a shared appointment for Myriam Cotten. We extended adjunct faculty appointments for Brian Dolan and Liang Huang from Vet Med and Computer Science. We have a new Dean in the College of Science and a new OSU strategic plan focused on our shared prosperity and student success. Our faculty received several College of Science awards (pictured on the right). Lauren Dalton and colleague published the first ever open-source Introductory Cell Biology textbook.



We held our first (hopefully, of many) alumni mixers in Portland this December, expanded our offerings in biophysics, and organized an NMR and biophysics symposium. The GCE4ALL held a week-long summer training workshop and monthly international webinars. Our BB spin-off company eMSion was bought by Agilent and successfully hosted an international meeting in mass spectrometry. Our facilities are expanding, with a new confocal microscope on the horizon funded by the research office and a new mass spectrometer funded by the NIH for the GCE4ALL Center. We expanded the NMR facility to include solid state NMR and helium recovery capabilities, and the macromolecular interaction facility installed a new FPLC funded by RERF, and a new AUC purchased by NSF and NIH funds. For more details, check out our new revamped website! <a href="https://biochem.oregonstate.edu">https://biochem.oregonstate.edu</a>

As we reflect on our activities and successes this past year and look forward to the future, we also think of the people in other parts of the world who are less fortunate and with very limited opportunities. A little over 30 years ago, I was one of these people who was stuck in a war-torn country with no future. Leaving family and friends was not easy, leaving a way of life was not easy, and thus I identify with all the students who left behind family and are worried about them especially in places that are in turmoil. I consider myself incredibly lucky that I could immerse myself in science, education, and research, and helping provide this opportunity for others is a huge motivation in everything I do.

In times when progressive viewpoints and activism on university campuses is under attack, I feel compelled to speak out against oppression. Only this week, conservative activists pushed for Harvard president Dr. Claudine Gay's resignation and helped publicize allegations of plagiarism. This is an attack on free speech and in opposition with our university's commitment to diversity, equity, and inclusion. As educators, we need to redouble our efforts in supporting all students, and shaping a new generation of leaders who believe in justice.

As the face of the department is changing, reaching students from all backgrounds, and giving them opportunities for a better life remain our goal. Thankful that I can count on you to make this possible.

#### **Funded Grants**

**Juan Vanegas** supercomputing proposal "Membrane-Mediated and Chemical Activation of G-Protein Coupled Receptors" was awarded for 2023-2024 at the Anton 2 special purpose supercomputer.

**Nate Mortimer** secured funding from the research office for a Leica Stellaris 5 confocal microscopy system. It will be used for fluorescence microscopy, 3D imaging of cells and tissues, and for localizing protein-protein interactions. Others on the request are Ryan and Kyle from BB and Anne-Marie from COLS.

# **Grant Proposals Submitted**

**Ryan Mehl** submitted to Light Horse Therapeutics Inc. a proposal for GCE Fellow Internship of \$46,300.00.

**Ryan Mehl** submitted to Odyssey Therapeutics a proposal titles "Develop a protected-serine GCE system for encoding in E. coli and Mammalian cell protein expression systems" for \$238,125.00.

**Sarah clark** submitted to the NIH a proposal titled "Acquisition of a Vitrobot 5 Plunge Freezer" for \$133,000.

**Alysia Mortimer** submitted to the NIH a proposal titled "Neuronal Mechanisms of Copper Transport and Toxicity" for \$590,719.00.

**Colin Johnson** submitted to the NSF a proposal titled "Establishing a function for ferlin proteins" for \$471,691.00.

**Juan Vanegas** submitted to the NIH a proposal titled "A comprehensive approach to bacterial osmotolerance" for \$1,157,735.00.

#### **Professional Service**

**Elisar Barbar** served as an NIH panelist for the MSFC study section in October, and as an NSF panelist in the Genetic Mechanisms panel in November.

Elisar Barbar and Ryan Mehl were co-organizers of the Chemical Biology and Physiology Conference at OHSU in December.

## **Publications**

From the Barbar Group

Estelle AB, Forsythe HM, Yu Z, Hughes K, Lasher B, Allen P, Reardon PN, Hendrix DA, **Barbar EJ**. RNA structure and multiple weak interactions balance the interplay between RNA binding and phase separation of SARS-CoV-2 nucleocapsid. 2023 Oct 12;2(10):pgad333. PMID: 37901441. PMCID: PMC10605006. PNAS Nexus.

## From the Gombart Group

Berger MM, Amrein K, Barazzoni R, Bindels L, Bretón I, Calder PC, Cappa S, Cuerda C, D'Amelio P, de Man A, Delzenne NM, Forbes A12, Genton L, **Gombart AF**, Joly F, Laviano A, Matthys C, Phyo PP, Ravasco P, Serlie MJ, Shenkin A, Stoffel NU, Talwar D, van Zanten ARH. <u>The science of micronutrients in clinical practice - Report on the ESPEN symposium.</u> Clinical Nutrition. doi: 10.1016/j.clnu.2023.12.006. Epub 2023 Dec 9. PMID: 38104489. DOI: 10.1016/j.clnu.2023.12.006. Free article

From the *Hendrix* Group

Valencia JD, **Hendrix DA**. Improving deep models of protein-coding potential with a Fourier-transform architecture and machine translation task. PLoS Comput Biol. doi: 10.1371/journal. pcbI.1011526. eCollection 2023 Oct. 2023 Oct 12;19(10):e1011526. PMID: 37824580. PMCID: PMC10597526 DOI: 10.1371/journal.pcbi.1011526

From the Cooley/Mehl Group

Zhu P, **Mehl RA**, **Cooley RB**. <u>Biosynthesis and Genetic Encoding of Non-hydrolyzable Phosphoserine into Recombinant Proteins in Escherichia coli</u>. Bio Protoc. 2023 Nov 5;13(21):e4861. doi: 10.21769/BioProtoc.4861. PMID: 37969748; PMCID: PMC10632156.

Eddins AJ, Bednar RM, Jana S, Pung AH, Mbengi L, Meyer K, Perona JJ, Cooley RB, Karplus PA, Mehl RA. <u>Truncation-Free Genetic Code Expansion with Tetrazine Amino Acids for Quantitative Protein Ligations</u>. Bioconjug Chem. 2023 Dec 20;34(12):2243-2254. doi: 10.1021/acs.bioconjchem.3c00380. Epub 2023 Dec 4. PMID: 38047550.

From the Vanegas Group

Sharma, A., Leverant, C. J., Richards, D., Beamis, C. P., Spoerke, E. D., Percival, S. J., Rempe, S. B., and **Vanegas, J. M.** <u>Transport and Energetics of Carbon Dioxide in Ionic Liquids at Aqueous Interfaces.</u> *J. Phys. Chem. B* 127, 10573–10582 (2023). Highlighted on the supplementary cover of J. Phys. Chem B.

Poudel, B., Monteith, H. L., Sammon, J. P., Whiting, J. J., Moorman, M. W., Vanegas, J. M., and Rempe, S. B. <u>Energetics of High Temperature Degradation of Fentanyl Into Primary and Secondary Products</u>. *Phys Chem Chem Phys* 25, 30880–30886 (2023)

Sharma, A., Chiang, R.-A., Manginell, M., Nardi, I., Coker, E. N., **Vanegas, J. M.**, Rempe, S. B., and Bachand, G. D. <u>Carbonic Anhydrase Robustness for Use in Nanoscale CO2 Capture Technologies</u>. *ACS Omega* 8, 37830–37841 (2023)

From Lauren Dalton

**Dalton, L.**, Jager, K., Rose, J. M. & Smyth, J. C. (2023). <u>Pacing online learning: The impact of video segmentation and active learning on conceptual understanding in STEM</u>. White Paper. Oregon State University Ecampus Research Unit. [PDF]

# **Faculty Talks**

**Elisar Barbar** gave an invited seminar talk at OHSU, "Protein disorder in regulation of large molecular machines: From dynein motor to coronavirus" (Oct 3rd).

**Rick Cooley** gave an invited seminar talk at Emory University, "Unlocking the secrets of post translational modifications with genetic code expansion." (Oct 19<sup>th</sup>).

**Douglas Walker** (post-doc, Barbar lab) gave a talk at the Gibbs Conference on Biothermodynamics in October (14-17) where he presented his research on the utility of Bayesian Inference for extracting more information out of ITC isotherms.

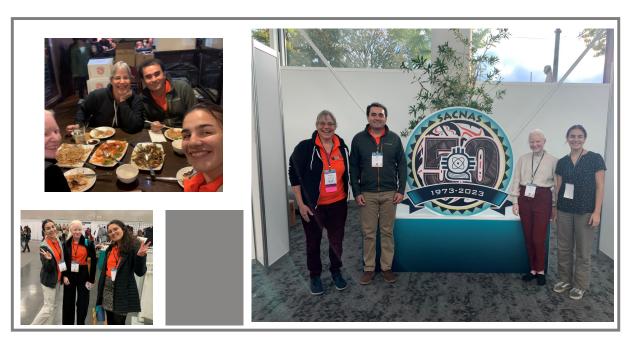
**Juan Vanegas**, **Sarah Clark**, **Patrick Reardon**, and **Douglas Walker** gave talks at the NMR and Biophysics symposium at OSU in Dec, **Elisar Barbar** moderated a panel discussion on women in leadership.

# Research in the News

**Juan Vanegas** had a paper featured in an article by the San Diego Supercomputing Center. The paper can be found here <a href="https://www.nature.com/articles/s41467-023-40433-4">https://www.nature.com/articles/s41467-023-40433-4</a> and the article can be read here: <a href="https://www.sdsc.edu/News%20Items/PR20231005">https://www.sdsc.edu/News%20Items/PR20231005</a> AT1 receptor heart kidney disease.html

#### **Conferences and Poster Presentations**

In October, Juan Vanegas, Kari van Zee, BB Graduate Student Monica Vidal-Franco, and undergrad students Kendall Evanchak and Alyssa Garcia attended the SACNAS conference in Portland, OR.



In December, a group of graduate students, faculty research assistants, and faculty members attended and presented at the **OHSU Chemical Biology and Physiology** conference in Portland, OR.

- **Kari van Zee** presented a poster, "The GCE4All Research Center: Promoting Your Ability to use Genetic Code Expansion in Your Research".
- Cat Vesely presented a poster, "Breaking BAD: A Versatile strategy for production of intrinsically disordered peptides or proteins with site-specific phosphorylation".
- Nathan Alexander presented a poster, "Accessible Genetic Code Expansion with Tool Kits for Selecting your own Noncanonical Amino Acyl tRNA Synthetases".
- **Riley Bednar** presented a poster, "Towards an Untargeted, Continuous Evolution Platform for the Optimization of Genetic Cide Expansion Machinery".
- **Sarah McGee** presented a poster, "Phosphatase and Denitrase Functions of Protein Tyrosine Phosphatase Receptor T's D1/D2 Tandem Domains".
- **Abi Pung** presented a poster, "Creating Conjugate ready Antibody Fragments in *E. coli*".



- **Jesse Howe** presented a poster, "Regulation of Tumor Suppressor 53BP1 Oligomerization by the Hub Protein LC8"
- **Hannah McClain** presented a poster, "Role of Amyloid Precursor Protein-Like in the Cellular Immune Response in Drosophila Melanogaster"
- Sanjay Ramprasad presented a poster, "The Conformational Flexibility in the IDR of LATS1 Determines Molecular Recognition"

- **Kristen Snitchler** presented a poster, "How do the Biophysical Properties of Amyloid- $\beta_{42}$  Contribute to the Pathogenesis of Alzheimer's Disease?"
- **Hannah Stuwe** presented a poster, "Phosphorylation of the SR-Rich Region of the SARS-CoV-2 Nucleocapsid Regulates Self-Association and RNA Interactions"
- **Kendall Evanchak** presented a poster, "Regulation of the JAK-STAT Pathway in Drosophila by Parasitoid Wasp Venom"
- Carrie Marean-Reardon presented a poster, "An Advanced Cell Signaling System for Discerning Cancer Inhibition Mechanisms in Ganaspis Hookerii Wasp Venom"
- Michael Youkhateh presented a poster, "Venoms and their Toll (Like Receptors)

#### **Grad Awards**

**Jesse Howe** applied for and was awarded the Graduate Dean's Catalyst Fellowship for Winter term. Congratulations, Jesse!

# **Teaching and Learning News**

A new course is now offered for Winter term! Intro to Molecular Modeling, by **Juan Vanegas**:

Course description Introduction to computational modeling of biomolecules including proteins, lipids, etc. Basic principles of physics-based approaches such as molecular dynamics (MD) and docking. Atomistic vs. coarse-grained descriptions of molecules and balance between chemical accuracy and adequate exploration of length/time-scales. Overview of force-field parametrization from thermodynamic data, experiments, and quantum mechanical data. Tools for creating simulation inputs and processing of structural files (e.g., protein databank). Basic usage of open-source MD simulation packages. Data processing and analysis of simulation trajectories. Visualization of molecular models. Practical usage of Alphafold for developing starting structures for MD simulations. Other advanced topics such as *ab initio* MD and quantum chemistry packages may be explored if time permits.

The first ever open-source Introductory Cell Biology textbook is live! Congratulations to Lauren Dalton and her coauthor Robin Young from University of British Columbia - Okanagan for finishing this 2-year project with funding from both UBC and OSU and support from the OSU OER team. Check out the beautiful illustrations and the diverse topics, truly a labor of love! Thank you Lauren! <a href="https://open.oregonstate.education/cellbiology/front-matter/introduction/">https://open.oregonstate.education/cellbiology/front-matter/introduction/</a>

# **Undergrads in the News**

Senior undergraduate student Maya Sonpatki in **Elisar Barbar's** lab was named a Homecoming Court Ambassador based on her contributions and involvement at OSU. Read more about Maya and the other Homecoming Court Ambassadors here: <a href="https://fororegonstate.org/get-involved/welcome-to-oregon-state/homecoming-court-2023">https://fororegonstate.org/get-involved/welcome-to-oregon-state/homecoming-court-2023</a>

#### Outreach

Michael Youkhateh, Brittany Lasher, and Nathan Mortimer ran a "Demystifying Graduate School" panel for the PNW Genomics Education Symposium.

# **GCE News**



The second year of the **International GCE Webinar** series kicked off in October. See our upcoming schedule and register for future webinars <u>here</u>.

# INTERNATIONAL GCE WEBINAR: FALL 2023 SPEAKERS



**NOVEMBER 16TH** 

# **OCTOBER 19TH**





Supported by: OSU College of Science, OSU Dept Biochemistry & Biophysics NIH GCE4All Research Center



# **Special News**

Congratulations to David Hendrix and his partner on the arrival of their baby girl Hazel!

Good news from **Tony Reyna**, he has just accepted a position with the University of Texas as the Business and Operations Manager for the School of Natural Science and Math. The position will start on Monday, January 8<sup>th</sup>. Congratulations Tony!

# **Alumni News**

State University.

BB Alum **Simon Johnson** was awarded the 2023 College of Science Young Alumni Award! Simon presented a talk titled "Deciphering the Complex Pathobiology of Genetic Mitochondrial Disease" that can be watched here: <a href="https://media.oregonstate.edu/media/t/1\_qnys2u47">https://media.oregonstate.edu/media/t/1\_qnys2u47</a>
IMPACT Magazine wrote a wonderful article about the Alumni Awards Night full of fun pictures, which can be found here: Alumni Awards celebrates exceptional achievements | College of Science | Oregon



**Other recent alumni news: Amber Vogel**, PhD 2022 (Nyarko Lab) now a postdoc at the University of Utah has received a 3-year grant of \$203K from the Board of Directors of JDRF International on her project titled: *Structural approaches to understand biased insulin signaling and design glucose-binding proteins for smart insulin therapeutics.* Congratulations Amber!

The **BB-PDX Alumni Mixer** was held at The Growler Guys in Portland on December 15<sup>th</sup>. Thanks to Kari for organizing.











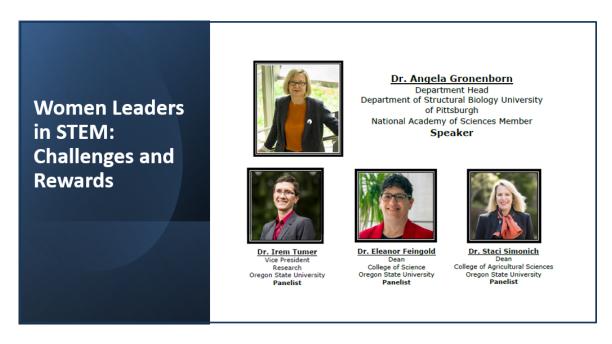
# From the BPS Student Chapter

With two distinguished professors slated to be in Portland for a conference this December (Angela Gronenborn from U Pitt, and Michael Sattler from Munich Technical University), we invited them to join us a day early for our own Symposium. We planned a day filled with talks from them along with Dan Zuckerman from OHSU (adjunct position with OSU) and from faculty here at OSU to showcase our capabilities in biophysics including NMR (solution and solid-state), EM, and modeling. Central to the Symposium was a panel about challenges and rewards experienced by women in STEM leadership positions that was extremely well attended. A poster session and associated lunch filled out the program and allowed our own graduate students to communicate their excellent research. Overall, the NMR & Biophysics Symposium was highly successful, with engagement from multiple departments, our satellite campus, and even nearby universities, a lot of exciting research was discussed, lasting networking established, and awareness and tools for allies spread to many receptive ears!

Speaker topics included: Biomolecular NMR Spectroscopy, 19F NMR Spectroscopy, Solid State NMR Spectroscopy, Statistical Physics Computations, Molecular Simulation, Biological Applications of NMR, and Cryo-electron Microscopy.



The Women Leaders in STEM: Challenges and Rewards panel discussion, moderated by Dr. Elisar Barbar, explored the journeys of accomplished women in STEM as they shared insights on overcoming unique challenges and breaking barriers, as well as the rewards that come with persistence in the evolving STEM landscape.

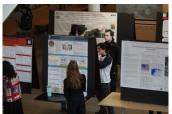


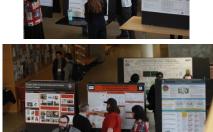
OSU's IMPACT magazine featured an article about the women's panel: <a href="https://science.oregonstate.edu/impact/2023/12/women-leaders-in-stem-challenges-and-rewards">https://science.oregonstate.edu/impact/2023/12/women-leaders-in-stem-challenges-and-rewards</a> All talks were recorded on Zoom, and can be found here: <a href="https://media.oregonstate.edu/media/t/1\_qrmt3h8m">https://media.oregonstate.edu/media/t/1\_qrmt3h8m</a> (apologies for some technical difficulties in the recording)

# Poster Session

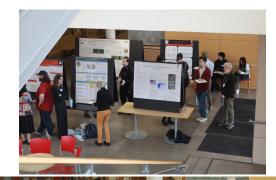
#### Presenters:

- Jesse Howe
- Shelby Santos (OHSU)
- Yuan Gao
- Robert Cornwell-Arquitt
- Sanjay Ramprasad
- Riley Bednar
- Akasit Visootsat
- Yanapat Janthana (Hossienzadeh Lab, U of O)
- Carrie Marean-Reardon
- Yaya Kiss















After a full day of talks, Elisar Barbar hosted a dinner for the speakers at Magenta Restaurant.

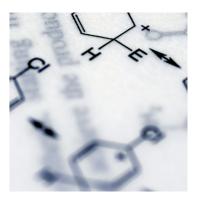
The BB Department would like to thank the inaugural Gender Equity Leadership Fund and Bio-Rad for their assistance in making this event a success!



# **Rotation Talks**

Congratulations to our first-year graduate students for completing their first rotation talks!

- · Cameron Call: "Revenge"
- Hannah Long: "Purification and Characterization of Directionality Controllable Kinesin"
- Ian Noonan: "Drosophila: Insectigating Human Disease"
- Joline Nguyen: "Purification and Characterization of Hippo Signaling Proteins"
- Samrin Shahnaz: "Identifying the Role of the SARS-CoV-2 N Protein Linker Dimerization Using LC8"



#### **Recruitment News**

Graduate student recruitment is underway, with 10-15 applicants invited to attend BB's recruitment weekend, scheduled for January 25-27.

# **BB** Holiday Party

The Saran Wrap Ball game was a hit, as was the dessert contest! Congratulations to our Dessert Contest Winners - Best Looking Dessert: Carrie Marean-Reardon; Best Tasting Dessert: Kate Shay, and Most Unique Dessert: Moriah Mathis. Thanks to Kimberly Webster for organizing the event.



# DEJI Tip of the Quarter: People Over Systems: Prioritizing the Human

This quarter's tip is about the pitfalls of favoring standardized systems over the concerns of individuals. Although standardization, codes of conduct, data systems appear to make things fairer and less biased, these types of systems always reflect the values and biases of the designers. Systems are incredibly useful; however, they are imperfect. They should never be prioritized over individual judgement and the specific context. Equality is not equity—meeting the needs of each individual is equity. Please keep in mind that preserving a system that is not meeting every student's needs makes things fall less manageable in the end.

#### Questions to ponder:

- Are there blanket policies that are getting in the way of serving your audiences' needs?
- How have the limitations of standardized tests as measures of success affected your progress in working towards equity?
- Do your stakeholders have to go through a hierarchical structure to get the information they need?
- Is communication honest, humble, courageous, and authentic?

#### **BPS Journal Club**

The **BPS** Chapter will continue to host the **Friday 9 am journal club**, every Friday starting Jan 12<sup>th</sup>, organized and led by Jesse, but this term the schedule will include monthly contributions of papers focused on X-ray/Cryo-EM (led by Cooley), computational biophysics (led by Vanegas), NMR (led by Barbar) and one week per month will focus on introduction of work from speakers of the upcoming month (led by Jesse). Speakers/participants interested in Biophysics from OSU Cascades and from outside OSU will be invited to attend by zoom. Look for a schedule coming up soon.

#### **Past Events**

October 6: Faculty Meeting

October 11: BB Seminar Series Speaker, Dr. David Hendrix October 18: BB Seminar Series Speaker, Dr. Brian Dolan

November 3: Faculty Meeting

November 15: BB Seminar Series Speaker, Dr. Nicole Hams (BB Alum, Johnson Lab)

November 17: BB Seminar Series Speaker, Dr. Simon Johnson

November 23-24: University Closed – Thanksgiving

December 1: Faculty Meeting

December 13: NMR and Biophysics Symposium

December 15: Alumni Mixer

December 18: First Year Rotation Talks, BB Holiday Party

## **Upcoming Events**

January 8: Winter Term Starts

January 16: BYO Lunch Meeting; PI/Science Talk - Nate Mortimer

January 17: Neuroscience/Infectious Disease Assistant Professor Candidate Interview

January 22: Biochemistry Club Student and Faculty Social

January 23: BYO Lunch Meeting

January 24: Neuroscience/Infectious Disease Assistant Professor Candidate Interview

January 25-27: Grad Recruit Weekend

January 30: BYO Lunch Meeting

January 31: Neuroscience/Infectious Disease Assistant Professor Candidate Interview

February 2: Faculty Meeting

February 6: BYO Lunch Meeting

February 7: Neuroscience/Infectious Disease Assistant Professor Candidate Interview

February 13: BYO Lunch Meeting; PI/Science Talk - Sarah Clark

February 14: Winter Term Rotation Talk #1

February 20: BYO Lunch Meeting

February 21: Moriah Mathis 3<sup>rd</sup> Year Talk

February 27: BYO Lunch Meeting

February 28: TBD (Candidate interview or Hannah Stuwe 3<sup>rd</sup> Year Talk)

March 1: Faculty Meeting

March 5: BYO Lunch Meeting

March 6: Reginald Appiah-Kubi 3<sup>rd</sup> Year Talk

March 12: BYO Lunch Meeting

March 13: BB Seminar Series Speaker Dr. Swetha Murthy from OHSU (Juan Vanegas hosting)

March 19: BYO Lunch Meeting

March 20: Winter Term Rotation Talk #2

March 18-22: Finals Week

March 25-29: Spring Break

Thank you for reading this far, and we will catch up again beginning of Spring term. Many thanks to Kimberly Webster for compiling these events.

Elisar