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A Word from the Chair

By Deborah Herrington

We know that chemistry is fascinating and impacts virtually every aspect of our lives. So why does chemistry seem to have such a bad reputation with the general public? Think about how many times things claim to be “chemical free” because the word “chemical” has become synonymous with poison or pollution. When most people think of chemicals they do not think about things like amazing new materials that allow us to make and do new things. Take for example the new stretchy polymer that could serve as a reversible, color changing force sensor (C&E News May 28, 2019: <http://bit.ly/2KMzJ83>).

The GVSU Chemistry Faculty are doing their part to try and combat this negative image of chemistry and generate curiosity and excitement through numerous outreach activities. The following are a few highlights of activities that GVSU chemistry faculty and students have been involved with this past year.

For four years Stephanie Schaertel has organized a tutoring program at City High School in Grand Rapid. Other chemistry faculty from GVSU (Mary Karpen and Karen Matchett) along with a number of students and other GVSU and GRCC faculty have been involved with this program.

In February, as part of Fall in Love with STEM, Mary Karpen, Dalila Kovacs and Jessica VandenPlas coordinated the activity Get Stuck on Some Sweet Green Chemistry, an exploration of what causes stickiness, and how scientists can use nature as inspiration for creating biodegradable adhesives.

Numerous Faculty and students have conducted hands on demonstrations for hundreds of students at various area schools, cub scout groups, and the general public (Jim Krikke, Andy Lantz, Rachel Powers, Marshall Werner, and Randy Winchester).



Andy Lantz designed and coordinated activities for the Energizing our World camp which provided students with insight on how batteries function and how design choices affect battery performance, as well as several hands-on activities to create and test batteries.

Brittland DeKorver designed and, with the assistance of Blair Miller and Jim Krikke, facilitated two chemistry activities for the Middle School STEM camp organized by Feryal Alayont (Department of Statistics). Students engaged in computer modeling and used chromatography to separate compounds from plant leaves that they had collected from our arboretum.



Julie Henderleiter provided professional development for NGSS-aligned science curricula to 9 elementary school teachers.

Michelle DeWitt oversaw six high school students who helped out in our chemistry stockroom for a month.

Continuing our tradition of community outreach, this fall we will be hosting an extra special National Chemistry Week event. The Western Michigan section of the American Chemical Society will fill the GVSU field house with hands on demos, demo shows, a K-12 Poster contest, posters highlighting chemistry research projects

conducted by area college students, and, in honor the International Year of the Periodic Table, the World's Largest Periodic Table! Each of the 118 elements for the periodic table have been designed by different groups from across campus, the region, and the world. Many local high schools as well as high school groups from Texas and Pennsylvania have designed elements, and we have one group from India who is mailing us their element! Our amazing lab supervisor, Michelle DeWitt, has been working tirelessly along with her team to organize this event. We hope that you will plan to join us on Saturday October 19th from 10am – 2pm in the field house to witness history being made!

Alumni Spotlight

Joe Grit B.S. Chemistry, 2013 High School Teacher at Zeeland East

Why did you choose GVSU and what year did you graduate?

I chose GVSU for a few different reasons. For each school I was interested in, I asked alumni as well as current students at the university about their overall/current experience, what they liked best and what they wished were different. Each person I talked with spoke highly of GVSU and the many opportunities they had to excel, learn and have fun. They also spoke highly of the professors, particularly in the chemistry and education department. Additionally, the tuition was very reasonable compared to other universities and I loved having the ability to enjoy downtown Grand Rapids as well as the lakeshore. I graduated in 2013 with a B.S. in chemistry and an emphasis in secondary education.

What are you doing today, and how did your education at GVSU help prepare you for your current work?

Currently, I am a high school chemistry and forensic science teacher and girls varsity soccer coach at Zeeland East high school. While attending GVSU, I really enjoyed getting involved with intramural sports and meeting new people. The professors pushed me to think critically, challenge ideas and learn more than just facts. My research professor, Dr. Debbie Herrington, had and still has a significant impact on my life and education. Dr. Herrington challenged me to develop high quality work and showed me the importance of critique and revision. Dr. Herrington modeled the importance of developing relationships and the impact of creating a safe learning environment where students have the opportunity to inquire with work that is relevant and meaningful. My undergraduate research on the Nature of Science (NOS) and science inquiry ended up steering me towards Project Based Learning (PBL). Now, in conjunction with teaching and coaching, I am also a National Faculty member for PBLWorks – Buck Institute for Education, where we help build the capacity for teachers and school leaders to design and facilitate quality PBL.

What is the most exciting (or gratifying) part of your current work?

The most exciting part of being a teacher is the opportunity to interact, teach and learn from so many amazing students. I strive to inspire students to believe in themselves and each other, believe in the beauty and power of learning and to embrace a fail forward mentality. A failure in the moment does not mean you are a failure in life or in the

grade book. It is important to learn from mistakes and have a chance to reflect and revise in order to grow moving forward. I also get excited about creating opportunities for learning to be meaningful and authentic. Students want to be engaged and inspired, so it's important to create learning experiences that are authentic and rigorous which allow students to grow beyond just the content and the classroom. Educators have the opportunity to make a positive impact on our youth every day, and I strive to be one of those educators.

What advice do you have for GVSU Chemistry students who wish to pursue the same path as you have?

I would strongly encourage any college student seeking a career in education to reach out to your professors and have them put you in touch with quality elementary, middle or high school teachers in which you can go observe once or twice a week when it works in your schedule. It is powerful the learning that can take place when you have no agenda or requirements and you are able to just observe and absorb. Once you graduate and are in the classroom, work to build strong, healthy and authentic relationships with each of your students and set up the conditions for your students to do the same with one another.

What do you like to do with your time outside of work?

My wife and I love to travel and create memories experiencing new places. We most recently traveled to Croatia and Ireland. Driving on the opposite side of the road in Ireland, navigating roundabouts traveling in the clockwise direction, and wondering if a tour bus was going to be on the other end of a sharp corner is something I will never forget! Outside of travel, we also enjoy watching a variety of different sporting events and getting together with friends and family where you'll often find us grilling out, playing cards and enjoying life together.



2018-2019 Arnold C. Ott Lectureship in Chemistry

The Arnold C. Ott Lectureship in Chemistry was created and endowed by a generous gift from Dr. Arnold C. Ott and Marion Ott. Dr. Ott received his Ph.D. in 1943 from Michigan State University in Chemistry/Physics/Bacteriology and is a leading chemist and entrepreneur in West Michigan. He is one of the co-founders of Grand Valley State University and served on the GVSU Board of Trustees for 28 years.

Steven Buchwald - Fall 2018



In October 2018, the Chemistry Department was pleased to welcome Dr. Steven Buchwald to GVSU to give two lectures covering his work on the development of novel synthetic methods in organic synthesis. Professor Buchwald, the Camille Dreyfus Professor of Chemistry at the Massachusetts Institute of Technology, is well-known for his group's work on the

development of transition metal catalysts to effect selective carbon-carbon and carbon-heteroatom bond formation. On Thursday evening, October 4th, Dr. Buchwald presented a community talk entitled "The Development of Palladium-Catalyzed Carbon-Nitrogen Bond-Forming Reactions as a Key Technology for the Pharmaceutical Industry" at Loosemore Auditorium on GVSU's Grand Rapids campus. In this lecture, he described his path to a career as an academic chemist, and discussed how he and members of his lab team developed a series of ever-improving catalysts for use in the development of novel drugs. The next day, with the GVSU Chemistry community as an audience, he gave a more research-focused talk entitled "Copper-Catalyzed Hydrofunctionalization of Alkenes as a Tool for Asymmetric Catalysis".



Melanie Sanford - Winter 2019

Dr. Melanie Sanford, the Arthur F. Thurnau Professor of Chemistry at the University of Michigan, was the Ott Lecturer for the Winter semester. At The University of Michigan since 2003, Professor Sanford and her colleagues pursue a wide variety of chemical problems including the development of novel methods for fluorination of compounds to the development of sustainable energy technology. Her public lecture, entitled "New Ways to Make Molecules: From Fundamental Science to Applications in Medical Imaging and Drug Development", was presented on Thursday, April 4th. In that talk, she spoke of how she and her lab developed fluorination techniques that had been previously thought too difficult, and how these new methods were useful in the development of agrochemicals and medical innovations.

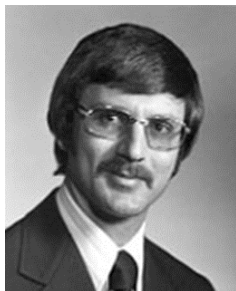


Her talk to the Chemistry Department the following day, "Developing Organic and Inorganic Molecules for Electrical Energy Storage" focused on the synthesis of new compounds for use in flow batteries, and how improvements in such batteries may someday allow for large-scale storage of solar and wind-generated energy.

farewell

Long-time Chemistry Department Chair Harvey Nikkel Retires

When Professor Harvey Nikkel arrived at Grand Valley in the Fall of 1974, the world that he entered would hardly be recognizable to those who inhabit it today. The school—known then known as Grand Valley State Colleges—was limited to about 15 buildings, and students could take correspondence classes by mail. After teaching at another Midwestern public school for four years, Nikkel had been hired as the 7th member of Grand Valley's Chemistry Department and its resident biochemist. Regarding his previous job, he remarks that he had become frustrated at the way undergraduate education took a back seat to faculty research interests, and was looking for something different.



Nikkel is one of only a handful of people who were present for all of the remarkable changes that occurred over the last 45 years. First came the conversion from an academic year based on quarters to a semester system in 1980. "The change from three 10-week quarters to two 14-week semesters lost us instruction time, but made room for the establishment of the Spring/Summer sessions that continue today," Nikkel noted. A reorganization in 1983 moved Chemistry into the newly created the Science and Math Division and another in 1987 yielded the transformation to a full University structure. The year 1988 marked GVSU's establishment of a campus on the Grand River in Grand Rapids. This downtown presence was extended in the early 2000s with the Center for Health Sciences and the DeVos Campus, with major impacts on the department's research and teaching footprint. Perhaps the most profound impact on Chemistry however was the 1995 transformation of Loutit Hall into the renovated and expanded Padnos Hall, the department's current home. Nikkel said that for many years, it had been necessary for Chemistry faculty to share offices in the cramped Loutit, and the rapidly expanding science programs had far outgrown their spaces. "We only had a few laboratories, so we had to use them for multiple classes. One room had labs scheduled over 45 hours a week". The remarkable growth of the student body in the 1990s and 2000s is perhaps the most dramatic change though. "In the early days, we had 7-8 Chemistry majors graduate each year, while the graduating class of 2019 numbered 43," says Nikkel.

awards over the last 40 years. Nikkel himself received the most prestigious of these awards—University Outstanding Teacher—in 1987. The desire to keep undergraduate teaching as the top priority led Nikkel to resist any outside pressure to start a research-based graduate program, and GVSU Chemistry currently ranks as one of the largest departments in the country that focuses fully on undergraduates. Despite this resistance to delve into graduate research, Harvey's initial years as chair coincides with another large change in the department: the expansion of undergraduate research. Thirty years after the department began this push, high quality research experiences for Chemistry and Biochemistry majors abound, with students regularly publishing scientific manuscripts and presenting at national conferences. True to Nikkel's vision to keep the emphasis on the student's education, however, the focus of these research experiences remains on teaching experimental skills and scientific thinking.

In the late 1970s, Nikkel recounts that the Chemistry faculty was a tight group, because there were only five full-time professors. "In those days, Charlie Knop, Dick Atkinson, Gary Richmond and I would meet every day in Eileen Paré's office for lunch". When he took the helm as chair, Harvey set out to continue the tone of collegiality, even as the department grew by leaps-and-bounds. Colleagues were encouraged to share their teaching resources and learn from each other, something he himself practiced for over forty years, noting, "Every time I visited a classroom, I learned something about teaching". New faculty were given an unusually strong voice in departmental affairs. "I was amazed that even in my first year, Harvey treated me as an equal," says Professor Brad Wallar, a fellow biochemist. "He would come around to my office and ask how I was doing, and what I thought about various issues—and he really wanted to know."



After stepping down as Chair in 2003, Harvey returned to Biochemistry instruction full time, with a particular emphasis on Biochemistry classes for Allied Health students. His desire to keeping learning prompted two sabbaticals to update his skills in the area of recombinant DNA technology, including a stint at the Van Andel Research Institute. As for his future, Harvey and his wife, Linda, are excited to travel, garden and extend their extensive volunteer work.



Harvey Nikkel and Linus Pauling (left) during the Nobel Laureate's visit to GVSU in 1985

Harvey's most enduring legacy can be traced to the nearly 15 years he served as chair (1989-2003). His philosophy that quality teaching should be the department's top priority was reflected in hiring decisions, and many current faculty remember his signature interview statement: "We are looking for a candidate who has

an irrational desire to teach." The strength of this emphasis can be seen in the fact that Chemistry faculty have received over 30 teaching

Professor Ed Baum retires

Professor Ed Baum, a member of the Chemistry Department and a key contributor to science education in the Honors College retired in May of 2019. Ed joined the Chemistry Department in 1983 and served as Unit Head from 1983 – 1989. Professor Baum won the 1999 GVSU Outstanding Contribution in a Discipline for his work in the field of Chemometrics, and is the author of a 1997 textbook on the subject entitled Chemical Property Estimation - Theory and Practice. After 2000, he gradually shifted his efforts to teaching in the Honors College, and became Director of the Center for Excellence in Science and Mathematics Education.



Professor Andrew Korich takes new position

After 8 years teaching and mentoring research students in the Chemistry Department, associate professor Andrew Korich has moved from GVSU to a new position in the Chemistry Department at St. Michaels College in Burlington, Vermont. We wish Andrew and his family much continued success in their new home and position.

Long-time Instructor Ellen Siu Retires

Affiliate Faculty Ellen Siu retired in May 2019. Professor Siu started as an adjunct in 1995, and focused her teaching efforts on chemistry courses taken by Allied Health students and moved into the role of

Affiliate in 2002. An earlier stint as a research technician at a transplantation surgery center in Colorado gave rise to her efforts to demonstrate the importance of chemical principles in the medical field. Members of the Chemistry Department appreciated how she could teach such a broad range of classes, and how she was willing to mentor new faculty in the art of teaching labs. In retirement, Ellen plans a variety of activities including biking, skiing, genealogy, spending more time with her grandchildren and continuing her long-running pastime of judging figure skating.



Alumni Spotlight

Angela Norton (Bopra) Chemistry 2008 Business Development Manager, Perrigo



Why did you choose GVSU and what year did you graduate? GVSU was on my radar because I had a cousin who was attending and loved it, and I had attended a basketball camp at GVSU when I was in middle school. Grand Valley offered me a great scholarship and with my cousin already attending, it won. I liked Grand Valley so much that I came back for my MBA as well. I graduated with my BS in Chemistry in 2008 and my MBA in 2018.

What are you doing today, and how did your education at GVSU help prepare you for your current work? I am a business development manager at Perrigo, where I have the responsibility of driving growth for half of our Americas selfcare business. I look for opportunities we could develop internally, partner externally, and/or acquire to provide growth 3-5 years into the future. It's an incredibly fast-paced and exciting job. My chemistry background puts me at a great advantage because I'm able to have thoughtful conversations about products and technology, and I can question when something doesn't fit within scientific rationale.

What was the biggest surprise for you in the path you have chosen? How valuable a scientific background is in

business – especially healthcare related businesses. I spent 6 years in the analytical R&D lab at Perrigo, and when I made a move to business development I thought my experience would put me at a disadvantage, however this has been a differentiator. My chemistry education trained me to develop a hypothesis and test it. I've been able to leverage that skill to tackle new business and product opportunities, which has led to better informed decisions.

What is the most exciting (or gratifying) part of your current work? I get the most excitement out of my work when I'm working on building a business case for something new to the market. This requires me to dive into something new: researching trends, products and ingredients in order to figure out how to win in that space.

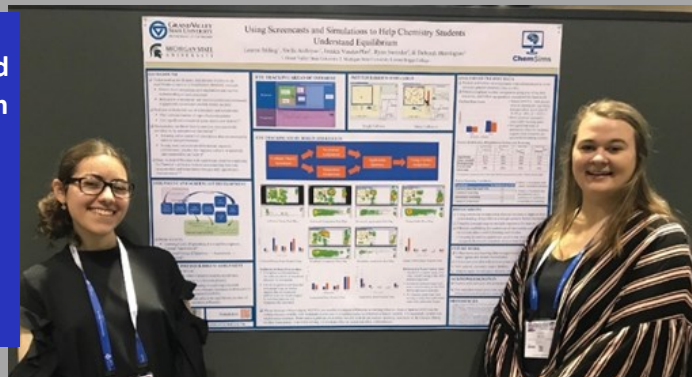
What advice do you have for GVSU Chemistry students who wish to pursue the same path as you have? I have a couple of pieces of advice. First, your major does not dictate where you will end up. Be open to continually learning and don't be scared to pursue something that's new. There are opportunities if you're willing to try. Second, if you want to advance in your career, you have to be willing to put in hard work and show that you are capable of more challenging tasks. Not to say that you need to put in a 70-hour work week, but you can't be packing up 10 minutes before your day is done so you can clock out directly on time.

What do you like to do with your time outside of work? I spend the majority of time outside of work with my family (husband, two daughters and dog). We are very involved in our church and our community, where we spend a significant amount of time volunteering for organizations that are working to address homelessness and socioeconomic inequality. Additionally, I love to cook, garden and do jigsaw puzzles.

Any other comments? I'm a PhD dropout. Not everything in life will follow a linear line or will be the right fit for you. The most important piece of advice I can give is: take with you what works, leave behind what doesn't and don't worry about much else.



Stella Archiyan and Lauren Miling from the Herrington group present at the National ACS meeting in Orlando, FL



Supporting our Students and the Chemistry Department

There are multiple ways that you can help continue your support of the GVSU Chemistry Department. The following is a list of funds that directly support GVSU chemistry students and the Department. To provide support for any of these programs go to www.gvsu.edu/give, choose *Other Fund* and search for the program name.

Retaining and Inspiring students in Science & Engineering (RISE) Program (Search: STEM Student Mentoring)

GVSU was awarded a five-year, one million dollar National Science Foundation (NSF) grant to support academically talented, economically disadvantaged students majoring in Science, Technology, Engineering, and Mathematics (STEM) through the RISE program. This program provides scholarships, mentoring, and paid experiential learning opportunities including:

- Renewable scholarship support
o\$2,000 per year or more
- Faculty mentoring
- Curricular/co-curricular support for activities including research, internships, and cooperative education

We are looking for additional funds to support more students and keep this valuable program going beyond the five-year NSF grant

Chemistry Scholarships and Fellowships

- ****Aaron M. DesRocher Memorial Chemistry Endowment Fund**: Assists enthusiastic upper level chemistry majors with finishing their educational journey with a minimum of educational debt.
- Mark A. Warren Memorial Scholarship**: Fund supports future junior and senior chemistry students complete their education.
- ****Ott-Stiner Fellowship in Chemistry and Natural Sciences Endowment**: Financially assists students who are focused in Chemistry and the Natural Sciences while providing mentoring for students in the GVSU Summer Scholars program.
- ****Professor Charles Knop Chemistry Scholarship Endowment**: Provides an award for an outstanding chemistry major.
- ****William Schroeder Undergrad Endowed Fellowship in Chemistry**: Assist students who participate in GV Student Summer Scholars program and interested in research in the field of Chemistry.

Chemistry Support Funds

- Chemistry Instruments and Infrastructure Fund**: The assets of this non-endowed fund are used to purchase and maintain instrumentation, software, and other infrastructure for research and teaching in Chemistry.
- Chemistry Support Fund**: This fund helps to ensure the Chemistry Department's ability to purchase and maintain excellent instrumentation for the long term. With support of faculty and alumni, seed money from Dr. Bill Schroeder, and a matching gift from Drs. Bob Smart and Sara Kane-Smart, this permanent resource has grown to over \$60,000.00!
- ****Weldon Memorial Chemistry Endowment**: This fund supports supplies, equipment, travel, and similar needs for undergraduate research projects in Chemistry

** Faculty & Staff, every gift you make to any of these endowed fund is matched by the university 1:1 for the same purpose.

Chemistry Department Instrumentation Update 2019

HPLC/MS

A new Advion HPLC/MS system was purchased and is intended to be used for research and training at GVSU. This instrument was funded by a grant from the National Science Foundation's Major Research Instrumentation program. The grant was awarded to Dr. Laura Hawk, grant author and principle investigator (PI) and co-PIs: Shannon Biros, Dalila Kovacs, Laurie Witucki, Paul Cook and Andy Lantz.

This instrument will complement the currently existing GC/MS systems by allowing mass spectra to be obtained on higher mass molecules. Accessories allow sample introduction versatility by use of electrospray ionization (ESI), atmospheric pressure chemical ionization (APCI), atmospheric solids analysis probe (ASAP), ultra-high pressure liquid chromatography (UHPLC), direct sample infusion, and also a thin layer chromatography (TLC) plate reader. The mass spectrometer has a mass range up to 2000 atomic mass units (AMUs).



Advion compact mass spectrometer with UHPLC and TLC reader (Advion photo)

Kugelrohr

A second Kugelrohr unit was purchased with help from the Dean's office. In case you were wondering a Kugelrohr is a short path distillation device used under vacuum to distill smaller quantities of compounds with higher boiling points. This device will aid researchers and will also serve the advanced synthesis laboratory sections.

SFE

A supercritical fluid extractor (SFE) from Applied Separations was also purchased with help from the Dean's office. This instrument will help the chemistry department's green chemistry effort by allowing us to do supercritical fluid carbon dioxide extractions of herbs, spices, and compounds of interest from plants, foods, drugs, etc. without the use of harmful solvents.

Another interesting use is in the preparation of nanoparticles. The unit should be arriving in time for the fall semester.

The Chemistry Instruments and Infrastructure fund is a non-endowed fund that provides much needed monies for new instrumentation. Donations from our graduates are encouraged and of course much appreciated! In addition, donated equipment is always welcome.



Applied Separations SFE unit (Applied Separations photo)

A collage of four photographs from the 33rd Annual Symposium of the Protein Society in Seattle. The top-left photo shows Erin Fish standing next to her award-winning poster. The top-right photo is a graphic for the symposium with the text '33rd Annual Symposium June 30 - July 3, 2019 Seattle, WA'. The bottom-left photo shows a group of four people, including Shea Siwik, Dr. Paul Cook, Michaela Castleman, and Dolly West. The bottom-right photo is a graphic with the text 'Erin Fish from the Wallar and Powers groups won the award for "Best Undergraduate Poster" at the Annual Symposium of the Protein Society in Seattle.'

Erin Fish from the Wallar and Powers groups won the award for "Best Undergraduate Poster" at the Annual Symposium of the Protein Society in Seattle.

33rd Annual Symposium
June 30 - July 3, 2019
Seattle, WA

Shea Siwik, Dr. Paul Cook, Michaela Castleman and Dolly West at the Annual Symposium of the Protein Society in Seattle.

Faculty & Staff Awards

Paul Cook: Distinguished Undergraduate Mentoring Award

Professor Paul Cook was selected as the recipient of the GVSU Distinguished Undergraduate Mentoring Award for 2019. Since joining GVSU in 2013, Dr. Cook has worked with dozens of students researching how bacteria become resistant to the antibiotic fosfomycin. Cook works closely with these students to help them learn techniques such as protein purification, enzyme assays and molecular cloning, but the main focus of the lab is protein structure determination through X-ray crystallography. His students have presented their work at national conferences, served as authors on publications, and continued their training at prestigious graduate programs. His most significant impact comes through a passion for research, as noted by a former student: "He helped me recognize and understand my love of biochemistry and experimental science."

Sarah Clark: CLAS Teaching Excellence Award for Affiliate Faculty

This year's recipient of the CLAS Teaching Excellence Award for Affiliate Faculty is Professor Sarah Clark. Focusing her efforts on General Chemistry, Introductory Chemistry and Preparatory Chemistry, Prof. Clark is known for highly effective practices in teaching, and also for connecting with students to provide positive relationships and academic support. One student in her CHM 100 class noted, "she is able to inspire the classroom to WANT to learn, and to make it exciting every day." A very reflective instructor, she regularly attends and presents at teaching conferences, and incorporates proven methods into her classroom. In addition to her outstanding work in the classroom, Prof. Clark heads up the Chemistry Success Center, including hiring and training the tutors that work with students all across the curriculum.

Rachel Powers: Fulbright Grant

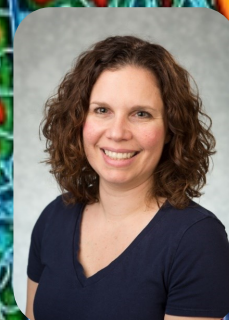
Professor Rachel Powers has been awarded a Fulbright Grant to support a research and teaching experience in Argentina in the Winter semester of 2020. The Fulbright Program is designed to promote mutual understanding between the people of the United States and the people of other countries. Dr. Powers will carry out research in the laboratory of Drs. Gabriel Gutkind and Pablo Power at the University of Buenos Aires. Already an expert in the biochemistry of antibiotic resistance, she will expand her work by identifying and characterizing novel β -lactamases from a variety of different environmental non-pathogenic microorganisms. In addition to her research work, Dr. Powers will teach a class on the structural aspects of β -lactamase enzymes.

Mary Karpen: Maxine Swanson Award

Professor Mary Karpen was selected to receive the Grand Valley State University Maxine Swanson Award for 2019. This award is conferred by the GVSU Women's Commission, and recognizes a person with extensive leadership in support of the rights of women at Grand Valley State University. As part of her nomination, it was noted that Dr. Karpen "serves as a role model for women in STEM, while at the same time increasing opportunities for students who wish to pursue STEM fields." Professor Karpen was cited for her long history of advocacy for part-time faculty and her passionate outreach activities to encourage girls and young women to pursue careers in science. She also has an extensive history of sharing her STEM expertise with students from the Grand Rapids Public Schools by participating in math and science tutoring and starting a science club at City Middle School.

Shannon Biros: CLAS Annual Faculty Service

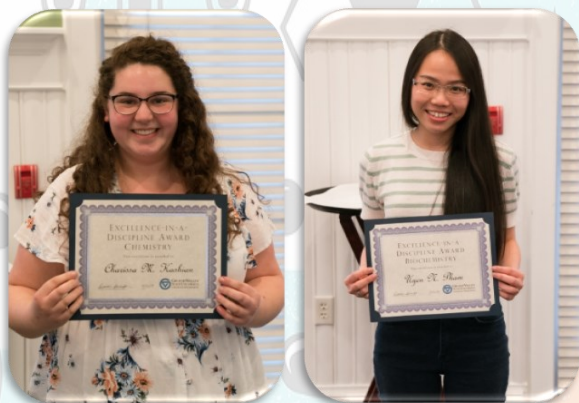
For her extensive work on behalf of the Chemistry Department, the College of Liberal Arts and Sciences and the broader scientific community, Professor Shannon Biros received the CLAS Annual Faculty Service Award. Among a myriad of efforts, Biros served as the Chair of the CLAS Faculty Development committee, sat on the University Sabbatical Review Committee, helped hire an assistant CLAS Dean, and sponsored a research symposium at the National ACS meeting highlighting research at primarily undergraduate institutions. One supporter of her nomination stated: "She is very organized, continually solicits feedback, and is able to motivate committee members to be thoughtful in their service." Perhaps most notably for the department, Dr. Biros spear-headed a successfully funded grant proposal to purchase a new 400 MHz NMR that is already being extensively used by many researchers and hundreds of organic chemistry students.



ANNUAL STUDENT AWARDS

In April of 2019, the Chemistry Department honored many of its most outstanding students for the 2018-2019 academic year. The award winners in the different categories were as follows:

Excellence in a Discipline Award: The top award for undergraduate Chemistry and Biochemistry majors. To be eligible, a senior, presenting in CHM 491 this academic year, must be a declared chemistry or biochemistry major and have an overall GPA of 3.5 or greater. The award recipients were **Charissa Kashian** (Chemistry) and **Uyen Pham** (Biochemistry).



ACS Poly-Ed Award in Organic Chemistry: **Brock Stenfors** This award recognizes a student that excels in the major's organic chemistry sequence (CHM 245/246/247/248).

ACS Analytical Chemistry Division Undergraduate Award: **Sabrina Jenkins** This award is given to a declared chemistry or biochemistry major who is outstanding in CHM 221 (Analytical Chemistry) and CHM 325 (Instrumental Analysis).

ACS Inorganic Division Chemistry Undergraduate Award: **Sabrina Jenkins** This award is given to a chemistry or biochemistry major that has excelled in the inorganic chemistry courses (Principles of Inorganic Chemistry/Advanced Inorganic Chemistry/Synthetic Inorganic Chemistry).

ACS Physical Chemistry Division Undergraduate Award: **Nicholas Dewey** This award recognizes a declared chemistry or biochemistry major that has excelled in the upper level physical chemistry sequence (CHM 356/358).

ACS Outstanding Achievement in Organic Chemistry Award: **Andrew Freiburger** This award is given to a graduating chemistry or biochemistry major who has excelled in a combination of organic chemistry courses (Advanced Topics in Organic Chemistry/Synthetic

Polymers/Organic Synthesis and Characterization) and research and has a desire to pursue a career in chemistry.



Outstanding Undergraduate Research Award: **Kyle Korman** In order to be eligible for this award, a declared chemistry or biochemistry major must show outstanding skills, motivation, and progress in undergraduate research.

Green Chemistry Award: **Nicholas Actis** This award is given to a declared chemistry major who has excelled in the green chemistry courses (Green Chemistry for Sustainable Environment/Green and Environmental Chemistry Laboratory).

Biochemistry Award: **Michaela Castleman**. This award is given to a declared chemistry or biochemistry major who has excelled in the Biochemistry I/Biochemistry II/Biochemical Techniques sequence.

Senior Chemical Education Award: **Katelyn Mackowski** This award is given to a Chemical Education major, typically a graduating senior or other student who has successfully completed Physical Chemistry in Secondary Education (SCI 440) and who has demonstrated professionalism as a preservice teacher.

American Institute of Chemists Award: This award is given to a declared chemistry or biochemistry major who has made significant contributions in service to the department. This year, the winners were **Caleb Huizenga** (Chemistry) and **Brandy Curtis** (Biochemistry).

Outstanding Service Award: This award will be given to a declared chemistry or biochemistry major who has made significant contributions in service to the department. This year's award was given to the Officers of the ChemClub (**Emma Krueger, Michaela Castleman, Nicole Yakimovich and Caleb Huizenga**).



Faculty News and Research Highlights

Dr. Shannon Biros and her research group, in collaboration with Chemistry colleague **Dr. John Bender**, continue to synthesize novel compounds for use as lanthanide and actinide extraction agents. In the past year, the efforts of her lab group led to the publication of a manuscript in *Acta Crystallographica Section E* featuring the work of Chemistry major Andrew VanderWeide. Professor Biros also published a review article in *Organic Chemistry Frontiers* entitled "Regio- and stereo-selective decarbonylative alkylative arylation of terminal alkynes with aliphatic aldehydes and arenes via dual C-H bond functionalization".

Dr. Paul Cook and his group continue their work on structural and functional studies of the enzymes that produce and utilize bacillithiol, a molecule critical to bacterial resistance to the antibiotic fosfomycin. The group published a paper in the journal *Protein Science* describing the X-ray crystallographic structure and function of the enzyme that initiates bacillithiol production (BshA), with GVSU biochemistry alumnus Chris Royer as the first author. Students Shea Siwik and Michaela Castleman presented a poster at the Midwest Enzyme Chemistry Conference in Evanston, IL describing their work with the second enzyme of the pathway (BshB). The ultimate goal of this work is to find new avenues to combat antibiotic resistance in certain pathogenic bacteria. He will be on sabbatical during the 2019-2020 academic year during which he will complete current work relating to bacillithiol metabolism, develop new student-centered projects, and submit the renewal for his NIH grant.

Dr. Brittlund DeKorver is developing a survey to measure students' perceptions of risk and fear in chemistry laboratory coursework, collaborating with Dr. Sango Otieno from the Department of Statistics. She presented her results at the Gordon Research Conference on Chemical Education Research and Practice in June. Her poster was one of three selected to be presented as a talk on the final day of the conference. DeKorver is also working with undergraduate student Selin Turan on a project to investigate potential sources of bias in general chemistry exams. DeKorver co-authored two peer-reviewed publications during the past year: "Supporting the growth and impact of the chemistry education research community" in the *Journal of Chemical Education*, and "Fusion Story Form: A novel, hybrid form of story that promotes and assesses concept learning" in the *International Journal of Chemistry Education*. During the summer, DeKorver worked with Dr. Feryal Alayont (Department of Statistics) to add chemistry sessions to the 2019 Mathematics and Science Summer Camp, sponsored by Michigan Space Grant Consortium. The middle school students attending camp learned how to use electrostatic potential maps to interpret chemical polarity and predict the results of their extraction and chromatography experiments.

Dr. Laura Hawk secured funds to purchase a Liquid-Chromatography Mass Spectrometer (LC-MS). This instrument was funded through a Major Research Instrumentation (MRI) grant through the National Science Foundation.

Dr. Julie Henderleiter is collaborating with the Regional Math Science Center, GVSU faculty from biology and math and teachers and administrators across Battle Creek Public Schools to launch a STEM academy for 6-8 grade students beginning this fall.

Dr. Debbie Herrington continued her work with Dr. Ryan Stowe (University Wisconsin Madison) and several high school chemistry teachers on the development and testing of a research-based high school chemistry curriculum aligned with the Next Generation Science

Standards. She is also working on a multi-institution NSF-funded collaboration with Michigan State University, Florida International University, and Kansas State University to provide and assess a STEM-focused faculty development program that promotes the use of three-dimensional instruction and assessment. Herrington is also part of the NSF funded Facilitating Online-learning in Chemistry Using Simulations project in collaboration with **Dr. Jessica VandenPlas** (GVSU) and Dr. Ryan Sweeder (MSU), working with GVSU undergraduate students Lauren Miling, Stella Archiyan, and Elizabeth Sielaff on data collection and analysis. She also continues to collaborate with Dr. Ryan Sweeder (MSU) on the development and assessment of the use of text-messages to engage students with regularly spaced formative assessment prompts that require students to construct coherent science explanations. This work was disseminated through three conference talks, a student-presented poster and eight published manuscripts, including "Using Text Messages to Encourage Meaningful Self-Assessment Outside of the Classroom" in the *Journal of Chemical Education*.

Dr. Dalila Kovacs' lab is researching the use of Shrub Willow biomass as a chemical feedstock, and also the isolation and transformation of naturally-derived compounds as potential platform molecules. A highlight of the year was the 23rd Annual Green Chemistry & Engineering Conference in Reston, VA, at which Prof. Kovacs organized a symposium titled "Linking Chemical Design to Toxicity/Hazard/Alternatives Assessment". Chemistry majors Brooke Maguire and Breezy Squires presented the poster "Rapid and efficient extraction of essential oils" and Andrew Frieburger gave a talk titled "Biomass and biorefinery: A project for undergraduate laboratory". Professor Kovacs also published a manuscript in *Green Chemistry Letters and Reviews* titled "Contemporary concepts in toxicology: a novel multi-instructor general education course to enhance green chemistry and biomedical curricula".

The lab of **Dr. Andy Lantz** focused on three broad research projects including a) the development of organic redox electrolytes for energy storage in flow batteries, b) the development of a capillary electrophoresis based method for the isoelectric focusing of GAP-43 protein, and c) the development of in-field methods for analysis of primate olfactory compounds using portable gas chromatography-mass spectrometry instrumentation. Andy and Chemistry major Sydney Shevalier received a grant from the Michigan Space Grant Consortium for work on the first project. This work resulted in a the presentation of a poster entitled "Development of Organic Flow Cell Electrolytes for Terrestrial and Space Based Large-Scale Energy Storage" at the Michigan Space Grant Consortium Conference as well as a paper submitted to *ACS Applied Energy Materials*.

The lab of **Dr. Dave Leonard** continued its focus on the study of proteins involved in antibiotic resistance. Senior Biochemistry/CMB major Emma Krueger explored clinical variants of the cell-wall synthesizing enzyme PBP3 and after graduation began work at the Van Andel Research Institute. Former BMS major Kevin Chui presented a poster titled "Mutations at Arginine-148 in the ADC-7 Cephalosporinase Confer the Ability to Hydrolyze Cefepime" at the 38th Midwest Enzyme Chemistry Conference, and will begin graduate work at the University of Utah this Fall. Starting in May 2018, Leonard took on the role of Associate Chair of Student Affairs in the Chemistry Department.

Dr. Richard Lord gave a talk titled "Computational exploration of the electronic structure and reactivity of high-valent transition metal

carbenes in bis(alkoxide) ligand environments" at CERMACS in Midland, MI (June 2019). The Lord group also published five manuscripts over the past year, including one in *Organometallics* featuring the work of Chemistry major Nick Dewey. (Ketenimine Formation Catalyzed by a High-Valent Cobalt Carbene in Bulky Alkoxide Ligand Environment). Graduating lab members Caleb Huizinga (graduate school, Indiana University) and Liz Washnock-Schmid (applying for medical school) also published a paper in *Inorganic Chemistry* titled Catalytic Nitrene Homocoupling by an Iron(II) Bis(alkoxide) Complex: Bulking Up the Alkoxide Enables a Wider Range of Substrates and Provides Insight into the Reaction Mechanism. Richard and his wife Sarah welcomed a daughter, Freya Adley Lord in March.

Dr. Felix Ngassa continues research in synthetic organic and computational chemistry. Three undergraduate coworkers were involved in research projects in the Ngassa lab in the 2018-2019 school year. A synthetic project involving three undergraduate students on "Crystal Structure of 2,4-Dinitro-N-propylaniline" is currently being written for publication in *Acta Crystallographica Section E Crystallographic Communications*, 2019. Dr. Ngassa received a patent entitled "Heterogeneous Foldamers Containing Alpha, Beta, and/or Gamma-Amino Acids".

Dr. Rachel Powers and her research group are involved with several projects that focus on the structure, function, and inhibition of β -lactamases, key antibiotic resistance targets. Using a structure-based approach, they are characterizing novel inhibitors for class C and class D β -lactamases. These projects are in collaborations with GVSU colleagues **Drs. Brad Wallar and Dave Leonard**, Dr. Robert Bonomo (Cleveland VA Hospital), and Drs. Fabio Prati and Emilia Caselli (University of Modena, Italy). Dr. Powers' research group is saying farewell to students Brian Basinski (graduate school at the University of Michigan), Uyen Pham (graduate school at Duke University), Naomi Parker (gap year before applying to medical school), Emily Claeboe (graduate school at the University of Indiana). In collaboration with the Wallar group, Dr. Powers had two posters at the Protein Society Meeting in June: "Characterization of Novel Triazole-Containing Boronic Acid Transition State Inhibitors (BATSIs) for *Acinetobacter*-derived Cephalosporinase (ADC-7)" (presented by Biochemistry major Erin Fish) and "Structural Characterization of *Acinetobacter*-Derived Cephalosporinase-7 in Complex with Ceftazidime and its Transition State Analog" (presented by Biochemistry major Brandy Curtis). Dr. Powers received a Fulbright fellowship to carry out research and teach in Argentina in the Spring of 2020 (see Faculty awards).

Dr. Stephanie Schaertel collaborated with Chemistry colleague **Dr. George McBane** and Chemistry major Ted Schultz on a project measuring pressure-broadening coefficients of carbon monoxide. Additionally, Dr. Schaertel worked with several other GVSU/GRCC faculty members and GVSU student tutors to continue a collaborative program with Grand Rapids Public Schools. In this program, the faculty and student tutors help GRPS students prepare for International Baccalaureate examinations in science and mathematics.

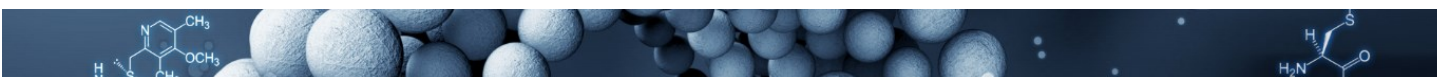
During the 2018-2019 academic year, the lab of **Dr. Scott Thorgaard** has continued its research in nanoelectrochemistry. Students Sabrina Jenkins and Anna Tarach each completed projects focused on

electrochemical tracking of individual bacteria using ultramicroelectrodes, following up on work which former student Austin Ronspees and Thorgaard published in 2018 (*Electrochimica Acta*, 2018, 278, 412–420). Sabrina and Anna were both supported by GVSU Student Summer Scholar awards, and both won Ott-Stiner fellowships (in 2018 and 2019, respectively). Anna was also supported by a Michigan Space Grant Consortium grant. Sam Stahl worked on a different project to study the influence of reactions having surface adsorbing products on single nanoparticle collisions at ultramicroelectrodes. Sabrina will present her findings nationally at the 2019 fall ACS meeting, while Anna and Sam will present at Pittcon 2020 in March.

Dr. Jessica VandenPlas co-edited the book "Eye Tracking for the Chemistry Education Researcher" published by the American Chemical Society. This book featured work presented at an ACS symposium and included two chapters by VandenPlas and collaborators including "Using Fixations To Measure Attention".

Dr. Brad Wallar and his research group are focused on the structure, function, and inhibition of class C β -lactamases. These enzymes play an important role in the multidrug-resistance of *Acinetobacter baumannii*; an organism that presents one of the greatest challenges to contemporary antimicrobial chemotherapy, as noted by the Centers for Disease Control and the World Health Organization. The class C β -lactamase enzymes in *A. baumannii*, known as *Acinetobacter*-derived cephalosporinases (ADCs), can bind and inactivate many different antibiotics. In collaboration with researchers from GVSU (**Drs. Powers and Leonard**), Case Western Reserve, and Università di Modena e Reggio Emilia (Italy), the Wallar lab is working on characterizing molecules that can bind and inhibit ADC enzymes. Throughout the last year, the Wallar research lab has consisted of biochemistry majors Brandy Curtis (who is beginning graduate studies at Univ. North Carolina in Fall 2019) and Erin Fish (pre-MD/PhD student supported by Beckman and Goldwater Scholarships). New students Micah Fernando and Violet Ruiz both start in the lab after receiving an Ott-Stiner Fellowship and McNair Scholarship, respectively.

Dr. Randy Winchester's group continues its focus on silicon chemistry with three projects: a) dynamic NMR studies of sterically hindered diarylsilanes and b) synthesis of vinylsilyl anions, and c) synthesis of silicon based analogs of modafanil. During a sabbatical leave (Fall 2018 – Winter 2019), Winchester worked at the University of Missouri St. Louis with his new collaborator Janet Braddock-Wilking on a project synthesizing luminescent-silafluorenes as potential biological probes. Over the past year the group's work led to a manuscript published in *Acta Crystallogr E Cryst Communications* "Crystal structures of 2-bromo-1,1,1,3,3,3-hexamethyl-2-(trimethylsilyl)trisilane and 2-bromo-1,1,1,3,3,3-hexaisopropyl-2-(triisopropylsilyl)trisilane," another submitted to *Magnetic Resonance and Chemistry*, and two talks (one at the 50th Silicon Symposium 2019 and the other at the National ACS Meeting in Orlando). Winchester currently serves as the chair of the Western Michigan section of the American Chemical Society.

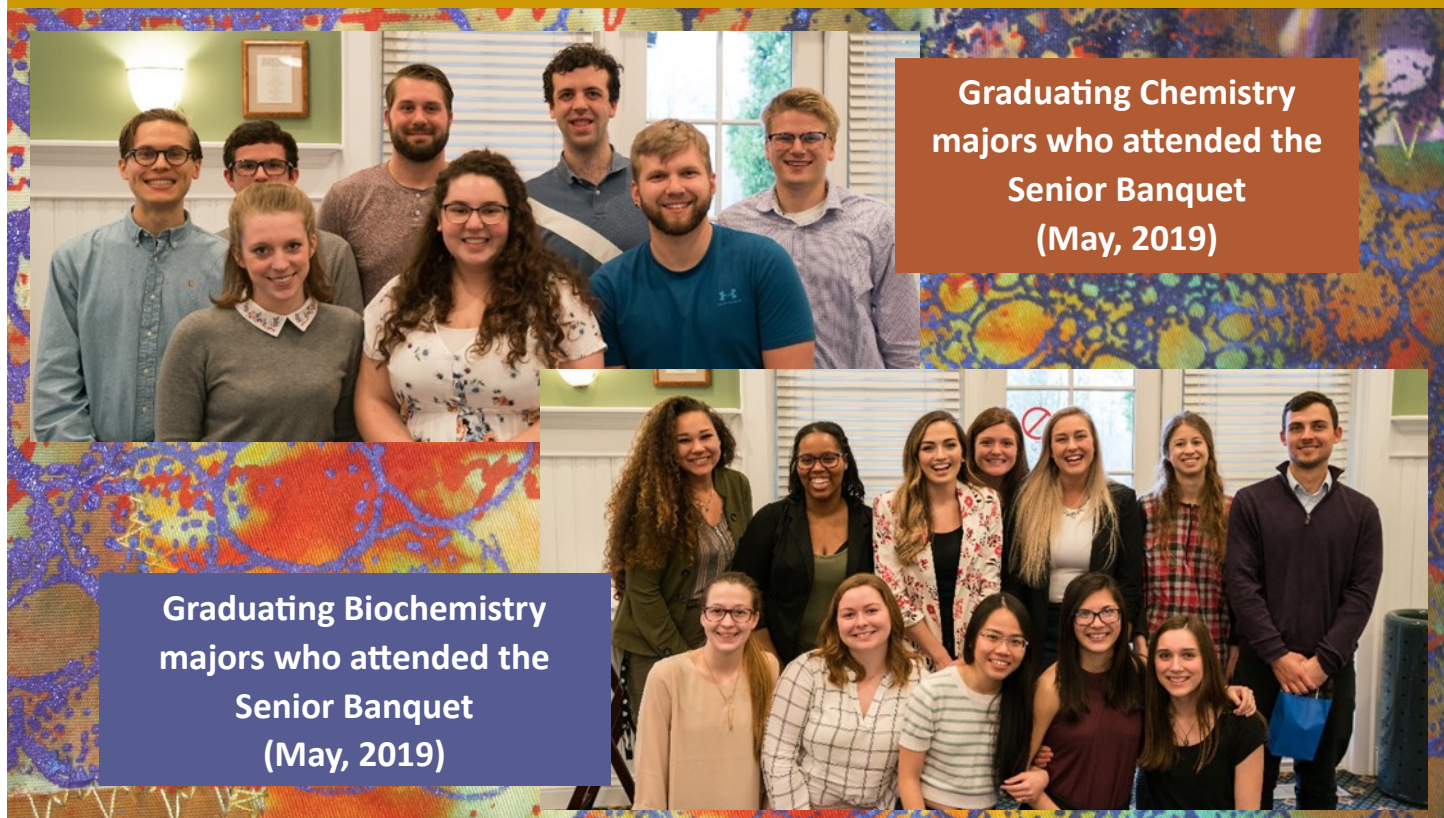




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**Graduating Chemistry
majors who attended the
Senior Banquet
(May, 2019)**

**Graduating Biochemistry
majors who attended the
Senior Banquet
(May, 2019)**