

BLUE HEN Chemist

DEPARTMENT OF CHEMISTRY & BIOCHEMISTRY ALUMNI NEWSLETTER

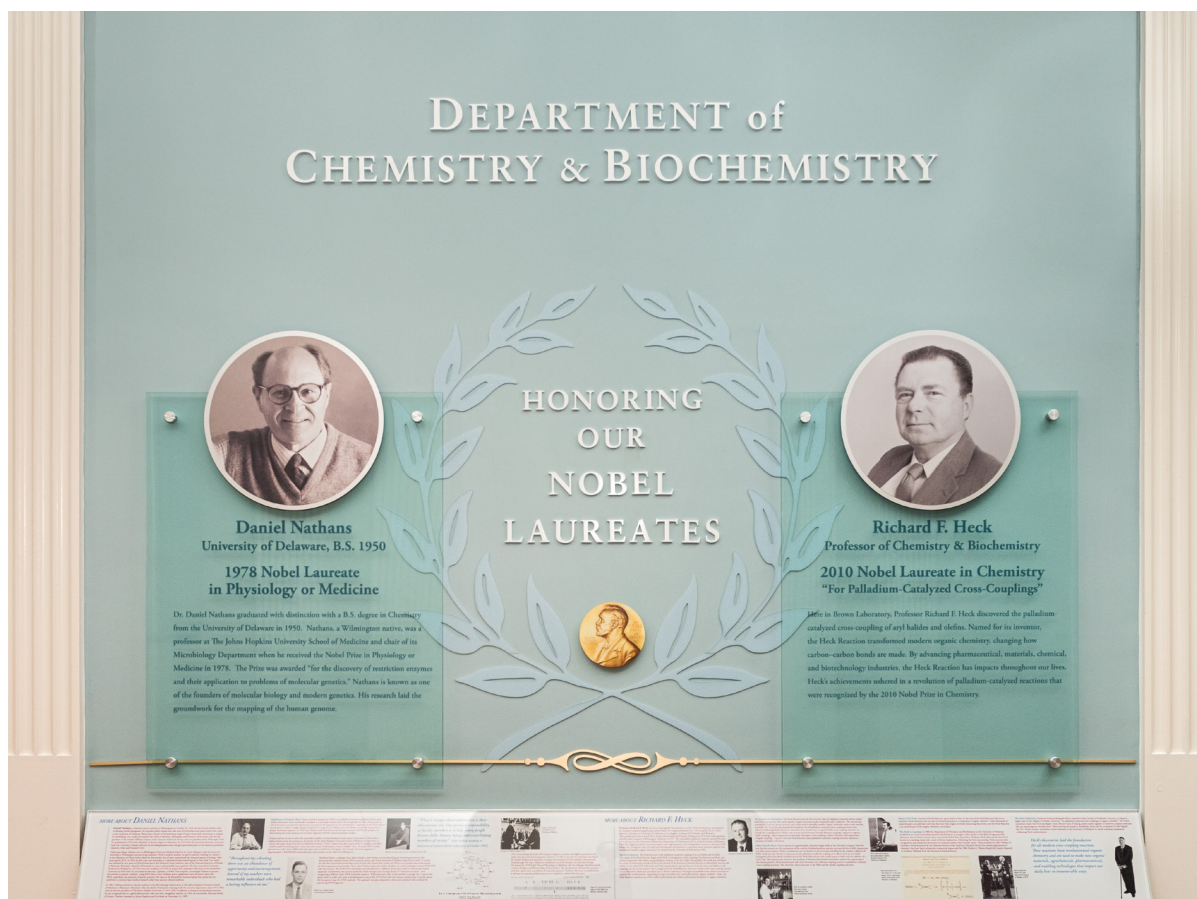
#42, FALL 2015



Nobel Recognition

A new Brown Lobby display commemorates UD's Nobel Laureates





On April 14, 2015, Governor Jack Markell joined faculty and friends of the Department of Chemistry and Biochemistry to unveil a new display in the lobby of Brown Laboratory to commemorate the Department of Chemistry and Biochemistry's two Nobel Laureates, **Professor Richard F. Heck** (FAC71-89) and **Dr. Daniel Nathans** (BS50). Shortly after the announcement that Professor Heck won the Nobel Prize in Chemistry in 2010, discussions about creating a permanent display to recognize this momentous occasion began to circulate through the Department. But, what and where, and how to pay for it? After several years developing ideas and raising funds, we are pleased to announce that visitors to Brown Lab will now be greeted with a large professional display that tells the story of how these two Blue Hen Chemists changed the world.

When Professor Emeritus Richard Heck won the 2010 Nobel Prize in Chemistry, the Department erupted in celebration; however, only a few of our current students knew that Heck was actually our Department's second Nobel Laureate. Though Daniel Nathans had visited

UD on several occasions prior to his death in 1999, the Department had never made a formal display to document the achievements of this most heralded alumnus. Thirty-seven years after his Prize was awarded, we have finally done right by our home-grown hero.

While Nathans may have had to wait longer for his Brown Lab commemoration, he only had to wait seven years from his 1971 pioneering paper on the application of restriction enzymes to genome mapping before he was awarded the Nobel Prize in Medicine in 1978. By contrast, Heck, who published his seminal paper on the Heck Reaction a year later in 1972, had to wait 38 years before being awarded the Nobel Prize. In either case, our recognition of these Blue Hen Chemists has been long overdue.

The display consists of two large frosted glass plaques with metal etched photos of Nathans and Heck. A museum-style information bar provides facts about each scientist and their contributions to science and society. The display is located between the two main doors

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Cover photo: Governor Jack Markell speaks at the unveiling of the new display in the lobby of Brown Laboratory to commemorate the Department of Chemistry and Biochemistry's two Nobel Laureates, Professor Richard F. Heck and Dr. Daniel Nathans.

Hello to all in our Chemistry and Biochemistry Community! As many of you know, there are two things I emphasize to our graduating students at our Departmental Convocation each year. First, I encourage them to look expectantly to the arrival of the **Blue Hen Chemist**. If this is your first issue of the **Blue Hen Chemist**, please enjoy and continue to look expectantly for it in future years. If you have received the **Blue Hen Chemist** in the past, then welcome to this year's issue and I hope that you catch the excitement that flows through our Department. Second, I encourage our graduating students to come back in the future and not allow Departmental Convocation be the last time they set foot on campus. How about you? Have you visited recently? If not, I hope you will consider making a trip to Newark. Change is inherent to a university, both inside and outside the classroom and laboratory. Visiting will help you to experience the vibrancy of a Department and campus in motion.



William Chain

In our ever-changing landscape, I have several hellos, goodbyes and advancements to report. During the past year, **Svilen Bobev** and **Neal Zondlo** were promoted to Professor. **Joel Rosenthal** and **Don Watson** were promoted

to Associate Professor with tenure. **Douglass Taber** received an appointment as Emeritus Faculty. Professor **William (B.J.) Chain** joined our faculty in August 2015, moving from a faculty position in the Chemistry Department at the University of Hawaii. His research focuses primarily on the efficient total synthesis of natural products. **Hal White**, a mainstay of our faculty since 1971, officially retires in December 2015.

After serving almost 10 years as our building manager, **Dave Murray** moved to the College of Engineering late last summer. **Doug Nixon** (our glassblower extraordinaire) effectively performed two jobs, taking over building management until **Brandon Calitree** joined us this spring as our new safety and building coordinator. Brandon received his Ph.D. in Chemistry from the University at Buffalo, State University of New



Brandon Calitree



York. **Mark Schrader** joined our Department last fall as our new master machinist. **Debbie Fox** retired in June after serving the Department and University for over 20 years as an administrative assistant. Two new administrative assistants are joining us September 1, 2015: **Lori Nesnow** who will support graduate studies and department outreach, and **Tracy Walsh** who will support various faculty activities.



Debbie Fox

Our faculty continues to garner awards and accolades for their work.

Karl Booksh and **George Luther** (joint faculty position with Marine Studies), along with David Martin from Materials Science, were named Fellows of the American Chemical Society.

Joel Rosenthal, who has previously received a Sloan Research Fellowship, a National Science Foundation (NSF) Career Award, and an award from the Camille and Henry Dreyfus Foundation Postdoctoral Program in Environmental Chemistry to support his research in renewable energy and molecular energy conversion, was selected by the University's Francis Alison Society to receive the 2014 Gerard J. Mangone Young Scholars Award.



Joel Rosenthal



Cecil Dybowski

Cecil Dybowski received the 2015 Francis Alison Faculty Award, the University's highest competitive faculty honor. As many of you know, Cecil is internationally known for his work in nuclear magnetic resonance, and in recent

years has collaborated with the Metropolitan Museum of Art to address important problems in art conservation. This is the first time in recent memory that both Francis Alison Society awards went to faculty in the same Department. Well done, Joel and Cecil!

Catherine Leimkuhler Grimes, who previously was named a Pew Scholar in the Biomedical Sciences by The Pew Charitable Trusts, was one of eighteen faculty nationwide to receive a Cottrell Scholar Award from the Research Corporation for Science Advancement. Along with her mentor, **Tatyana Polenova**, Catherine received a University of Delaware Research Foundation Strategic Initiative Grant. She also received an award from the Mitzutani Glycoscience Foundation. Catherine's research program is focused on bacterial cell walls and the way human cells interact with them.

Joe Fox received the 2015 Delaware Section Award of the American Chemical Society for his research in the development of new types of chemical reactions and the application of these to the synthesis of naturally occurring and designed molecules with biological function. He also chaired the 2014 Gordon Research Conference in Organic Reactions and Processes, and has been invited as the 2015/6 Bristol Myers Squibb lecturer in organic chemistry at MIT. **Joe Fox** and **Tatyana Polenova** serve as lead Principal Investigators for two separate Centers of Biomedical Research Excellence (COBRE) projects that were awarded from the National Institutes of Health this past year. COBRE supports the research of junior faculty members and strengthens the research infrastructure available to them. The theme of the project led by Joe is molecular discovery to improve human health, while the theme of the project led by Tatyana is molecular design of advanced biomaterials. Together, these projects provide over 17 million dollars of support over the next five years.

Hal White received the 2015 Educator of the Year Award from the Delaware Bioscience Association for his contributions to the advancement of science, tech-

nology, engineering and mathematics (STEM) education in Delaware. Hal has received numerous awards for education over the years including the College of Arts and Sciences Outstanding Teaching Award, the Howard Barrows Award for exceptional undergraduate teaching from McMaster University, Delaware Professor of the Year by the Council for the Advancement and Support of Education (CASE) and the Carnegie Foundation for the Advancement of Teaching, and the Award for Exemplary Contributions to Education from the American Society for Biochemistry and Molecular Biology.

Kate Scantlebury and **Jacqueline Fajardo**

received grants from UD's Center for Teaching and Assessment of Learning (CTAL). Kate's project was "Improving Co-Teaching Across The University of Delaware's Teacher Education Programs", while Jackie's was "Creating Integrated Bio-Chemistry Honors" awarded jointly with Alenka Hlousek-Radojic in Biological Sciences.

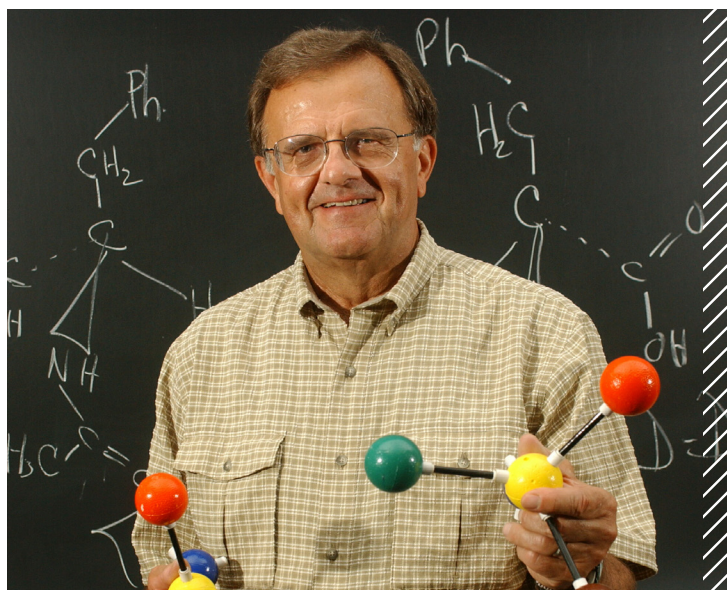
Karl Booksh and **Sharon Rozovsky** continue to lead a Research Experiences for Undergraduates (REU) program funded by the National Science Foundation, which is designed to provide mentoring and research opportunities for students with disabilities. In a similar spirit and thanks to the effort of **Catherine Grimes** and **Mary Watson** to spearhead the nomination, our Department received a 2015 Diversity Ambassador Award from the Provost's office in recognition of our efforts to celebrate diversity at the University of Delaware. Normally these awards are given to individuals within the UD community. That it was given to our entire Department highlights the effort made by so many in our departmental community to promote diversity.

I would like to close by returning to the idea of visiting campus to experience the vibrancy of our Department. Our students and faculty are constantly on-the-go. The fruits of their labor are evident in the many awards and accolades highlighted above and elsewhere in the **Blue Hen Chemist**. Donations from our alumni and friends are a crucial part of making this happen. To those of you who have provided support in the past, I would like to express a resounding "Thank You!" on behalf of our students and faculty. Looking forward, I encourage everyone to visit and partner with us so that we can continue to provide the highest quality environment for teaching and research.

—Murray Johnston

Some years ago, **Prof. Cecil Dybowski** compiled a list of CHEM/BIOC faculty during the modern era- that dating back to the yoking of the men's and women's Chemistry Departments in 1944. It included both tenure track, continuing track (erstwhile continuing non-tenure track), and temporary full-time faculty members. He listed both their doctoral universities and their period of service in our Department. I filled in some missing names, and we have maintained the list to the present day. (The then-current complete list was published in *Blue Hen Chemist* #31, in 2004)

While adding the name of our most recent faculty addition, **Prof. BJ Chain**, to the list, I was struck by its surprising diversity, as far as the schools of doctoral origin are concerned. Accordingly, I have decided to share it with our alumni, faculty, and staff, organized in that manner:



DOCTORAL SCHOOLS OF ORIGIN: TENURE-TRACK FACULTY

UNIVERSITY	UD CHEM/BIOC FACULTY
Berlin	Lars Gundlach
Brandeis	Don Dennis, Hal White
Brown	Brian Bahson
California- Berkeley	Jean Futrell, Mel Schiavelli, Klaus Theopold , Bob Wood
California- Irvine	John Newberg, Don Watson, Mary Watson
Cal Tech	Doug Ridge
Cambridge (UK)	Andrew Evans
Carnegie- Mellon	John Bulkowski
Chicago	Quaesita Drake, J.J. Ewing, Greg Moe
Columbia	Joe Fox, John Koh, Cecil Lynch, James McNeal (MA), Tatyana Polenova, Sharon Rozovsky, Doug Taber, Andrew Teplyakov, John Wriston
Delaware	Tom Apple
Emory	Sharon Neal
Georgia	Henry Blount
Harvard	BJ Chain, Keith Chenault, Roberta Colman, Doug Doren, Dennis Evans, Leila Gierasch, Catherine Grimes, Harold Kwart, Eugene Mueller, Joe Noggle
Illinois	Wayne Anderson, Wally McCurdy, Garry Rechnitz, Cliff Robinson, Glenn Skinner
Johns Hopkins	Arnold Lippert
Kent (UK)	Colin Thorpe
Maryland	Arnold Rheingold
Michigan State	Roger Murray
Minnesota	Tom Brill
MIT	Sandeep Patel, Joel Rosenthal, Ed Schweizer

DOCTORAL SCHOOLS OF ORIGIN: TENURE-TRACK FACULTY

New Mexico	Zhihao Zhuang
North Carolina	Harvey Gold, Seymour Yolles
Northwestern	John Burmeister
Notre Dame	Svilen Bobev
NYU	Harold Beachell, Junghuei Chen
Oxford (UK)	Luigi Venanzi
Penn	Eugene Hamori, Carl von Frankenberg
Penn State	Jim Moore, Bill Mosher, Conrad Trumbore
Pittsburgh	Tom Beebe , Yong Duan
Princeton	Jim Damewood
Purdue	Bob Curry, Kate Scantlebury , Mary Wirth
Texas	Cecil Dybowski , Burnaby Munson
Texas A&M	Charlie Riordan , Joel Schneider
UCLA	Dick Heck
Vermont	Dave Dalrymple
Virginia Tech	Ed Lyman
Yale	Betty Dyer, Neal Zondlo
Washington	Fred Askham, Karl Booksh , Steve Brown
Weizmann Inst.	Phil Gottlieb, Mahendra Jain
Wisconsin	Murray Johnson , Cyd McClure, Don Wetlaufer

DOCTORAL SCHOOLS OF ORIGIN: CONTINUING TRACK & TEMPORARY FACULTY

UNIVERSITY	UD CHEM/BIOC FACULTY
Brandeis	Judith Voet
Brown	Susan Peluso
Delaware	Bill Fultz, Mary Beth Kramer (MS), Rosette Roat, Gary Weddle, Meredith Wesolowski
Drexel	Louise Sowers
Emory	Mark Baillie
Georgia	Ed Davis
Illinois	Ed Bromels
Indiana	Karen Bush, Priscilla Hamill (MS)
Iowa	Tekum Fonong
Iowa State	Ken Coskran
Johns Hopkins	Richard Rebbert
Kentucky	Fred Hawkridge
Massachusetts	Marvin Illingsworth, George Reilly
Nevada	Michael Babich
New Hampshire	Al Denio
North Dakota	Fred Alvares

DOCTORAL SCHOOLS OF ORIGIN: CONTINUING TRACK & TEMPORARY FACULTY

Northern Colorado	Jackie Fajardo
Ohio State	Wilma Meckstroth
Oregon State	George Rose
Penn	Peter Sparks
Princeton	Kim Graves
Purdue	Patricia Metz, Marjorie Nieh
Rochester	Clarence Heining
Stanford	Sue Groh
Syracuse	George Stine
Texas	Jim Wingrave
UCLA	Bruce Hietbrink
Villanova	Mary Kaiser
Washington (St. Louis)	John Garavelli
West Virginia	Ralph Booth (MS)
Wisconsin	John Hostettler
Yale	Kevin Krist

The 88 faculty members listed in the tenure-track table (the 33 who are current are shown in bold face) earned their highest degrees at a large number of universities (41) – an average of 2.1 per school. Only half of the schools have multiple representation, led by (no surprise!) Harvard (10) and Columbia (9).

The continuing track/temporary table of faculty members (current faculty shown in bold face) is even more diverse, with 39 faculty members coming from 32 doctoral institutions. Delaware (again, no surprise) heads the list with 5. Only 4 schools have multiple representations. What **is** surprising, however, is that only a dozen schools (Brandeis, Brown, Emory, Georgia, Illinois, Johns Hopkins, Penn, Princeton, Purdue, Texas, UCLA, and Wisconsin) are to be found on both lists. The bottom line is obvious: excellence can be found in a great variety of sources.

Editors Note: If you know of any names that should be added to either list, please let me know of the omissions.

The Undergraduate Program

The changes that have taken place in our undergraduate program during my 51 years in the Blue Hen's Coop have been both wide-ranging and significant. Chief among these is our substantial **growth**. Our CHEM/BIOC faculty has expanded from 13 in 1964 to our current 39. The University's Class of 2019 will be our second consecutive freshman class in the 4200 student range. In 1964, the **total** undergraduate enrollment was ca. 4400!

I don't recall the size of the freshman CHEM major class in 1964, but I do know that we will reach unprecedented heights this coming fall. Both the size of the incoming CHEM/BIOC/XCE freshman class (95) and our total UG majors enrollment (337) will be the largest in our history. The last data published by the ACS (in 2009) showed that our graduating class of 41 certified BS/CHEM and BS/BIOC majors was the 11th largest in the country, out of 653 schools. With a range of 36-53 certified graduates in the interim (41 in 2015), we have undoubtedly held serve.

The make-up of our majors has undergone profound changes, as well. What was once an overwhelmingly male-dominated major, became majority female for a period and is now (end of spring, 2015) almost evenly divided by gender:

- Male: 157
- Female: 142
- White: 194
- Black: 17
- Hispanic: 5
- Asian: 56
- Multiethnic: 27

The creation of our BS/BIOC major in 1989 created a surge of interest, and it quickly became our dominant major. It retained that status through 2009 (30 BS/BIOC, 11 BS/CHEM). Since then, our BS/CHEM program has regained numerical supremacy. At the end of 15S, the breakdown was as follows:

- BS/BIOC: 106
- BS/CHEM: 147
- BA/CHEM: 40
- BA/XCE: 6

Like diversity, retention has become a U of D hallmark. Taken at face value, it would appear that our CHEM/BIOC program is a paragon of retention. When the class of 2015, 57 in number, entered as freshmen in the fall of 2011, it consisted of 66 students. That's an apparent (commendable) retention rate of 86%. But wait—a survey by **Prof. Burnaby Munson** showed that fully **two-thirds** of those who entered as CHEM/BIOC/XCE majors in 11F did not graduate as such! Their numbers were replenished by a stream of both internal and external transfer students. Chemical engineering refugees constituted, as usual, a majority in the former category, with biology majors also contributing a sizeable number of transfers.

From where I sit, the foregoing still represents positive retention, in the absolute sense, for our missing would-be majors still graduated from other departments, for the most part. Indeed, why should most 17- or

18-year-olds have a solid fix on their future lives? I was “certain” that I wanted to be a chemist when I enrolled in Franklin & Marshall in 1955. However, I had absolutely no inkling, then, that I would pursue a graduate degree, let alone launch a 52-year professorial career (or be our Associate Chair for 41 years or, for that matter, be married to Aileen for 55 years!)

Our chemistry curriculum will experience two significant changes in 2016-2017. The integrated (with BISC-207/208) version of CHEM-103/104, held in the Harker Interdisciplinary Science & Engineering (ISE) Laboratory, will be renumbered CHEM-107/108 General Chemistry for the Life Sciences. Hopefully, this will forestall some of the confusion created during the past two years by the existence of **four** versions (counting the Honors versions) of CHEM-103/104.

To the great joy and satisfaction of my inorganic colleagues and yours truly, we will **finally** add a second required course in inorganic chemistry to our BS/CHEM curriculum. CHEM-357 Inorganic Chemistry I will be offered during the second semester of the sophomore year for our BS/CHEM majors, starting with the class of 2019. The campaign to add this required course was spearheaded by **Prof. Joel Rosenthal**.

Finally, although a final decision has yet to be reached, we are contemplating one of the two following scenarios for our BS/CHEM and BS/BIOC majors:

- Providing them with a **choice** between taking the traditional foreign language through the XXXX-107 level **or** CISC-106 General Computer Science.
- Replacing the foreign language requirement with CISC-106.

Your feedback is hereby solicited!

—*John Burmeister*

Greetings and welcome to my rubric. Writing this contribution for the 42nd edition of the **Blue Hen Chemist** is a bittersweet moment for me, as this is my last time doing so in the capacity of Graduate Director. The Teaching Assistantships and Fellowships committee (TAF) and the Graduate Curriculum Committee, which I headed for the past four years, accomplished a lot, and I am very proud of what we have done together. The program has grown over the years and the Department currently has 9 Masters and 156 Ph.D. level students. In the past academic year, we awarded 8 Masters and 21 Ph.D. degrees. We also had a successful graduate recruiting season overall. The Department will be welcoming another sizeable incoming class in the Fall semester—38 new graduate students, representing 6 foreign countries and about half-a-dozen States. We are all excited about the new addition to the Department and the preparations for their arrival are already well-underway.

At the outset, I must say that I am sincerely indebted to my colleagues **Profs. Sharon Rozovsky, Catherine Grimes, Brian Bahnson, Karl Booksh, Cecil Dybowski, Lars Gundlach, John Newberg, Sandeep Patel, Joel Rosenthal, Donald Watson, Zhihao Zhuang,** and **Neal Zondlo**, who all served in various capacities on either (or both) committees. Without their hard work and dedication, our graduate program would not be thriving, as it does today.

A true testament to the tremendously successful year we had is the long list of accolades received by our students in 2014-15. In the next paragraphs, I will describe some of the most notable achievements by our graduate students, and would like to begin with the winners of several popular Departmental awards. Saying that the competition this year was fierce, will be an understatement.

The 49th winner of the **Glenn S. Skinner Memorial Prize** is **Dr. Amber Gietter-Burch**. Amber did her Ph.D. in the research group of **Prof. Donald Watson** and defended her thesis already on July 17th. She received the award (a check and a certificate) at the Departmental Colloquium given by **Prof. Jon Thorson** (University of Kentucky) on April 17, 2015. The Skinner Award, as it is more commonly announced, is the most coveted honor for graduate students in our Department. It is presented every year to a single graduate student, who fully exemplifies excellence in all three areas—scholarship, teaching, and service. The



award is named in honor of **Prof. Glenn S. Skinner**, an active faculty member in the Chemistry Department from 1928 to 1958.

A few more words about Amber. She received her bachelor's degree in Chemistry from the College of New Jersey (TCNJ) in 2010 and began her pursuit of a Ph.D. in our program, starting in the fall of the same year. Early on in her graduate career, Amber excelled in all her graduate-level coursework. Later, she proved to be a student with outstanding research abilities, becoming the most productive graduate student from the Watson group to date. Her stellar research aptitude was noted by the University as well, when she was awarded a highly competitive University Fellowship for year 2014-15. According to her advisor **Prof. Donald Watson**, "Amber has made outstanding contributions to science during her time at UD, and has been one of the primary drivers of our group's efforts to develop new chemistry of nitroalkanes—one of the two major research areas in the group". Amber has also trained and mentored a number of younger graduate students, as well as a cohort of undergraduate students. I also personally would like to acknowledge Amber's active participation in the Graduate recruiting activities, where she has proven to be an outstanding spokeswoman for the Department.

The Department gave three graduate teaching awards this year. The Graduate Curriculum Committee received a multitude of excellent nominees for the 33rd annual Departmental **Elizabeth Dyer Excellence-in-Teaching Award**. The Dyer Award honors



Prof. Jon Thorson (University of Kentucky), Donald Watson, Amber Gietter-Burch, Svilen Bobev, John Burmeister.

the memory of the late **Prof. Elizabeth Dyer**, a member of the chemistry and biochemistry faculty from 1933-1971. The award has been given since 1981 and recognizes graduate students who have been exemplary teaching assistants during the past academic year. The awards, which constitute a certificate and a modest cash prize were presented to the winners at the **Mary Elizabeth Kramer Memorial Lecture** on Friday, October 3, 2014, given by **Prof. Tom Holme** (Iowa State University).

This year, the committee decided on the following winners—**Vijayarajan Devannah**, **Tian Qiu**, and **Yiben Wang**. They were selected out of nine nominees, all of whom were worthy of being winners this year. The committee had a really hard time ranking the students, given the extremely strong evaluations and supporting letters from faculty. A few words about each awardee:

Vijayarajan (Vijay) Devannah received his bachelor's degree from the University of Madras in India and works in the laboratory of **Prof. Donald Watson**. He served as a TA in CHEM-332, second semester Organic Chemistry for majors, during the Spring of 2014. He was singled out for being “solely responsible for developing the material presented to students during the weekly discussion section”. “Based upon his attendance at the lectures, Vijay developed problems and concepts that he would present during his discussion sections” is a recurring statement in his student evaluations. His advisor also notes that “This was the first year, at least in modern history, where TA discussion leaders had been used in CHEM-332. As such, Vijay was a trail-

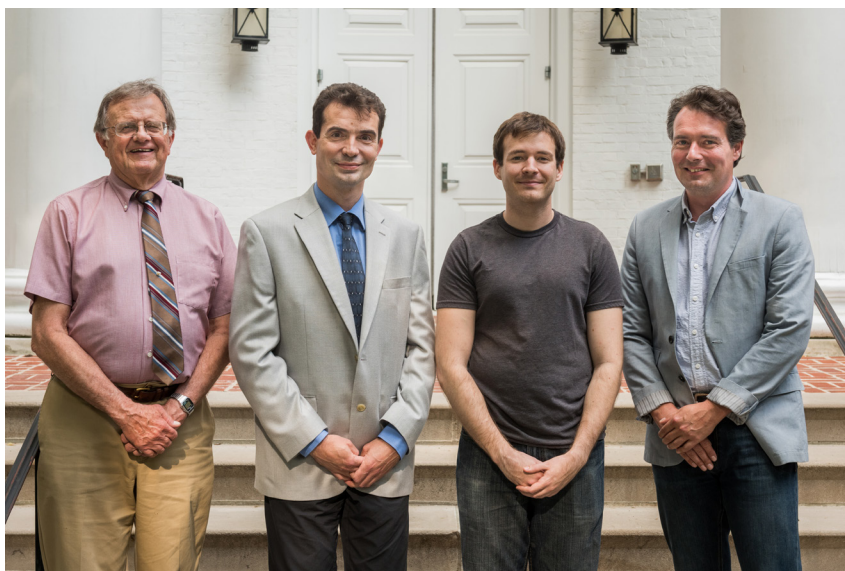
blazer in developing new materials for this aspect of the class.”

Tian Qiu received her bachelor's degree from Nanjing University in China and is currently pursuing a Ph.D. under **Prof. Joel Rosenthal's** supervision. Tian served as a TA in CHEM-458 during the Spring semester of 2014. The nomination letter by **Prof. Rosenthal** describes how Tian “independently carried out and optimized each of the synthetic and physical experiments” and displayed “a level of engagement and dedication that serves to highlight her initiative as an educator and distinguishes her performance.”

Yiben Wang received his bachelor's from Virginia Commonwealth University and is currently pursuing a Ph.D. with **Prof. Catherine Grimes**. Yiben served as a TA in the integrated CHEM-103 laboratory, General Chemistry, during the Fall of 2013. According to Yiben's peers, “he embraces and seeks opportunities to teach and his contributions have had a significant impact in General Chemistry laboratory instruction at UD”. Another nominator also writes: “Yiben is interested in learning new techniques, hence, his desire to work on Problem Based Learning (PBL) and thoroughly enjoys interacting with students”. At the end, I would like to mention what I had highlighted already in **BHC #41**—in 2014, Yiben received another important recognition—the **University's Graduate Student Excellence in Teaching Award**.

Mr. Baxter Abraham, a graduate student in the laboratory of **Prof. Lars Gundlach**, was awarded the **2015 Brennie E. Hackley, Jr. Award for Excellence in Research**. The award commemorates the life of Dr. Hackley, who in 1957 became UD's first African American doctoral graduate. His 57-year career at the U.S. Army Medical Research Institute for Chemical Defense in the Edgewood Laboratories at Aberdeen (MD) Proving Ground culminated in his becoming chief scientist there and earning him the federal government's Exceptional Civilian Service Medal.

Baxter is richly deserving of this recognition. His advisor writes for him “Baxter is a student who identifies



John Burmeister, Svilen Bobev, Baxter Abraham, Lars Gundlach

and solves problems independently and creatively adjusts his experimental strategies based on the circumstance". Prof. Gundlach also noted the impressive graduate work, which has already produced publications in prestigious journals and accolades, and also commented that "he [Baxter] started with no background in non-linear optical spectroscopy and little background in instrument development. He has developed into a young scientist who possesses the necessary theoretical knowledge and the experimental skills to develop and employ new spectroscopic methods".



Allen Pistner

This year, two students need to be acknowledged as the recipients of the annual **Trofimenko Memorial Prize** for creative synthetic inorganic work. Both have already graduated and are currently pursuing post-doctoral training. The first student is **Dr. Allen Pistner**, who worked in the laboratory of **Prof. Joel Rosenthal**. Allen is now learning new chemistry at Penn State University. The second student receiving a \$500 check and a certificate is **Dr. Jessica Wallick**, who finished her Ph.D. work under the tutelage of **Prof. Charlie Riordan**, and is presently employed at PPG Industries.



Jessica Wallick

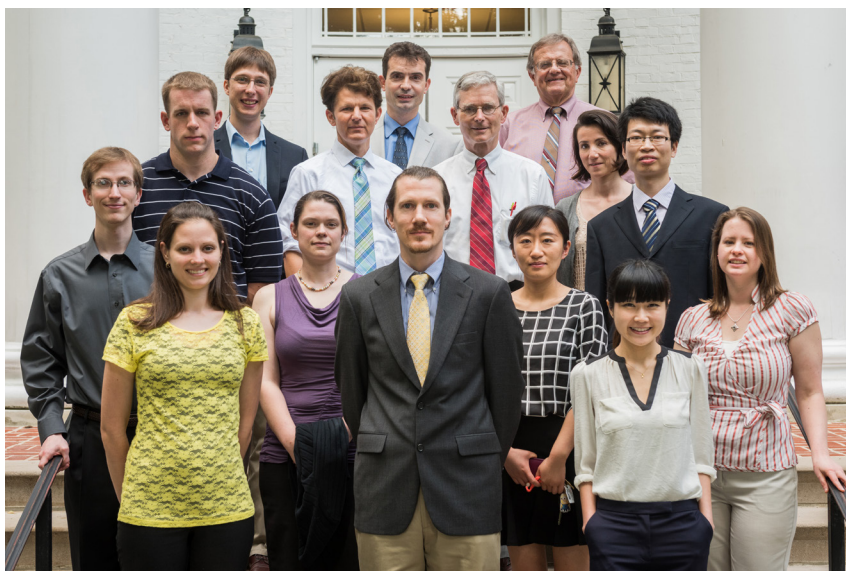
The award was established in 2007 in honor of **Dr. Swiatoslav 'Jerry' Trofimenko**, a renowned chemist from DuPont, who is also known for the creation of the polypyrazdyl ("scorpionate") family of ligands. Following his retirement from the industry, Dr. Trofimenko spent the final decade of his productive research career as a visiting scholar in the group of **Prof. Klaus Theopold**.

Let me now switch gears and describe the friendly competition among our graduate students, affection-

ately known as the **Joel L. Silver Award Symposium**. The presentations took place on May 19, 2015 (Reading Day). Nine students participated in the event and gave short research talks based on their graduate work. The talks were judged by a panel of four outside expert jurors: **Prof. Ramona Neunuebel**, Biological Sciences at UD; **Prof. Graham Dobereiner**, Temple University; **Prof. Emeritus Douglass Taber**, Chemistry and Biochemistry at UD; **Prof. Barry Walker**, Physics and Astronomy at UD.

The namesake of the Silver Award, the late **Joel L. Silver** (PhD72) was a doctoral student in the laboratory of **Prof. John Burmeister**, who was tragically killed in a car accident in 1971, just a few months before earning his Ph.D. A fixture in the Department of Chemistry and Biochemistry since 1973, the Award Symposium commemorates Dr. Silver, and honors the hard work of all involved in graduate education in Chemistry and Biochemistry.

We extend our sincere appreciation to the jurors, who had the very difficult task of selecting the top presentations—**Jesse McAtee** (**Prof. Donald Watson**) won the 1st place award for his presentation titled "Development of the Silyl-Heck Reaction and Second-Generation Catalysis". The jury recommended two runner-ups: **Qin Liang** (**Prof. Zhihao Zhuang**) for her presentation titled "ML323, an Inhibitor of the USP1/UAF1 Deubiquitinase Complex, Reveals Important Roles of Deubiquitination in DNA Damage Responses" and **Rachel Pupillo** (**Prof. Joel Rosenthal**)



First row: Rachel Pupillo, Jesse McAtee, Qin Liang
 Second row: Daniel Cummins, Caitlin Tressler, Mingyue Li, Jennifer Eddy
 Third row: James Melnyk, Barry Walker, Douglass Taber, Ramona Neunuebel, Jun Liu
 Fourth row: Graham Dobreiner, Svilen Bobev, John Burmeister

who spoke on the topic “On Surface Cross-Coupling Methods for the Construction of Modified Electrode Assembles”. The other six presenters, who also gave very interesting and informative talks were: **Jun Liu (Prof. Sharon Rozovsky)**, **James Melnyk (Prof. Catherine Grimes)**, **Caitlin Tressler (Prof. Neal Zondlo)**, **Daniel Cummins (Prof. Klaus Theopold)**, **Jennifer Eddy (Prof. Joel Rosenthal)**, and **Mingyue Li (Prof. Tatyana Polenova)**.

Last on my long list of honors and awards, but not least of course, is the mention of several, high University-level recognitions. First, a Ph.D. student, who will begin her studies in the Fall’15, **Ms. Jodi Kraus**, was awarded the highly competitive **University Scholars Fellowship**. Continuing a tradition from last year, the Department was awarded two prestigious **University Graduate Fellowships**. The 2015-16 University Fellows are **Mr. Kirk Shimkin**, who is a 5th year graduate student in the laboratory of **Prof. Donald Watson**, and **James Melnyk**, who is a 4th year graduate student in the laboratory of **Prof. Catherine Grimes**. The fellowships will fund in part their studies in the upcoming academic year.

In 2015, I am pleased to report, the Department won again in the University-wide competition for



Zachary Voras

teaching. **Mr. Zachary Voras**, a graduate student in the laboratory of **Prof. Thomas Beebe** received the **University Graduate Student Excellence in Teaching Award**.

The \$1500 award (one of only two University-wide) recognizes the best teaching assistants, who help guide their students and facilitate their learning.

The Department is clearly on a roll when it comes to University accolades, as this year, we also have two **Graduate Students of Distinction Awards—Gabriel Andrade and Rachel Pupillo** (both

working under **Prof. Joel Rosenthal**) were honored in a special ceremony for their outstanding academic achievements.

Heartiest congratulations to all current and past graduate students that did us proud! I am looking forward to yet another spectacular honor list next year!

In closing, I would again like to express my sincere gratitude to all my colleagues, especially those that served on the GCC and TAF committees, and our Chair, **Prof. Murray Johnston** for their continued support for the advancement of the graduate program. I also must acknowledge the invaluable assistance of the graduate-recruiting coordinator **Mrs. Carrie Johns** (née **Bonnett**, who has embarked on new personal and career paths), and from the pillar of the Chair’s office **Mrs. Susan Cheadle**. Without their countless hours behind the computer screens and on the phone, the incredible growth of the program would not have been impossible. And last, I am sure my successor, **Prof. Donald Watson**, will hit the ground running when he assumes the role of Graduate Director in September, and I wish him much success.

—Svilen Bobev

Tribute to Hal White

Our esteemed colleague, Professor Harold B. White, III, is retiring effective January 16, 2016. Hal joined what was then called the “Chemistry Department” at the University of Delaware in 1971 as the third member of the fledgling Biochemistry Division. Hal was promoted to associate professor in 1977 and to full professor in 1982. For many years Hal’s biochemistry research program was supported by grants from the National Institutes of Health and the National Science Foundation. Hal worked on isozymes, on vitamin-binding proteins, and on evolution. Indeed, Hal authored a ground-breaking and widely-cited paper on the evolution of coenzymes long before the term “RNA-world” entered the scientific vernacular.

Hal explained his choice of career in a feature in the American Association for the Advancement of Science: “As a high school student, I considered entomology as a career, but a geologist who had a vocational interest in insects told me to keep it a hobby and to pursue the most difficult subjects I enjoyed. Liking biology and chemistry led me to choose biochemistry as a career and I have remained an amateur entomologist ever since.” Some amateur!—Hal has published almost 50 articles on Dragonflies, and written a book *“Natural History of Delmarva Dragonflies and Damselflies: Essays of a Lifelong Observer”* that melds entomology with reminiscences and

observations on Nature and the environment.

Hal’s commitment to the educational enterprise is legendary. He brought a panoramic view of the biological sciences to his classroom and challenged students with assignments that remain remarkably innovative and far-reaching. More broadly, Hal shared a deep interest in problem-based learning approaches and played a key role in developing the Institute for Transforming Undergraduate Education at the University of Delaware. Hal also served as the director of the Howard Hughes Medical Institute (HHMI) Undergraduate Research Program at Delaware from 1998-2015. Among other things, the HHMI program provided summer research scholarships for undergraduates - with a day of posters and lectures as the grand finale. His HHMI program inspired the development of the NUCLEUS office for underrepresented scholars here at the University of Delaware. And with all this, Hal still found the time to give large numbers of “egg-citing” science demonstrations to student groups and schoolchildren.

As Hal transitions into retirement mode, he remains a remarkably creative educator and a tireless advocate for transforming our education enterprise. We know he will be a vigorous emeritus member of the Chemistry and Biochemistry Department—let’s hope he can be persuaded to teach a course or two in the future!

—Colin Thorpe



Molecules to Medicine

With support from the National Institutes of Health IDeA COBRE Program, the University of Delaware has assembled a team of scientists to develop new approaches for the discovery of molecules that can be used to study and treat a number of diseases, including cancer, Crohn's disease, Huntington's disease, Alzheimer's disease, and Creutzfeldt-Jakob disease. With this 11.2 million dollar, five-year award, our team is developing new libraries for high-throughput screening, providing perspectives on innate immune response and neurodegenerative disease, developing new molecules for renal cancer treatment, enabling new screening technology, and advancing the state-of-the-art in virtual screening.



Joe Fox

Life After the HHMI Grant Ends

The Howard Hughes Medical Institute (HHMI) Grant to UD received a one-year no-cost extension until August 31, 2015. Thus, the more than 20 years of HHMI support ends this month. The current grant has focused on the integration of introductory biology and chemistry courses for life science majors and the previous HHMI grant (2006-2010) focused on quantitative aspects of biology. The construction of the Interdisciplinary Science Learning Laboratory Building and the hiring of additional staff for it have gone a long way toward realizing the goals for which UD received HHMI funding. However, this is an on-going process that will continue in the years to come with the efforts and support of the administration, faculty, preceptors, and staff.

Any initiative needs to be assessed. In the cases involving undergraduate education, the assessment typically focuses on improvement of student learning and attitudes. If we want students to have better interdisciplinary awareness and competence; their education needs to be more than interdisciplinary in name. There needs to be a change in what and how students are taught. Many students are keen observers and do what they need to do to get the grades they want. If their graded assignments and examinations do not reflect interdisciplinary expectations, then they will not value those goals. The focus of the final assessment activities of the HHMI grant were not focused on students per se but on our expectations for students as exemplified in the examinations

they have taken. It was an attempt to document where we are, whether integrated and differentiated courses have different expectations in terms of their examinations, and to identify items for future action.

Lara Appleby and Dylan Audette were assigned this assessment task early this summer. It soon became clear that there were additional issues that needed to be addressed, in particular the need for a shared vision of what interdisciplinary means in the context of the integrated introductory courses.

—Hal White, Director
UD HHMI Undergraduate Program

to young scientists. Recent Awards include: Sloan Foundation Fellowship from the Alfred P. Sloan Foundation, (2) Pew Scholars in the Biomedical Sciences, (2) Cottrell Research Scholars by the Research Corporation for Science Advancement, Inter-American Photochemical Society Young Investigator Award, (5) NSF CAREER awards, American Chemical Society Rising Star Award, Dreyfus Foundation Environmental Chemistry Mentor, DuPont Young Professor Award, Oak Ridge Associated Universities Ralph E. Powe Junior Faculty Enhancement Award, and the ACS Inorganic Chemistry Undergraduate Research Mentor Award.

More than 30 biomedical research students will receive Ph.D. training with support from this award, with opportunities for research experiences at the National Cancer Institute. As matching commitment to the federal grant, UD is providing more than \$1 million to support new equipment and renovate lab facilities, designed to build additional infrastructure for biomedical research at the University. The center has already bolstered our mass spectrometry facility through the purchase of 4 new LC-MS systems, and our computational core through the purchase of a new computational cluster. The center is creating new common facilities for molecular synthesis, purification, analysis and screening.

The COBRE will build new research areas and develop regional collaborations with the National Cancer Institute (NCI) and the Nemours Center for Childhood Cancer Research. In the NCI collaboration, University researchers will work closely with the NCI Molecular Targets Laboratory and Chemical Biology Laboratory. This collaboration will include cross-training for graduate students at NCI and enable follow-up mechanisms for pursuing promising discoveries.

The five diverse projects included in the grant seek to use novel approaches to discover new molecules, develop chemical probes and therapeutic leads, create new libraries for screening diseases and explore other aspects of immune responses and neurodegenerative diseases.

- **High Throughput Technology for Accelerating Discovery**

The group of **Prof. Joel Rosenthal** is developing Electrochemical Chemiluminescence as a higher sensitivity and more accurate technique for high throughput screening to discover new drug leads.

- **Learning from Bacteria to Treat Inflammatory Diseases**

The group of **Prof. Catherine Leimkuhler Grimes**, is using carbohydrate chemistry and bacterial cell wall engineering to understand inflammatory disease. Her group is collaborating with A.I DuPont Children's Hospital to develop biomarkers for pediatric Crohn's disease.

- **Enabling Drug Discovery for Neurodegenerative Disease**

The groups of **Profs. April Kloxin** and **David Colby** are developing an *in vitro* model for Huntington's disease, which they will use to discover molecules which will aid in the understanding and treatment of the disease.

- **Realizing the Promise of Virtual Drug Screening**

The group of **Prof. Ed Lyman** is developing computational methods that will enable medicinal chemists to streamline the drug discovery process.

- **New Technologies for Building Tomorrow's Drugs**

The groups of **Profs. Donald Watson** and **Mary Watson** are developing new reactions to rapidly prepare novel molecules with the potential to target cancer, leukemia, Huntington's and other diseases.

—Joe Fox

Molecular Design of Advanced Biomaterials

Our NIH IDeA COBRE Center “Molecular Design of Advanced Biomaterials” has been renewed for Phase III of support starting September 30, 2014. We will receive \$5.85 million over five years, to continue our successful program in the development of infrastructure for interdisciplinary research in advanced biomaterials on campus. Since its inception in 2004, this NIH-COBRE award has been instrumental in establishing research instrumentation facilities and developing a vibrant team of investigators engaged in biomaterials research on campus. The main objective of Biomaterials COBRE-supported research is molecular design of advanced biomaterials to address societal needs, including those for regeneration of liver and vocal fold tissues, for drug-lead identification, and payload delivery. Significant biomedical therapies are likely to emerge from novel biomaterials that are designed at the molecular level to offer customized control over mechanical and biological properties. The realization of such biomaterials requires synergy between diverse research communities of molecular design, biochemistry, biology, biophysical chemistry, materials engineering, and organic chemistry. Collaborations between an outstanding group of junior, mid-career and senior investigators spanning multiple units across campus were established during phase I and phase II COBRE awards and will be extended in COBRE III. The Center is currently comprised of ca. thirty faculty and Ph.D. level scientific staff from two colleges, encompassing five departments.

COBRE III provides funds for support of four research instrumentation cores: i) mass spectrometry and surface characterization; ii) nuclear magnetic resonance; iii) microscopy and mechanical testing; and iv) computational modeling. COBRE III includes support for pilot research projects to support new collaborative directions and attract new investigators in biomaterials research to the Center, particularly early-career faculty.



The principal investigator for the grant is **Prof. Tatyana Polenova**. Her research is in the area of biophysics and structural biology of biomaterials and biological assemblies. Her group has developed novel NMR methods for structural analysis of complex macromolecular assemblies and applied these for characterization of a diverse range of systems ranging from HIV-1 to cytoskeletal assemblies to metalloproteins and engineered biomaterials. **Prof. Polenova** has considerable experience in building core facilities on the UD campus and leading a major instrumentation grant that brought ultrahigh field NMR infrastructure to UD.

The Mass Spectrometry and Surface Characterization (MSSC) Core is a critical component of

COBRE serving the diverse needs of researchers for mass spectrometric and surface characterization of biomaterials. In COBRE III, the MSSC Core will (1) Develop state-of-the-art mass spectrometry infrastructure and service to support the goals of the COBRE research in biomaterials design, synthesis, and characterization; (2) Provide surface characterization capabilities for shared use by multiple COBRE investigators; and (3) Establish a Mass Spectrometry and Surface Analysis training and education platform for COBRE investigators and the broader research community on campus. The MSSC Core Co-Directors are **Profs. Colin Thorpe** (Mass Spectrometry component) and **Tom Beebe** (Surface Characterization Component), and **Drs. Stephen Chan** and **Papa Nii Asare-Okai** are MSSC Core Advisors.

The Nuclear Magnetic Resonance (NMR) Core with existing state-of-the-art instrumentation and techniques represents a critical part of COBRE to address the following needs of COBRE research programs across the campus of the University of Delaware (1) to facilitate the research and development of NMR spectroscopy as a premier method for structural analysis of a wide variety of systems in solution and solid states, and (2) to provide support for structural analyses of small-molecule and mac-

romolecule-based biomaterials in solution and solid states. The NMR Core Director is **Dr. Steve Bai**, and **Dr. Guangjin Hou** is an NMR Core Advisor.

The Microscopy and Mechanical Testing (MMT) Core, equipped with state-of-the-art imaging techniques, scattering tools and mechanical testing capabilities, is designed to answer these important questions. The MMT Core was established during previous COBRE funding years and will be strengthened and maintained by our COBRE team through new method developments. **Prof. Xinqiao Jia** is the MMT Core Director, and **Dr. Chaoying Ni** is a MMT Core Advisor.

The Computational Modeling Core is focused on building, supporting, and extending the computational modalities applied by the COBRE PI's within the context of biomaterials synthesis and characterization. This facility is unique on campus in that it supports this heterogeneous computing environment, with support infrastructure for modeling of biomaterials for design and characterization purposes. The CM Core Director is **Prof. Sandeep Patel**, and the Core Advisor is **Mr. Pat McMahon**.

—Tatyana Polenova

Additional Faculty/Staff Activities

Profs. Karl Booksh and **George Luther** (JOINT FAC) are the latest CHEM/BIOC faculty members to be named Fellows of the American Chemical Society (Class of 2015).

The 10-week Summer Research Experience for Undergraduates (REU) Program for Students with Disabilities, organized and directed by **Profs. Karl Booksh** and **Sharon Rozovsky**, was highlighted in an article in **C&E News** (9/1/14, pp. 60-61).

Joe Camperson (STAFF, 74-80), our second Assistant to the Chair, and his wife, Jan, are living in The Villages, FL (or, as Joe describes it, “A Walt Disney World for Seniors”). At age 89, he has finally given up teaching tennis, and has switched to horseback riding!

Dana Chatellier (MA83, Education Specialist) has recorded an impressive milestone- he has now taught 300 university-level chemistry courses, all but six at the U of D.

Our oldest surviving CHEM/BIOC faculty member, **Dr. James J. Eberl**, died on 6/6/15 on Hilton Head Island, SC, at age 98. Although his tenure in our Department was brief (Instructor, 41-42), his subsequent move to industry produced a stellar career, first at Johnson & Johnson, where he became Director of Special Products Research, then as Vice-President for Chemical Research at Scott Paper Company. At his death, he was an Emeritus member of the Board of Trustees of the Franklin Institute, serving on the Sciences and Arts Committee.

Dr. Al (chemist) **Denio** (FAC78-79, 98-99) is a member of the ACS National Senior Chemists Committee.

Prof. Jacqueline Fajardo has been appointed to the ACS Examinations Committee, charged with the development of the 2017 General Chemistry Examination.

Prof. Joseph Fox has had a banner year. He received the 2014 Delaware Section Award, chaired the 2014 Gordon Research Conference on Organic Reactions and Processes, and has been named the 2015-16 Bristol Myers Squibb Lecturer in Organic Chemistry at MIT.

Dr. Jean H. Futrell (FAC 86-99, CHAIR 86-95, 96-97) may have retired, but he is far from forgotten. His stellar career in mass spectrometry has been featured in a recent article in **The Encyclopedia of Mass Spectrometry, 9B**, 83-84 (2015).

Prof. Catherine Grimes has received Cottrell funding from the Research Corporation to develop a much-needed biochemistry laboratory course for undergraduates. She and her husband, Dan, were blessed with the birth of their second child, Grace Jeanne, on 8/25/15.

Victoria Orner Johnson, M.A., director of our NUCLEUS Program from 1993-1998, has gone back to her roots, in more ways than one. She is now a mathematics teacher at St. Mark's Catholic School, in Wilmington, NC.

Prof. Joel Rosenthal received the Young Investigator Award from the Inter-American Photochemical Society.

Prof. Donald Sparks (JOINT FAC) has been selected as the 2015 medalist for the Geochemistry Division of the ACS. Don, the S. Hallock du Pont Chair in the Department of Plant and Soil Sciences, Frances Alison Professor, and Director of the Delaware Environmental Institute (DENIN) is the first soil scientist to receive this award.

Dr. Douglass F. Taber (FAC 82-13) was credited by Prof. Stephen Buchwald, MIT, with the inspiration for the latter's development of paraffin capsules preloaded with air-sensitive reagents that free chemists from the glove box. [**Nature**, 2015, DOI: 10.1038/nature14654., **C&E News**, 8/17/15, p. 6]

Prof. Klaus Theopold is a co-author of the recently published (by Words & Numbers, Inc.) OpenStax textbook CHEMISTRY, which is **free** for downloading! (openstaxcollege.org/textbooks/chemistry/get)

Dr. J. Herbert Waite (PAST ADJ FAC), Professor of Chemistry and Biochemistry at the University of California- Santa Barbara, is a member of a team of scientists who have discovered how mussels prime salt-covered surfaces in the sea for sticking. [**Science**, 2015, DOI: 10.1126/science.aab0556, **C&E News**, 8/17/15, p. 8]

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Visiting Faculty & Staff Activities

Mr. Huy (Mike) Dao (MS11): CHEM-103/104 General Chemistry (Dover Associate-in-Arts Program)

Dr. Karen L. Hooper (PhD99): CHEM-106 Elementary Bioorganic Chemistry, CHEM-214/216 Elementary Biochemistry

Dr. Paul A. Silver (PhD73): CHEM-101/102 General Chemistry

Dr. Michael Stemniski: CHEM-102, CHEM-103 (Summer College), CHEM-103/104 (Wilmington Associate-in-Arts Program), CHEM-213/215 Elementary Organic Chemistry

Postdoctoral Researchers and Fellows, 2014-15

David Boyce (University of Minnesota, Minneapolis) [Rosenthal]

Ampofo Darko (University of Florida) [Fox]

Ming Dong (University of Delaware) [Bahnsen]

Peter Eldridge (University of Southampton, England) [Gundlach]

Himal Ganguly (Bose Institute with University of Calcutta, India) [Zondlo]

Rupal Gupta (Carnegie Mellon University) [Polenova]

Guorui Li (Wuhan University, China) [Zhuang]

Xingyu Lu (University of Lille, France) [Polenova]

Julien Makongo Mangan (Technical University of Dresden, Germany) [Bobev]

Jonnathan Medina Ramos (Virginia Commonwealth University) [Rosenthal]

Luis Mori Quiroz (Michigan State University) [D. Watson]

Raghupathi Neelarapu (Osmania University, India) [Koh]

Taryn Palluccio (Tufts University) [Rosenthal]

Jai Prakash (Indian Institute of Technology, India) [Bobev]

Caitlin Quinn (Columbia University) [Polenova]

Sudipta Sinha (Indian Institute of Technology, India) [Patel]

Guoyin Yin (Shanghai Institute of Organic Chemistry, China) [D. Watson]

Libo Yuan (Wuhan University, China) [Zhuang]

Visiting Scholars, 2014-15

Anita Abedi (Islamic Azad University, Tehran, Iran) [Theopold]

Stephen Habay (Salisbury University) [Fox]

Ardak Kussainova (L. Gumilov Eurasian National University, Astana, Kazakhstan) [Bobev]

Named Lectures 2014-15

Our academic program has benefited greatly from the endowments supporting four named lectures:

The 8th **John C. Wriston, Jr.** (FAC55-85) **Memorial Lecture** was presented on September 8, 2014, by Prof. Bonnie Bassler, the Squibb Professor of Molecular Biology at Princeton University. Her topic was “Manipulating Quorum Sensing to Control Bacterial Pathogenicity.”

Prof. Thomas Holme, Director of the ACS Examinations Institute at Iowa State University, presented the 3rd **Mary Elizabeth Kramer** (MS76, FAC86-12) **Memorial Lecture** on October 3, 2014. His thought-provoking talk was on “Thinking About

Measuring Learning in Chemistry- What We Want, and What We Do.”

The 12th **Richard F. Heck** (FAC71-89) **Lecture** was to have been presented by Prof. Melanie Sanford, University of Michigan, on March 6, 2015. Unfortunately, it had to be cancelled.

The 1st **Jefferson Lecture** was presented by Prof. Harry Gray, Caltech, on April 23, 2015. His stirring presentation was on “The 21st Century Solar Army.”

Editor's Note: Prof. Gray was a lab mate of mine in Prof. Fred Basolo's group in graduate school at Northwestern University in the early 60's.

Chapter Officers 2015-2016

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Prof. Catherine Grimes

Prof. Sharon Rozovsky

Colloquia & Symposia 2014-15

The special, all-Department lectures which we call colloquia, both internal and external, added interest to our year-round divisional seminar programs (see table below).

The 35th East Coast Ion Chemistry Conference was held on Saturday, September 27, 2014. Talks were given by speakers from the University of Delaware, Georgetown University, Rutgers University, the Ohio State University, and DuPont Crop Production Laboratory. Topics included aerosol composition and growth, gas phase ionic organic mechanisms, mass spec imaging, ionization mechanisms, and proteomics.

“Metals for Life,” a Symposium honoring the 2015 recipient of the Benjamin Franklin Medal

in Chemistry, Prof. Stephen Lippard of MIT, was held at the U of D on Thursday, April 23, 2015. The Symposium, organized by **Prof. Klaus Theopold**, included lectures presented by Prof. Lippard, Prof. Amy Rosenzweig (Northwestern), Prof. Thomas O'Halloran (Northwestern) and Dr. Richard Wooster (Blend Therapeutics).

A Membrane Protein Symposium, organized by **Profs. Edward Lyman** and **Sharon Rozovsky**, was held at the U of D on Monday, May 4, 2015. In addition to invited lectures by renowned experts in membrane biophysics and biology, the Symposium included poster presentations by students and post-docs. The Symposium was supported by the NIH-COBRE Program of Membrane Protein Production and Characterization.

DATE	SPEAKER/AFFILIATION	TOPIC
8/29/14	Prof. Donald Watson University of Delaware	“Transition Metal Catalyzed Methods for Introducing Heteroatoms into Hydrocarbon Frameworks”
9/5/14	Prof. Svilen Bobev University of Delaware	“Solid State Chemistry at UD”
9/15/14	Prof. Neal Zondlo University of Delaware	“Controlling Structure and Function with Noncoded and Unnatural Amino Acids”
9/19/14	Prof. M.G. Finn Georgia Institute of Technology	“Click Chemistry Returns Home: Development & Applications to Material Science”
10/10/14	Prof. Joel Rosenthal University of Delaware	“New Catalyst Architectures for the Conversion of Carbon Dioxide to Solar Fuels”
11/5/14	Prof. Sarah Reisman California Institute of Technology (Annual Student Invited Colloquium)	“From Alkaloids to Terpenoids: Strategies and Tactics for the Synthesis of Polycyclic Natural Products”
2/11/15	Prof. Hrvoje Petek University of Pittsburgh	“Molecular Interactions on One-Dimensional Substrates”
3/13/15	Prof. Lars Gundlach University of Delaware	“Ultrafast Dynamics at Interfaces”
4/17/15	Prof. Jonathan Thorson University of Kentucky	“Microbial Natural Product Discovery and Diversification: New Tools and Application”

MAY 30, 2015

20th CHEM/ BIOC Graduation Convocation

It hardly seems possible that we have already reached this milestone, but 'tis true! All were organized by your Editor (who MC'd 19 of them), all were held in the Pearson Auditorium, all were marshaled by **Prof. Burnaby Munson** (19 were also marshaled by **Prof. Hal White**), and all but one featured an outstanding alumnus as the primary speaker.

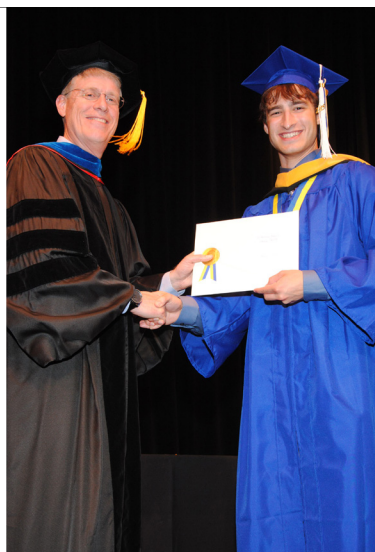
The 20th version measured up to the foregoing, in every respect. **Prof. Wilma King Olson** (BS67), Mary I. Bunting Professor of Chemistry at Rutgers University, presented an address that truly resonated with the graduates, for it was permeated with remembrances of her days in Brown Laboratory. Wilma pursued her undergraduate research project under the mentorship of **Prof. Emeritus Don Dennis** (FAC61-99), who was present in the audience. She earned her doctorate at Stanford

University in 1971, working with Nobel Laureate Paul J. Flory. Her research at Rutgers has focused on trying to understand the influence of chemical architecture on the conformation, properties, and interactions of nucleic acids. It has resulted in her having been named both Alfred P. Sloan and Guggenheim Fellows, as well as her having received NIH Career Development and MERIT Awards. She has also received an Excellence in Education Award from the ACS New Jersey Section, and has served as the Biophysical Society's President.

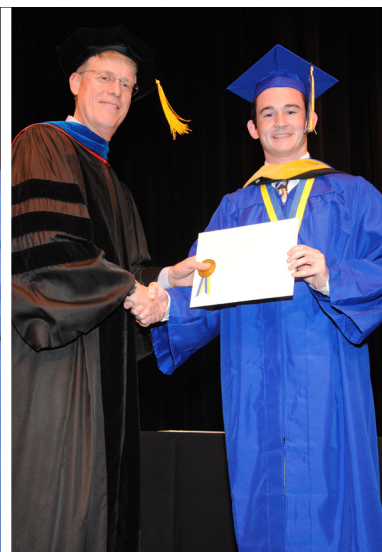
The subsequent reception in Brown Laboratory for the graduates, their families, and friends continued another, even longer tradition. Once again, **Prof. Burnaby Munson** provided Segway rides, which are always a hit with those who are willing to try them.



Wilma King Olson



*Murray Johnston and
Dyer Awardee Ben Lefler*



*Murray Johnston and
Dyer Awardee Colin Daingerfield*



Murray Johnston, John Burmeister, Wilma King Olson, Svilen Bobev

Variability and uncertainty continued to be the hallmarks for the class of 2015:

	2015	2014	2013	2012	2011	2010	2009
Graduate School	11	12	18	10	12	7	20
Medical School	1	1	4	1	7	3	4
Dental School	-	-	1	-	2	2	2
Pharmacy School	2	2	-	-	1	1	4
Law School	-	1	-	1	1	2	2
Nursing School	-	-	2	1	-	-	2
Industry	5	8	6	7	3	8	2
Government	2	-	-	1	1	1	2
Teaching	1	2	-	1	1	1	4
Other	1	1	2	2	1	3	3
Undermined	34	34	18	29	26	22	9
TOTAL	57	61	51	53	55	50	54

In like manner, the mix of baccalaureate degrees keeps changing:

	2015	2014	2013	2012	2011	2010	2009
BA/CHEM	14	7	5	12	18	11	11
BA/XCE	2	1	2	1	1	-	-
BS/CHEM	25	30	21	17	21	18	13
BS/BIOC	16	23	23	23	15	21	30

2015 Graduates

2015 B.A. Chemistry Graduates

Amanda M. Bell (XCE)
Natalie M. Carter
Jones F. Devlin V
Leena M. Doolabh^a
Cory P. Fowser
Kyle E. Gilley
Jessica A. Harvey^b
Charles J. Hing
Laura S. Kennedy (XCE)
Oanh T. Le
Sarah J. O'Brien
Raj C. Sheth
Pengweixi Sun^a
Ralph A. Tedesco III
Yan Wang
Allyson A. Zeitschel^c

2015 B.S. Biochemistry Graduates

Borja Barbero
E. Colin Daingerfield^a
Gregory A. Davidson
Rebekah E. Dumm^d
Uk Her
Richard F. Kane
Kevin A. Kaplan
Dana E. Mieras
Helina S. Patel
Gizelle B. Pendang
Thomas E. Rivas^{ad}
Hannah N. Simmons^{ad}
Angela R. Stegmuller
Ralph A. Tedesco III
Brian A. Wilson^a
Sarah M. Yannarell^{ad}

2015 B.S. Chemistry Graduates

Evan T. Andrews
Adriana C. Barrantes
Lukas Campolo^a
Lauren A. Genova^{ad}
Jane Huynh
Rachel W. Jung^a
Benjamin M. Lefler^a
Christopher E. Lemieux
Melissa G. Morris
Sean R. Morris
Christina T. Nolen^a
Katie G. Owings^a
Brittney E. Petel
Jenny E. Rendon
Daniel E. Roberts
Samantha B. Rutkowski
Jessica R. Shearer^a
Matt E. Stapley
Leonard H. Voss III
Kenneth B. Weaver
Kimi A. Yamada
Haoze Yang
Eric Yen
Farnaz N. Yousefi
Tao Zhang



(a) Honors Degree, (b) Interdepartmental Degree with Criminal Justice, (c) Interdepartmental Degree with Mathematics, (d) Degree-with-Distinction

Graduate or Professional School Bound

- **Borja Barbero**, Texas A&M University (Ph.D. in Biochemistry);
- **Colin Daingerfield**, University of Rochester (Medical School);
- **Gregory Davidson**, University of Delaware (Ph.D. in Biochemistry);
- **Rebekah Dumm**, Duke University (Ph.D. in Cell & Molecular Biology)
- **Leena Doolabh**, University of Maryland (Pharmacy School)
- **Lauren Grenova**, Cornell University (Ph.D. in Chemical Biology)
- **Oanh Le**, LECOM (Pharmacy School)
- **Benjamin Lefler**, Temple University (M.Ed. in Secondary Science Education)
- **Brittney Petel**, University of Rochester (Ph.D. in Inorganic Chemistry)
- **Thomas Rivas**, University of Colorado, Boulder (Ph.D. in Biochemistry)
- **Kenneth Weaver**, University of Pennsylvania (Ph.D. in Physical Chemistry)
- **Brian Wilson**, University of Delaware (Ph.D. in Biochemistry)
- **Haoze Yang**, KAUST (Ph.D. in Chemistry);
- **Sarah Yannarell**, University of North Carolina, Chapel Hill (Ph.D. in Biological and Biomedical Sciences)

Headed for Industry, Etc.

- **Adriana Barrantes**, Internship in Quality Systems, Bimbo Bakeries, Horsham, PA
- **Amanda Bell**, High School Chemistry Teacher, Klein Independent School District, Spring, TX
- **Christopher Lemieux**, Analytical Chemist, Innospec Fuel Specialties
- **Christina Nolen**, U.S. Department of Defense
- **Gizelle Pundang**, Medical Associate, Jesuit Volunteer Corps, St. Luke's Catholic Hospital, Camden, NJ
- **Jenny Rendon**, Associate Scientist, QPS
- **Samantha Rutkowski**, Intern, Environment, Health, and Safety Office, Siemens Healthcare Diagnostics
- **Leonard Voss**, U.S. Navy's Officer Candidate School, Newport, RI
- **Kimi Yamada**, Formulation Chemist, Innospec Performance Chemicals, Charlotte, NC
- **Farnaz Yousefi**, Consultant, Pyromet Silver Refinery, Aston, PA.

Graduate School Placements, 1994-2015

Adelphi	1	Gordon Conwell	1	Princeton	8
Alaska-Fairbanks	1	Harvard	5	Purdue	3
Arcadia	1	Hawaii	2	Rhode Island	1
Boston College	3	Illinois-Chicago	2	Rochester	4
Boston University	3	Illinois-Urbana	7	Rutgers	7
Brigham Young	1	Imperial College, London	1	St. John's	1
Brandeis	1	Indiana	4	Scripps	2
Cabrini	1	Johns Hopkins	5	Selznick School for Film Preservation	1
California-Berkeley	2	Kansas	1	Shenandoah	1
California-Irvine	5	KAUST	1	South	1
California-Los Angeles	1	Lehigh	2	Southern Mississippi	1
California-San Diego	3	Maryland-Baltimore	1	Stevenson	1
California-San Francisco	3	Maryland-Baltimore Co.	4	SUNY-Buffalo	2
California-Santa Barbara	1	Maryland-College Park	6	SUNY-Stony Brook	1
Cal Tech	5	Massachusetts	3	Syracuse	1
Carnegie Mellon	1	Michigan	5	Temple	4
Case Western	4	Michigan State	1	Tennessee	1
Chicago	1	Minnesota-Twin Cities	2	Texas	4
Clemson	1	MIT	7	Texas A&M	4
Colorado	1	Montana State	1	Thomas Jefferson	5
Colorado State	1	Montclair State	1	Toledo	1
Columbia	5	New Castle (England)	1	Toronto	1
Connecticut	3	New Hampshire	2	Towson	1
Cornell	10	NYU	1	Tufts	2
CUNY	2	North Carolina-Chapel Hill	12	Vanderbilt	1
Delaware	23	North Carolina-Greensboro	1	Villanova	1
Drexel	1	North Carolina State	1	Virginia	4
Duke	4	Northeastern	1	VPI & SU	3
Emory	1	Northwestern	2	Wake Forest	2
Florida International	1	Notre Dame	1	Washington (St Louis)	1
Florida State	2	Ohio State	4	West Chester	1
George Mason	1	Oregon	1	Wisconsin	1
Georgetown	2	Pace	4	Yale	4
George Washington	3	Penn	13	Yeshiva	1
Georgia	1	Penn State	9		
Georgia Tech	2	Pittsburgh	3		

Undergraduate Awards, 2014-15

NATIONAL AWARDS	RECIPIENTS
American Chemical Society-Hach Scientific Foundation Scholarship Awards	Margaret M. Dolan (BA/XCE/16) Laura S. Kennedy (BA/XCE/15)
ASBMB Undergraduate Travel Award to National Experimental Biology Meeting, Boston, MA	Thomas E. Rivas (BS/BIOC/15)

REGIONAL AWARDS	RECIPIENTS
All Colonial Athletic Association Soccer First Team (Goalie)	Borja Barbero (BS/BIOC/15)
Delaware Academy of Science 2015 Awards in Science and Technology	Kelly E. Daniels (BS/BIOC/16) Thomas P. Keane (BS/CHEM/16)
2014 ICCA South Semifinal Outstanding Soloist Award	E. Colin Daingerfield (BS/BIOC/15)
79th Intercollegiate Student Chemists Convention, Muhlenberg College, Allentown, PA, April 11, 2015	Lauren A. Genova (BS/CHEM/15) First place, Biochemistry Hannah C. Wastyk (BS/BIOC/17) Second place, Biochemistry
17th Undergraduate Research Symposium in the Chemical and Biological Sciences, University of Maryland- Baltimore County, October 25, 2014	Gabriel E. Gregorzak (BS/CHEM/17) Second place, Chemical Sciences DD Thomas P. Keane (BS/CHEM/16) 1 st place, Chemical Sciences Y Jay S. Subramoney (BS/BIOC/17) Second place, Biological Sciences N Hannah C. Wastyk (BS/BIOC/17) 2 nd place, Biological Sciences A

UNIVERSITY AWARD	RECIPIENT
4th Interdisciplinary Undergraduate Research in Sustainability Prize	Thomas P. Keane (BS/CHEM/16)

DEPARTMENT AWARDS	RECIPIENTS
American Chemical Society Award in Chemistry	Nikifar D. Lazouski (BS/CHEM/16)
American Chemical Society Division of Analytical Chemistry Award in Analytical Chemistry	Thomas P. Keane (BS/CHEM/16)
American Chemical Society Division of Inorganic Chemistry Award in Inorganic Chemistry	Thomas P. Keane (BS/CHEM/16)
American Chemical Society Division of Organic Chemistry Award in Organic Chemistry	Rachel W. Jung (BS/CHEM/15)
American Institute of Chemists Award in Biochemistry	Thomas E. Rivas (BS/BIOC/15)
C. Frank Shaw III Undergraduate Award in Inorganic Chemistry	Brittney E. Petel (BS/CHEM/15)
C. Frank Shaw III Undergraduate Inorganic Research Fellowship	Thomas P. Keane (BS/CHEM/16)
Carl A. von Frankenberg Undergraduate Award in Chemistry Education	Benjamin M. Lefler (BS/CHEM/15)
Elizabeth Dyer Award for Excellence in Chemistry and Biochemistry	Benjamin M. Lefler (BS/CHEM/15) E. Colin Daingerfield (BS/BIOC/15)
Frank W. Collins Undergraduate Award in Biochemistry	Thomas E. Rivas (BS/BIOC/15)
Gene J. and Francis E. Schiavelli Undergraduate Research Fellowship	Thomas P. Keane (BS/CHEM/16)
Hypercube Scholar Award	Eric Yen (BS/CHEM/15)
James A. Moore Undergraduate Award in Organic Chemistry	Lauren A. Genova (BS/CHEM/15)
Joseph H. Noggle Undergraduate Award in Physical Chemistry	Shelby Chan (BS/BIOC/16)
Kevin Scott Beall Memorial Awards	Keshav Choudhuri (BS/BIOC/18) Griffen J. Desroches (BS/CHEM/18)
Merck Index Awards	Lauren A. Genova (BS/CHEM/15) Brittney E. Petel (BS/CHEM/15)
Quaesita Drake Scholarships	Kelly E. Daniels (BS/BIOC/16) Rebekah E. Dumm (BS/BIOC/15) Lauren A. Genova (BS/CHEM/15) Rachel W. Jung (BS/CHEM/15)
Wallace H. Carothers Scholarships	Alex Manders (BS/CHEM/17) Hannah C. Wastyk (BS/BIOC/17)
Wallace H. McCurdy, Jr. Undergraduate Award in Analytical Chemistry	Thomas P. Keane (BS/CHEM/16)

SUMMER RESEARCH AWARDS

RECIPIENTS	SOURCE OF SUPPORT	MENTOR
Annette J. Brocks (BS/CHEM/17)	UG Research Program	Prof. Willett Kempton
Cannon J. Giglio (BS/CHEM/17)	Plastino Fellowship	Prof. Steven Brown
Gabriel E. Gregorzak (BS/CHEM/17)	HHMI	Prof. Catherine Grimes
Tyler K. Heiss (BS/BIOC/16)	HHMI	Prof. Catherine Grimes
Thomas P. Keane (BS/CHEM/16)	HHMI	Prof. Joel Rosenthal
Nikifar D Lazouski (BS/CHEM/16)	Plastino Fellowship	Prof. Joseph Fox
Alex Manders (BS/CHEM/17)	Plastino Fellowship	Prof. Mary Watson
Jessica N. Mann (BS/CHEM/16)	EpScor	Prof. Angelia Seyfferth (Agriculture)
Alexander M. Northrup (BS/CHEM/16)	HHMI	Prof, Tatyana Polenova
Taylor L. Paskey (BS/CHEM/17)	Plastino Fellowship	Prof. Joel Rosenthal
Shelby A. Roseman (BS/CHEM/17)	Plasitino Fellowship	Prof. John Koh
Dominic A. Santoleri (BS/BIOC/17)	HHMI	Prof. Sharon Rozovsky
Jay S. Subramoney (BS/BIOC/17)	HHMI	Prof Sharon Rozovsky
Brian H. Tran (BS/CHEM/17)	Heitzer/CHEM S&E	Prof Klaus Theopold
Caroline M. Vesper (BS/CHEM/17)	Plastino Fellowship	Prof. Don Watson
Hannah C. Wastyk (BS/BIOC/17)	HHMI	Prof. Catherine Grimes
Nicole A. Wenzell (BS/BIOC/17)	Plastino Fellowship	Prof. Neil Zondlo

2015 M.A./M.S. Graduates

Michael B. Elbaum (M.S.)
B.A. Rider University
Mentor: Prof. Neal Zondlo

Mashid P. Esfahani (M.S.)
B. Pharm., Islamic Azad University,
Iran
Mentor: Prof. Sharon Rozovsky

Bryan D. Klebon (M.S.)
R&D Chemist, Lamotte Chemical
Company
B.S., Salisbury University
Mentor: Prof. Charles Riordan

Yuefan Li (M.S.)
B.E., China University of Mining and
Technology
Mentor: Prof. Sharon Rozovsky

Kimberly A. Lindenmuth (M.S.)
B.S., Lebanon Valley College
Mentor: Prof. Karl Booksh

Xiaorong Liu (M.A.)
B.S., Wuhan University, China
M.S., Wuhan University, China

Christopher P. Weinacht (M.A.)
B.S., University of Notre Dame

Kaitlyn M. Woerner (M.S.)
B.S., Richard Stockton College of New
Jersey
Mentor: Prof. Brian Bahnson

2015 Ph.D. Graduates

NAME	PREVIOUS DEGREE(S), COLLEGE(S)	DISSERTATION CHAIR	DISSERTATION TITLE	PLACEMENT
Devon A. Boyne	B.S., Northern Arizona University	Karl Booksh	Development and Characterization of Platinum Materials For Chemical Sensing: An Investigation into Novel SPR Architectures	
Bryan R. Bzdek	B.S., Bucknell University	Murray Johnston	Chemical Mechanisms Governing Atmospheric New Particle Formation	Post-Doctoral Research Associate, University of Bristol, UK
Joseph W. DePalma, Jr.	B.S.H., Sacred Heart University M.S., Sacred Heart University	Murray Johnston	Quantum Chemical Studies of Atmospherically Relevant Molecular Clusters and Their Role in Particle Formation	Post-Doctoral Research Associate, Dr. Mark Johnson, Yale University
Andrew R. Ehle	B.S., West Chester University	Mary Watson	The Functionalization of Carbon-Oxygen Bonds to Form Alkanes and Allenes	Post-Doctoral Research Associate, Dr. Tyler McQuade, Florida State University
Jia Gao	B.S., Lanzhou University, China	Andrew Teplyakov	Surface Chemistry of Zinc Oxide Powder for Catalysis and Sensing Applications	
Peter G. Gildner	B.A., Lafayette College	Donald Watson	Discovery and Development of Copper Catalysis for the C-Alkylation of Nitroalkanes	Post-Doctoral Research Associate, Johnson Matthey Catalysis & Chiral Technologies
Srinivas Harinath	B.S. Osmania University, India	Mary Watson	Transition Metal Catalysis of Acetals and Pivalates:	Post-Doctoral Research Associate, Dr. Michael Doyle, University of Texas-San Antonio
Harathi Dwarakanath	M.S., Osmania University, India		Enantioselective and Enantiospecific Methods for C-C and C-B Bond Formation	

Yuan Hu	B.S., Wuhan University, China M.S., Wuhan University, China	Sandeep Patel	Mechanistic Study on Uptake of Cell Penetrating Peptides into Model Lipid Bilayers and Transient Pore Formation	Post-Doctoral Research Associate, Merck, Inc.
Jia-Ming Lin	B.S., Chi-Nan University, Taiwan M.S., National Sun-Yat-Sen University, Taiwan	Andrew Teplyakov	Molecular Level Understanding of Deposition Processes on Functionalized Silicon Surfaces	Research Scientist, Taiwan Semiconductor Manufacturing Co.
Yue Liu	B.S., Nanjai University, China	Andrew Teplyakov	Application of Surface Functionalization for Designing Novel Interfaces and Materials	Senior Research Scientist; L'Oreal
Sarah E. Martin	B.S., Lebanon Valley College	Donald Watson	Development of the Silyl-Heck Reaction: Preparation of Organosilanes Via the Transition Metal-Catalyzed Sylylation of Alkenes	Post-Doctoral Research Associate, Dr. Suzanne Walker, Harvard Medical School
Timothy Miller	B.S., Siena College	Andrew Teplyakov	Fabrication and Characterization of Thin films and Coatings	Post-Doctoral Research Associate, University of Illinois, Urbana/Champaign
Anil K. Pandey	B.S., University of Delhi, India M.S., University of Delhi, India	Neal Zondlo	Synthesis of Conformationally Diverse Peptides to Control Peptide Structure and Function and Investigation of Unique Serine/Threonine Phosphorylation Effects on Peptide Conformation	
Allen J. Pistner	B.S., University of Pittsburgh	Joel Rosenthal	The Development of the 5,5-Dimethylphlorin and 10,10-Dimethylbiladiene Tetrapyrrole Platforms	Post-Doctoral Research Associate, Dr. Alex Radosevich, Penn State University

Ramajeyam Selvaraj	B.S., University of Madras, India M.S., Indian Institute of Technology, Madras	Joseph Fox	Catalytic Carbozincation of Diazoesters and Development of Probes for F-18 Imaging Based on Rapid Bioorthogonal Reactivity	Post-Doctoral Research Associate, Dr. Christopher Ueda, Purdue University
Megan P. Shalaida	B.S., St. Joseph's University	Charles Riordan	Synthesis and Reactivity of Acetyl Coenzyme A Synthase Active Site Analogues	
Eric R. Sirianni	B.S., University of South Carolina	Klaus Theopold	Dioxygen Activation by Low Valent Cobalt Complexes Supported by Redox-Active, Ferrocenyl-Substituted Hydrotris (Pyrazolyl) Borate Ligands	
Natalee J. Smith	B.A., Bryn Mawr College	Joseph Fox	Strain Release Driven Reactivity Bicyclobutanes and Cyclopropenyl Ketones and Studies Toward Understanding the Role of Helicity in Salen Catalysis	Technical Trainee, Bayer Material Science, LLC
Nian-Tzu Suen	B.S., Chi-Nan University, Taiwan M.S., Chi-Nan University, Taiwan	Svilen Bobev	Exploratory Synthesis: Crystal Chemistry and Physical Properties of Binary, Ternary, and Quaternary Alkaline-, Rare-Earth, and Group 12 Metal Tetrelides	
Mark Villamil	B.S., Richard Stockton College	Zhihao Zhuang	Understanding the Regulation and Interaction of the Beubiquitinating Enzyme Complex USPI/ UAF1	
Jessica Wallick	B.S., Gettysburg College	Charles Riordan	Elemental Sulfur and Selenium Activation by a Monovalent Nickel Complex	Post-Doctoral Research Associate, PPG-Industries, Pittsburg

Burnaby Munson, 82 years young!

HAPPY 82nd
BIRTHDAY
MUNSON



*Left to right (all CHEM/BIOC staff members, except where indicated otherwise):
Brian Wilson (UD/BS CHEM/15, now a first-year UD graduate student), Wanda Cibroski,
Lauren Genova (UD/BS CHEM/15, now a first-year graduate student at Cornell University),
Susan Cheadle, Eileen Burns, Prof. Munson, Linda Staib, Prof. John Burmeister, Judy
Dellose, Elizabeth Townsend, Donna Ayers-Alexander, Brenda Carboni*

Boston Tea Party

Prof. Harold White hosted a reunion dinner for UD. CHEM/BIOC alumni at the ASBMB meeting in Boston on 3/31/15. A wide range of former students and faculty were in attendance:

Marilee Benore (PhD86) : Professor of Biology & Biochemistry, University of Michigan- Dearborn

Sujata Bhatia, M.D., Ph.D. (BS99): Assistant Dean, Harvard University

Eric Bugglin-Borer (BS11): Agilent Technologies, Cambridge, MA

Arthur Coury, Ph.D. (BS62): Consultant, Biomaterials & Medical Devices, Boston, MA

Michael Cox, Ph.D. (BS(Biology)74): Professor of Biology, University of Wisconsin-Madison

Daniel Dries, Ph.D. (BS00): Assistant Professor of Chemistry, Juniata College

Steven Foltz (BS11): Graduate Student, University of Georgia, College of Pharmacy

Karl Hansen, Ph.D. (BS93): Scientific Director, Amgen, Inc., Cambridge, MA

Sean Herron (BS14): Harvard Law School

Isaac Hubner, Ph.D., (BS01): Lawyer, Proskauer Rose, LLP, Boston

Douglas Kenny (BS14): Graduate Student in Chemistry, Harvard University

Evan LeBois, Ph.D. (BS07): Senior Scientist, Pfizer, Cambridge, MA

Lauren Maliszewski (BS(Biology)01): Executive Director, Laboratory Systems, Harvard Medical School

Sara Martin (PhD14): Post-doctoral Research Associate in Chemical Biology, Harvard Medical School

Edward Miracco (PhD11): Scientist, Moderna Therapeutics, Cambridge, MA

Courtney Ngai (BS11): Graduate Student in Chemistry Education, University of Massachusetts, Boston

Aparna Sapra (PhD14): Post-doctoral Research Associate, University of Michigan, Ann Arbor

Alexey Shiklomanov (BS14): Graduate Student in Geography and Environmental Science, Boston University

Amanda Simons, Ph.D. (BS99): Assistant Professor of Biology, Framingham (MA) State

Justin Teesdale (BS13): Graduate Student in Chemistry, Harvard University

Raymond Trievel, Ph.D. (BS95): Associate Professor, University of Michigan, Ann Arbor

Meredith Wesolowski, Ph.D. (FAC10-14): Living in Natick, MA

... and a good time was had by all!

CONTINUED FROM PAGE 1



ACS Student Affiliates circa 1949: Who among you will win the Nobel Prize? Dan Nathans is fourth from the left, second row.

doors of the Brown lecture hall (BRL101), where Nathans once sat as a student and where Heck lectured during his two decades at UD. We hope that this display will inspire the faculty and the thousands of students who enter Brown Lab each semester.

It has not escaped notice that this former student and retired research-active faculty member epitomize what our Department prides itself in doing so well: outstanding scholarship and research and a dedication to first-rate undergraduate education and



Graduate student Greg Stakem (Ph.D. 82) with Dick Heck

mentorship. While at UD, Nathans was very active in the Department as the ACS Student Affiliates president and, like nearly a thousand other Blue Hen chemists, he participated in his first research experiences as an undergraduate researcher in faculty research labs. These undergraduate research experiences, largely funded through federal research grants, highlight the symbiosis that exists between academic research and undergraduate and graduate education.

Heck's research was so fundamental and so far ahead of its time that he at times struggled to convince funding agencies of the importance of his work. Today, his chemistry is so ubiquitous that it has been estimated that approximately one fourth of all modern pharmaceuticals are made using chemistry based on Heck's discoveries. Heck and Nathans, retired faculty member and former student, made discoveries that have transformed modern science and impact our lives daily in innumerable ways.

We encourage our alumni and friends to come visit the Department and see the display for themselves. For those unable to visit, we have posted pictures and the full text of the display on line at: www.chem.udel.edu/nobel-legacy.

—John Koh

Alumni News

Fifty-Year ACS Members

The annual listing of 50-year ACS members in **C&E News** (4/20/15, pp. 32-42) produced a bumper crop of CHEM/BIOC alumni and past faculty members:

- **Stanley E. Anderson, Esq.** (MS66),
- **James D. Beck** (PhD69),
- **W. Brooks Bigelow, Ph.D.** (BS65)
- **Peter A. Christie** (PhD67)
- **Wesley O. Fritz, Jr., Ph.D.** (MS66)
- **Robert J. Nash, Jr., Ph.D.** (MA68)
- **Henry F. Russell, Ph.D.** (BS63, MS65)
- **Thomas B. Brill, Ph.D.** (FAC70-06)
- **Karen J. Bush, Ph.D.** (FAC72-73)
- **Kenneth W. Loach, Ph.D.** (FAC85-86)
- **Roger K. Murray, Jr., Ph.D.** (FAC71-98)

Heartiest congratulations to all!

50's

While **Donald J. Lyman** (MS51, PhD52) may have achieved Professor Emeritus status in the University of Utah's Departments of Material Science Engineering and Bioengineering, his fertile mind is far from retiring. While living in Olympia, WA, he has been able to keep his research going by getting short term loans of infrared equipment. Check out his latest publication in **ecancer** 2014, 8:405 DOI: 10.3332/ecancer.2014.405. In 2009, he started the **Science Cafe of Olympia**.

Charles B. Miller, Jr. (BS51,MS52) died in Wilmington on 2/3/15, at age 92. His entire professional career was spent with the DuPont Company, where he developed a new lubricant that was able to withstand the extremely high temperatures produced in heavy machinery. He retired from DuPont in 1985.

Joseph V. Marra Sr., Ph.D. (BS54) died in Wilmington on 6/18/15 at age 82. Joe earned his doctorate at Notre Dame University, after which he spent his career as a research scientist at Hercules and, later, Applied Extrusion Technologies. His daughter **Suzanne Marra-Shealey** (BA82) is also a graduate of our program.

Leland A. Watermeier, D.I.C. (MS55) retired as Chief of the Interior Ballistics Laboratory at the U.S. Army's Aberdeen, MD Proving Ground in 1986. He was a charter member of the Senior Executive Service, appointed by President Jimmy Carter for Civil Service- the highest level possible.

60's

Daniel Madinabeitia (MS60) died in Wilmington on 2/19/15, at age 85. Dan began his professional career with the DuPont Company in the early 50's, later becoming the sales and marketing representative for the Freon Division. After retiring from DuPont, he became a consultant for the World Bank.

Arthur J. Coury, Ph.D. (BS62) is now the University Distinguished Professor and Director of the Engineered Biomaterials Program in Northeastern University's Department of Chemical Engineering.

Henry F. Russel, Ph.D. (BS63, MS65) has retired as Professor Emeritus of Chemistry, after a 33-year teaching and research career (1979-2012) at Johnson C. Smith University, in Charlotte, NC.

J. Richard Ward (BS64) has retired, following a 45-year career at the Aberdeen (MD) Proving Grounds. He spent the last 20 years working with chemical agent demilitarization as chief scientist at the chemical materials agency.

Gary W. Ver Strate (PhD67) died on 3/16/14, in Port St. Lucie, FL.

Reed E. Pyeritz, M.D., Ph.D. (BS68) presented the Dr. Arnold Clark Memorial Lecture on "Are We Ready for the \$1000 Genome?" in Wolf Hall on 4/4/15. Reed is the William Smilow Professor of Medicine & Professor of Genetics, as well as the vice-chair for Academic Affairs in the Perelman School of Medicine at the University of Pennsylvania. Reed also serves as a Senior Fellow in the Lemard Davis Institute of Health Economics and is the Chair-Elect of UPenn's Faculty Senate.

70's

Noreen C. Campbell (BS70, MS73) presented an invited keynote lecture at a conference on Finding Your Way: An International Learning Seminar for Corporate Professionals, held in Malta in July, 2015. (www.finding-your-way.org/).

James S. (PhD72) and **Maurine V.** (BA72) **Falcone** have moved to Deerfield Beach, FL.

Walter J. Freeman (PhD72) was a participant in a story telling workshop on Ocacroke Island, NC in June, 2015.

Richard C. Gearhart, Jr. (PhD72) died in Oxford, PA on 2/8/15, at age 70. Dick spent his professional career at Agilent Technologies. He served as an adjunct instructor in our Department of many years, earning two awards for excellence in innovation of online courses.

Kenneth S. Rosenthal, Ph.D. (BS73), recently retired from the Northeast Ohio Medical University, served as a Visiting Professor at the American University of Antigua Medical School in November, 2014. During 2015, he is helping to create a new medical school in Summerlin, NV- the Roseman Health Sciences University Medical School- as Professor of Biomedical Sciences and Director of Microbiology and Immunology. The 8th edition of his textbook, **Medical Microbiology**, by Murray, Rosenthal, and Pfaller (Elsevier) was published in 2015. It has now been translated into at least 9 languages.

Faith K. Silver (MA73) has changed working venues. After serving for 40 years at DuPont, most recently as an intellectual property strategist, she has joined the Chemours spin-off in the same capacity for their performance chemicals business.

Charles W. Stanger, Jr. (PhD74) and his wife, Jo, have completed one major entry on their bucket list, and are about to embark on another. Last summer, they RV'd in the last 4 of the 50 states (DE, CT, RI, and MA). Next up: Canada!

Michele Hackley Johnson, M.D. (BA75) became, in 2014, the first African-American woman to be named full professor at the Yale Medical

School. Her father, (the late) **Brennie E. Hackley, Jr.** (PhD57) was the first African-American to earn a doctorate at the University of Delaware.

H. Douglas Thornley (BA75), President of Impact Colors, has created and maintained a mutually beneficial experiential pipeline for our students and graduates. **Ashley N. Lennon** (BA/CHEM/17) is the latest of our undergraduates to have interned in Impact Colors' Applications Laboratory in the University's Delaware Technology Park.

Mark F. Bockrath (BA78) is a paintings conservator for Barbara A. Buckley and Associates Painting Conservation, a private conservation firm in West Chester, PA.

Silvia S. Jurisson, Ph.D. (BS78), Professor of Chemistry at the University of Missouri-Columbia, has been recognized as a Fellow by the American Association for the Advancement of Science for her contributions to cancer research.

Sheree Gehman Fleming, M.B.A. (BS79) is a Market Research Manager for ExxonMobil, in Spring TX.

80's

Barbara Shaw Harrison (BS80) has been promoted to Manger of CRF Design by Incyte Genomics, in Wilmington.

Andrea E. Martin (PhD81), Associate Professor of Chemistry at Widener University, was the recipient of the 2014 Ronald T. Pflaum Outstanding Chapter Advisor Award, presented by the Alpha Chi Sigma Chemistry Fraternity. She is a 2015 candidate for Director of the Delaware Section of the American Chemical Society.

We have, in effect, consummated a trade with the University of Hawaii-Manoa. **Thomas M. Apple** (PhD82) is now the chair of their Chemistry Department, while **Dr. B.J. Chain** is now an associate professor in our Department.

Edward W. Rutter, Jr., Ph.D. (BS82) is a Senior Principal Engineer in TE Connectivity's Circuit Protection Division in Menlo Park, CA.

Martin W. Brechbiel, Ph.D. (MS83) has been selected as the recipient of the 2015 Michael J. Welch Award by the Society of Nuclear Medicine and Molecular Imaging. Martin, an NIH scientist, is a leading authority on the development of the chemistry required for effective targeted radiation therapy and imaging chemistry.

Richard J. Karpowicz, Sr. (MA83, PhD83) is now the R&D Manager for American Bilrite's Tape Productions Division, in Moorestown, NJ.

Laurence M. Principe, Ph.D. (BS83), Drew Professor of the Humanities in Johns Hopkins University's Departments of the History of Science and Chemistry, is in the news again—**Chemical and Engineering News**, that is (8/3/15, pp. 35-37). Larry's efforts to reproduce the work of alchemists, which he began as a UD undergraduate, is highlighted in the article "Reviving Ancient Recipes."

Ronald E. Shomo II, Ph.D. (BS83) is the Sales and Marketing Manager for Scientific Instrument Services.

Rodney D. Hudson (MS84) is the President and Owner of Quicksilver Analytics, Inc., in Belcamp, MD.

Supercritical Fluid Technologies, Inc., founded in 1994 by **Kenneth J. James** (BS84, PhD98), who now serves as its President and Director of

Technology in UD's Delaware Technology Park, was profiled in a 4/13/15 feature article in the **Wilmington News-Journal**. Ken's classmate, **Kenneth R. Krewson** (BA84) serves as SF's Vice-President for Sales and Marketing.

Niel C. Hoglen, Ph.D. (BS86) is Zafgen's Head of Pharmacology & Toxicology in Boston, MA.

R. Michael Buch (MS87, PhD91) is the Director of Scientific Strategy for GlaxoSmithKline's R&D Management in Parsippany, NJ.

Christopher M. Hadad, Ph.D. (BS87) is the Divisional Dean of Natural and Mathematical Sciences in Ohio State University's College of Arts and Sciences, Columbus.

Anthony-Joseph (Tony) DiMaio (PhD89) passed away on 1/19/15 at Massachusetts General Hospital, Boston from cystic fibrosis. He was 52. He most recently worked for Galata Chemical, in Southbury, CT, as the Technical Support Manager for the Americas Region.

The article, "The Making of a Man," by **Andrew D. Hollenback**, Ph.D. (BS89) in the 1/15 edition of **ASBMB Today** (pp. 29-30) moistened your Editor's eyes, for the only essential change required to make his story my story is to shift the locale from Perkasio, Bucks County, PA to Fountain Springs, Schuylkill County, PA. Andy is a Professor in the Genetics Department at the Louisiana State University Health Sciences Center in New Orleans. Subsequently, he published the very provocative article "The Reality That Dare Not Speak Its Name," is **ASBMB Today** (4/15, p. 28)

Jon S. Kauffman (PhD89) is a Senior Director, Biopharmaceutical Services and Method Development & Validation, for Eurofins Lancaster (PA) Laboratories, Inc.

Rebecca K. Lowe, M.Ed. (BS89) is a Chemistry Instructor at Shippensburg (PA) University.

90's

Lee J. Silverberg (PhD91) is an Assistant Professor of Chemistry and Coordinator of the Undergraduate Research and Creative Accomplishments Program at Penn State's Schuylkill Campus, in Schuylkill Haven.

Daniel V. Paone, Ph.D. (BS92) is the Chemistry Leader for GlaxoSmithKline's Discovery Partnerships with Academia Program.

Timothy A. Sherwood (PhD92) is now a Dean at Oakland (MI) Community College.

John C. (Chuck) Cloyd III (BA93) is the Senior Service Manager for Sciex's Mid-Atlantic Region.

Christopher L. Kulp, M.S., M.B.A. (BS95) has been promoted to Executive Vice-President at Richman Chemical, Inc. in Lower Gwynedd, PA.

Scott A. Barber (BS96) was one of ten UD Alumni honored with Presidential Citations for Outstanding Achievement on 10/24/14. Scott is Head of Quality for Facebook's User Operations.

Joseph J. Barycki (PhD97), Associate Professor of Biochemistry in the University of Nebraska's Redox Biology Center, is the co-PI of a program just funded by NIGMS that is modeled after UD's Chemistry-Biology Interface Program. The latter was pioneered by **Prof. Roberta Colman** (FAC73-09). It is still going strong, with **Prof. Brian Bahson** as its current Director.

Sujata K. Bhatia, M.D., Ph.D. (BS99) and Daniel Ashline were married in Greenfield, MA this past April. For the

second year in a row, she was chosen to be a Harvard Yearbook's Favorite Professor by the graduating class. She served as the Department of Biological Sciences' Graduation Convocation speaker on 5/29/15.

John E. Dueber, Ph.D. (BS99), assistant professor of bioengineering at the University of California-Berkeley, is a member of a team that is genetically engineering yeast to synthesize opioid precursors. (www.sciencemag.org/content/349/6249/677.full.pdf)

00's

Brian A. Cann, M.B.A. (BS00) is the Vice-President of Marketing for Boekel Scientific, in Feasterville, PA.

Joshua D. Figueroa, Ph.D. (BS00), Associate Professor of Chemistry at the University of California, San Diego, and his old undergraduate research mentor, **Arnold Rheingold**, Ph.D. (FAC84-03), Professor of Chemistry at UCSD, are both At-Large Members of the Board of Directors of the Inorganic Chemistry Division of the American Chemical Society.

Suzanne Bart Doucette, Ph.D. (BS01) Assistant Professor of Chemistry at Purdue University, has been selected as a recipient of a 2015 Rising Star Award by the ACS Women Chemists Committee.

Matthew J. Swierzbinski, M.D. (BS02) completed his infectious diseases fellowship at the George Washington University last summer. He is now an infectious diseases physician at Inova Fairfax Hospital in Falls Church, VA.

Todd M. Greco, Ph.D. (BS03) is in his 4th year as a post-doc at Princeton University. Characterizing his post-doctoral experience as “productive” would be an understatement- during this time, he has published 20 papers!

Jennifer Brocius Palenchar

(PhD03), Associate Professor of Chemistry at Villanova University, returned to campus on 11/12/14 to present a Chemistry-Biology Interface Program seminar on “Altering the Cofactor Specificity of Trypanosome beta-Hydroxybutyrate Dehydrogenase.”

James W. Hansen, D.O. (BS05) is a Cardiology Fellow at Penn State’s Hershey Medical Center.

Daniel M. Lins (BS05) is a Print-on-Demand staff member at Wycliffe Associates.

Kevin D. Joye (BS06) is a Research Scientist with ACell, Inc., in Columbia, MD.

Damien (PhD06) **The’venin** is an Assistant Professor of Chemistry at Lehigh University, Bethlehem, PA.

Blair S. Thornley, D. Pharm (BS07) is on the staff of Poison Control of Philadelphia.

David F. Grieco, M.S. (BA09) has completed his studies toward a Master of Science degree in Weapons of Mass Destruction. The degree was awarded through Missouri State University, which has a Defense campus in Vienna, VA, and the National Defense University at Fort McNair, in Washington, DC. Dave was one of 14 graduates in the inaugural class of the program, which is sponsored by the Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense. Dave spent last fall working in Seoul, Korea with the 65th Medical Brigade. In his “spare” time, he continued his volunteer service with

the U.S. Coast Guard Auxiliary. He was elected by his peers to serve as Vice Flotilla Commander for 2015.

Paul N. King (BA09) is working as a freelance writer and chemical tutor for Empire Edge and Sentia Education, in New York City.

James C. Lansing, Ph.D. (BS09) has completed his doctoral studies at the University of Illinois, Urbana-Champaign, working in the laboratory of Prof. Thomas Rauchfuss.

John F. Young (PhD09) is the group leader of the metal-organic division of Gelest, Inc. (germanium, lead, silicon, tin—get it?), a Pennsylvania specialty chemical manufacturer. His alma mater, Gettysburg College (class of ’03), recently featured him in an article lauding him for his exploits on the gridiron (a three-year letter winner as defensive lineman [#88] for the Bullets), his completion of a demanding double major of chemistry and business management, his earning of the doctorate in the laboratory of **Prof. Klaus Theopold**, and his subsequent successful career with Gelest. (www.gettysburg.edu/news_events/press_release_detail.dot?id=4462a999-b424-43a3-89fa-801937d16cd8)

10’s

Amy L. Styer (BS10), a doctoral candidate in Biochemistry and Molecular Biology at the University of Georgia, presented a seminar in our Department on 5/29/15 entitled “Parasites and Peroxides: How the Human Innate Immune Factor Trypanosome Lytic Factor Kills *Trypanosoma brucei brucei*.”

Anastasia Fuzaylova The’venin

(PhD10) is a Visiting Assistant Professor in Lafayette College’s Department of Biology, Easton, PA.

Sean T. Hunt, M.S. (BS11) received his master’s degree in Chemical Engineering Practice from MIT in 2013. He is continuing his studies there toward his doctorate in Chemical Engineering.

Kana H. Panchmatia (BS11) is pursuing a master’s degree in Product and Service Development in the Integrated Institute Department at Carnegie Mellon University.

Charles F. Polotti, Jr., M.D. (BS11) having completed his medical school studies at Drexel University’s College of Medicine, is engaged in a residency in Urology at Rutgers-Robert Wood Johnson. He and **Alyssa B. Hellreich** (BS11) will tie a Double Del matrimonial knot in May, 2016. Alyssa is in her third year of study toward the D. Pharm. Degree at Thomas Jefferson University’s School of Pharmacy.

Fang Dai (PhD12) and **Jingmei Shen** (PhD12) are the proud parents of a baby boy, Ethan, who was born on 11/2/14.

Michael T. Taylor (PhD12), a Post-doctoral Research Associate at the University of Cambridge (U.K.) has received a Marie Curie International Fellowship from the Marie Sklodowska-Curie Actions, a research funding initiative of the European Union’s governing body.

Christopher D. Wright (BS12) is in his third year of doctoral study in Princeton University’s Molecular Biology Department.

Mathew J. Urban (BS13) has begun his medical studies in Drexel University’s College of Medicine.

Jennifer M. Kurek (MS14), a chemistry teacher at North Harford (MD) High School, is pursuing an MAT degree from Stevenson University.

HONOR ROLL

of Gifts to the Department

The *Blue Hen Chemist* is an annual magazine distributed by the Department of Chemistry and Biochemistry at the University of Delaware. Its purpose is to reach out to our extended CHEM/BIOC family members: current residents, alumni, friends, retirees and benefactors, both individual and corporate; to keep them abreast of the goings on in the Department, to put old family members and new ones in touch with one another, and to give credit and thanks to the contributions of all.


The individual contributions of all, past and present, is the foundation that has built and continues to grow the Department and advance the mission that maintains our tradition of excellence in teaching and research. The financial support of

the benefactors of the Department, whose generous contributions make it possible to recognize excellence among our students and faculty, gives the Department the opportunity to bring in world renowned speakers who further advance the knowledge base and skills of our faculty and students, and allow us to continue the mission of recruiting the best and brightest students and faculty to join our ever growing family.

Please, on behalf of the Department, accept these sincere thanks for the generosity of all. So, without further ado, we would like to express our sincere appreciation to the following companies and foundations for their unrestricted financial support of the Department during 2014-2015:

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The Department would like to acknowledge, with extreme gratitude, financial support from the following alumni, parents, faculty members, staff members, and friends during 2014-2015. Your support has always been important to us; however, in these stressed financial times, it is like manna from heaven!

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To our alumni and friends:

Each year, we receive a substantial amount of unrestricted funds through annual giving. These funds allow us to do many things that otherwise would be difficult to achieve. Here are several activities and funding levels that these donations facilitate. If you feel inspired, please consider making a donation. You could fund one of these activities on your own, or the Department can pull together many contributions to effectively group-fund one or more of these endeavors. Either way, your donation has a huge impact!

To those of you who have made contributions over the past year, thank you so very much. To make a gift this coming year, please visit www.udel.edu/giving/ where you will find more information. Be sure to specify the Department of Chemistry and Biochemistry in the “Other” tab of the online form or in the memo line of a mailed check.

\$300-1000

Supports scientific travel of one individual. Examples include supporting the travel of a student to a scientific conference to present research results, or bringing an eminent scholar to campus where they meet with students and faculty and discuss their latest scientific research.

\$4000-7000

Provides full support for summer research of one undergraduate student or one graduate student. We have a robust undergraduate research program. Financial pressures associated with the cost of education require most of our students to secure paid

employment during the summer. These stipends provide the financial support needed for our undergraduates to become involved in research. At the graduate level, these stipends support students that have been teaching assistants during the academic year, allowing them to move forward in research at a faster pace during the summer.

\$10,000-30,000

Supports special projects awaiting the opening of budget space, for example incorporating new forms of technology into teaching and research or performing minor renovation of space for a new or unusual purpose. Last year, a substantial donation was received that allowed us to move forward immediately with transforming sophomore organic teaching labs to micro-scale experiments. By doing so, it provided a safer environment for laboratory instruction and allowed us to more efficiently use teaching laboratory space to meet the acute rise in enrollment.

\$50,000 and up

Provides the opportunity to endow any of the above activities. In addition, funds at this level help us to secure sophisticated instrumentation, perform major renovations and establish named chair positions to attract and retain top faculty.

—*Murray Johnston*

Let Them Flow

An Organic Chemistry Professor's Lament

Original composition by D.S. Chatellier (MA84)
(to the tune of "Let It Go" from the movie Frozen)

(Piano Introduction)

You put it off for as long as you could. Even tried to bribe the dean.
But you have to take Organic now, and you say that I'm so mean.
Your tutor's howling, "practice 'til your brain is fried!"
You just failed my quiz. And I know you tried.

Do you want an A? Or perhaps a B?
Be the student that I know you must be
Mechanisms / show electron flow / with curved arrows!

Let them flow! Let them flow! Let those curved arrows go
From the negative charge to the positive charge. That's how electrons
flow!
If you care / what your prof will say / then you'll do it right!
Or you'll just have to learn it another day.

It's funny how professors / care about things oh-so-small.
But if you master this concept / you'll be standing very tall.
Try it! Let's see what you can do. Are we on the verge of a break-
through?
There's right, there's wrong. Learn the rules.
Someday... you'll be free!

Let them flow! Let them flow! Let the electrons go
From the nucleophiles to the electrophiles. Otherwise you get zeroes!
I want you / to get an A! / But I won't back down... (Instrumental
Interlude)

You just need to pass this class. You don't have to be the star.
(Do you think that Idina Menzel knows what fractals are?)
It's time for your next test, and your blood feels like ice.
But there's no going back. (Do you want to take this twice?)

Let them flow! Let them flow! When you draw those curved arrows
They must not converge and they must not diverge. Those are very big
"no-no's"!
Prove you can! / The you'll get an A!
That's why I rage on!
(Professor's voice, spoken) "Giving F's never bothered me anyway."

BLUE HEN
Chemist

DEPARTMENT OF
CHEMISTRY & BIOCHEMISTRY
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past two decades, the produc-
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Linda Staib

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Heather Harwood

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My sincerest thanks to all!
—J.B.

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