



CHEMISTRY NEWS

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Council on Undergraduate Research

Welcome from the Chemistry Division Chair: Don't just be a mentor, be an advocate!

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by Kim Frederick

Welcome to the start of another academic year and the promise of another great year of mentoring undergraduate research students. I want to encourage each and every one of us to take our mentoring up a notch and become full-on advocates for our research students.

The difference between an advocate and a mentor is similar to the difference between being cheerleader versus a spectator at a sporting event. An advocate takes an active role in working for the success of students.

The following are some suggestions for how to take typical mentoring practices and turn them into advocacy:

- (1) Don't just write great letters of recommendation; call someone to say that your student is really top-notch. I wouldn't recommend you do that for every program, but usually students

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In This Issue ...

- Councilors Trotter and Castellani Reflect on Their CUR Service

About CUR's Chemistry Division

The Chemistry Division of the Council on Undergraduate Research—the oldest and largest division of CUR—provides networking opportunities, activities, and resources to assist chemistry administrators, faculty members, students, practitioners, and others in advancing undergraduate research.

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have one or two programs that are particularly interesting. Or you can call/send an email to a colleague. This helps maintain your professional network as well as benefit your student.

- (2) Don't just forward information to students; help them strategize. As faculty, we get lots of information about summer internships and travel fellowships. Help your students by figuring out which of these opportunities is right for them based on their personal and career aspirations. Don't know what opportunities are out there? The CUR Community is a great resource.
- (3) Don't just acknowledge your students' accomplishments—celebrate them! Let your colleagues know when your students receive awards or present/publish results. Keeping a social media presence can really be helpful here as can being in touch with your communications office.
- (4) Diversify your understanding. In my case, I am significantly older than my students and never worked in industry or in a medical field. As a white, cis, hetero woman, I also have privilege in many areas of my identity that my students do not. To be able to truly advocate for my students, I need to understand the unnecessary barriers that are being placed in their paths. Education of ourselves is an ongoing process and one at the core of what we do.

Advocating for your students will help them advance as scientific professionals and as human beings but will also be beneficial

for you as well by helping you to develop a stronger network.

Let's get out there and advocate!•

Have You Checked Out [CURCHEM](#), the Division's Blog, Recently?

- [Research at the Freshman Level](#) (Aug. 7)
- [Encouraging Science Communication through Research and Discussions](#) (July 17)
- [Contemplating a Professional Move? Risks and Rewards to Consider...](#) (June 20)•

Is Your Department or Program Undergoing Review in the Near Future?

Could your department benefit from the insight of a team of CUR external reviewers? One service provided by CUR is the opportunity to bring to campus a team of faculty and administrative professionals who share similar vision and goals, who are knowledgeable and experienced in departmental program reviews and/or disciplinary accreditation processes, and who have thought deeply about high-quality undergraduate education at a reasonable price. For additional information on this unique program, contact William Polik (polik@hope.edu), CUR Chemistry's representative on the Review Committee, email programreview@cur.org, or visit this page on the [CUR website](#).•

"Big Data and Undergraduate Research"—SPUR Summer 2019

CUR Chemistry Councilor Rebecca Jones is issue editor of the summer 2019 [Scholarship and Practice of Undergraduate Research](#) (SPUR), the scholarly journal of

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CUR. Articles in this issue highlight models and stories on the use of large databases and data analytics to engage undergraduate students in scholarly work

(see the [table of contents](#) for this issue).

SPUR publishes peer-reviewed scholarly work describing novel approaches and models for the involvement of undergraduates in research and creative work, and research that identifies and assesses current and emergent practices. The Editorial Board welcomes your contributions and also wishes to [recruit additional manuscript reviewers](#) (provide interests/specialties in an email; e.g., assessment). Author guidelines can be found [here](#). Individuals planning a submission are encouraged to contact one of the [Editors](#).•

Starting an Undergraduate Research Program or Trying to Get Funding for Your Research with Students— Have You Considered Attending a CUR Institute?

Are you or a colleague interested in starting a research program or in obtaining support for undergraduate research? If so, perhaps participation in an upcoming CUR institute might be an invaluable opportunity to come together with other faculty and administrators and explore the issues more deeply with a team of experienced CUR facilitators. CUR Institutes are two- to three-day meetings held on the campus of a higher education

institution where individuals discuss an issue related to undergraduate research and faculty development, leading to plans for improvement on their home campuses. Since the goal is institutional as well as individual change, campus-based teams of 3–5 individuals usually attend an institute. Individual faculty can attend [Beginning a Research Program in the Natural Sciences at a Predominantly Undergraduate Institution](#) (Stetson University, Nov. 22-24, 2019) and the [Proposal Writing](#) Institute (Daemon College, July 8–12, 2020).•

Editor's Note: In this issue, two CUR Chemistry Councilors who have played important roles in the division and its activities and who are stepping down from the CUR Council share some reflections on their work with CUR and with undergraduates.

CUR Chemistry Exit Interview with Pamela J. Trotter (Augustana College)



Could you tell us a bit about yourself where you teach, what your area of specialization is, and a bit about your past involvement in undergraduate research?

I am a professor of chemistry at Augustana College in Rock Island, Illinois, where my teaching includes all the courses in the bio-chemistry sequence, general chemistry

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courses as needed, and a course for non-majors that focuses on molecular nutrition. Before coming to Augustana, I spent five years on the faculty at the University of Texas at Austin. The research effort in my laboratory examines the coordination of lipid and amino acid metabolism with the citric acid cycle. Initially efforts were focused on using the yeast *Saccharomyces cerevisiae*. More recently, I have “retooled” and begun to examine the role of this metabolic coordination in fat accumulation by the very different oleaginous yeast *Yarrowia lipolytica*; the first article (with four undergraduate coauthors) on this new project will appear in the January 2020 *Yeast*. Undergraduate students have always worked in my laboratory. I have had about 50 research students; roughly half have gone on to graduate or medical school.

How did you originally get involved in CUR? What made you decide to run for a CUR Chemistry Councilor position?

During the summer between high school and college, I was given a rare opportunity to work full time in a research laboratory, and my mentor invited me back each summer throughout my college years. I see this experience as the primary catalyst for my decision to pursue a PhD. Thus, providing research opportunities for students has always been a priority for me. When my department was undergoing a program review about 10 years ago, I met George Shields, who has been a CUR Chemistry Councilor and a representative on the CUR Executive Board. He encouraged me to run for a position on the CUR Council. Seeing it as an opportunity to be involved in a national effort to support undergraduate

research, I did, and I have served on the council for six years.

Would you tell us about some of the roles and opportunities that your participation in CUR has given you?

Being on the CUR Council gave me many chances to be involved in activities that, via the organization, support opportunities for undergraduate research. With all the other Chemistry Councilors, I served as a judge for the yearly competition for students to present their work to legislators at Posters on the Hill in Washington, DC. This allowed me not only to consider all the great work being done with students around the country but also the importance of having the support of our leaders in the government. I was on the CUR Program Review roster; so, I had opportunity to visit chemistry departments at other institutions and help with periodic program reviews. One element of this that was especially rewarding was my ability to serve as an advocate for the faculty to their administration in support of student research opportunities on their campus. Finally, I was on the CUR-wide Constitution and Bylaws Committee for much of my time on the council. I served as committee chair for 2017–2019, during which there was a restructuring of CUR governance that required revision of the constitution. This gave me “real-life” exposure to organizational architecture and the writing of the document outlining it.

What do you think is the value of CUR for faculty at various institutions and different career stages?

As a senior faculty member, I have very much appreciated, and will miss, the

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camaraderie amongst Chemistry Division Councilors and other CUR members! As mentioned before, my primary reason for joining CUR was to help support student research opportunities at the national level. However, I feel I have received much more in return. Interacting with colleagues from all over the country (and the world), from all types of institutions (community colleges, undergraduate colleges, and research universities), and from different disciplines has given me a new awareness and understanding of the entire enterprise of undergraduate education and the importance of individual inquiry/research exposure for every student. I have a better appreciation of the unique challenges we face as we endeavor to provide these experiences for our students. Also, I was asked to write about my passion for research, which was published on the CURChem blog; it was wonderful to connect with others like me by telling my story. Overall, CUR provides a strong support and mentoring network for faculty desirous of helping students gain familiarity with the *doing* of scholarly work.

What's Next for You?

The college is starting a new calendar this fall; we have been teaching 10-week terms with courses of 3 semester hours. Starting fall 2019, we will be on semesters with a January term with courses of 4 semester hours each. This required rewriting of majors and revamping of all courses. So, my colleagues and I are very busy preparing for this big change. Also, as my research focus has changed recently, it has required me to learn new things and begin new collabor-

ations. Although there is an article in press, I have so far been unsuccessful at gaining funding. Thus, that is a goal for the future. •

Did You Know CURChem Has a LinkedIn Group?

We would love to have you join us on LinkedIn! The group is open to all, so encourage your colleagues—graduate students, postdoctoral scholars, faculty, and administrators—to join our LinkedIn group.

You are welcome to share your work with undergraduates; any questions you have about CUR; the teaching and practice of undergraduate research in chemistry such as links to useful articles, books, grant opportunities, information about undergraduate research conferences, journals; and so forth. If you are unfamiliar with LinkedIn, email Pam Mabrouk for a quick-start guide. We look forward to seeing you soon! •

CUR Chemistry Exit Interview with Mike Castellani (Marshall University)

Could you tell us a bit about yourself: where you teach, what your area of specialization is, and a bit about your past involvement in undergraduate research?

I am an inorganic (organometallic) chemist who teaches at Marshall University. I started in 1988 and over the past 30+ years have mentored more than 60 undergraduates. Fifteen students have coauthored eight publications with me. My biggest role regarding undergraduate research at Marshall has been within my department. In 2004, the longtime chair stepped down, and the faculty wanted to move the department

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in a new direction. We had always involved students in research, but recently the university instituted a capstone graduation requirement, and we decided to make undergraduate research ours. My role was to help systematize how we would involve almost all our graduates doing a research project and altering our hiring process to find the best candidates to support that goal.



How did you originally get involved in CUR? In the Chemistry Division?

In the late 1990s I took a sabbatical leave and leave of absence when my wife went back for her PhD and wound up teaching in a one-year position at Texas Wesleyan University. Bob Landolt was a professor there and a Chemistry Division Councilor. He suggested I run for Councilor when his term expired. I attended the 1999 College of Wooster meeting and met a few Councilors. CUR sounded exciting and was working on things I found really interesting, so I ran for Councilor the following year. I was actually less involved in the division than the broader organization. All through my time in CUR, there have been

incredible people in the Chemistry Division, and there weren't a lot of opportunities for a new person to do divisional activities, but there were CUR-wide committees that needed chemistry representation. I volunteered to be in CUR Fellows my first year, and a secretary/recorder was needed, so I did that. From there, I was moved to a few different committees, eventually being selected to chair a few.

Would you mind telling us about some of the roles and opportunities that your participation in CUR has given you?

I've had a chance to co-chair a number of committees, including a CUR Biennial Conference Planning Committee, Outreach Committee, Posters on the Hill Review Committee, and the CUR-Goldwater Scholars Faculty Mentor Award Committee, as well as serving as secretary to the Executive Board. Each was a learning experience that helped me as much as I hope I helped the organization. As a committee chair, I think my primary role was to codify and update the rules for the committees. In each case, there was a reasonably well-established way of doing things, but it was always a bit of an oral tradition. For example, I worked with three co-chairs on the Posters on the Hill selection committee moving from paper applications to an electronic system that streamlined the selection process to maximize CUR institutional memory and influence by covering the largest number of and most important congressional districts nationally. That was largely in place when I joined the committee, but my co-chairs and I developed a decision tree to have a greater impact.

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What are the accomplishments you have made through CUR of which you are the most proud?

I don't know that I can point to any big thing within CUR. I hope that in my various roles I have helped CUR achieve its mission, most notably the promotion and practice of undergraduate research across a wide array of disciplines. To the extent that any of the work that I have done has helped a larger number of students participate in a high-quality research experience, I would consider my time well spent. I think the lessons I learned from CUR that I was able to bring back to my home institution have been invaluable. I believe those lessons have improved the education of Marshall chemistry majors immeasurably.

The best part of being a CUR Councilor has been, without a doubt, my association with my fellow Councilors, both within chemistry and beyond. They are the most incredible group of people I have been privileged to know in my career. I am a better teacher, a better chair, and a better person because of them. It is what I will miss most as I retire from being a Councilor. Without a doubt, one of the best professional decisions I have made was becoming a Councilor.

What Are Your Plans for the Immediate Future?

I have two years left as department chair, and I will return to being a regular faculty member. The chair position has given me the opportunity to help new faculty develop their research programs, but mine has

largely lapsed because I don't have time to devote to it. I plan to get back to teaching a full slate of courses and repopulating my research group. In short, I'd like to get back to why I became a faculty member in the first place. •

Becoming a Scientist: Engaging the Next Generation of Chemists in Computational Research at a Primarily Undergraduate Institution



Heidi Hendrickson

I'm just about to start my third year as a tenure-track assistant professor of chemistry at Lafayette College, an undergraduate liberal arts college in Easton, PA, with about 2,600 students. As a computational chemist, I typically teach general chemistry and physical chemistry courses. Before coming to Lafayette, I earned my MSc in educational studies and PhD in chemistry at the University of Michigan, lectured in a summer course at the University of Michigan, and conducted postdoctoral research at Yale University.

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In my undergraduate research lab at Lafayette, computational methods are used to study molecular systems. The lab focuses on two broad research themes: (1) designing materials that can be used in sustainable energy devices and (2) designing chemical leads targeting G-protein coupled receptor proteins. In this article, I would like to provide a perspective on what undergraduate research in computational chemistry looks like at a PUI. I've asked each student in my group to share a little about their research experience. Combined, their stories paint a vibrant picture of life in the lab.

Emily Lugos (fourth-year chemistry major, English minor)

My journey in computational chemistry has been challenging and exciting. When I started my research, I had no idea what I was doing. I joined the Hendrickson lab my sophomore year, when my understanding of how chemistry applies to broader subjects was limited. Computational research served as a gateway for me to understand chemistry in greater depth and breadth than I had experienced in my introductory classes. My first research project involved protein-ligand docking calculations, but I quickly realized the work was not for me. Instead, I helped initiate a collaboration with Melissa Galloway's lab at Lafayette College to investigate the electronic structure of the atmospheric brown carbon compounds she studies. Although I experienced challenges associated with density functional theory calculations and coding, I fell in love with the project and with atmospheric chemistry! I was inspired

to apply for the ACS Bridge Travel Award to present my research at the spring 2019 ACS National Meeting in Orlando, Florida. I received the award and presented my work while networking with other computational chemists at the conference. My computational research has provided a foundation for any future career path. The skills and knowledge I have developed will be useful even after graduation.

Zahra Gandhi (third-year chemistry, English double major)

My research involves conducting molecular dynamics (MD) simulations on protein-peptide complexes. This summer, one of my main tasks was translating old Tcl/Bash/Excel workflows into Python. When I joined Dr. Hendrickson's lab, I was not ready to code. Navigating the terminal was difficult enough. I saw coding as time-consuming and inefficient. Why write blocks of code when I could enter the command manually?

In July 2018, the lab attended the MolSSI Coding workshop at the MERCURY (Molecular Education and Research Consortium in Undergraduate Chemistry) Conference. I had never felt more overwhelmed. Despite the instructors breaking down the steps, the few commands I didn't understand quickly escalated to pages of complex code. Overall, the experience was quite discouraging.

So, when Dr. Hendrickson asked me to translate her old scripts into Python, I was terrified. But I realized I already had experience with most of the procedures. I could edit files in Bash, use variables in Tcl, and do math in Excel. I just had to combine those steps and translate. As an English major, I likened each piece of code to

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chapter in a book. Coders need to craft each chapter into an easy, efficient story for someone else to read and understand. I felt an incredible sense of accomplishment watching my code print lines to files neatly, without errors! During MolSSI 2019, I was able to keep pace and write my own working code! And with the future in mind, I also focused on ways to make my scripts more detailed and efficient.

Michael O'Connor (second-year biochemistry major, math minor)

This summer, I worked in James Dearworth's lab at Lafayette College studying turtle irises. The project aims to discover where in the eye a protein, melanopsin, is expressed. I had also been working in Dr. Hendrickson's computational chemistry lab, so I offered to model the protein. The model can be used to discover more about how the protein works. This way of combining two fields was a great experience for me to learn both biology and chemistry and has helped me understand the technical vocabulary of both fields. Learning the chemistry of proteins by working with the structure has helped me learn how proteins function in biology and knowing how these functions fit into complex biological processes has helped me recognize patterns in the chemistry of proteins.

Another field that helps me understand my computational work is math. Dr. Hendrickson explained to me that most of her math background comes from learning math in physics classes, but I am a math minor taking many traditional math courses. It is helpful for us both to learn the

language the other one knows. It is exciting when we make a connection between the two fields, like when I am able to read about the Schrodinger equation in my Calc III textbook, and then in the lab, we discuss what the wavefunction is for a molecule. I am able to share formal math language with Dr. Hendrickson, and she is able to explain how that connects to physics.

Ella Kaplan (third-year chemistry major, classical civilization minor)

In my research, I use MD simulations and quantum mechanics/molecular mechanics methods to characterize how small molecules interact with the prostaglandin EP3 receptor protein to identify potential drug candidates. For two summers, I have presented my research at the MERCURY Conference. These poster sessions have really helped me grow as a presenter and a scientist. Prior to this conference, I believed not knowing the answer to a question was the end of the world, but participating in the poster sessions proved me wrong. Before the poster session each year, I would talk to the other students, and we would all discuss how we were extremely nervous about not knowing the answer to a potential question. Realizing my fears were shared amongst everyone really leveled the playing field for me. I realized not everyone knows more than I do. During the poster sessions I was asked questions for which I did not have answers, but they deepened my understanding by forcing me to really think about what was being asked so I could give a cohesive answer. Explaining my research to people with different levels of chemistry knowledge made me understand how my research fits into the broader context of

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chemistry. Presenting my research helped me see that everyone is constantly learning, even the people who seem like they already know everything. •

Upcoming Chemistry-Related Funding Programs and Deadlines

American Chemical Society (9/23/19–10/18/19)

New Directions (grants for faculty in PhD-granting departments)

Doctoral New Investigator (starter grants for new faculty in PhD-granting departments)

Undergraduate New Investigator (starter grants for new faculty in nondoctoral departments)

Undergraduate Research (grants for faculty at nondoctoral departments)

National Science Foundation – grant deadlines before 12/30/19

Historically Black Colleges and Universities – Undergraduate Program (HBCU-UP) (letter of intent 9/3/19; 10/1/19 proposals)

Facilitating Research at Primarily Undergraduate Institutions (no deadline)

Tribal Universities and Colleges Program (TCUP) (6/1–12/30/19)

Improving Undergraduate STEM Education (IUSE) Exploration and Design, and Development and Implementation (through 9/30/19)

Graduate Research Fellowship Program (for doctoral students) 10/21–25/19 (date depends on division)

Division of Chemistry: Disciplinary Research Programs (10/1/19–10/31/19)

Louis Stokes Alliances for Minority Participation (LSAMP) (11/1/19 for Bridge to Doctorate and 11/15/19 for New and Renewal Bridge to Baccalaureate)

Historically Black Colleges and Universities – Undergraduate Program Broadening Participation Research Centers (Letter of Intent

9/3/19 and full proposal 10/1/19 for Research Initiation and 10/19/19 for Broadening Participation Research Centers)

Alliances for Graduate Education and the Professoriate (AGEP) (12/13/19) •

Save the Dates! CUR Biennial Conference 2020 – June 27-29, 2020

The CUR Biennial Conference will take place at Purdue University in West Lafayette, Indiana, on June 27–29, 2020. The theme will be “Inclusivity in Research: Scholarly Inquiry throughout the Undergraduate Experience.” •

2020 Posters on the Hill: Applications Opening Soon

Do you have a talented undergraduate research student who would be an effective communicator about his/her undergraduate research and would benefit from the opportunity to present research to Congress? Consider working with your student to help him/her assemble an application for this year’s Posters on the Hill event. Information on what applicants will need prior to application submission can be found [here](#). Applications can be submitted between September 4 and November 5, 2019. •

How Are We Doing? Chemistry News Wants to Hear from YOU!

It’s been two years since the CUR Chemistry Division newsletter began. Is the content relevant and useful to you? Do you share the newsletter with your colleagues? Administrators? Students? Do you have an idea for an article? Please send your thoughts and ideas to p.mabrouk@neu.edu. Thank you! •