



DIVISION OF BIOLOGICAL CHEMISTRY AMERICAN CHEMICAL SOCIETY

NEWSLETTER

<http://www.divbiolchem.org/>

Secretary: T. D. Meek

Winter 2016

Message from the Chair: Dewey G. McCafferty, Ph.D.

The Division of Biological Chemistry participated in the Fall ACS with diverse programming, which included contributed talks and award sessions. The division hosted a total of 98 papers that were distributed in 7 award, 2 thematic, and 6 contributed sessions. In addition to the five divisional awards (Lilly, Pfizer, Repligen, ACS Infectious Diseases, and the Gordon Hammes lectureship), we also hosted the National Fresenius and the Ronald Breslow award symposia, which are national ACS awards. The ACS Infectious Diseases is a new award that is hosted by the division in collaboration with the *ACS Infectious Diseases* journal. The inaugural award session took place during the Fall meeting, and we anticipate that the award will be presented through our division at least through Fall 2018. The bulk of our program (65 papers) was distributed among 6 sessions. These sessions highlighted the exciting research being carried out by graduate students, postdoctoral fellows, and faculty. These contributed sessions are new to our division and the Philadelphia meeting was the second time we have programmed from the submitted abstracts. We hope to be able to continue this tradition so as to provide a platform for oral presentation to our community at large and valuable experiences to our junior investigators. I would like to thank Craig Crews, Vahe Bandarian, Liz Hedstrom, and Shana Kelly, who have or will soon assume the role of Program Chair for our national meetings, and who implemented such expansive and creative programming.

At its business meeting conducted at the Philadelphia ACS meeting in August, the officers of the BIOL Division voted to provide support for the following conferences: The 36th Midwest Enzyme Chemistry Conference (October 1, 2016), the 2017 Gordon Research Conference/Gordon

Research Seminar on Bio-Organic Chemistry (June 10-11, 2017), the 68th Southeastern Regional Meeting of the American Chemical Society – Symposium - Catalysis and Biocatalysis (October 23-26, 2016), The Northeast regional Meeting of the American Chemical Society – Chemical Biology Symposium (October 5-8, 2016), and the 68th Southeastern Regional Meeting of the American Chemical Society – Cutting Edge of Biological Inorganic Chemistry (October 23-26, 2016).

In addition to our now quarterly newsletter, please visit the ACS Biological Chemistry Division website, <http://www.divbiolchem.org>. There we provide up-to-date BIOL Division award announcements, upcoming national, regional and related meeting dates, application information for student travel awards and divisional awards, professional opportunities, and other information for the benefit of our Division members to complement the regularly updated information – please online at the ACS Biological Chemistry Division website, <http://www.divbiolchem.org>.

I am also extremely pleased to announce the winners of the 2017 ACS Biological Chemistry Division Awards (Lilly, Pfizer, and Repligen Awards), and the 2017 ACS *Chemical Biology* Lectureship:

Professor Emily Balskus is the recipient of the **2017 Pfizer Award in Enzyme Chemistry** in recognition of her contributions to the understanding of enzymatic transformations from the human gut microbiome. Her



research, which lies at the interface of chemical biology, enzymology, and microbiology, seeks to use chemical approaches to enhance our understanding of microbes and microbial communities (microbiomes). A major area of interest is elucidating how the metabolic capabilities of the human gut microbiome contribute to human health and disease. Using chemical knowledge to inform bioinformatics, her group mines DNA sequencing data to uncover new gut microbial metabolic pathways and enzymes; deciphering the functions and mechanisms of these enzymes facilitates the characterization of their distribution and abundance in human-associated microbes, the study of their impact on host biology, and the development of chemical tools to probe their roles in complex human microbial communities. Her work is providing a better understanding of how the chemical capabilities of the gut microbiome influence human biology and will illuminate new strategies for treating disease. For example, her group has discovered the enzymes involved in anaerobic choline metabolism, a gut microbial metabolic activity linked to heart, liver, and kidney diseases. The key enzyme in this pathway, choline trimethylamine-lyase, is a new member of the glycy radical enzyme family, is widespread in human gut microbes, and is a potential target for therapeutic development. She has also uncovered key enzymatic transformations in the biosynthesis of colibactin, a gut bacterial genotoxin of unknown structure that may influence the progression of colorectal cancer. By studying colibactin biosynthesis prior to isolation and structure determination, her group has revealed structural features and biosynthetic logic that has informed ongoing efforts to identify the active genotoxin.

Professor Howard Hang is the recipient of **2017 Eli Lilly Award**.

His laboratory is broadly interested in developing chemical approaches to understand fundamental aspects of host-microbe interactions and discovering new therapeutic approaches to combat infections. To elucidate key mechanisms involved in host-microbe interactions, the Hang laboratory has developed chemical methods to image and profile the biochemical targets of metabolites that are synthesized endogenously or



derived from the environment (diet or microbiota). At the heart of this chemical approach is the design and synthesis of specific chemical reporters, metabolites bearing uniquely reactive groups, that can be chemically or enzymatically incorporated into biomolecules *in vitro* and *in vivo* and then selectively labeled with imaging or affinity reagents. Using this strategy, a variety of chemical reporters based on key metabolites (nucleosides, amino acids, lipids and other cofactors) have been developed in the Hang laboratory for the sensitive detection and analysis of metabolite-protein modifications such as palmitoylation, myristoylation, acetylation, prenylation, adenylation and ADP-ribosylation. These metabolite chemical reporters have been used to functionally characterize metabolite-protein modifications in diverse areas of biology, and enabled the Hang laboratory to discover new mechanisms of host-microbe interactions. The Hang laboratory continues to develop new chemistry to explore host-microbe interactions, and is currently exploring anti-infectives from traditional medicines and beneficial microbiota.

Professor Wilfred A. van der Donk is the recipient of the **2017 Repligen Award in the Chemistry of Biological Processes** in recognition of his contributions to the understanding of natural product biosynthesis. He has been a pioneer in the rapidly growing field of ribosomally synthesized and post-translationally modified peptide (RiPP) natural products. He recognized early on that their biosynthesis follows a similar logic in all three domains of life. His laboratory discovered that substrate-tolerant enzymes recognizing a leader peptide in the substrate direct these downstream post-translational modifications. He discovered that these enzymes are forgiving with respect to the sequence of a core peptide, where the post-translational modifications take place. This physical separation of substrate recognition and chemistry allows nature to evolve new RiPPs, and has been used by his laboratory as a fertile playground for synthetic biology and genome mining. To support these efforts, his group has studied the detailed mechanisms by which enzymes carry out a remarkable number of successive chemical transformations that morph a



linear precursor peptide into a structurally complex and often macrocyclic product. In particular, his group reconstituted the biosynthesis of lantithionine-containing peptides and glycosins. He discovered unanticipated chemical transformations such as glutamyl-tRNA dependent dehydration of Ser and Thr residues, the first example of S-glycosylation, an intriguing example of substrate control over stereochemistry of an enzymatic reaction, and an enzyme that acts on 30 very different substrates to generate a combinatorial library of cyclic peptides. His laboratory also studied the biosynthesis of phosphonate natural products, providing a platform for large-scale genome mining with his colleague Bill Metcalf, and studying the mechanisms of phosphonate biosynthetic enzymes, including transformations involved in the production of the clinically-used antibiotic fosfomycin and the commercial herbicide phosphinothricin.

In addition to our divisional award recipients, I am pleased to announce that **Professor Ben Cravatt** is the distinguished recipient of the **2017 ACS Chemical Biology Lectureship**. The award is in recognition of Prof. Cravatt's ground-breaking development of activity-based protein profiling technology, which enables the functional annotation of enzymes using active site-directed chemical probes. Through post-genomic profiling of the functional state of enzymes in complex proteomes, Prof. Cravatt has identified key mammalian enzymes involved in regulation of lipid signaling pathways in cancer. Utilizing his activity-



based profiling technology in conjunction with advanced mass spectrometry methods, Prof. Cravatt has generated global-scale maps of lipid-binding proteins, amino acid reactivities, and novel functional residues within the proteome. Prof. Cravatt's technologies have been adopted by academic and industrial labs worldwide for broad-scale functional characterization of enzymes within biological systems, thus having far-reaching implications for our understanding of mammalian physiology and disease.

On a personal note, it has been an honor and great pleasure to serve these past two years as the ACS Biological Chemistry Division Chair. I believe great changes have been made to benefit our Division in the past two years and the path forward is equally exciting. I would to sincerely thank the present and past Division Officers, members and student members that I have worked over the past two years. In January we welcome incoming Chair Prof. Craig Townsend, as well as several newly elected officers from our current online election. As always, I continue to encourage your ideas and participation in the BIOL Division. I look forward to seeing you soon.



Best wishes,
Dewey G. McCafferty, Ph.D
Professor of Chemistry and Biochemistry
Duke University
Duke University Medical Center

253rd ACS National Meeting, April 2-6, 2017, San Francisco, CA. BIOL Program Preview

- Ronald Breslow Award for Achievement in Biomimetic Chemistry: Symposium in honor of Benjamin G. Davis
- ACS Award in Pure Chemistry: Symposium in honor of Neal K. Devaraj
- Murray Goodman Award: Symposium in honor of Jennifer Doudna
- ACS Chemical Biology Award: Symposium in honor of Benjamin Cravatt (*organizer L. Kiessling*)
- Nucleic Acid Therapeutics: mechanisms and applications (*organizer M. Manoharan*)
- Self-assembly of small molecules in the cellular milieu (*organizer B. Xu*)

- Metalloprotein-initiated Signaling Transduction Response to Redox Stress (*organizer A. Liu*)
- Chemical Probes for Bacterial Imaging (*organizer E. Carlson*)
- Chemical Epigenetics (*organizer D. Fujimori*)
- Contributed talks from graduate students, postdoctoral fellows, early and mid career investigators
- Poster session: Current topics in Biochemistry

NEW! Symposium proposals: The Division of Biological Chemistry invites proposals for symposia to be organized as BIOL programming at the two 2018 ACS National Meetings. Organizers must be members in good standing of the Division of Biological Chemistry. Please submit the application [form](#) no later than **February 15, 2017** for consideration in the Spring 2018 meeting and no later than **July 25, 2017** for the Fall 2018 meeting to Shana Kelly (shana.kelley@utoronto.ca).

Travel Awards

The division offers travel awards for graduate students and postdoctoral fellows to attend the 253rd ACS National Meeting in 2017. **The deadline for submission is January 15, 2017, and submission details may be found [here](#).** The level of support is \$500, which can be used to offset travel costs and registration fees. Detailed information about these awards is provided later in this Newsletter and on the division website.

Future National Meetings

254th ACS National Meeting, August 20-24, 2017, Washington, DC. Program Chair: Lizbeth Hedstrom (hedstrom@brandeis.edu)

255th ACS National Meeting, March 18-22, 2017, New Orleans, LA. Program Chair: Shana Kelly (shana.kelley@utoronto.ca)

256th ACS National Meeting, August 19-23, 2017, Boston, MA. Program Chair: Shana Kelly (shana.kelley@utoronto.ca)

Regional ACS Meetings

Regional meetings of the American Chemical Society provide young chemists, particularly graduate students and postdoctoral fellows, the opportunity to make professional contacts and hone their presentation skills. The Division of Biological Chemistry encourages its members to participate in the following regional meetings.

72nd Southwestern Regional Meeting (SWRM)
November 10-13, 2016, Galveston, TX
<http://www.scsb.utmb.edu/swrm-2016>

Other Meetings of Interest

25th Enzyme Mechanisms Conference, Chemistry Conference, January 4-8, 2017, St. Petersburg, FL
Chair: Richard B. Silverman, Northwestern University
<http://www.enzymemechanismsconference.org>
email: agman@chem.northwestern.edu

Metals in Medicine Gordon Research Conference:
June 26 – July 1, 2016
email: katherine.franz@duke.edu

Support for Meetings

The Division of Biological Chemistry provides grants to support symposia at ACS Regional meetings and for conferences in research areas of interest to the division membership. Members interested in applying for support from the Division for a symposium or conference during 2016-2017 should submit an outline for the event as an e-mail attachment to the Treasurer Chris Whitman (whitman@austin.utexas.edu). These proposals will be reviewed twice a year at the Division's business meetings, which are held during the Spring and Fall ACS national meetings. The deadlines for receipt of applications are **March 1**

and **August 1** for review at the Spring and Fall meetings, respectively. Unfortunately, due to increased numbers of funding requests, proposals received after a given deadline will only be considered at the business meeting held after the next deadline. These awards are intended to provide Division members with new forums in which to present their work as well as to support focused conferences in biochemistry and chemical biology. Proposals that are judged not to meet these objectives, such as requests for blanket support of regional ACS meetings, are unlikely to be funded.

Elections for Division Positions

Several DBC Officers will rotate out of their current roles in 2017, creating a number of vacancies. Elections to fill these new positions have been underway as of November 1, 2016, with voting currently occurring division-wide via internet voting. There are 4 vacant positions for DBC Councilors (2 as Alternate Councilors), one vacant position for Chair-Elect, two vacant positions for the Advisory Committee, one vacant position for the nominating committee and the 2019 program chair. Requests for nominations for open positions for DBC officers who will be outgoing at the end of 2017 will be posted in an upcoming newsletter.

Travel Awards to Attend the 253st ACS National Meeting

The division offers travel awards on a competitive basis for graduate students and postdoctoral fellows to attend the meeting and present a poster on their research in the DBC. The selected awardees will be reimbursed up to \$500 for travel and registration expenses. Receipts must be submitted along with a request for reimbursement after the meeting. No more than two awards will be made to one laboratory for any single ACS meeting. In addition, **please note that no individual can win more than one division travel award in his/her career.**

The deadline for submission of an application for a travel award to the 253st ACS National Meeting (San Francisco, CA) is **January 15, 2017.**

How to apply for a Travel Award

- (1) Fill in the Travel Award Application (below).
- (2) Attach a printed copy of your abstract.
- (3) Attach a one page CV.
- (4) Attach a signed letter of recommendation from your faculty advisor.
- (5) Send **ONE COMPLETE PDF FILE** of this material as *single* EMAIL attachment to the Program Chair, Liz Hedstrom (hedstrom@brandeis.edu). Be sure to use a subject line of "ACS Travel Awards" in your electronic application.

Application for a Travel Award for Graduate Students and Postdoctoral Fellows

Deadline: January 15, 2017 (San Francisco)

Name: _____ Advisor: _____

Department _____ Graduate Student: _____ Postdoctoral Fellow: _____

Institution: _____ Street: _____

City, State, Zip: _____

Tel: _____ E-mail: _____

Is an Abstract attached? _____ Is a CV attached? _____

Is the advisor's recommendation letter (one page) attached?