DIVISION OF BIOLOGICAL CHEMISTRY
AMERICAN CHEMICAL SOCIETY

NEWSLETTER

http://www.divbiolchem.org/

Secretary: T. D. Meek *Summer 2016*

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

Welcome to the ACS Division of Biological Chemistry summer newsletter. One of the goals I set as Chair was to expand the BIOL Division ACS National Meeting scientific programming. I am indebted to our wonderful Program Chairs, Vahe Bandarian (2016) and Lizbeth Hedstrom (2017) for orchestrating this massive programming expansion. Over the past two years we have expanded to a full week of programming – offered twice annually during the Spring and Fall ACS meetings. This includes almost 70 invited research talks at both Spring and Fall meetings, with almost 300 poster presentations at each meeting, and special events such as the BIOL Division and ACS national award winner lectures and associated symposia.

Meet the Division Officers at the Philadelphia ACS meeting! Please stop by during the BIOL poster session on Sunday August 21 to meet our officers, including those newly elected.

In 2017, our Division will host the new *ACS Infectious Diseases* Lectureship Award. I wish to thank to Vahe and editor-in-chief Courtney Aldrich, who worked to establish this new annual lectureship within the BIOL Division.

In support of these changes, from now on our newsletter will be expanded to a *quarterly* format to continue to 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 that is available online at the ACS Biological Chemistry Division website, http://www.divbiolchem.org**.**

Our division dues, along with a membership-based allocation from national ACS dues together provide funds that support not only the BIOL Division meetings at the ACS national meeting, but also numerous international, national, regional, and local scientific meetings annually. Please encourage your colleagues and students/trainees to join the BIOL Division. Dues are only $15.

I would like to congratulate **Prof. Alanna Schepartz,** She has recently been appointed as the new editor-in-chief to lead *Biochemistry*, the Society's long-standing, peer-reviewed journal. As most of you are aware, *Biochemistry* publishes research at the intersection of biochemistry, biophysics and molecular biology. Prof. Schepartz is the Milton Harris '29 Ph.D. Professor of Chemistry and professor of molecular, cellular and developmental biology at Yale University. Since 2005, Schepartz has served as an associate editor for the Society's flagship *Journal of the American Chemical Society*, a position she will now relinquish as she assumes her new editorial post. Schepartz succeeds Richard Armstrong, Ph.D., who served as *Biochemistry's* editor-in-chief from 2004 until his untimely passing in mid-2015, after which Charles Sanders, Ph.D., professor of biochemistry and the Aileen M. Lange and Annie Mary Lyle Chair in Cardiovascular Research at Vanderbilt University,

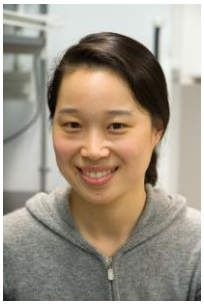
headed the journal in an interim capacity while an intensive international search for a successor was conducted by the Society.

****Immediately following the Hammes lecture on Sunday, August 21 in room 103B of the Philadelphia Convention Center a reception sponsored by the journal Biochemistry will be held in celebration of this announcement.**** Alanna indicated to me recently that she is excited to meet with BIOL members at the reception, to hear your views and discuss the journal, and sends these words:

> "I am incredibly excited to take over the leadership of Biochemistry. Rest assured that the journal will remain the preeminent home for rigorous investigations of the mechanisms that drive biology, with a clear focus on macromolecular structure and function, protein and nucleic acid enzymology, protein folding, and membrane structure and function. My singular goal as editor-in-chief is to retain this focus but broaden the scope, so that Biochemistry becomes the preferred home for outstanding mechanistic work in all areas of biological chemistry. Although some faces on the editorial roster must change to reflect this expansion, all Biochemistry editors will be world leaders who knowledgeably and efficiently shepherd your work through the review process, reach decisions quickly, and communicate effectively. And the transition will be managed with utmost care and thoughtfulness.
>
> Most sincerely,
> Alanna Schepartz"

In January 2016, the Division announced the winners of the **2016 ACS Biological Chemistry Division Awards**. Please join me again in congratulating our award winners! At the upcoming Philadelphia ACS meeting, each award winner has organized a fantastic symposium and will be giving their award lecture.

Professor Elizabeth Nolan is the recipient of the **2016 Eli Lilly Award in Biological Chemistry** in recognition of her contributions to metal homeostasis and human innate immunity. Her research program is motivated by the global public health problems of infectious disease and antibiotic resistance, and affords paradigms for the discovery and elucidation of new bioinorganic chemistry, advancing fundamental understanding of human innate immunity and microbial pathogenesis, and providing new molecules with potential therapeutic applications. Her recent initiatives focus on deciphering the biochemical and biophysical properties of biomolecules employed by the human host and colonizing microbes at mucosal surfaces and sites of infection. She has illuminated the bioinorganic chemistry of human calprotectin, an abundant neutrophil protein that sequesters first-row transition metals at sites of infection. She performed pioneering biochemical and biophysical studies of two cysteine-rich defensin peptides, human α-defensin 5 and 6, that are abundant in the human small intestine and contribute to intestinal homeostasis. She also actively studies the chemistry and biology of siderophores. In this arena she employed native siderophore scaffolds for use in targeted antibiotic delivery, and has identified new strategies to block siderophore-mediated iron acquisition by bacterial pathogens.



Professor Michelle Chang is the recipient of the **2016 Pfizer Award in Enzyme Chemistry** in recognition of her contributions to the understanding of enzymatic incorporation of fluorine into natural products. Her research group works at the interface of enzymology and synthetic biology, with a focus on understanding and engineering enzymes and metabolic networks involved in the production of pharmaceuticals, materials, and commodity chemicals. In particular, her laboratory has focused on developing synthetic biology approaches to introduce fluorine into small molecule targets, which has become a key strategy for drug design and discovery. Although

fluorine has emerged as a common design element among man-made compounds (including 30% of marketed drugs), only a handful of biogenic compounds containing fluorine (<20) from the fluoroacetate pathway of *Streptomyces cattleya* have been identified to date. Her research group has studied the mechanism of fluorine selectivity in a fluoroacetyl-CoA thioesterase from *S. cattleya* and showed that it is mediated by catalysis rather than substrate recognition. They have further shown that thioester hydrolysis proceeds by an unusual C_{α}-deprotonation mechanism through a putative ketene intermediate. This work has enabled the engineering of systems for the enzymatic introduction of the fluoroacetate monomer into polyketide products.

Professor Tadhg Begley is the recipient of the **2016 Repligen Award in the Chemistry of Biological Processes** in recognition of his contributions to mechanistic enzymology of cofactor biosynthesis. Focusing on complex cofactor assembly reactions, he has uncovered a remarkable amount of new biochemistry demonstrating nature's versatility in assembling these key metabolites. His most significant contribution involves the biosynthesis of thiamin pyrophosphate. He elucidated the mechanistic chemistry of thiazole and pyrimidine formation in both bacteria and yeast. Highlights of this work include the discovery that the bacterial thiamin pyrimidine is formed by a complex radical SAM-mediated rearrangement as well as the discovery of a small sulfide-carrier protein involved in the thiazole biosynthesis. Similar sulfide carrier proteins have now been found in the biosynthesis of other key metabolites. The discovery that two suicidal enzymes mediate the thiazole and pyrimidine assembly in yeast was unexpected. In these enzymes, part of the reaction product is derived from the enzyme. The biological functions of the resulting posttranslational modifications have yet to be elucidated. Prof. Begley has also characterized the thiaminase-mediated thiamin degradation as well as the biosynthesis and mode of action of bacimethrin – the only known anti-thiamin natural product. The thiamin biosynthesis project benefitted greatly from a structural biology collaboration with Steve Ealick at Cornell that resulted in structures of all of the thiamin biosynthetic enzymes. The Begley group has also made important contributions to the biosynthesis of NAD, molybdopterin, menaquinone, pyridoxal phosphate, vitamin B_{12}, coenzyme A and the deazaflavin F_{420}. Current areas of research include the elucidation of the mechanism of complex radical rearrangements involved in cofactor biosynthesis, cofactor catabolism and prospecting for new catalytic motifs in flavo-enzymology.

In addition to our divisional award recipients, in January 2016 the BIOL Division announced the distinguished recipients of the **Gordon Hammes *ACS Biochemistry* Lectureship**, the ***ACS Chemical Biology* Lectureship**, and the ***Biopolymers* Goodman Award**:

Professor Carol Fierke is the recipient of the **2016 Gordon Hammes *ACS Biochemistry* Lectureship** in recognition of her contributions toward understanding the function of enzymes. Her laboratory has combined an array of chemical, biological and biophysical approaches to identify the mechanistic and structural constraints that determine the high catalytic efficiency and rigorous substrate specificity of protein and nucleic acid catalysts. She is recognized as an international leader in devising elegant experimental approaches for probing the structure, function and biological relevance of metals as cofactors in catalysis. She and her co-workers carried out a groundbreaking analysis of the determinants of metal affinity and specificity for carbonic anhydrase, the prototypical zinc enzyme, and then used this information to develop biosensors to make the first real-time measurement of the cellular concentration of readily exchangeable zinc ions to analyze cellular zinc homeostasis. Additionally, her work led to a detailed understanding of the catalytic mechanism and metal selectivity of UDP-3-O-(R-3-hydroxymyristoyl)-N-acetylglucosamine deacetylase and histone deacetylase (HDAC) as well as demonstrating the feasibility of Zn/Fe metal switching in cells. Her laboratory has

investigated the substrate selectivity of enzymes that perform post-translational modifications, leading to a better understanding of their biological function. Measurement of the reactivity of protein farnesyltransferase with peptide substrates taken from the human proteome demonstrated that hundreds of proteins are farnesylated in cells. Studies with HDAC8 have led to an understanding of the structural determinants of peptide recognition and the identification of in vivo substrates. Finally, the Fierke lab elucidated the catalytic mechanism, substrate selectivity and structural transitions of both an RNA-dependent and a protein-dependent ribonuclease P that catalyzes maturation of precursor-tRNA, demonstrating that both enzymes use comparable two-metal ion catalytic mechanisms. Fierke's work significantly enhanced our understanding of the cellular function of all of these enzymes and the potential for therapeutic interventions by enzyme-specific inhibitors.

Professor Peter Schultz is the recipient of the **2016 *ACS Chemical Biology* Lectureship**. Schultz's research uses both chemical and biological tools to synthesize molecules with novel functions. By developing technologies to make and characterize molecules and materials hundreds to millions at a time, his work has dramatically impacted our ability to make create molecules with novel biological and physical properties - ranging from medicines to materials. He has pioneered the development of new drugs that affect endogenous stem cells for neurodegenerative diseases and diseases of aging, and has led efforts that have resulted in breakthrough therapies for the treatment of multiple sclerosis, lung and blood cancers, and malaria. At the same time his work has changed the way both academic and industrial scientists discover new catalysts, polymers and energy storage materials. Most recently his laboratory has successfully created new "synthetic" organisms in which the evolutionary constraints of the twenty-amino acid genetic code are lifted. This advance is allowing scientists to create new biomolecules and even whole organisms with properties that are not possible using Mother Nature's restricted set of protein building blocks.

Professor Jennifer Doudna is the recipient of the **2016 *Biopolymers* Murray Goodman Memorial Prize**. Doudna's research focuses on determining how non-coding RNAs function in living systems. Following her pioneering work on the structures and catalytic mechanisms of ribozymes, Dr. Doudna made exceptional advances in understanding how small RNAs are produced and used to control gene expression in mammals and bacteria. This line of research led to the breakthrough discovery of an RNA-programmed DNA endonuclease, Cas9, which functions as part of a CRISPR-based acquired immunity system in bacteria. By determining the molecular mechanism by which Cas9 uses RNA to recognize and cleave double-stranded DNA at specific sites, Prof. Doudna and collaborator Emmanuelle Charpentier showed how the system could be readily adapted for use in human and other cells and organisms. This transformative technology has influenced fundamental and clinical biology by enabling genetic experiments that were previously difficult or impossible to conduct. As Doudna's research revealed, the CRISPR-Cas9 enzyme functions by using a 20-nucleotide RNA sequence within a dual-guide RNA structure to base pair with a complementary target sequence within doubled-stranded DNA. By showing how the dual-guide RNA could be redesigned as a single-guide RNA with the necessary structure to bind Cas9 and to direct site-specific Cas9-mediated DNA cleavage, Doudna and Charpentier's findings almost immediately became a transformative tool for molecular biologists. The CRISPR-Cas9 system has been used for site-specific genome editing in human somatic and pluripotent stem cells, mice, rats, plants, fruit flies, nematodes and fungi. This versatile system is useful in organisms and cell lines, and also in various *ex vivo* experiments where excision of specific segments of chromosomes is desirable. The CRISPR-Cas9 technology is likely to create new therapeutic strategies as well as impacting the fields of plant and synthetic biology.

As always, I welcome your ideas and participation in the BIOL Division. See you in Philly….

Best wishes,

Dewey McCafferty

Meetings of the Division of Biological Chemistry at the 2016-2017 National Meetings of the American Chemical Society.

252nd ACS National Meeting, August 21-25, 2016, Philadelphia, PA. Vahe Bandarian, Department of Chemistry & Biochemistry, University of Utah will serve as the Chair of the Program Committee for this meeting (vahe@chem.utah.edu). In keeping with our programming at recent national meeting the BIOL Division will be offering opportunities for graduate student and postdoctoral researchers to deliver short-format invited talks, which will be selected from submitted abstracts. **If a student or postdoc wishes to be considered for an oral presentation, please select this option during the time of submission of the abstract.**

Poster Presentations. Posters will be presented at several sessions during the week of the ACS meeting. The division encourages submission of abstracts for posters. Contributions on topics related to the themes of the organized symposia are particularly encouraged.

Submission of Abstracts. The instructions for submissions of abstracts for poster and oral presentations are given towards the end of this Newsletter.

Travel Awards. The division offers travel awards for graduate students and postdoctoral fellows to attend the 253st ACS National Meeting in 2017. **The deadline for submission is January 15, 2017, and submission details may be found at: http://www.divbiolchem.org/awards/travel-awards/.** 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

253rd ACS National Meeting, April 2-6, 2017, San Francisco, CA. Liz Hedstrom, Department of Biology, Brandeis University will serve as the Chair of the Program Committee for this meeting (hedstrom@brandeis.edu).

254th ACS National Meeting, August 20-24, 2017, Washington, DC. Liz Hedstrom, Department of Biology, Brandeis University will serve as the Chair of the Program Committee for this meeting (hedstrom@brandeis.edu).

255th ACS National Meeting, March 18-22, 2017, New Orleans, LA

256th ACS National Meeting, August 19-23, 2017, Boston, MA.

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.

Northeast Regional Meeting (NERM)
http://nerm2016.sites.acs.org/
October 5-8, 2016, Binghamton, New York

51th Midwest Regional Meeting (MWRM)
http://mwrm2016.org/
October 26-28, 2016, Manhattan, KS

68th Southeast Regional Meeting (SERMACS)
October 23-26, 2016, Columbia, SC
http://www.sermacs.org/

72st 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

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. Currently for 2016, the Division will provide support for the following symposia and meetings held this year:

25th Enzyme Mechanisms Conference
January 4-8, 2017
email: Agman@chem.northwestern.edu

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

Travel Awards for 2016-2017

The Division of Biological Chemistry promotes the work of our young talent (students and postdocs) through the award of Travel Grants.

Nominations for Division Positions

The Nominating Committee:

Christine Hrycyna (hrycyna@purdue.edu)
James Hougland (hougland@syr.edu)
Coran Watanabe (watanabe@chem.tamu.edu)

There currently is one vacant position for this committee.

Program Committee. The 2016-2017 Program Committee Chair, Vahe Bandarian, in consultation with the Program Committee (below), prepares the divisional program for ACS National meetings. The committee requests suggestions for symposia from Division members.

Vahe Bandarian (vahe@email.arizona.edu)
Liz Hedstrom (hedstrom@brandeis.edu)
Shana Kelley (shana.kelley@utoronto.ca)
Craig Crews (Craig.Crews@yale.edu)

There is one vacancy for this committee.

Founders Travel Award

Tom Bruice, Bill Jencks, and Myron Bender, as a mechanism to foster collegial interactions within the community of chemists and biochemists interested in understanding the chemical basis for enzymatic catalysis and the regulation of enzyme action, founded the Winter Enzyme Mechanisms Conference in 1969. The passing of William P. Jencks coincided with the 20th meeting of the Winter Enzyme Mechanisms Conference, and this loss was felt keenly by many senior participants at that conference. The interest in recognizing Bill's many contributions to mechanistic enzymology, in a manner that would help to ensure the vibrancy of the community that he helped to create, resulted in the creation of the "Founders Travel Award", which supports the participation of students and/or postdocs at the Winter Enzyme Mechanisms Conference. The ACS Division of Biological Chemistry manages the investment of funds contributed for this award and has established the process for the competitive selection of the awardees.

Travel Awards to Attend the 253st ACS National Meeting

The division will offer travel awards on a competitive basis for graduate students and postdoctoral fellows to attend the meeting and present a poster on their research. 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 their lifetime, and that preference will be given to presenters within the division.**

How to apply for a Travel Award

(1) Fill in the Travel Award Application on the next page.

(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 2017 Program Chair, Liz Hedstrom (hedstrom@brandeis.edu).

Be sure to use a subject line of "ACS Travel Awards" in your electronic application.

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

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?