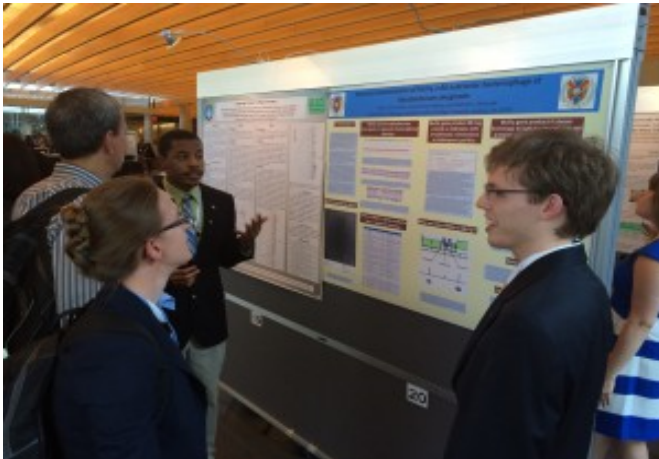


## News from the Hampden-Sydney Sciences 2014-15

### Biology—by Michael J. Wolyniak

The 2014-15 academic year saw several exciting events happen to Biology Department students and faculty. In the summer of 2014, 9 Biology majors undertook summer research projects. Among these students were **Joshua Dimmick '15** and **Grayland Godfrey '15**, who presented their work at the Howard Hughes Medical

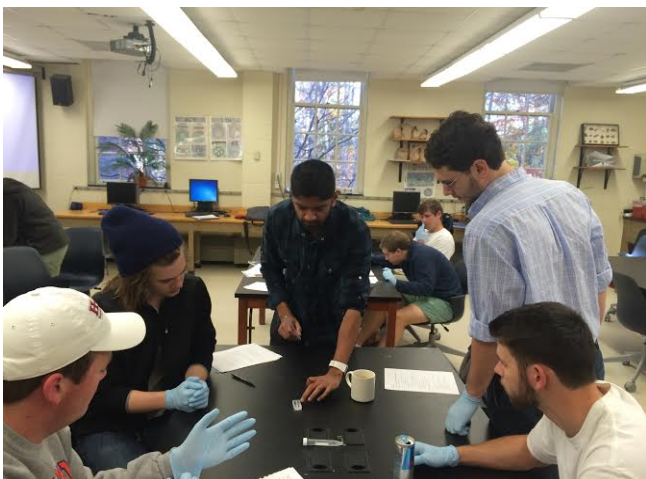


*Joshua Dimmick '15 and Grayland Godfrey '15 present their original research on the characterization of mycobacteriophage McFly, discovered at Hampden-Sydney by Seth Ayres '13, at the HHMI SEA-PHAGES Symposium at the HHMI Janelia Farm Research Campus in Ashburn, Virginia.*

Institute (HHMI) Janelia Farm Research Campus (pictured at left) on the characterization of a bacteriophage discovered at Hampden-Sydney as part of the College's participation in the HHMI SEA-PHAGES program. Now in its fourth year of participation, Hampden-Sydney is one of approximately 80 institutions that engage in this exciting HHMI initiative to bring authentic research to the classroom. HHMI awarded **Daniel Osarfo-Akoto '15** with the second EXROP fellowship ever given to a Hampden-Sydney student (joining **Yonathan Ararso '13** with this honor), giving him the chance to spend the summer at Harvard Medical School doing research on CRISPR technology, an emerging way to study how genes function. **Davis Carter '15**, **Erik Kellogg '15**, and **Sean Kellogg '15** presented their research work at the National meeting of the Ecological Society of America in Sacramento, California. They were accompanied by their faculty advisors, Professors **Rachel Goodman** and **Ed Lowry**. Meanwhile, Professor **Ed Devlin** completed his third cross-country bike ride, following a route from St. Augustine, Florida to Seattle, Washington. Professor **Alex Werth** returned from his year-long sabbatical which took

him to Vancouver, Iceland, and Alaska in pursuit of his research work.

The department was the recipient of two significant grants in the summer of 2014. Professor **Kristian Hargadon** received a two-year \$125,000 grant from the Commonwealth Health Research Board for his ongoing work on immune suppression by melanoma, while Professor **Michael Wolyniak** received a three-year \$118,000 grant from the National Science Foundation (NSF) for his ongoing work in the Undergraduates Phenotyping *Arabidopsis* Knockouts (unPAK) network for the study of plant genetics and ecology. Both grants are providing significant boosts to the department's capacity to support undergraduate research work both in the classroom and on an independent basis while also allowing the purchase of pieces of equipment like plant growth chambers that increase the scope of research that can be done on campus. Professor Goodman was elected into H-SC's Lambda Circle of Omicron Delta Kappa, the national leadership honor society, in 2014 in recognition of her tireless work on campus on behalf of Hampden-Sydney students.



*Dr. Sritharan Murugesan brings his NIH cell biology research to Professor Wolyniak's Molecular and Cellular biology students*

During the academic year, several Biology majors participated in the department's Biology Colloquium seminar series and pursued research work in pursuit of department honors at graduation. **Chris Ferrante '15** and **Jay Brandt '15** presented their Senior Fellowship work on developing new small peptide antibiotics at two national conferences, the Annual Meetings of the American Society for Cell Biology (ASCB) in Philadelphia, Pennsylvania, and the American Society for Biochemistry and Molecular Biology (ASBMB) in Boston, Massachusetts. **Taylor Meinhardt '16** also attended the ASCB meeting, and **Stephen Woodall '15** also presented his work at the

ASBMB meeting. H-SC Biology also expanded its collaborative interactions with other institutions with the goal of providing its students the most complete and comprehensive biology education possible. Professor Wolyniak's Molecular and Cell Biology class hosted a multi-class module from Dr. Sricharan Murugesan of the National Heart, Lung, and Blood Institute of the National Institutes of Health in which students worked on his ongoing research on



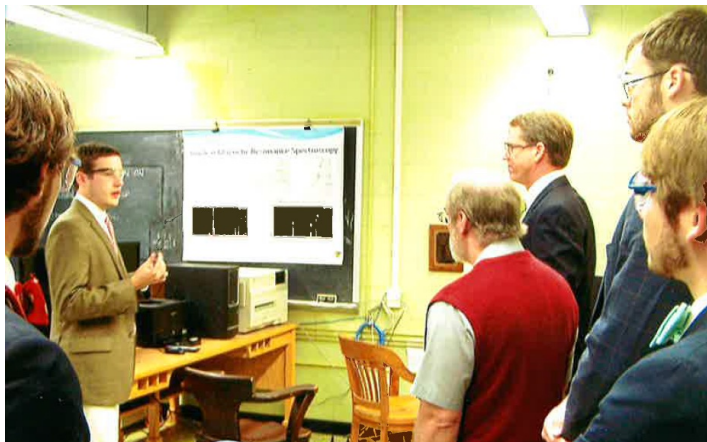
*Professor William Shear, retiring from Hampden-Sydney's biology department after 41 years of service to the College, works with introductory biology students on their laboratory research.*

the formation of actin filaments in human cells. Also, Hampden-Sydney was honored to receive accreditation of its biochemistry and molecular biology curriculum by the ASBMB. Hampden-Sydney is one of only 28 institutions nationwide to carry this distinction.

Trinkle Professor of Biology **William Shear** (left) is retiring from the department in 2015 after 41 years of service to the College. Dr. Shear is indisputably the most productive scholar at Hampden-Sydney, having authored 205 publications, including a joint publication with Professor Werth that graced the cover of *American Scientist* magazine in 2014, as well as the books "The Gardener's Iris Book" (2001) and "Spiders: Webs, Behavior, and Evolution" (1986). Professor Shear's research encompasses entomology, invertebrate zoology, evolutionary theory, and the history of Earth and life, with particular emphases on the taxonomy of arthropods. In addition to his work at Hampden-Sydney He holds Research Associate positions with the American Museum of Natural History and Virginia Museum of Natural History. Professor Shear is an institution in Hampden-Sydney Biology, and he will be profoundly missed in Gilmer Hall.

## **Chemistry**—by *Nicholas P. Deifel*

**Russell Lee Ayscue '15**, a senior chemistry major and Patrick Henry Scholar, was awarded a 2014 Barry M. Goldwater Scholarship in recognition of his top-notch classroom and research work during his Hampden-Sydney



*Lee Ayscue '15 (left) demonstrates the NMR spectrometer to several visiting H-SC alumni. Jason Halmo '17, Mitchell Owens '16, and Jeremy Hall '16 are also pictured.*

career. Lee was one of only six Virginians to receive the award in 2014. The Goldwater Scholarship is nationally awarded to students who have displayed outstanding potential and intend to pursue research careers in mathematics, the natural sciences, or engineering. Lee also won the Hampden-Sydney College Topham Chemistry Award last May. This award was established by classmates of **Richard Topham '65**, who was a longtime professor of biochemistry at the University of Richmond, to recognize outstanding achievement and potential in a junior chemistry major.

Professor **Kevin Dunn** was on sabbatical leave for fall term 2014. His sabbatical project involved using NMR to determine saponification values for oils used in craft soapmaking. Professor Dunn was also an invited speaker at this summer's Biennial Conference on Chemical Education held at Grand Valley State University August 3-7, 2014. Dunn presented workshops titled *Caveman Chemistry* and *Scientific Soapmaking*.

Spalding Professor of Chemistry **Herbert Sipe** attended the Gordon Research Conference on Oxygen Radicals in Ventura, California in February 2014 where he presented results from a project entitled "Free radical metabolism of methyleugenol and related compounds." Professor Sipe performed this research during his 2009-2010 sabbatical research while at the National Institute of Environmental Health Sciences in Research Triangle Park, North Carolina.

The Chemistry Department is currently soliciting for an instrument endowment program that is being spearheaded by Professor Sipe and Venable Professor of Chemistry Emeritus **Bill Porterfield**. This fund is designed to periodically replace important instrumentation. As part of this effort, the department invited several chemistry alumni from the 1980's to reunite in September. **Brandon Newcomb '10** and **Kent Saxton '13** gave brief presentations about their current jobs to the alumni and current students gave demonstrations of the Department's current instrumentation.

### **Mathematics and Computer Science—by Heidi N. Hulsizer**



This year the students and faculty of the Department of Mathematics and Computer Science have a lot going on. **Drs. Rebecca Jayne** and **Heidi Hulsizer** attended the national Joint Mathematics Meeting in San Antonio along with Applied Math and Mathematics major **Michael Salita '15**. Dr. Jayne gave two talks at the conference, the first was in a MAA (Mathematical Association of America) General Paper Session on Teaching or Learning Advanced Mathematics and it was entitled "A Hybrid IBL/Traditional Abstract Algebra Class." Her second talk was given in an AMS (American Mathematical Society) Session on Associative and Nonassociative Algebras and Rings: Homological Algebras and Category Theory, the talk was entitled "A count of maximal dominant weights of integrable modules." **Dr. Hulsizer** will be organizing a paper session on Mathematics in Video Games at the national MathFest in August '15.

The department's students are also accomplishing great things. We have had several students participate in the William Lowell Putnam Mathematical Competition, a challenging competition for which the median score is usually 0 or 1 out of 120 possible points. The students were **Caleb Bowyer '16**, **Zach King '15**, **Shaquann Seadrow '16**, **Branch Vincent '16**, and **Branch Vincent '16**. We have not yet received scores for the Putnam Competition and we look forward to the

students' results. **Dr. Brian Lins** supervised these students in preparation for the exam during the fall and was on sabbatical for the spring semester.

### **Physics and Astronomy—by Joshua D. Taylor '16**

As any of the students of Hampden-Sydney know, success at this college is not easily attained. Maintaining the focus required to do well here, especially as an ever-busy physics major, can mean that one grows ignorant of the activities of his peers. The fact of the matter is that there is a lot happening in the basement of Gilmer Hall.

The "Energy House" is an exciting new project that has inspired collaboration with the computer science department. Together and under the auspices of **Professor Stan Cheyne**, **Branch Vincent '16** and **Zachary Carter '17** are working on installing and automating thermal sensors in a structure built here on campus out of a new kind of concrete (developed by an alumnus, **Steve Huff '73**). Meanwhile, **Charles Kelley '16** continues Dr. Cheyne's bubble research. This fall Dr. Cheyne also accompanied one of **Professor Trey Thurman's** students, **Carson Maki '15**, on a trip to the 168th meeting of the Acoustical Society of America, where Mr. Maki presented some of his own research concerning Faraday waves.

Besides advising Maki's research, Professor Thurman has been busy working with five other students on some fascinating projects. **Branch Vincent '16** and **Robinson Sagar '15** worked (independently) with Dr. Thurman over the summer to study Savonius Rotor optimization and build an external cavity diode laser. Dr. Thurman has spent the fall of 2014 overseeing **John McGhee '15** (measuring the coefficient of friction of snow), **Robert Harris '16** (building an eye-emulating light sensor), and **Andrew Arnold '15** (studying the effects of temperature on ocean currents).

**Professor Mike McDermott**, despite having stepped into the role of Associate Dean of Faculty, remains active in the department. In the fall of 2014, **Jamshaid Chaudhry '16** worked with Dr. McDermott to build a Mossbauer drive using parts made almost exclusively from scratch, using the department's 3-D printer. Considering the conditional success of their work thus far, Chaudhry and McDermott plan to continue next semester, with the ambition of automating and miniaturizing the drive.

In addition to all of their advising and teaching responsibilities, the faculty of the department has found time for some interesting and impressive pursuits. After a year on sabbatical, **Professor Steven Bloom** looks forward to continuing his own research on high-energy quasar radiation, as well as completing his book, *The Physics and Astronomy of Science Fiction*, approved and soon to be published by McFarland Press. **Professor Jonathan Keohane** has also been working studiously on his book, *An Introduction to Classic Electro-Dynamics* (being co-published with Joe Foy by Yale University Press, which is slated for release in the fall of 2015. Not to be outdone, Dr. McDermott, Dr. Cheyne and Dr. Thurman are also co-writing an introductory physics textbook, untitled as of yet, but hopefully to be submitted for publication in 2015.

Lastly, the Department of Physics and Astronomy is very proud to say that this year its own Dr. Thurman received the Cabell Award. This prestigious award is granted annually by a committee of faculty, administrators and was created, in the words of the College, "...to assist the College in attracting and keeping professors of high integrity and ability."

### ***Psychology—by G. Daniel Weese***

The primary focus of **Professor Dan Weese**'s sabbatical research was to investigate the role of a brain region known as the thalamic reticular nucleus (TRN) in attention. Specifically, does the TRN enhance one's ability to attend to relevant information by reducing the distraction produced by irrelevant stimuli? Rats were trained to discriminate between two visual or two auditory stimuli and later performed the task with an irrelevant stimulus from the other modality. Adjustments were made in the intensity of the stimuli until the irrelevant stimulus decreased the number of correct responses by 10 to 15 percent. Bilateral lesions in the TRN (visual or auditory sectors) produced an increase in the number of errors when the irrelevant stimulus was present but had no effect when only the discriminative stimulus was present. These results confirm the hypothesis that the TRN focuses attention on relevant stimuli by reducing the distracting effects of irrelevant stimuli. Disorders such as schizophrenia and attention deficit disorder may involve the abnormal function of the TRN.