

News from the Hampden-Sydney Sciences 2023-24

Biology—by Michael J. Wolyniak

Dr. Kristian M. Hargadon '01 continued work on a number of exciting projects during the 2023-2024 academic year. His lab has recently been focused on engineering a variety of murine melanoma cell lines for projects related to understanding immune evasion and gene regulation by cancer cells. Of note, Dr. Hargadon worked closely with **Patrick Conde '23** and **Devanand "Davie" Clark '25** on CRISPR-Cas9 gene-editing studies to engineer a FOXC2-deficient melanoma cell line that will be used to investigate the role of the FOXC2 transcription factor in melanoma progression and drug resistance. Aspects of this work were presented by Davie Clark at the 2023 Commonwealth of Virginia Cancer Research Conference held at the University of Virginia. Davie will also be presenting follow-up work related to this project at the 2024 Annual Meeting of the American Association for Cancer Research that will be held in San Diego, CA this April.

In addition to his efforts in the lab, Dr. Hargadon also spent much of this past year serving as Co-Editor of a special issue Research Topic for the journal *Frontiers in Cell and Developmental Biology*. This Research Topic, entitled "Modulation of T-cell Function and Survival by the Tumor Microenvironment," includes several original research and review articles focused on issues pertaining to tumor immune evasion and the immunotherapeutic strategies currently being designed to enhance anti-tumor immunity. Dr. Hargadon was also appointed as a founding Editorial Board member for *Discover Immunity*, a new peer-reviewed journal published by Springer Nature that is expected to launch later this year.

In the fall of 2023, Dr. Hargadon was honored by the University of Virginia School of Medicine when he was named the recipient of its Early Achievement Award in Biomedical Sciences. This award is given annually in recognition of an alumnus who has brought honor and distinction to the UVA School of Medicine by demonstrating outstanding leadership in – and making significant contributions to – the field of medicine early in their careers through research, discovery, and innovation.



H-SC was well-represented at the Virginia Academy of Sciences 2023 Undergraduate Research Meeting at Virginia Union University. Front: Dr. Michael Wolyniak, Henry Loehr '24. Back: Matthew Miscikowski '26, Bo Frazier '26, Marc Moroz '26.

Sydney history, as part of the college's upcoming 250th anniversary celebration. He is traveling this spring to give research seminars at universities and to serve as an external reviewer of biology programs at Virginia colleges, and he has multiple research trips lined up for the next year, including a return to Australia to give a talk and meet with researchers in Perth.

Dr. Rachel Goodman and her research students continue to survey wildlife diseases in reptiles and amphibians on our campus. Recently, the paper "Trace amounts of ranavirus detected in Common Musk Turtles (*Sternotherus odoratus*) at a site where the pathogen was previously common" was published in the journal *Animals* with co-authors Hery Carman '23, Paul Mahaffy '22, and Nathan Cabrera '24. She presented this work on behalf of the



UNIVERSIDAD DE NARIÑO
DEPARTAMENTO DE BIOLOGÍA
INVITAN A LA:

CONFERENCIA
ENFERMEDADES DE LA HERPETOFAUNA Y
PRÁCTICAS DE BIOSEGURIDAD EN EL CAMPO.



RACHEL M. GOODMAN PhD
PROFESORA DE BIOLOGÍA
HAMPDEN-SYDNEY COLLEGE EE.UU.

Septiembre 28 de 2023
Auditorio: Bloque sur Hora: 10:00 am

Dr. Rachel Goodman spent the Fall 2023 semester in Colombia as a Fulbright Scholar

group at the 2024 annual meeting of the Southeastern Partners in Amphibian and Reptile Conservation (SEPARC) in Alabama. She also led a working group session of the SEPARC Disease Task Team, completing her term as co-chair for this group. Dr. Goodman also presented research on a fungal pathogen of local snakes at the Virginia Academy of Sciences annual meeting at William & Mary University in 2023. The talk "Comparison of swab and tissue samples for detection of *Ophidiomyces ophiodiicola* in Eastern Wormsnakes (*Carphophis amoenus amoenus*)" represented research conducted with the aforementioned students and Gaelle Blanvillain of Virginia Tech. Dr. Goodman also recently co-authored a paper with several international co-authors, "Nocturnal basking in freshwater turtles: a global assessment," published in the journal Global Ecology and Conservation.

Dr. Goodman received a Fulbright Scholar Award to work in Colombia on a collaborative research project and educational outreach initiative for her sabbatical in the Fall of 2023. For 3 months, she worked between Universidad de Los Andes in Bogotá, University del Atlántico in Barranquilla, and University of Nariño in Pasto. Collaborating with La Asociación Colombiana de for ranavirus surveillance and field biosecurity. She gave several invited seminars in Spanish and co-mentored a Colombian undergraduate Leidy Gonzalez Galvis in her senior research.

Dr. Goodman is excited to start a new term as Coordinator for Environmental Studies this year and to start a new project investigating the presence of several pathogens in salamanders on campus -- so please let her know if you've seen any breeding pools in the woods!

Dr. Scott Starr spent most of last summer conducting research on Dragonfly and Damselfly (Odonata) diversity of Central Virginia. **Will Gardner '25** assisted in conducting fieldwork and identifying specimens in the lab. **Cullyn Cary '24** conducted research on the conservation status of Odonata found within Virginia. Cullyn presented her research at the Network for Undergraduate Research in Virginia (NURVa). This coming summer **Joe Newcomer '25** will continue research on the Dragonfly and Damselfly diversity of Central Virginia. **Haden VonCanon '27** will be starting a new research project on studying diversity of native bee species in central Virginia and comparing several sampling methodologies. Dr. Starr was awarded a grant from the Virginia Foundation for Independent Colleges to establish an apiary on campus and to expand the wildflower meadow. The first bee hives will be placed in the apiary this spring.

Dr. Michael Wolyniak worked with several students this past summer on research projects, including **Bo Frazier '26**, **Marc Moroz '26**, and **Henry Loehr '24**. Frazier presented his work at the 2024 SEA-PHAGES Symposium, while Loehr accompanied Wolyniak and **Becton Topping '24**, **Dorian Green '24**, **Connor Eickelman '24**, **Nathan Cabrera '24**, and **Pierce Gembors '25** to San Antonio to the Annual Meeting of the American Society for Biochemistry and Molecular Biology (ASBMB). On a national level, Dr. Wolyniak began a three-year term as the Chair of the Council on Undergraduate Research (CUR) Biology Division and continues to serve on the ASBMB Science Outreach and Communication Committee as well as a part of the Partnership for Undergraduate Life Science Education (PULSE).

Chemistry—by Ava R. Kreider-Mueller

Dr. Herbert Sipe, Spalding Professor of Chemistry, had a very busy year teaching, conducting research, and attending conferences! He attended an informal reunion of the Laboratory of Pharmacology and Toxicology at the National Institute of Environmental Health Sciences in Durham, NC in May of 2023. This is an almost annual event for alumni of the Free Radical Metabolite Research Group of Dr. Ronald P. Mason, who is now an emeritus member of the NIEHS staff. Dr. Sipe conducted research with Dr. Mason's group during his sabbatical leaves beginning in 1987-88 and in subsequent sabbaticals.

During the Summer of 2023, three students worked with Dr. Sipe: rising sophomore Ethan Currin investigated free radical chemistry of resveratrol and related compounds by fast flow ESR spectroscopy; rising junior Garrett Regan continued earlier studies of the antimalarial drug, amodiaquine; and rising senior Chase Magette investigated cyclic voltammetry as an electrochemical method for producing radical species for ESR spectroscopy.

In October 2023 Dr. Sipe presented a poster entitled "Electron Spin Resonance Spectroscopic Characterization of Phenoxy Radical from Thymol and Carvacrol" with coauthors Taylor McGee and Ethan Currin. These substances are constituents of thyme and oregano, respectively, and are purported to have significant antioxidant properties. Taylor did the spectroscopic studies as part of his advanced lab work and Ethan performed density functional molecular orbital calculations on the phenoxy radicals to rationalize their ESR hyperfine coupling constant assignments. The poster presentation was held at the Southeast Magnetic Resonance Conference which was combined with the American Chemical Society's Southeast Regional Meeting.

Dr. Ava Kreider-Mueller, a former Visiting Assistant Professor of Chemistry (2022-2023), was hired at the level of Assistant Professor in the Spring of 2023. Teaching a variety of classes including General Chemistry, Chemistry of the Environment, Inorganic Chemistry, and Advanced Inorganic Chemistry, "Dr. K" gets to continually explore all of her chemistry interests!

It's been a productive year in Dr. K's research group. During the summer of 2023 Dr. K worked for 8 weeks with three students on independent research projects: rising senior Thomas Morris, rising senior Jaron Concepcion, and rising senior Briggs Randall. Dr. Kreider-Mueller's research interests include synthetic coordination chemistry as it



Summer research students Chase Magette, Jaron Concepcion, Briggs Randall, Thomas Morris, and Ethan Currin enjoy a "lab lunch" at the "Fishin' Pig" with Dr. Sipe and Dr. Kreider-Mueller

relates to the study of humic substances. Dr. Kreider-Mueller mentored sophomore Evan Old in a research project as part of an independent study during the Fall of 2023. She is also acting as the mentor for Becton Topping's capstone project. Dr. Kreider-Mueller will be accompanying students Evan Old and Thomas Morris to the American Chemical Society Spring Meeting held in New Orleans in March, where they will be presenting their research at the undergraduate poster session. Thomas Morris will be presenting a poster entitled "Employing alkali metal carboxylate salts to model cation exchange in humic substances" and Evan Old will be presenting his poster entitled "Designing small coordination compounds for use in modeling metal ion competition and binding in humic substances".

In August 2024 the Chemistry Department welcomed **Dr. Glenn Gilyot** as a new Assistant Professor of Chemistry! Dr. Gilyot graduated from the University of Missouri-Columbia with a PhD in Chemistry. His area of focus is Organic Chemistry and Fluorescence Chemistry. Dr. Gilyot also finished with a graduate minor in College Teaching and a graduate certificate in Science Outreach. During his time at the University of Missouri he served as the graduate coordinator for STEM Cubs, a free K-5th grade STEM

education program that offered half-day camps once a semester. The purpose of the program is to offer science outreach experiences for kids from traditionally underrepresented groups in STEM and from rural areas. Dr. Gilyot also created a middle school component for the STEM Cubs program, which allowed them to offer the program to students in grades 6-8.

During his first two semesters at Hampden Sydney College, Dr. "G" has mentored four students as part of the Advanced Laboratory courses. One of those students, Garrett Regan, is presenting his research project at the 2024 American Chemical Society Spring National Meeting that is taking Place in New Orleans in March. Dr. Gilyot plans to take more students to conferences in the future to show them all of the exciting work that is happening in the field of chemistry. He believes that conferences are an important way to help students network and identify their future career paths.

Welcome to the Chemistry Department and to Hampden-Sydney College, Dr. G! We are thrilled to have you join our community of learners.

Dr. Timothy Reichart, Elliott Assistant Professor of Chemistry, has been working on some exciting projects in the Hampden-Sydney Chemistry Department this year! In the Spring of 2024 he launched a new course, entitled "Introduction to the Chemistry of Food", which has been an absolutely hit. From drawing Lewis Structures of biologically relevant molecules, to chewing gum and chocolate demonstrations, this course has been a "sweet success". Dr. Reichart has also acted as the mentor for senior Nathan Cabrera in his capstone project. Nathan will be presenting his work on the synthesis and analysis of the oligomerization state of the transmembrane domain of the accessory protein ORF7b from SARS-CoV-2 at the annual meeting of ASBMB in San Antonio, TX at the end of the March.

In addition to teaching and mentoring, Dr. Reichart has been busy with his own research. He recently published an article in Nature Chemistry with collaborators from the EPFL and University of Geneva in Switzerland entitled: "Tubulin engineering by semisynthesis reveals that polyglutamylolation directs detyrosination." (*Nature Chemistry*, **2023**, DOI:10.1038/s41557-023-01228-8). Dr. Reichart also presented his research at the 28th American Peptide Symposium, Poster presentation in Scottsdale, AZ in June of 2023.

Dr. Kevin Dunn, Chair of the Hampden-Sydney Chemistry Department, continues to tirelessly guide the department toward success. Now in our 2nd year in the new Pauley Science Center, Dr. Dunn has ensured that everyone in our chemistry community has been able to "settle in" comfortably. From overseeing the research spaces and maintaining all of the scientific instruments, to teaching Physical Chemistry and Advanced Laboratory, Dr. Dunn still finds time to be a chemistry hero to the world of handcrafted soap! Dr. Dunn was invited to give lectures at the Celebrate Lavender Conference held in Wytheville, Virginia, The Greener Life Annual Conference held in Erie, Pennsylvania, and Soapcon held Mt. Sterling, Kentucky. Being invited to give a lecture is an honor, and Dr. Dunn was invited to give five lectures at these various conferences! Well done, Dr. Dunn!



Dr. Glenn Gilyot joined the H-SC Chemistry faculty in 2023.



LaDawn Matthews became the Chemistry Department Lab Tech and Chemical Safety Officer in 2023.

In the Fall of 2023 the Chemistry Department was thrilled to welcome **Ms. LaDawn Matthews** as the new Chemistry Lab Technician and Safety Officer. Ms. Matthews graduated from Virginia Commonwealth University with a BS in Chemistry. She has 18 years of experience working in industry laboratories such as Afton Chemical, International Petroleum Additives Company, and West Rock. During her time in industry, she focused her efforts on quality, lab safety, and support. When Ms. Matthews is not on campus, she enjoys spending time volunteering for James River Greyhounds helping find retired racers forever homes. Ms. Matthews has become a vital part of the "chemistry team" and ensures that the department runs efficiently and effectively. Welcome to Hampden-Sydney College, Ms. Matthews!

The department purchased two new and exciting pieces of equipment this year: a new nitrogen glovebox which was installed in July 2023, and an automated flash

and prep chromatography system. The glovebox will allow air sensitive research to be conducted. These instruments will help both the professors and their students in their research projects!

In the spring of 2023 the chemistry department had 6 students graduate: Jake Brown (CHEM), Brett Reis (CHEM), Benjamin Rose (BCMB), Loyal “Trey” Grimes (BCMB), Tyler Hobart (BCMB), and Taylor McGee (BCMB). Brett Reis (Virginia Tech), Benjamin Rose (University of Colorado), and Tyler Hobart (NC State) all began their graduate school studies in Fall 2024. Trey Grimes is currently working as a medical scribe and Taylor McGee is working as a PostBac at the NIH.

Mathematics and Computer Science — by Michael C. Strayer

With collaborator Kailash Misra, **Dr. Rebecca Jayne** had a paper titled “Multiplicities of maximal weights of the $\overline{sl}(n)$ -module $V(k\Lambda_0)$ ” accepted to the *Journal of Algebra and Its Applications*.

Dr. Sarah Loeb published a new paper “Determining Number and Cost of Generalized Mycielskian Graphs” (with D. Boutin, S. Cockburn, L. Keough, K. E. Perry, P. Rombach) in *Discussiones Mathematicae Graph Theory*. With various collaborators, she had another paper accepted and submitted two others. Dr. Loeb will give a talk in the Longwood mathematics colloquium series this spring.

In addition, Dr. Loeb welcomed a daughter, Gwendolyn Sloan, in December.

The Mathematics and Computer Science Department also welcomed new colleagues this year. **Dr. Daniel Gulbrandsen** joined the department in Fall 2023 as Visiting Assistant Professor. He received his undergraduate degree in Mathematics from Utah Valley University and did his graduate studies at University of Wisconsin, Milwaukee. A recent paper by Dr. Gulbrandsen, “A Generalized Theory of Expansions and Collapses with Applications to Z-Compactifications” (with C. Guilbault) has been accepted for publication with *Topology at Infinity of Discrete Groups*.



Daniel Gulbrandsen joined the Mathematics and Computer Science Department in 2023.



Paul Hemler retired from the Mathematics and Computer Science Department after 20 years of service to H-SC.

Dr. Leila Setayeshgar joined the department as a Visiting Assistant Professor in the Spring of 2024. She obtained her undergraduate degree from Sharif University of Technology, and earned her Ph.D. in Applied Mathematics from Brown University. Dr. Setayeshgar teaches courses ranging from calculus to statistics and probability, and is broadly interested in conducting research in stochastic analysis. She is currently working on a manuscript entitled “Central Limit Theorem and Moderate Deviations for a Class of Semilinear Stochastic Partial Differential Equations in Any Space Dimension” and has been enjoying her new appointment at Hampden–Sydney College.

Physics & Astronomy – by R. Glynn Holt & Jonathan W. Keohane

Dr. Steve Bloom continues to work on revised journal articles related to the pedagogy of mechanics, such as using EXCEL and Mathematica to study the flight of airplanes and rockets. In addition, he is excited as he begins his survey of exoplanets using the now-automated HSC Observatory. He also is continuing to monitor some interesting quasars with our telescope!

Dr. Stanley Cheyne continued his research on bubbly liquids with Dr. Hugh (Trey) Thurman and Dr. Glynn Holt. During the summer of 2023 we got more data and wrote a paper entitled, "Phase speed and attenuation of a bubbly liquid using a transfer function method." Dr. Cheyne is continuing his research on acoustic properties of ethanol/water mixtures in the hope to develop a digital hydrometer to measure the percent alcohol in distilled spirits. During the spring of 2024, he worked with a student to study the acoustical properties of all the classrooms on campus.

Dr. Jonathan Keohane has continued to maintain the Hampden-Sydney Observatory. Anyone associated with Hampden-Sydney may use the HSC Observatory by contacting Dr. Keohane. Dr. Keohane is continuing to work as part of a team of astronomy instructors and software developers, including **John Torian '24**, to develop a second-year laboratory curriculum centered on the use of these automated observatories.

Dr. Walter (Mike) McDermott continued his service to the College as Dean of Faculty through December 31, 2023. He is on sabbatical in the Spring of 2024, and we look forward to having him rejoin the department in a full-time teaching capacity in the fall of 2024.

Anthony Pinchefskey continues to keep the department working with all his hard technical work, primarily in areas such as maintaining our laboratory spaces and the observatory hardware.

Dr. Hugh (Trey) Thurman conducted an independent study course **with Kade Minton '25** focused on improving the efficiency of a Trombe wall. This course has direct application to Mr. Minton's proposed project for his Goldwater scholarship that he applied for this academic year. Dr. Thurman with Dr. McDermott is working with another student **Peter Smith '24** on his proposed project for a Goldwater scholarship that is focused on improving the efficiency of a coil gun which is an alternative to a rail gun. Dr. Thurman continued his research efforts with Dr. Cheyne and Dr. Holt in attempting to measure the dispersion curve for the phase speed of a bubbly liquid using a modified two microphone transfer function technique that models the bubbly liquid as a porous medium. Dr. Thurman was able to collect preliminary data that Dr. Cheyne and Dr. Holt presented at the December meeting of the American Acoustical Society.

Dr. Glynn Holt hooded his penultimate PhD student, Ankush Gupta, at Boston University in May 2023. Dr. Gupta's thesis, "Putting cavitation to work: applications of strongly collapsing bubbles", discusses the results of projects involving the role of collapsing bubbles in novel ice formation, detecting cavitation in fuel injectors, and detecting underwater objects of interest. His final PhD student, Victoria Doheny (PhD '24 expected), presented one aspect of her work at the 2023 Chicago Acoustical Society of America meeting in a paper titled "Characterization of lipid shelled microbubbles designed for targeting post-operative nascent abdominal adhesions". He continues to consult professionally on a variety of projects, including an AFOSR-sponsored project investigating the role of cavitation in droplet breakup in hyper-shocks, and a Navy-sponsored project to develop a novel acoustic sensor for flight-attitude-independent gearbox oil volume sensing.

Psychology—by Jennifer E. Vitale

The 2023-2024 academic year was a productive and interesting one for Psychology. We said a final farewell to Dr. Dan Weese, who retired at the end of the 2023 academic year, but who graciously continued to offer a section of his Behavioral Neuroscience class and lab in the fall of 2023. We also conducted a successful search for our newest departmental colleague, **Dr. Matt Locey**, who will be joining us from his current position at the University of Reno. Next year, Dr. Locey will be offering a variety of courses, including a special topics course on the science of self-control, while he gets his new lab established.

Drs. Bauer, Gyurovski, and Vitale were excited to have three students present their research at the annual meeting of the Eastern Psychological Association (February 2024) in Philadelphia, PA. This included **Luke Lindquist '26** and Dr. Bauer's poster "Pretending to be a scientist: Improving scientific creativity in children", **Trevor Wade '24** and Dr. Bauer's poster "How do imaginative behaviors and self-regulation predict prosocial behaviors?", **Camden Libby '26** and Dr. Gyurovski's poster "Third-party judgements of moral dilemma resolutions", and **Tristin Winkler '24** and Dr. Vitale's poster "The Acceptance of Sexuality-Based Microaggressions Towards White, Black, and Asian gay and Lesbian Couples".

Since her arrival at Hampden-Sydney in 2022, **Dr. Rebecca Bauer** has continued to develop her research area in creativity in early childhood. In addition to her work with students, this year she published her latest article “Creativity in early childhood: how do imagination and self-regulation predict creativity in a story-stem task?” in *Psychology of Creativity, Aesthetics, and the Arts* with co-author A.T. Gilpin. She also presented her research on childhood creativity and its relation to the development of self-control at the annual meeting of the Cognitive Development Society (March 2024), in Pasadena, CA. In the classroom, she continues to give her students the opportunity to study children’s behavior directly through her fruitful partnerships with local preschools and daycare programs.

Dr. Ivo Gyurovski was on sabbatical in the spring semester and spent that time working on projects at the nexus between morality and economics. Specifically, he and his students are examining how people’s impressions and judgments of moral situations are shaped by characteristics of the context and the actors involved. Dr. Gyurovski also is developing his interest in program and College administration, and will be joining the Dean of the Faculty’s office in academic year 2024-2025 as the Assistant Dean of Grants and Faculty Development.

Dr. Jennifer Vitale continued in her role as Assistant Dean of the Faculty, in which capacity she oversees the College’s Compass Program. In addition, she offered courses in abnormal psychology, psychotherapy, and learning theory, as well as a 1-credit EL-OFF course entitled “In Conversation”, which focused on exposing students to different models of communication and partnering them with a member of the Farmville community for a series of interviews and discussions. Dr. Vitale currently has an article entitled “Contributions of the PCL-R to the mechanistic understanding and construct validation of the Cleckley psychopath” under review at the *Journal of Psychopathology and Behavioral Assessment*. This article evaluates the role of a specific measure of psychopathy (the Psychopathy Checklist-Revised) in the development of her field, and the ways in which having a unified conceptualization of the psychopathy syndrome is necessary for continued advancement. In this context, she and her co-authors J. Newman and R. Hamilton examine how their work in the area of response modulation and the ways in which deficits in this process may explain the emotional and behavioral responses of psychopathic individuals has been made possible through the use of this instrument.