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SPRING 2012

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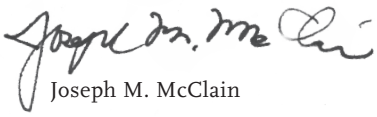
You're holding a copy of the final print issue of *Ideation*. I'm an old print guy and for me it comes more naturally to make a case for continuing an ink-and-paper magazine than for going completely digital. Over the past year or so, though, I've learned another kind of wisdom on the subject.

Ideation began in 2005 as a way to showcase the work of William & Mary's researchers and scholars. Looking for the best way to present stories about the College's considerable relevance to the world beyond our community, everything pointed toward a print magazine.

Seven years and more than a dozen issues later, things are pointing in a different direction. The resources required to create, print and mail thousands of copies of a magazine have risen. At the same time, the web and other digital media are changing how people like to receive and process information. A web-based version of *Ideation* came on line a few years ago, offering content organized topically as well as by print issue.

The digital version of the magazine has opened up unexpected opportunities. The web-based *Ideation* is attractive (check out that "Ken Burns effect" on the opening pages). Maybe it's part of being an old print guy, but I can't help being amazed by the results generated by the simple ability to send a link via email. (Yes, I know about Twitter and Facebook, too.)

There's good news for the people who say, "Yes, but nothing replaces print." *Ideation* will continue in print as a department in the William & Mary *Alumni Magazine*. The *Ideation* web site will continue as well. Thanks for reading. I hope you'll continue to stay with us at www.wm.edu/ideation.



Joseph M. McClain

A WORD ON THE PREVIOUS ISSUE

It has come to the attention of *Ideation* that the imagery and headline used in connection with the article in the fall 2011 issue about Professor Rachel Di Nitto's research on Japanese culture had the potential to offend some readers. We deeply regret this. Professor Di Nitto had no advance knowledge of this imagery or headline.

The College of William & Mary in Virginia

Chartered February 8, 1693, by King William III and Queen Mary II of Great Britain. Phi Beta Kappa, the nation's premier academic honor society, and the honor code system of conduct both were founded at William & Mary.

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Ideation is the crystallization and conceptualization of ideas. It is part of the process through which thought ultimately becomes deed.

Ideation is published by the College of William & Mary, Office of Strategic Initiatives, P.O. Box 8795, Williamsburg, VA 23187-8795.
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Researcher will use hypoxia chamber to investigate susceptibility to acute mountain sickness

The first Cooperative Research and Development Agreement (CRADA) between William & Mary and the U.S. Army Research Institute of Environmental Medicine (USARIEM) will focus on the effects of high-altitude sickness.

Ken Kambis, professor of kinesiology and health sciences at the College, and USARIEM agreed to collaborate on research primarily focused on acute mountain sickness, most especially as it affects women. Kambis already has 20 of the 36 volunteers he is seeking, nine of whom have completed a rigorous pre-testing indoctrination. His subjects will come primarily from the student body, while USARIEM will continue its work with subjects up to age 35.

A few days after being tested at sea level, subjects will enter the College's normobaric hypoxia chamber. The oxygen they breathe will be reduced to the level found at an altitude of 3,500 meters. During the subjects' 30-minute "rest" period, researchers will measure heart rate, the amount of oxygen being carried by the red blood cells and the concentration of carbon dioxide in an exhaled breath.

Then, subjects will pedal a stationary bicycle for 10 minutes, followed by more measurements.

"We're looking for very small, nuanced differences," he said. "What we hope to find is some easily testable sea-level metric that can predict with a high degree of accuracy whether this person is going to be susceptible to acute mountain sickness when they rapidly go to high altitudes."

—Jim Ducibella

Marine forensics: VIMS shows how genetic markers can help Feds enforce seafood regulations

New discoveries in "marine forensics" by researchers at the Virginia Institute of Marine Science, College of William & Mary, will allow federal seafood agents to genetically test blue marlin to quickly and accurately determine their ocean of origin.

The test is needed to ensure that the blue marlin sold in U.S. seafood markets were not taken from the Atlantic Ocean. The import and sale of blue marlin from the Pacific or Indian oceans is legal in the U.S., while the marketing of Atlantic blues can bring civil or criminal penalties, including fines, seizure of a catch or the loss of a fishing permit. Regulation of Atlantic blue marlin reflects overfishing and a troubling drop in population within Atlantic waters.

The VIMS research team—graduate student Laurie Sorenson, molecular biologist Jan McDowell, and professor John Graves—reported the findings of their study, "Isolation and characterization of microsatellite markers for blue marlin, *Makaira nigricans,*" in a recent issue of *Conservation Genetics Resources*.

Graves, who chairs the U.S. Advisory Committee to the International Commission for the Conservation of Atlantic Tunas (ICCAT), says "Blue marlin from the Atlantic can be illegally marketed as originating from the Indo-Pacific stock, which is currently unregulated. Laurie and Jan identified 10 new microsatellite markers that enforcement agencies can use to readily discriminate between Indo-Pacific and Atlantic fish."

—David Malmquist, VIMS

Protein behavior might hold the key to developing synthetic silk

By Joseph McClain

THE WORLD MAY JUST HAVE MOVED A STEP CLOSER TO THE REALITY OF COMIC BOOKS.

A trans-Atlantic collaboration of scientists has revealed the structure of a key protein of silk and discovered a previously unknown behavior of this protein: to self-organize into tiny fibrils a single molecule in diameter. This discovery sets the stage for the eventual creation of synthetic silk—not just the luxury fabric that's a product of silkworms, but also the manufacture of ultra-tough spider silk familiar to fans of the Marvel superhero Spider-Man.

Hannes Schniepp cautions that the world's textile mills aren't likely to start producing "spidey silk" in the near future, but says his work describing the structure of the silk protein and its self-organizing behavior is an important step in that direction. Schniepp is an assistant professor in the Department of Applied Science at the College of William & Mary. Along with graduate student Minzhen Cai and a set of collaborators at the University of Oxford in the United Kingdom, he has published a paper describing silk at the molecular level.

"Silk is a polymer," Schniepp explained. "It's not a synthetically-made polymer, but it's a polymer made out of proteins."

Synthetic plastics are polymers, but these macromolecules are common in the natural world, too. Schniepp points out that much of the human body—including DNA—is constructed of polymers.

"What's so fascinating about silk is that in terms of its mechanical properties, silk is better than any polymer that we can make synthetically," he said. "Particularly, certain spider silks are even tougher than Kevlar, the best high-performance polymer we have."

YOU CAN'T FARM SPIDERS

For millennia, people have been using the cocoons of silkworms to weave silk cloth. Humans have used spider silk to a much lesser degree, but spiders have proven to be impossible to cultivate: "They start eating each other," Schniepp says.

Figuring out a process to make synthetic silk has been a sort of Holy Grail of materials science for nearly as long as people have been making silk. After years of scientific study, the exact natures of both the biochemistry and the mechanics of silk creation by silkworms and spiders remain elusive.

"The big question really is how does the spider do it? How does the silkworm do it?," Schniepp says. "The problem is it's a tiny animal and it happens in very small dimensions inside the animal, and it's really almost impossible to watch what's going on there."

He said that most of the scientific study on the structure of silk has focused on examination of the product through microscopy and other analytical tools. The study has yielded a fair amount of understanding about the structural nature of silk, but scientists had no idea of what shape an individual silk protein had.

Schniepp and his team at William & Mary took a different approach than most materials scientists, sampling "silk dope," the gel-like material inside the silkworm that the worm exudes to spin its cocoon.

"A lot of these biomolecules, they're very sensitive to changes. So the closer you can be to the native state, the more valuable this information is that you get," he said.

WORKING WITH SILK DOPE

Schniepp and his research group examined the silk dope in their McGlothlin-Street Hall laboratory, using an atomic force microscope (AFM), an instrument capable of looking at materials at the nanoscale. Before placing them in the AFM, they prepared their silk dope, diluting the samples with a bit of water, then spun the sample on a plate, so that the silk spread out on the surface.

"When you spin liquid on a plate like this, you shear it. And that does something to these proteins that's similar to the way that the animals do," he explained. "They have a gland that produces this material and at the end is something like a nozzle. So they squeeze this material out through the nozzle. To create a similar effect, you shear the solution. By spinning it very quickly, the liquid is forced away, and it is similar to what happens when the animal pushes the silk out."

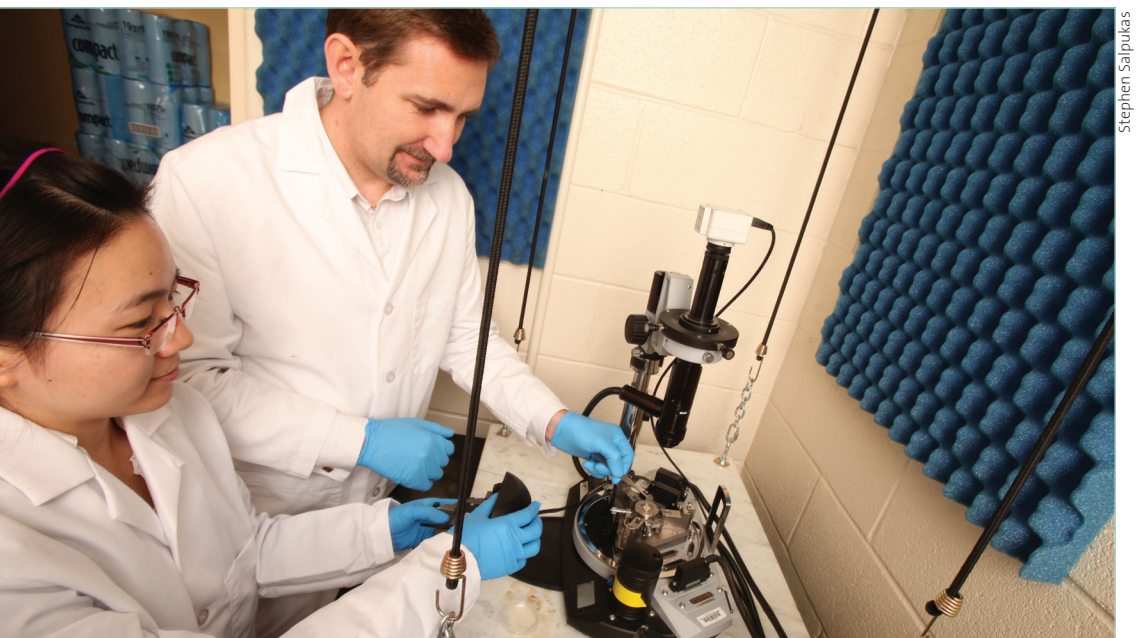
A number of curious things happen when the material is sheared. For one thing, the water-soluble silk dope has been transformed into something waterproof. More importantly, the shearing somehow induces individual proteins to "find each other," as Schniepp describes, and to self-organize into fibrils. One molecule thick, the fibrils are the thinnest possible threads of silk and are precursors to silk fibers.

Seen through AFM magnification, each fibril shows where the individual proteins have conglomerated. The magnification resembles a string of pearls. It's the first time that the structure of the native silkworm protein has been imaged at such high resolution.

The work on silk is supported by the Jeffress Memorial Trust.

Schniepp published his findings in a paper, "Shear-Induced Self-Assembly of Native Silk Proteins into Fibrils Studied by Atomic Force Microscopy" in the journal *Biomacromolecules*. Fritz Vollrath of Oxford University is a co-author, as is Cai. They are continuing their work on the structure of the material.

"We don't know what other secrets silk has hidden for us," Schniepp says.



Stephen Salpukas

Hannes Schniepp and Minzhen Cai load a sample of silk dope into their atomic force microscope in their laboratory in McGlothlin-Street Hall.

Geologists study water from the wells of the Jamestown colonists

Geologists at William & Mary are analyzing a possible contributing cause of the deaths at Jamestown Island during the Starving Time of 1609 and 1610—bad drinking water.

The water, by today's standards of drinkability and even safety, is really bad. The scientists are finding that the Jamestown aquifer water contains high, but varying, levels of arsenic. But arsenic may be far down on a list of problems that include high salinity, various metals and fecal contamination from the colonists' latrines.

The Starving Time nearly eliminated the fledgling colony, killing the majority of the 500 colonists before supplies and reinforcements arrived from England. History indicates that food was scarce for a number of reasons, including a severe drought. The role of the drinking water has been a matter of scholarly consideration.

Advised by Associate Professor of Geology Gregory Hancock and Assistant Professor of Geology James Kaste, Doug Rowland '12 is studying water from wells actually used by the colonists.

Stephen Salpukas

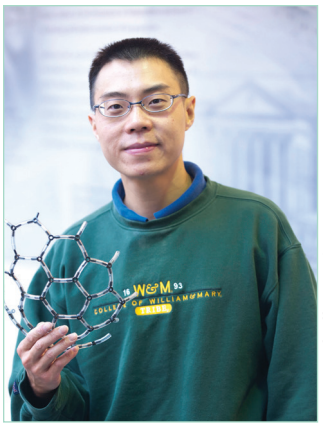
Doug Rowland gets ready to sample at Jamestown.

Levels of salt and arsenic in the aquifer are controlled by naturally occurring factors, such as precipitation, tidal flow and seasonal variations. By taking a multiplicity of samples as natural conditions change, Rowland hopes to project levels of arsenic and salinity in the groundwater during the Colonial period.

—Andrea Davis

J-Lab scientist wins award for graphene invention he developed as a Ph.D. student at William & Mary

Like most inventors, Jefferson Lab scientist Xin Zhao's moment of inspiration was prompted by a need, and the result was an invention that could someday see batteries in electric vehicles and similar devices boosted or replaced by high-power, high-capacity, fast-charge/discharge energy storage systems using graphene.



Courtesy of Jefferson Lab

Xin Zhao

"After graduation, I was looking for applications for a new material developed by my colleagues at William & Mary," recalled Zhao, who had just graduated from the College of William & Mary with a Ph.D. in materials science. It was 2006, and even before he had a job, he began exploring possible uses for graphene carbon nanosheets.

The material developed at William & Mary "is a carbon nanomaterial, which is made of layers of graphene—one to three layers. It's flat, like a sheet of paper. I thought maybe this material could be used to store energy," Zhao explained. The epiphany spurred an exploration of scientific literature in search for answers. Soon, he became focused on electrochemical double-layer capacitors (EDLC), so-called supercapacitors, or ultracapacitors. Unlike batteries, supercapacitors have a much higher power density—hundreds of times more—and can be charged in seconds.

Zhao designed a supercapacitor that would use graphene, and William & Mary filed for a patent on the invention. In 2010, a patent (U.S. Patent No. 7852612) was granted, opening doors to a plethora of potential commercial applications.

"We are excited about the commercial potential of the technology," said Jason McDevitt, director of technology transfer at William & Mary.

William & Mary team among physicists finding a key value of neutrino oscillation at Daya Bay

An international team of physicists has reported the first set of observations detailing important behavior of neutrino oscillation, an accomplishment that is a necessary step to additional experiments intended to answer fundamental questions about the makeup of the universe.

Physicists operating the Daya Bay neutrino experiment in China have observed a neutrino "mixing angle" known as θ_{13} (pronounced "theta one-three.") Robert McKeown says Daya Bay's discovery of θ_{13} is the final piece needed to complete the understanding of how these mysterious particles oscillate among three forms, or "flavors." Neutrinos are byproducts of nuclear reactions, emitted in enormous quantities by the sun, by nuclear activity in the core of the earth and by nuclear power plants. Despite their large numbers, neutrinos are extremely hard to detect.

McKeown, the Governor's Distinguished CEBAF Professor in William & Mary's physics department as well as deputy director for science at Jefferson Lab, leads the William & Mary contingent working on the Daya Bay experiment. McKeown and his collaborators built a set of instruments designed to observe the stream of particles emitted from a nuclear power facility.

"Neutrino physics is a very important part of particle physics these days," McKeown said. "The first thing that knowing this particular mixing angle allows us to do is to confidently mount the next series of experiments that are to be done."

He said the Daya Bay results give physicists the scientific grounds to proceed with more ambitious neutrino experiments. McKeown has been involved in planning of the Long-Baseline Neutrino Experiment (LBNE), which, when constructed, will send a neutrino beam more than 1,000 kilometers through the earth from Fermilab, in Batavia, Ill., to a detector that will be located outside Lead, S.D.

The LBNE (which has yet to be funded, let alone constructed) and similar experiments seek to use neutrinos to observe a phenomenon known as CP symmetry violation.

—Joseph McClain

Joseph McClain

Lizabeth Allison

Molecular biologist receives $1 million to study intracellular 'traffic control'

William & Mary molecular biologist Lizabeth Allison has received a grant of more than $1 million from the National Science Foundation (NSF).

Allison is Hamilton Professor and chair of the College's Department of Biology. The four-year NSF grant of $1,064,582 is Allison's third renewal of the NSF funding on the topic "Mechanisms Regulating the Subcellular Distribution of the Thyroid Hormone Receptor." She is the sole Principal Investigator (PI) on the grant, but the work will continue to involve faculty and undergraduate students from Hampton University as well as William & Mary.

She describes her research as the study of "intracellular traffic control"—the study of how proteins known as nuclear receptors move in and out of a cell's nucleus. Allison's lab focuses on the thyroid hormone receptor.

She explained that nuclear receptors do their work by going from the cytoplasm of a cell into the nucleus, where they bind to DNA and turn genes on and off in response to hormones. The thyroid hormone receptor, for reasons yet unknown, has a more complex mission.

Learning how nuclear receptors work is important for understanding how healthy cells work and is particularly important for a better comprehension of gene expression, she added. Her work also has medical relevance: "When there are misregulated traffic signals, this can lead possibly to types of cancer," she said.

A dozen William & Mary students are working on the project with Allison, along with lab manager Vinny Roggero and Manohara Mavinakere, a senior research scientist. During the summer, she collaborates with Cornelius Bondzi, assistant professor of biology at Hampton University, and a group of Hampton University undergraduates.

—Joseph McClain

Stephen Salpukas

At a hanging

Muscarelle Museum Director Aaron De Groft (front) and Chief Curator John Spike confer with students for the hanging of works for the museum's exhibit Grand Hallucination: Psychedelic Prints by William Walmsley and Friedensreich Hundertwasser.

VIMS team wins Governor's Technology Award for Chesapeake Bay Inundation Prediction System

Professor of Physical Sciences Harry Wang and colleagues at the Virginia Institute of Marine Science, College of William & Mary, have won a prestigious Governor's Technology Award for their leading role in the Chesapeake Bay Inundation Prediction System, or CIPS.

The awards, now in their 14th year, recognize Virginia agencies, programs and people that use information technology to improve the delivery and efficiency of government services while solving real-world problems.

Wang's team was an inaugural winner in the new category of "Innovative Use of Modeling & Simulation Techniques." They were recognized for their development and continuing refinement of a cutting-edge computer model for predicting storm-tide flooding of the Chesapeake Bay shoreline during hurricanes and nor'easters. The model also aids in planning for sea-level rise.

—David Malmquist, VIMS

William & Mary's team of 'taxletes' brings home yet another Deloitte Tax Challenge victory

Every brand of competition has juggernauts that seem to dominate year after year. In the Deloitte Tax Challenge, it is the team from the College of William & Mary that dominates year after year.

2011 was no different, as Professor Jim Smith piloted his group to an incredible 11th first place finish at the national competition in Dallas.

The team, composed of undergraduate business students William Amante, Cara Ferraro, Sarah Parsons, Maria Pawlosky and Samantha Phillips brought home the coveted Deloitte "FanTAXtics" trophy to Miller Hall, completing their goal of joining the 10 other teams who have won it all for William & Mary in the past 18 years of competition.

"Every team is very different as a set of individuals than any of the others," said Smith, when asked to compare this year's group to his other championship taxletes. "We have very focused, bright and motivated students who take the suggestions that I give and are willing to put forth the effort."

The Deloitte Tax Challenge, now known as the FanTAXtics program, is a competition that pushes teams to make a presentation based on real-world federal or state tax scenarios to a board of directors who are not well versed in tax code or law. The William & Mary team competed and won its preliminary regional competition in Atlanta, moving on to face the other eight regional winners. In all, 83 teams participated in the competition.

— Eric W. Pesola

Professor Jim Smith with his winning Deloitte Tax Challenge team: William Amante, (lower row) Samantha Phillips, Maria Pawlosky, Sarah Parsons and Cara Ferraro.

Eric Pesola

Stephen Salpukas

President Taylor Reveley and Her Excellency Dr. Rawiyah bint Saud al-Busaidiyah tour the campus.

Gift establishes Sultan Qaboos bin Said Professorship in Middle East Studies

The College of William & Mary has received a gift from His Majesty Sultan Qaboos bin Said, Sultan of Oman, to establish the Sultan Qaboos bin Said Professorship in Middle East Studies.

The Sultan's gift establishes a fully funded, endowed professorship that will help to support the faculty's wide-ranging teaching and research on aspects of Middle Eastern culture, and caps this fall's introduction of the newly designed, multidisciplinary Asian and Middle Eastern Studies Program.

William & Mary President Taylor Reveley and Her Excellency Dr. Rawiyah bint Saud al-Busaidiyah, Minister of Higher Education, signed the agreement in October during a special ceremony in the Blue Room of the College's historic Sir Christopher Wren Building. The Omani delegation also included Her Excellency Hunaina Sultan al-Mughairy, Ambassador to the United States.

"This gift is simply marvelous," Reveley said at the event. "Today, we celebrate the Sultan's commitment to higher education and our mutual efforts to enhance and extend global cultural heritage for the benefit of all peoples. William & Mary is enormously grateful for the Sultan's transformative generosity. We look forward to the continuing achievements of our faculty and students in the important area of Middle Eastern studies."

—Megan Shearin

Heather Macdonald is a finalist for Robert Foster Cherry Award

Stephen Salpukas

Heather Macdonald

"Why do we study geosciences?" Heather Macdonald asked her audience at the Robert Foster Cherry Lecture. As an answer, she ran down a list of timely geoscience topics, including hurricanes, earthquakes, climate change, volcanoes, petroleum and other natural resources.

"It's a challenge to study these things," she said, "these are complex systems, such as economic systems and ecosystems. There are many interrelated variables that are strongly related to each other."

In addition to being a geoscientist, Macdonald is also a teacher of geoscientists. Macdonald is Chancellor Professor of Geology at William & Mary. She was one of three finalists for the Robert Foster Cherry Award, given every two years by Baylor University. The award recognizes excellence in classroom teachers. Macdonald's lecture, "Behind the Scenes: From Strong Geoscience Courses to an Energized Community" in the Brinkley Commons Room in Miller Hall of the Mason School of Business was a companion offering to a lecture given at Baylor.

The lecture was appropriately geological in scope, starting small, as Macdonald first described how students learn to "describe and interpret geology" by contemplating the sequence of forces that shaped one piece of earth.

William & Mary Provost Michael Halleran introduced Macdonald at the Cherry Award Lecture. "The Cherry Award is one of the national high marks for recognizing teaching excellence," he said.

—Joseph McClain

AidData partners with climate change center to launch foreign-aid mapping tool

AidData, in partnership with the Strauss Center's Climate Change and African Political Stability program (CCAPS), has launched an online data portal that enables researchers and policymakers to visualize data on climate change vulnerability, conflict and aid, and to analyze how these issues intersect in Africa. The CCAPS mapping tool aims to provide the most comprehensive view yet of climate change and security in Africa.

"This represents a major step forward in global aid transparency. The CCAPS mapping tool demonstrates the vast potential of geo-referenced data and visual analytic tools to increase the transparency and impact of development assistance at the subnational level," said Brad Parks, co-executive director of AidData and research faculty at William & Mary's Institute for the Theory and Practice of International Relations.

The tool allows users to select and layer any combination of CCAPS data onto one map to assess how myriad climate change impacts and responses intersect. To assess the interaction of climate vulnerability and international aid, users can locate aid projects funded by the 27 donors tracked in Malawi's Aid Management Platform, layered on top of climate change vulnerability data.

AidData is a collaborative initiative to make information on development assistance more transparent and accessible. AidData is a joint program of Brigham Young University, the College of William & Mary and Development Gateway.

World-class mineral collection rocks the geologists' world

THE WILLIAM & MARY DEPARTMENT OF GEOLOGY HAS ACQUIRED A WORLD-CLASS MINERAL COLLECTION THAT GEOLOGISTS SAY WILL BE A VALUABLE RESOURCE IN THE DEPARTMENT FOR MANY YEARS.

By Alla Herman

Professor Brent Owens of the geology department was contacted about donating the collection by Dimitri Georgiadis, a Greek immigrant and mineral enthusiast, who had an interest in rocks since he was a young boy.

While living in Memphis, Georgiadis often met with a friend and colleague named Dorothy Sturm. After showing her a rock he found on a trip to Colombia, Georgiadis was led into a secret room in Sturm's home.

"She opened the door and it was a room full of minerals. There were lights—a fantastic collection. I lost my mind." said Georgiadis. "So I said, 'Let's make a deal. The time will come that you will want to dispose of this. Give me the first option of refusal.'"

In 1970, Sturm decided it was time to let go of her collection, and contacted Georgiadis. Sturm's one request was that the collection not be sold off piecemeal. Georgiadis accepted, and purchased the collection. The collection went with Georgiadis on moves to Toronto, Mexico, the Caribbean coast and finally Virginia. Georgiadis originally paid $70,000 for the collection of 115 minerals. Today it contains more than 500 specimens, and is appraised at $514,000.

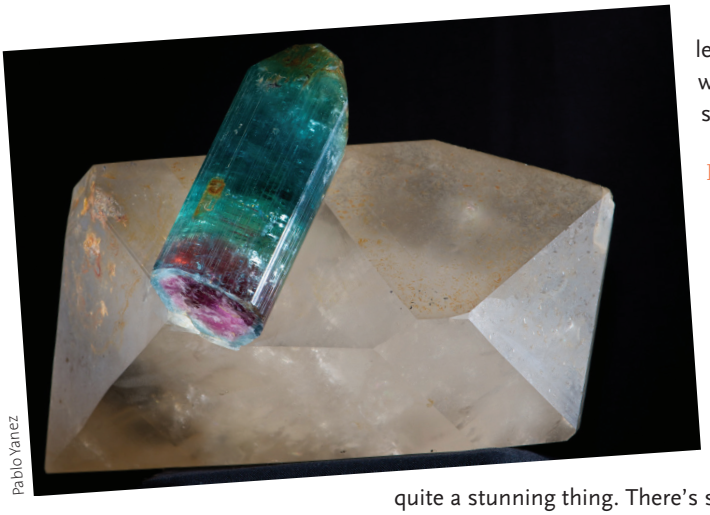
Georgiadis says he decided to donate the collection to William & Mary because he wanted to show his appreciation for what this country has done for him and because he wanted to help others.

"I would like it to be part of the educational process of a university. I always heard a lot about William & Mary," said Georgiadis.

SPECIMENS FROM ALL OVER

Owens says the collection ranges from some of the more common minerals to gemstones to specimens with unique crystal shapes. The minerals in the collection come from places all over the globe, including Brazil, Romania, South Africa, Italy, Switzerland, Madagascar and Mount Kilimanjaro. Some notable minerals in the collection include rhodochrosites, rubies, emeralds and Owens' personal favorite—a watermelon tourmaline. Also included are aquamarine, quartz, beryl, tanzanite and topaz.

"I thought it might be somebody pulling out a couple of boxes of rocks from under his bed," said Owens, "but I went to the donor's house, and not knowing at all what to expect, I was flabbergasted. My jaw, I'm sure, literally dropped. I was impressed by the number, the diversity and the really high quality of the samples."



Pablo Yanez

"You don't have to be a geologist to appreciate the beauty," says Brent Owens. His favorite among the specimens in the Dimitri B. Georgiadis Mineral Collection is this beautiful watermelon tourmaline on a piece of quartz.

Having the collection displayed in the classroom where students are learning about minerals means they will be put to good use. Owens says when he is teaching about minerals in his lab, he can use the various specimens to illustrate different features being taught in class.

BEAUTY AND UTILITY

"It's a chance for students to see first hand what some of these things look like. When I'm teaching about minerals, I can point to such-and-such mineral in the case and say, 'Here's a wonderful example of whatever feature I happen to be talking about.'," said Owens.

After Owens first saw the collection, he discussed the donation with the rest of the faculty in the geology department. Owens said everyone was shocked when they saw it.

"You don't have to be a geologist to appreciate the beauty," said Owens, "The colors are every color in the rainbow, and visually it's quite a stunning thing. There's something inherently quite pleasing about the collection."

Faculty and students of the geology department held a Feb. 16 reception to celebrate and commemorate the generous donation of the Dimitri B. Georgiadis Mineral Collection to the College. Georgiadis was guest of honor. Other attendees included William & Mary President Taylor Reveley, Provost Michael Halleran and Interim Dean of Arts & Sciences Gene Tracy.

Anyone interested in viewing the Georgiadis Mineral Collection should contact Owens to make arrangements.

Governor names VIMS Professor John Milliman one of Virginia's Outstanding Scientists for 2012

Governor Bob McDonnell and the Science Museum of Virginia have named Chancellor Professor John Milliman of William & Mary's Virginia Institute of Marine Science as one of Virginia's Outstanding Scientists for 2012.

The Outstanding Scientist award is bestowed annually to honor those who have excelled in research and commitment to science, and whose contributions to scientific research have extended the boundaries of their own and other fields. Award recipients are selected by a distinguished panel of internationally renowned Virginia scientists.

John Milliman

"This award is richly deserved recognition for John Milliman, and it's splendid not just for him but for VIMS and William & Mary as a whole," said President Taylor Reveley. "John is an internationally renowned marine geologist as well as a master teacher and mentor to his students. By every measure, Dr. Milliman has walked the walk of an outstanding scientist, professor and colleague. He is one of the best."

Milliman, whose career at William & Mary's School of Marine Science at VIMS began in 1993, has conducted groundbreaking research and published seminal works in not just one but two key areas of marine science—river discharge and carbonate chemistry. He is also a pioneer in establishing collaborative research ties between the U.S. and China.

—David Malmquist, VIMS

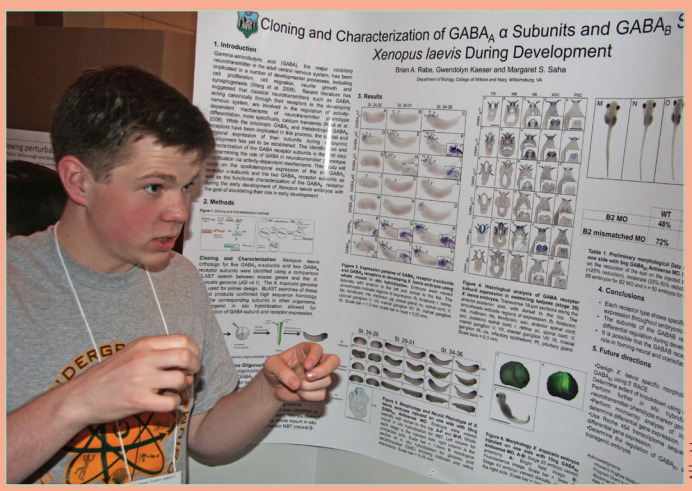
Noted legal scholars create Robert E. and Elizabeth S. Scott Research Professorship in Law School

Two alumni who are noted legal scholars—Board of Visitors member and William & Mary Law School graduate Robert E. Scott and his wife, Elizabeth S. Scott, a graduate of the College of William & Mary—were honored at a September reception in the Wren Building for their generosity in creating a new research chair in law. During the celebration, Michael Steven Green was recognized as the first scholar to be designated as the Robert E. and Elizabeth S. Scott Research Professor of Law.

In his remarks, William & Mary President Taylor Reveley said that the Scotts' creation of the research professorship was especially meaningful since it was made by two "highly acclaimed law professors and scholars."

Robert Scott is the Alfred McCormack Professor at Columbia Law School, a former dean of the University of Virginia School of Law and a fellow of the American Academy of Arts and Sciences. Elizabeth Scott is the Harold R. Medina Professor at Columbia Law School. She taught previously at the University of Virginia School of Law, where she was founder and co-director of the interdisciplinary Center for Children, Families and the Law.

—Jaime Welch-Donahue, Law School



Alla Herman

Showcasing research

Brian Rabe '13 explains his research at the poster session of the 18th Annual Undergraduate Science Research Symposium. More than 100 projects from 10 departments and programs were featured at the session.

Center for Gifted Education hosts delegation of Korean Nobel Project students and educators

The College of William & Mary's Center for Gifted Education hosted 34 administrators, educators and students from Korea.

The visitors came to Williamsburg to exchange ideas about teaching and learning through a variety of scientific and mathematical curricular concepts. The visit was part of the Korean Nobel Project, a project helping to stimulate the minds and develop the skills of Korea's future global leaders.

Visiting students went through a rigorous selection process to participate in the Nobel Project of Korea. The top 0.01 percent of all students from the Chungcheongnam-do Province were selected to participate in the visit to the College.

The Korean students engaged in authentic learning experiences through high-level and interactive mathematical and scientific curricula. The students learned about spatial reasoning, fractals, genetics, force and acceleration and the chemistry behind crime scene investigation in conjunction with the William & Mary gifted education curricular and instructional models.

—Paige Hendricks, Center for Gifted Education

Stephen Salpukas

Transcribing the Civil War

More than 200 volunteers have been helping Swem Library with the transcription of thousands of Civil War documents. It's part of a project called Fights to Rights: The Long Road to a More Perfect Union.

A Bouquet of STEM Outreach

Today, President Obama will host the second White House Science Fair celebrating the student winners of a broad range of science, technology, engineering and math (STEM) competitions from across the country. The President will also announce key additional steps that the Administration and its partners are taking to prepare 100,000 effective math and science teachers and to meet the urgent need to train one million additional STEM graduates over the next decade.

—White House Press Release, Feb. 7, 2012

We do STEM at William & Mary. We're good at it. We also do STEM outreach—offering a wide variety of programs to people outside of William & Mary.

"Doing" STEM means conducting research and also teaching science, technology, engineering and math in William & Mary's excellent STEM programs.

It's important to understand that we do "full-acronym" STEM—including the T and the E. Many of the projects under way in our labs would be at home in any list of work at programs or schools with "technology" or "engineering" in their name, even though William & Mary doesn't offer degree programs in engineering or technology.

A hallmark of William & Mary's STEM programs is the blending of activity dedicated to the *creation* of knowledge with activity dedicated to the *transmission* of knowledge. We have an inclusive culture here at the College when it comes to research. This culture makes it easy for people at all levels to get involved. We work easily with collaborators at other institutions and with industrial partners. Our culture also makes it easy for our youngest students to make important contributions to research. Our STEM outreach programs are a natural outgrowth of this culture, of course.

Some of those additional million STEM graduates the White House wants to produce will go through William & Mary's own excellent STEM programs or those offered by other universities. A large number also are needed for advanced manufacturing and other similar career paths that won't necessarily lead through a traditional college program.

David Malmquist/VIMS

Rachel Brotherton and Jennifer Yang of the Williamsburg Montessori Middle School repair a faulty thruster motor on an underwater robot. They're working with VIMS scientists to use the robots to survey the remains of ships scuttled in the York River at the end of the Revolutionary War.

So, just as we're "full acronym," we're also "full spectrum" when it comes to STEM. William & Mary hosts a wide variety of outreach programs to develop both interest and skills in STEM subjects. There are programs directed at K-12 students; others are for K-12 teachers. We offer still other programs geared toward the faculty of both community colleges and four-year institutions.

Federal agencies or private foundations support many of these programs. Others are grass-roots, powered by scientists and students at the College who think that STEM is cool and want to show people why.

Here's a sampling of STEM-outreach programs. It's not exhaustive, but the following pages contain the main ones.

STEM Education Alliance

Students & teachers meet and work with scientists & engineers

"Three, two, one ..."

A rocket made out of a two-liter bottle shoots into the blue sky, a line of white smoke trailing behind it. The middle school students on the launch team shield their eyes from the sun as they watch the bottle-rocket's descent, thinking of ways they can make it climb even higher. Nearby, scientists and engineers—who face similar situations in their careers, but with much larger equipment and consequences—stand ready to assist.

For the students, the scientists are the ultimate study aid, providing both guidance and a real-life example of a STEM career. For the scientists, the students are prospective colleagues and the possible future of their career fields.

Such collaborations between professionals and students are thanks to a National Defense Educational Program contract awarded to William & Mary's STEM Education Alliance. The project pairs middle school teachers with professional engineers and scientists, creating an opportunity for them to mentor both teachers and students.

"People often wonder why the School of Education is involved in STEM-outreach activities. Ultimately, it begins with education," said Gail Hardinge, executive director of the STEM Education Alliance, or SEA. "We must expose students to careers within an appropriate educational environment if we expect them to be interested in becoming the engineers and scientists of the future."

Since it began in 2004, the SEA has worked with more than 19,000 students in eight school districts and more than 100 engineers from four naval commands. Last summer, the alliance assisted in managing and evaluating four summer academies attended by 300 students and 75 teachers.

The SEA received funding from the U.S. Department of Defense for a total of $2.5 million over three years. The contract is allowing the alliance to expand its reach by offering follow-up training to scientists, engineers and teachers online. In the past, SEA staff had to travel to schools to conduct follow-up training.

"The bigger we become, the more demand there is," Hardinge said. "So, we're going to create blended learning opportunities by combining initial face-to-face sessions with follow-up distance sessions."

The contract is also allowing the alliance to support a Hampton Roads Regional STEM Coalition, which will partner with local teachers, engineers and scientists. In addition, the contract is funding an expansion of the alliance's use of the STEM Attitude and Awareness Scale, which assesses students' knowledge of and attitudes toward science and math topics.

"We've used our evaluation instrument in Virginia on over 5,000 students," said Jake Joseph, SEA assistant director. "We are now contracted to evaluate Charleston, South Carolina's, STEM programs, as well as after-school STEM programs in Philadelphia."

HHMI Summer Updates

High school science teachers are guest researchers in our labs

Every summer since 1999, a number of high school biology teachers gather in the labs and classrooms of William & Mary to work with and discuss the latest advances in research with the College's biologists.

"What we do is choose a topic that is highly relevant in society, but that also could be used in the classroom," explains Margaret Saha, "but the primary goal really is to excite the teachers about the new modern science that's going on."

Saha, Chancellor Professor of Biology, has coordinated these sessions from the beginning. Summer updates have been funded through four consecutive grants from the Howard Hughes Medical Institute (HHMI).

"I am pleased that William & Mary is using part of their HHMI grant to work with science teachers," said David J. Asai, director of precollege and undergraduate science education programs at HHMI. "It's more than just 'giving back.' The attention to K-12 teacher professional development is essential to ensure the vitality of science in this nation."

As many as 20 high school biology teachers have attended each of the annual summer update courses, but Saha says she prefers to keep the enrollment to a dozen or so.

"These courses just get rave reviews every year," Saha says. "In fact, teachers from last year already have asked to be placed on the waiting list for this year's course. They love the fact that a practicing scientist would take the time to deal with teachers."

Each summer update session focuses on a current topic in biology. The centerpiece is a series of experiments that the teachers can take back to their own classrooms. The most recent experiment concerned the effects of pollutants on the development of embryos. Because of its relevance, the course attracted a wide range of interest, Saha said.

"This is a topic that is really hot right now because it deals with the effects of certain chemicals—teratogens, endocrine disrupters—on animal embryos," she explained. "So it really drew in everyone who was interested in ecology and conservation biology."

The summer update experience carries graduate credit for the teachers, some of whom travel from hours away. Saha says teachers regularly come from schools in Richmond, Hampton and Suffolk. There's a steady North Carolina contingent, as well.

Other teachers, including Emil Davis of Bruton High School outside Williamsburg, come back almost every year. The returnees are drawn by the variety as well as the quality of the programs. A large proportion of the William & Mary biology faculty have taught at least one summer update course, ensuring a topical mix that, year to year, ranges from molecular biology to ornithology to genetics to entomology.

"I learn something new every summer that I can attend," Davis said. "And I get to associate with the professors."

Looking at STEM words

Linguistic variation makes a difference in STEM classrooms

The 30 students in a high school classroom may all speak English, but a mix of factors shapes how each one speaks it. The same is true for the teacher. Each person's social, regional and economic experiences influence which words are selected and how they are spoken. As a result, two students who try to communicate the same idea can be met with varying reactions from the teacher, based on the language used and the attitude of the hearer to those language variations.

In classrooms throughout Virginia and Maryland, Anne Charity Hudley is studying how such variations in language affect learning as well as student assessment in STEM classes. The work is supported by funding from the National Science Foundation.

"There has been some strong research on the implication of language and culture in language arts classrooms, but more information is needed about the intersections in STEM classrooms," said Charity Hudley.

Along with co-investigator Christine Mallinson from the University of Maryland, Baltimore County, Charity Hudley is working with 60 K-12 educators in Virginia and Maryland to assess their knowledge of and their responses to language variation, particularly among African American students.

In addition to her work with Mallinson, Charity Hudley is also collaborating with William & Mary biologists to investigate how cultural insights will help minority retention in the College's introductory biology courses.

The two investigators are using surveys,

Joseph McClain

Emil Davis learns techniques such as gel electroporesis in William & Mary's biology labs and brings them back to teach to Bruton High School students such as Brittany Cordero (front) and Kai Brown. It's one benefit of HHMI-funded summer updates coordinated by W&M's Margaret Saha (left).

interviews and classroom observations to conduct their assessments. They are also designing "linguistically informed" materials for teachers to use in their classrooms and they are hosting workshops for the teachers.

But Charity Hudley's work does not stop with K-12 classrooms. She and Mallinson are also working with pre-service teachers and STEM majors on their college campuses.

PERFECT Sense

VIMS grad students teach science in high school classrooms

Theresa Davenport was having some trouble with a guy in her class.

Davenport was explaining to a biology class at Grafton High School about the problems that can happen when seawater is low in oxygen. The guy was struggling with how water gets to be low in oxygen in the first place.

"He didn't understand that oxygen is dissolved in water," she said. "It finally hit me that he was picturing the organisms using the O in H_2O."

Once she understood the problem, it only took Davenport, a master's student in biological science at VIMS, a minute to explain the concept of dissolved aquatic oxygen. The football player got it.

Such mutual revelations between student and teacher are frequent in the GK-12 PERFECT program at VIMS. This STEM-outreach initiative, supported by the National Science Foundation, partners grad students from VIMS—like Davenport—with science teachers.

Kam Tang, associate professor of marine science at VIMS and director of the program, says the program gives VIMS students some classroom teaching experience.

"I plan to teach in the future, hopefully at the undergraduate level," said Samuel Lake, a Ph.D. student who is in his second year of a GK-12 fellowship at York High School. "I'm getting ideas on ways I can present different things and do activities and make things hands-on that you would normally have to do in a lecture setting."

GK-12 fellows typically spend a fullday twice a week at their partner schools. In accordance with the program's title behind the PERFECT acronym—Partnership between Educators and Researchers for Enhancing Classroom Teaching—the fellows forge links between William & Mary/VIMS and the K-12 community, Tang said.

The number of GK-12 fellows varies between eight and 12 each year, says Vicki Clark, one of the GK-12 project managers. The fellows and their partner teachers start their collaboration in the summer.

"Sometimes during the summer, the teachers are working with the grad students on their research projects here at VIMS and sometimes the graduate students are at the school working with the teachers to get ready for the school year," Clark explained.

Noyce Scholars

Training people who know STEM and who also can teach STEM

America needs more good, seasoned K-12 STEM teachers—professionals who not only understand science and math, but who also know how to teach science and math.

"An expert teacher needs to do both," said Paul Heideman. "Not having the content knowledge or not having the beginnings of expertise in pedagogy—both of those things are bad."

It's the goal of the Robert Noyce Scholars Program to produce professionals who can do both, says Heideman, professor of biology at William & Mary—and to keep them in the profession. Heideman is one of the principal investigators of William & Mary's Noyce Scholar Program, funded by the National Science Foundation.

The management team for the program is made up of faculty from both Arts & Sciences and the School of Education.

"The whole intent of the program nationwide is to try to get more science and math teachers," Heideman said.

He explained that the program leads science and math majors through the teacher certification process. Noyce scholars receive $5,000 per semester in return for a pledge to teach a STEM subject in a high-need school. Noyce alumni are asked to teach for a year for every semester of scholarship support they receive.

Many students become Noyce scholars after summer internships offered by Teachers for a Competitive Tomorrow, a "sister program" funded by the U.S. Department of Education.

Heideman says that William & Mary's science and math majors tend to be strong in their content areas, but cautions that knowing the science isn't the same thing as being able to teach the science.

"The research says that experts are not necessarily good teachers," he said. "If you want experts to be good teachers, they have to learn to be good teachers. "

VISTA

Two student researchers at the 2011 VISTA summer science camp work together on a project designed to measure the turbidity of water.

The program has several components to help Noyce scholars to become excellent STEM teachers. Marguerite Mason and Juanita Jo Matkins, science- and math-education specialists in the School of Education, conduct pedagogy components, while Kevin Goff, also of the School of Education, offers a practicum in teaching STEM in high-need schools.

William & Mary's Noyce Scholars Program has 10 students each year. In early 2012, 15 Noyce alumni were teaching math, chemistry, biology, earth sciences or physics in grades 6-12.

"We promised the NSF to support 40 over the five years of the grant. We are on pace to do a little bit better than that," he said.

On the Cutting Edge

A STEM-outreach program for faculty in the geosciences

Heather Macdonald has always been eager to get her new geosciences students out of the classroom and into the field—especially if there is a handy outcrop.

"Outcrops give us a great picture of what life was like in the past," she says. "I take my students to an outcrop over in Chippokes State Park. I love to see the moment when the students get what it means: This area was covered by an ocean millions of years ago. That's a great conceptual leap."

Outcrops aren't as handy to all of America's teachers of earth science as they are in Virginia. In 2002, Macdonald, Chancellor Professor of Geology at William & Mary, joined a cooperative venture of like-minded geosciences faculty to launch On the Cutting Edge, a STEM-outreach program for geoscience faculty. It's a professional-development initiative that integrates a resource-rich website with a series of workshops around the country for current and future geoscience faculty.

The group holds several workshops a year around the country as well as virtual workshops, online journal clubs and webinars. More than 2,000 faculty members, graduate students and post-docs from more than 450 colleges and universities have participated in Cutting Edge workshops.

The Cutting Edge website contains information and materials organized into some 40 topical sections. The resources include more than 1,500 activities contributed by faculty in the geosciences. The activities include ideas for interactive classroom discussions, field exercises and lab activities.

"If you are going to teach a class on landslides or earthquakes or tsunamis, you can go to our website and look for resources," Macdonald said.

On the Cutting Edge has been a success by any measure, attracting $9 million in support from the National Science Foundation and a number of awards. In 2010, the American Association for the Advancement of Science (AAAS) recognized the web component of On the Cutting Edge with its Science Prize for Online Resources in Education (SPORE).

The WISE women

Plugging those holes in the final stretches of "the leaky pipeline"

A pipeline with a leak isn't very efficient—much of whatever is supposed to be transported will be lost along the way. That's exactly what's happening to women as they pursue careers in science. A phenomenon aptly titled "the leaky pipeline" describes how the number of women working toward science careers decreases at each stage of the educational process.

That attrition is something that five women scientists are addressing through the Women in Science Initiative (WISE) at William & Mary. WISE is a STEM-outreach program that concentrates on helping young women to navigate through the final stretches of the pipeline that leads from kindergarten to a career as a practicing scientist.

"There's a discrepancy between males versus females who get their bachelor's degrees in science-related fields and then who go on to get their Ph.Ds. There is an even bigger gender difference in who gets hired as faculty and then receives tenure," said Assistant Professor Cheryl Dickter. "For women, maintaining a career in STEM drops off over time. The idea is to investigate why and figure out how we can help at each stage."

The initiative, which kicked off in 2011, seeks to conduct attitudinal assessments about women in STEM careers, provide female faculty members with research opportunities and sponsor career development opportunities. The workshops and activities are aimed at helping other female faculty members at William & Mary, Thomas Nelson Community College and Richard Bland College as they face challenges unique to women in STEM professions.

Along with Dickter, the five WISE women include Associate Professor Jennifer Stevens, Assistant Professor Catherine Forestell, Professor Pamela Hunt and Visiting Assistant Professor M. Christine Porter. Stevens is the principal investigator of the NSF grant. All are researchers in William & Mary's neuroscience and psychology programs.

To provide women with career development opportunities, WISE is sponsoring a variety of activities, including workshops on topics such as writing, leadership and challenges that women in STEM disciplines face. Participants will also have the chance to attend an annual leadership forum, an annual retreat and four symposia each year. The funding for WISE, a three-year initiative, was provided by the National Science Foundation.

"This grant is to career-develop and empower female faculty in the STEM disciplines," Stevens said.

Stephen Salpukas

A panel of William & Mary's female researchers offers advice and encouragement to young women scientists at a workshop conducted by the Women in Scientific Education (WISE). Female STEM faculty from Thomas Nelson and Richard Bland also attended.

Geology on Wheels

Students take earth sciences on a tour of fifth-grade classrooms

When Geology on Wheels rolls into an elementary school, the star is usually obsidian—at least as far as the kids are concerned.

"They love obsidian because it's glass," says Linda Morse. "And they know that a volcano threw it out in the air."

Morse is the director of laboratories in William & Mary's Department of Geology. She also is the coordinator of Geology on Wheels, which sends teams of geology majors out to introduce students to the earth sciences. Morse said that the program targets fifth-grade classes.

"That's the big SOL test year," she explained, referring to Virginia's Standards of Learning test regimen.

This STEM-outreach program continues to evolve to address the earth-science component of the fifth-grade Standards of Learning (SOL) test. A typical visit from Geology on Wheels is an hour-long, hands-on event with worksheets and lots and lots of samples. The subject matter is coordinated with the fifth-grade teacher and reinforces the lessons taught in the classroom, Morse said.

Geology on Wheels tries to reach as many public- and private-school fifth grade classes as possible. A visit from geology students carrying boxes of rocks is as welcome among fifth-grade students as it is their teachers, Morse added.

"It's a plus-plus for everybody. The students are thrilled to have William & Mary scientists in their classroom," Morse said. "The teachers are thrilled, because our majors can clear up questions that they have about the science."

Virginia's VISTA

Six Virginia universities join forces for better STEM education

Virginia's beaches are in trouble. Swimmers are getting sick. The governor hears about a convention of very young scientists at William & Mary's School of Education. He issues a desperate plea for help.

That's the hypothetical scenario given to fourth and fifth graders who participated in a 2011 summer science camp offered through the Virginia Initiative for Science Teaching and Achievement (VISTA) project.

This STEM-outreach project is funded by a $34-million grant from the U.S. Department of Education. VISTA aims to improve science teaching and learning in Virginia schools.

VISTA programs take place on the campuses of the three main partner universities for the project: William & Mary, Virginia Commonwealth University and George Mason University, which heads the project.

The project incorporates four major aspects. William & Mary is heavily involved in the first two, which are training for elementary teachers—which includes the summer science camps for elementary students—and training for provisionally licensed science teachers.

Juanita Jo Matkins, VISTA project manager for William & Mary, said that the purpose of the camps is to train elementary school teachers.

Four scientists participate in VISTA as content experts. The biology expert is Professor Paul Heideman of William & Mary.

The camps take place in the School of Education's new building and are aimed at a diverse population of students, including those from schools with many low-income families.

Matkins said that the camps make elementary teachers into "true believers."

"They begin to believe that they can do science in a way that the Virginia Standards of Learning and our national standards recommend science be done," she said.

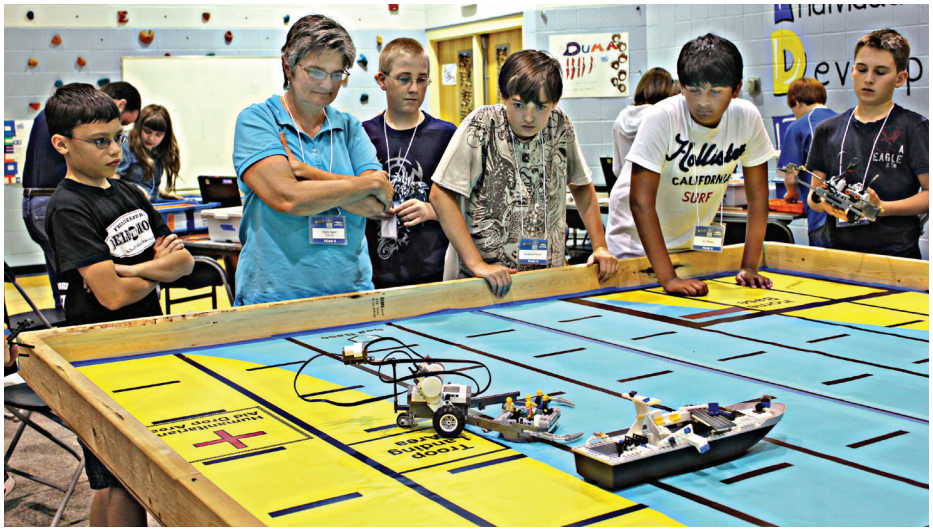
The second major area that William & Mary is involved in is induction and coaching for secondary pre-service teachers in science.

"What that means is that we train people who are hired to be science teachers, but who have little science education training," said Matkins. As part of this project, William & Mary provides newly licensed teachers with two courses in science methodology, satisfying the coursework requirement for licensure.

Provisionally licensed teachers also receive a coach who is an experienced teacher in their subject area. Coaches actually go into classrooms with the teachers, and they sometimes serve as a liaison and advocate for the teacher.

Stephen Salpukas

Anne Charity Hudley makes a point during one of her workshops on linguistic variation among students and teachers in STEM classes.



STEM Education Alliance

Students, teachers and engineers get together at Summer Academies conducted by the STEM Education Alliance. LEGO robot construction is one of the popular and effective exercises at the academies, such as this 2011 event held at the Naval Surface Warfare Center Dahlgren Division.

Launching Camp Launch

A STEM-based enrichment program for seventh graders

While William & Mary's students are away from campus in summer, a new—and younger—set of students will take their place in the dorms and in the classrooms, learning about science and cutting-edge technology.

Fifty-five seventh graders from school districts around the region will participate in a two-week enrichment program for gifted learners, hosted by William & Mary's Center for Gifted Education, part of the School of Education. The program, which will be residential for the first time in 2012, has been specifically offered to students from low-income backgrounds who may not have the chance to participate in similar programs because of financial constraints. Tracy Cross, executive director of the Center for Gifted Education, believes that the new residential program, "Camp Launch," will set students with low-income backgrounds on a trajectory for continued success in school and in their communities, thus creating a pipeline to university opportunities.

The program is the latest STEM-outreach offering from the center, which has provided science, math and technology classes to gifted pre-collegiate students through its Saturday and Summer Enrichment Programs for more than two decades.

The 2012 Camp Launch session will be held July 15-28. Sessions will include two courses each day, one focusing on LEGO robotics and another focusing on nanotechnology. The center received a $250,000 renewable grant from the Jack Kent Cooke Foundation to fund Camp Launch.

Mihyeon Kim, director of the pre-collegiate learner programs for the center, said that Cross and his program directors decided to address the demand for STEM education. In addition to the academic courses, the program will also offer a personal development component, which will include career planning and writing instruction. Writing skills are extremely important to students who plan to take advanced academic courses, Kim said.

"If they don't have those skills, even in the STEM portion, it's hard to catch up in those rigorous courses," she said.

Underwater history hunt

Students use submersibles to investigate sunken ships

A partnership between VIMS and the Watermen's Museum in historic Yorktown is giving students at three schools an opportunity to dive into Colonial history—literally.

This STEM-outreach project, funded by a grant from the National Science Foundation, allows the students to pilot unmanned submarines to monitor the conservation status of vessels scuttled by Lord Cornwallis during the Battle of Yorktown in 1781—the last major battle of the American Revolution.

Leading the project are Mark Patterson, head of the Autonomous Systems Laboratory at VIMS, and VIMS alum David Niebuhr, director of the Watermen's Museum. The students are from Point Option High School in Newport News, the Williamsburg Montessori Middle School and Peasley Middle School in Gloucester. VIMS graduate student Jennifer Elliott, who is teaching at Peasley as part of the VIMS GK-12 partnership, also is involved.

The project capitalizes on the recent discovery in the York River of two new shipwrecks from the Yorktown battle and siege. Previous archaeological work had revealed the presence of nine other wrecks, including HMS Betsy, the target of intensive study during the 1970s and 1980s. These wrecks are listed on the Virginia Landmarks Register and the National Register of Historic Places.

Patterson says the initiative involves field robotics at the graduate-student level, while lessons involving archaeology, history, math and marine science "sneak in." The experiences mix scientific learning with hands-on training and actual operation of two kinds of subs.

Patterson says the "real-science" lessons learned include frustrations such as propellers fouled by marine organisms known as hydroids and two instances of props being sheared off by debris—possibly from the wreck itself.

"The kids are learning lots of interesting skills, including navigation and modular arithmetic, which they need to help collect valuable data on currents over the wreck site," Patterson said.

Carol Hopper Brill

Samuel Lake, a fellow in the NSF-funded VIMS GK-12 PERFECT program, shows STEM teachers a board game based on the York River watershed.

The Tidewater Team

A mathematical formula for capturing kids' imaginations

The Tidewater Team is helping fourth- and fifth-grade students get their hands dirty—creating mini-ecosystems, fictional animals, volcanoes and ice cream makers. But the fun and games are just sneaky ways to teach math and science concepts.

"Unfortunately, many people think of math as just memorizing facts or just doing algorithms," said Margie Mason, a professor of education at William & Mary. "Here, we are capturing kids' imaginations. We're getting them actively engaged and they're seeing a purpose for math and science."

The hands-on projects are just one of the many strategies that the Tidewater Team, based in William & Mary's School of Education, employs to encourage "math excellence" in more than 20 school districts.

The team provides resources (such as a math vocabulary dictionary), professional development opportunities—even a support group for math teachers, specialists and supervisors. In addition, the team collects data from the schools for research to be conducted by graduate students at William & Mary.

The Tidewater Team was born out of Mason's meetings with local math specialists and supervisors. The group now meets monthly with Mason and other Tidewater Team members to discuss upcoming grants, needs assessments and possible collaborations.

Revisions to SOLs are a continual concern for math teachers, Mason noted. Train-the-trainer programs, usually conducted during the summer, are one of the Tidewater Team's strategies for addressing challenges of the SOLs. A recent train-the-trainer program reached about 500 middle school math teachers, she said.

"We brought leaders together from all of the school divisions and ran them through a one-week workshop on the changes to the SOLs in the seventh and eighth grade and how to teach them to teachers and how to teach them to kids," Mason said. "We sent them home, and with the support of our coaches, they trained people in their own building—the entire staff of seventh and eighth grade."

Some of the Tidewater Team's initiatives are aimed directly at students, but teachers remain a part of the action. A summer science camp for fourth- and fifth-graders was preceded by a workshop for their teachers.

"We helped the teachers and then they tried it out with the kids and now they're going back into their own schools and teaching full-blown units," said Mason.

Department of Geology

Clay Harris '13 shows fifth graders the wonder of rocks at a Geology on Wheels stop in Carver Elementary School in Newport News.

Wait, there's more!

These stories don't include the many, many smaller STEM-outreach activities, let alone the numerous informal visits to STEM classrooms by William & Mary scientists. Many of the miscellaneous activities take the form of annual events. For instance, the College's Applied Research Center participates in the open house held by Jefferson Lab and gets involved in NanoDays at the Portsmouth Children's Museum.

The Marine Advisory Services program at VIMS and the Virginia Sea Grant participates in offering a number of online resources, including Chessie: Chesapeake Science on the Internet for Educators and Bridge, a collection of marine education resources. VIMS also offers BWET, Bay Watershed Education and Training, which integrates marine science related to the Chesapeake Bay into seventh grade classrooms in Gloucester and Mathews counties.

Many STEM-outreach initiatives are offered at the departmental level. For example, the physics department conducts programs such as Saturday Morning Physics, with topics ranging from the Higgs boson to the science of chocolate. The physicists participated in the first nationwide LaserFest in 2010, and adapted the concept into PhysicsFest, an annual event.

Erin Zagursky, David Malmquist, Jim Ducibella, Justine Whelan and Joseph McClain all contributed to these stories of STEM outreach.

For additional material on the involvement of William & Mary faculty and students in STEM outreach, please go to http://www.wm.edu/research/ideation/stem-outreach/index.php

THE HUNT FOR THE MYSTERY DIARIST

Her penciled entries offer glimpses of the African American middle class in 1902

By Lillian Stevens

WHEN A YOUNG DOCTOR'S WIFE WROTE IN HER DIARY BACK IN 1902, SHE COULDN'T HAVE KNOWN THAT OVER A CENTURY LATER, SCHOLARS AT WILLIAM & MARY WOULD BE READING IT—LET ALONE TRYING TO DETERMINE HER IDENTITY.

The diary was acquired by the College in 2009 and dwells in Swem Library's Special Collections Research Center. Its unsigned entries offer a fascinating view into the day-to-day existence of a middle-class African American woman living in Virginia's Tidewater during the early 20th century. It also provides a focus for hands-on scholarly research, the results of which will surely be of interest to scholars and genealogists—and perhaps some day even to the diarist's descendants.

Once Special Collections purchased the diary (on eBay!) University Archivist Amy Schindler placed it on a list of items that would make a good focus for an honors thesis or student paper. Additionally, the diary has a Lemon Project component. Jody Allen, a visiting assistant professor of history and Lemon Project managing director and co-chair, explains the Lemon Project focuses on the history of Williamsburg and the Peninsula from the slavery era through the Jim Crow era. (See sidebar.)

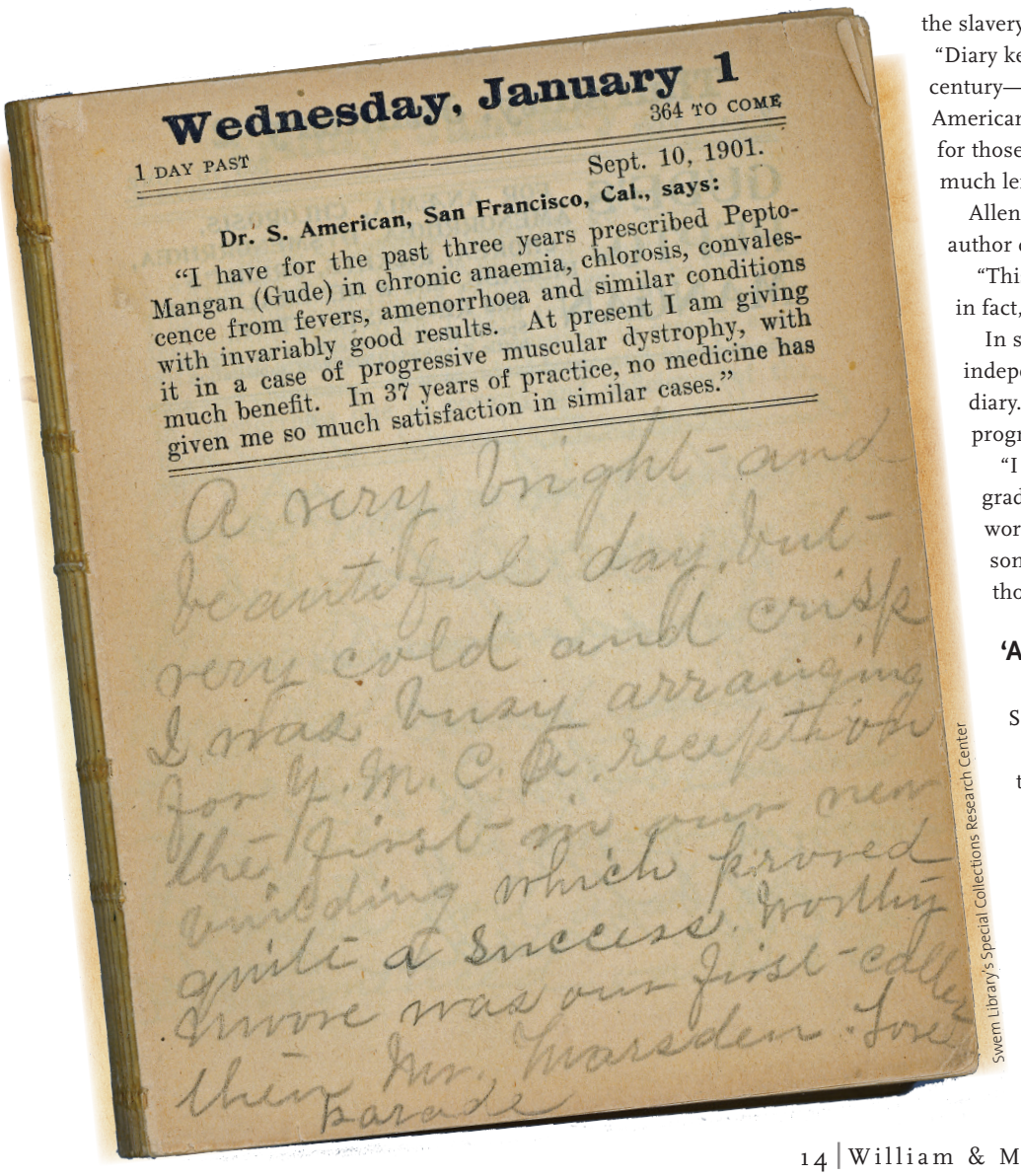
"Diary keeping was a common practice in the early 20th century—and certainly not uncommon among African Americans," Schindler says. "It was probably less common for those of the working class, who would not have had as much leisure time to devote to writing."

Allen agrees, noting that the diary entries suggest that its author did not work outside the home.

"This gives increased support to the idea that there were, in fact, middle-class blacks during this period," Allen says.

In spring 2011, Kendra Cabler '11, seeking a one-credit independent study topic, was the first to look into the diary. She graduated before she was able to make much progress, but her work informed subsequent research.

"I had it in my mind as a project for one of our graduate students," Schindler says. "Lauren Wallace is working on her master's in history and she had done some other research for me. So I know that she is very thorough."


Wednesday, January 1

1 DAY PAST

364 TO COME

Sept. 10, 1901.

Dr. S. American, San Francisco, Cal., says:

"I have for the past three years prescribed Pepto-Mangan (Gude) in chronic anaemia, chlorosis, convalescence from fevers, amenorrhoea and similar conditions with invariably good results. At present I am giving it in a case of progressive muscular dystrophy, with much benefit. In 37 years of practice, no medicine has given me so much satisfaction in similar cases."

A very bright and beautiful day, but very cold and crisp. I was busy arranging for Y. M. C. A. reception the first in our new building which proved quite a success. Worthy Grove was our first caller this Mrs. Marsden. Love Parade

Swem Library's Special Collections Research Center

'A FASCINATING DIARY'

Wallace, who also serves as an apprentice in Special Collections, was excited to tackle the project.

"It's a fascinating diary. The task I was given was to research and check the accuracy of things we thought were true about the diary from Kendra's research—and ultimately reveal the identity of the diarist," Wallace explains.

The mystery diarist likely acquired a copy of *The Physician's Daily Memorandum*, a drug-company promotional item, from her physician husband and used the blank portions of the pages to record her daily thoughts.

Wallace set about the painstaking task of scrutinizing clues from the diary and conclusions from Kendra Cabler's research. She combed through Google Books and other online archives, including special collection research centers in other institutions.

"The first thing I did was to begin double-checking dates and events," says Wallace. "Through Swem's databases, we have access to many records and newspapers."

The mystery diarist had written her entries on preprinted, dated pages within a small book called *The Physician's Daily Memorandum,* a drug-company freebie. The top half of each page is occupied by day and date information, followed by preprinted segments of a physician's case notes. The preprinted section for Thursday, July 10, details the gynecological problems of "Mrs. McG., Irish, aged fifty-seven" as recorded by Dr. Geo. G. Van Schaick. In the blank area below, the diarist recorded:

> *The Hottist day of the season thus far. Mr. Gray shot Dr. Batts and killed him at 8 o'clock at night. It poured down raining.*

Wallace plugged events mentioned in the diary into a search engine and newspapers from 1902 began to fill in the blanks. It became clear that the diary was set in Norfolk, not Portsmouth, as was originally believed.

"In one of the entries, she writes of a fire in the Columbia Atlantic Hotel which occurred on January 31," says Wallace. "*The New York Times* published an article saying the hotel burned down on January 31, 1902 in Norfolk, Virginia."

Most entries are less dramatic, mostly logistical ones surrounding church, family and what happened on a given day, e.g., "the weather was hot and Alma cleaned the shed."

Alma was the diarist's daughter; her presence in the diary would prove extremely helpful later—as Wallace's research brought her closer to a positive I.D. of the diarist.

For weeks, Wallace pored over the diary, drawing upon her own research expertise to unlock its mysteries. She knew that the diarist's husband was involved in a medical association which Wallace theorized was probably the National Medical Association, "since African American doctors were not allowed to be in the American Medical Association in the early 1900s."

Further inquiry into the National Medical Association revealed a list of prominent physicians in the Norfolk and Portsmouth area. While a number of names were crossed off Wallace's list because they did not match up to the diary's doctor, a few proved promising—in particular—a Dr. P. L. Barber.

Wallace was able to call up a document from Howard University, a historically black university, and established that a Philip L. Barber was a medical student there—and the years he was there were consistent with the age of the diarist's husband.

ZEROING IN ON THE DIARIST

"Through diary entries, I knew that the doctor's birthday was in May. At this point, other pieces of the puzzle were falling into place," Wallace says.

In addition to serving as a local officer for the Norfolk area in the NMA, the diary's doctor was also involved in the Tidewater Medical Society which provided medical care for the black population in Norfolk.

Ultimately, Wallace located a genealogy site recommended to her by the Norfolk Public Library.

"It showed that Philip L. Barber had a wife named Florence and an adopted daughter named Alma," says Wallace.

That information prompted Wallace to explore census records for Norfolk, Virginia, where she found pay dirt.

"Throughout the diary, there are references to meetings of the Colored Men's Department of the YMCA, conferences intended for racial empowerment and equality, and mentions of key individuals

Stephen Salpukas

In Special Collections, collaborators (from left) Amy Schindler, Lauren Wallace and Jody Allen examine the diary. Entries were written in pencil.

in the National Medical Association and Tidewater Medical Society," she says. "By using these organizations as a framework, it was possible to ascertain that the probable owner of the diary was indeed Florence Barber, wife of Dr. Philip L. Barber."

Beyond unveiling the probable identity of the diarist, there may be other opportunities for other scholars to build on Wallace's research. It is clear from diary entries that the doctor and his wife were very involved in their community and that they engaged regularly with influential people of color.

STIRRINGS OF A MOVEMENT

"I believe that a number of these conferences she wrote about as having attended were important because, although the Civil Rights Movement hadn't happened yet, there were the beginnings or stirrings of the African American community asserting themselves by trying to better their own lives," Wallace says.

In the near term, she has completed her research. Her paper will be incorporated into the Special Collections Research Center database so that people who find a description of the diary there will have more background information about the woman and the contents of her diary.

But it doesn't have to end there.

"I've started the ball rolling and now maybe the things that I discovered will make people want to learn more about Florence Barber," says Wallace.

ABOUT THE LEMON PROJECT

This initiative gets its name from Lemon, a man once enslaved by the College. We know very little about Lemon, but in 2009, William & Mary's Board of Visitors gave his name to a long-term research project "to better understand, chronicle and preserve the history of blacks at the College and in the community and to promote a deeper understanding of the indebtedness of the College to the work and support of its diverse neighbors."

TEAM GOLD GOES FOR THE GOLD

Competitive programming squad advances to World Finals

by Joseph McClain

SOMETIMES THE GUYS ON TEAM GOLD SAY "WORLDS." OTHER TIMES, THEY SAY "FINALS."

Both terms refer to the World Finals of the Association for Computing Machinery's International Collegiate Programming Contest (ACM-ICPC) to be held in May in Warsaw, Poland. Team Gold is going—and they're going to compete against the top young computer programmers on earth.

Team Gold is Michael Christensen M.S. '12, Brett Cooley '13 and Aaron Dufour '12. The three earned a berth representing William & Mary at the finals after a stellar showing in early November at the Mid-Atlantic Regionals, placing second among 166 teams.

"A large part of the competition is figuring out what to work on first and who should work on it," Christensen said.

To solve the problems, the team applies algorithms, the step-by-step instructions that are the basic vocabulary of human-computer communication. In competition, two members of the team typically work on paper while the third is at the keyboard, so that the team is working on at least two problems at any one time, Noonan said. Some competitors try using the most fleet-fingered on the team as a designated typist, but Team Gold has developed its own answer to who gets the keyboard.

> **"It's generally useful, regardless of typing speed and other considerations, to have the person who thought out the problem and came up with the algorithm to type it up."**

William & Mary had a second squad at regionals, Team Green. In March, the members of Team Green—Kevin Ji '13, Jeff Soosiah '12 and Alex Valentin '12—competed in another competition, the Dominion Enterprises Hackathon. Valentin was one of the winners.

Ever since regionals, the members of Team Gold have been in training for Warsaw where they will compete against 110 teams of the world's top student programmers.

This is the first time a William & Mary team has advanced so far, says Debbie Noonan, an instructor in William & Mary's Department of Computer Science. Noonan has coached the College's competitive programming teams for the past 15 years and she'll be accompanying Team Gold to Warsaw, along with her husband, Bob Noonan, a professor in the computer science department.

ONE COMPUTER FOR EACH TEAM

Coach Noonan says that the scenario at worlds will be similar to the regional competition. Only one computer and keyboard is provided for each three-person team. The teams are given a list of eight problems to solve and the clock starts ticking. The team who solves the most problems correctly in the allotted time wins.

"It's generally useful, regardless of typing speed and other considerations, to have the person who thought out the problem and came up with the algorithm to type it up," Cooley said. "A lot of times we'll write a lot of code on paper, since there's only one computer. But you don't necessarily write it out line for line."

SOLUTION GOES OUT FOR JUDGING

When the team believes it's solved a problem, the solution is sent out for review by judges. Incorrect solutions are returned with comments that might have been taken from the world's worst Turing test: "incorrect output," "bad output format" or maybe "running time exceeded." Teams get a penalty for each bad solution sent for judging, Noonan said.

No one uses words like "underdog," but there's a sense that William & Mary is punching a bit above its weight at the World Finals. Many of the teams that Team Gold defeated in the Mid-Atlantic Regionals were from schools with mammoth computer science departments that sent as many as nine teams to regionals. Christensen just came back from a round of job interviews (he's accepted a position at Microsoft, by the way) in which his berth at the World Finals generated a gratifying

amount of interest. He learned that several big schools have for-credit courses taking dead aim at getting a team to the World Finals.

William & Mary doesn't have those sorts of resources to dedicate to getting a team to worlds, but as Cooley says, "The CS department has given us what we need to succeed and do well." Noonan explains that the basis for success is the department's Analysis of Algorithms course.

"Many problems will fall into a particular category of algorithm, and if you apply the right algorithm to the problem, that works," she said. "Hopefully, the guys can apply strategies to the competition problems based upon what they've learned in Analysis of Algorithms."

TEAM GOLD'S SECRET WEAPON

Team Gold is taking to Warsaw the same feature that caused them to be a giant-killer in regionals. Christensen sums it up in a single word: diversity.

"Aaron is a physics major and math minor. That was really helpful at the regionals because there was something in there about the speed of light and he knew how to reduce the formula intuitively, which was amazing," Christensen explained. He added that Dufour also has been programming the longest of the three, but Dufour notes that the competition will be using Java.

"It's a language that I'm not terribly familiar with," he said. "And I'm probably the slowest typist."

Cooley points out that Christensen, as a graduate student, adds to the diversity of the team: "He's already got a bachelor's degree. He's taken courses that Aaron and I haven't."

The members are aware that diversity has another side.

"We definitely have put less preparation into working as a team for regionals than most of the other groups," Dufour said. "We probably have some catching up to do on that."

To hone their teamwork skills, the three meet for practice sessions every week. They began by discussing a practice problem that each has been working on individually. As worlds gets closer, they'll move into more real-time drills that simulate competition conditions.

The computing industry takes a keen interest in the members of the teams who advance to the World Finals; such a competition is a wonderful way to identify the best and the brightest among the crop of new computer programmers. Corporate sponsorship is allowing the University of Chicago to invite all the North American teams going to worlds to participate in a practice competition. Team Gold is going of course; it's all expenses paid.

THE TRAVEL ALGORITHM

The logistics of getting to Warsaw posed a number of challenges as well. To make connections and get to the competition on time, Team Gold will have to leave the U.S. on May 13. That's the day of William & Mary's commencement and Dufour and Christensen are receiving degrees. There was some anxiety that they might have to miss the big day, but Noonan worked it out.

"You know, their parents spent a lot of money to get them through school and they want to see them graduate," she said. "It turns out there are some flights out of Richmond that were later in the evening. Now they can actually go to commencement and get their picture taken with their parents and still get to the World Finals."

Joseph McClain

Michael Christensen (left) and Aaron Dufour work out a computer programming problem on the whiteboard as teammate Brett Cooley types in a solution to a second problem. Coach Debbie Noonan watches from the sidelines.

A COUPLE OF SIMPLE QUESTIONS...

...generate a close look inside the collective mind of the 'ivory tower'

By Jim Ducibella

THE MOST COMPREHENSIVE SURVEY OF INTERNATIONAL RELATIONS SCHOLARS EVER MADE STARTED AT WILLIAM & MARY WITH TWO ELEMENTARY QUESTIONS.

The first came in 2003 from a student, James Long '03. He wanted to know why his professor placed so much emphasis on the causes of war and realist theory in his Introduction to International Politics class. He noted that Mike Tierney, Hylton Associate Professor of Government and co-director of the Institute for the Theory and Practice of International Relations (ITPIR), didn't do research on war, and he did not employ realist theory in his research either.

At the same time, Tierney and colleague Sue Peterson, Reves Professor of Government and International Relations and co-director of ITPIR, had been pondering why U.S. foreign policymakers routinely ignored the research and suggestions made to them by international relations scholars, even when those scholars were largely in agreement.

Addressing Long's query meant delving into the relationship between teaching and research and whether other faculty members taught to their research interests—or whether issues raised in class informed their research projects. Posing such questions to William & Mary faculty quickly morphed into the idea of surveying international relations scholars throughout the United States and, later, the world.

The second question, Tierney and Peterson agreed, couldn't be answered without more complete data on what was being taught in international relations classrooms and what kind of research was being done within the "ivory tower." Their desire for a better look at the data led to the launching of a series of Teaching, Research and International Policy (TRIP) surveys and the compilation of the most comprehensive database of international relations research articles that are classified in terms of their methods, issues studied, regions covered, theories employed, time periods examined and other categories.

Former W&M undergraduates Long and Daniel Maliniak '06 have joined Peterson and Tierney as principal investigators on the TRIP project. With administrative support from ITPIR—and an ever-evolving team of researchers that also has included Assistant Professor Amy Oakes and 15-20 undergraduate researchers, including Jennifer Keister '03, Brandon Stewart '07, Ryan Powers '08, Richard Jordan '10, Will Brannon '11, Alena Stern '12 and Lindsay Hundley '12—the TRIP principal investigators have conducted four surveys since 2004.

In addition to the United States, the team now surveys international relations faculty in 19 other countries. Some of the results of the 2011 U.S. survey recently appeared in a *Foreign Policy* magazine article entitled "Inside the Ivory Tower."

Like the previous three *Foreign Policy* articles on the TRIP project, the latest includes international relations scholars' opinions on the best schools in the country at which to study international relations, whether at the undergraduate level or in a Ph.D. program.

BEST FEEDER SCHOOLS FOR POLICY JOBS

This year, for the first time, TRIP researchers, also asked respondents about the best feeder schools for inside-the-Beltway jobs and prepared a set of rankings.

Other topics covered in the *Foreign Policy* article included "How international relations scholars see the world"; "Leading scholars on China's rise, America's decline—and more"; "Why academics and policymakers don't get along"; and "What the Ivory Tower survey gets wrong," an op-ed piece by James Goldgeier, dean of the School of International Service at American University in Washington, D.C. (For the full survey and response, see http://www.foreignpolicy.com/ivory_tower.)

"*Foreign Policy* always tends to focus on the lists of best schools, which is not surprising, given who their advertisers and readers are," said Peterson, "but the survey has always been about so much more. It really is about the state of the international relations discipline, what we teach our students, what we study in our scholarship, and what we know or think we know about the world around us that might be of use to policymakers."

Asked if the 2011 U.S. survey—which encompassed nearly 100 questions and was distributed to all international relations scholars at four-year colleges and universities—contains any surprises, Tierney deadpanned, "Where to start?"

AMONG THE SURVEY'S FINDINGS:

- International relations scholars believe that East Asia has already become more important to U.S. national security than the Middle East. "This is a big shift from the 2008 survey," Tierney said, when large numbers of scholars chose the Middle East.
- The number of women studying international relations is growing very rapidly.

- George H.W. Bush was judged to be the best foreign policy president over the past 20 years. His son, George W. Bush, was judged to be the worst, by far.
- Some 28 percent of international relations scholars have cited a blog post in their academic research, "a huge surprise to me," Tierney said. Also surprising to Tierney was the fact that 14.6 percent of professors permit students to cite Wikipedia in their research papers. ("We don't allow our students to cite Wikipedia or any other unattributed source, whether electronic or print," added Peterson.)
- In the past two years, more than 20 percent of international relations scholars have worked in a paid capacity for the U.S. government. ("So much for being isolated in the ivory tower," said Tierney.)
- More than 60 percent of international relations scholars claim they supported the use of U.S. military force in Libya, but only 21 percent say that they would support the use of force in Syria. ("The real surprise," noted Peterson, "is that the international relations experts are highly skeptical of military intervention, whether to stop war between Sudan and South Sudan or to prevent Iran from getting a nuclear weapon.")
- More than 25 percent said they "don't know" whether the Arab Spring will be good or bad for the U.S. ("We have been doing these surveys for a long time, and I don't think we have ever had such a high 'don't know' rate from the professoriate," Tierney concluded.)

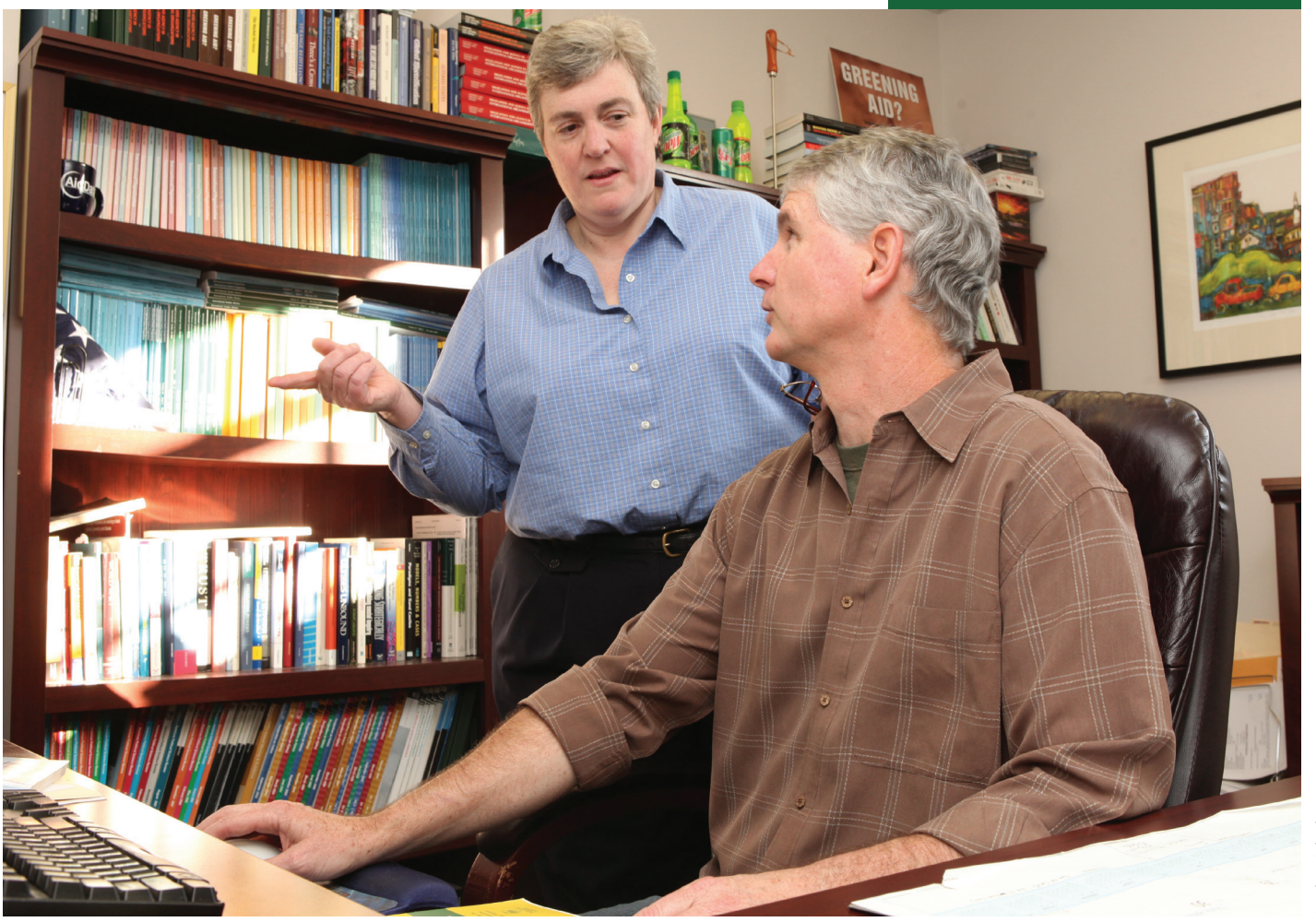
WORKING ON THE DATA

The survey closed in November, and the team still is working on the project, standardizing and analyzing data from all 20 countries.

"We will present some papers using these data at the International Studies Association Meeting in San Diego," Tierney said. "And, we will host a conference next fall where 20-30 international relations scholars from around the world will descend on Williamsburg to analyze these data and share their findings."

Peterson added: "Then we will invite policymakers and scholars to sit down together to discuss our findings and think about the role of scholars in the policy process and the place of policy analysis and policy-relevant research in the academy."

Sue Peterson and Michael Tierney discuss their multifaceted surveys of international relations scholars and scholarship. Their work generated insight on the links between U.S. policymakers and the "ivory tower."



Stephen Salpukas

From the dock to your fork

Partnership explores community-supported fishery concept

by David Malmquist

Janet Krenn, Virginia Sea Grant

LOCAL SEAFOOD ONCE PROVIDED A MAJOR ECONOMIC AND CULTURAL LINK BETWEEN THE CHESAPEAKE BAY AND THE PEOPLE IN ITS WATERSHED. TODAY—WITH A FEW EXCEPTIONS—THE CRABS, OYSTERS AND FISH ON YOUR PLATE ARE MORE LIKELY TO COME FROM THE GULF COAST, THE CARIBBEAN OR THE FAR EAST.

A new partnership between Virginia Sea Grant and the College of William & Mary—including the Virginia Institute of Marine Science, Mason School of Business and Marshall-Wythe School of Law—is exploring a community-supported fishery as a possible means to help reverse this trend by promoting greater consumption of locally harvested fish and shellfish.

Project leader Troy Hartley, director of the Virginia Sea Grant program at VIMS, explains the idea, which is similar to the more familiar co-op programs that provide farm-direct produce and other foodstuffs to consumers.

"Community-supported fisheries—'CSFs'—connect fishermen directly to local markets. Consumers pay for a share of the fishermen's catch and in return receive fresh seafood on a regular basis," Hartley said. "CSFs are based on the model of community-supported agriculture, which provide subscribers with shares of produce and other products from local farms."

In addition to Hartley, the project team includes Michael Luchs, assistant professor of marketing in the Mason School of Business; VIMS graduate student Gar Secrist, head of the VIMS "Green Team;" law students Nicole Benincasa and Michael Boyer; M.B.A. students Rustam Arstanov and Tom Innes; and William & Mary undergraduates Matt Faust, Zander Pellegrino and So-Jung Youn.

A SUSTAINABLE PRACTICE

Funding to study the feasibility of a community-supported fishery in Hampton Roads comes from the College's Committee on Sustainability. Established in 2008, the committee uses funds from the Student Green Fees to promote sustainable practices throughout W&M and nearby communities.

The first part of the feasibility study—telephone and in-person interviews with William & Mary students, faculty and staff—wrapped up in late February. The goal was to assess the respondents' current seafood choices, knowledge of sustainability issues,

ABOUT VIRGINIA SEA GRANT

Virginia Sea Grant advances the resilience and sustainability of Virginia's coastal and marine ecosystems and the communities that depend upon them. As a broker of scientific information, VASG works with resource managers, businesses, communities and other stakeholders to provide and apply the best science available.

VASG funds and conducts research, outreach and communications activities that focus on:

- **Safe & Sustainable Seafood (Fisheries & Aquaculture and Seafood Products & Safety)**
- **Healthy Coastal & Marine Ecosystems**
- **Sustainable & Resilient Coastal Communities**
- **Coastal & Ocean Literacy**

Virginia Sea Grant administrative and research offices are based at VIMS in Gloucester Point. Other partners are George Mason University, Old Dominion University, University of Virginia, Virginia Commonwealth University and Virginia Tech.

local-seafood preferences and willingness to pay for local fishery products.

The study was conducted by undergraduates in Luchs' Marketing Research class. He says the experience "provided a valuable opportunity to apply what they're learning in class to the real world." He notes that the preliminary results "show significant interest within the William & Mary community in support of locally harvested and sustainable seafood."

AN ON-LINE SURVEY

The next step in the project began in mid-March, when Luchs and his students build on the interview findings by launching an on-line survey that will expand the study into the local community and provide more quantitative results.

Secrist says the goal of the survey is to "identify the factors that would make people more or less likely to participate in a community-supported fishery, including important details such as how often they eat seafood, whether they prefer finfish or shellfish, what day and time would be most convenient for pick-up, how much they're willing to pay for fresh local products and the criteria they use to decide what counts as 'local' and 'fresh.'"

If the findings of the on-line survey confirm the positive comments from the interviews, the project team will move on to create a detailed business plan that identifies how to best proceed in terms of staffing, storage, transport, finance, legal arrangements and other factors. Law student Nicole Benincasa is leading this study of the "organizational design" needed to run a successful CSF, with help from undergraduates Faust and Youn.

The team will incorporate lessons learned from a small but growing number of community-supported fisheries at other campuses around the nation, including Duke University and the University of California, Santa Barbara. They will also work closely with LocalCatch.org, a national network of fishermen, organizers and consumers committed to the growth of CSFs.

PARTICIPATION IS KEY

A keystone of any community-supported fishery, is of course, the buy-in and participation of those who provide the seafood—fishermen, watermen and shellfish growers from the Chesapeake Bay and adjacent waters. Secrist says the CSF project team has not yet approached specific seafood suppliers, but is "in the planning stage of engaging the industry through a focus group and meetings with key informants."

Hartley stresses that market conditions and product supply are unique to every CSF location, but that all CSFs share what he calls "triple bottom-line business goals." These include increasing the viability of local economies, cultivating healthy ties within and between rural and urban communities and encouraging an ethic of environmental stewardship.

David Malmquist/VIMS

Katie Moriarty, an M.B.A. student at the Mason School of Business at the College of William & Mary, discusses the idea of a community-supported fishery with a pair of festival-goers during the 2nd Sundays Williamsburg Arts and Music Festival in March. The pair signed up for an online survey to gauge their attitudes and habits with respect to seafood consumption and a community-supported fishery.

SCIENCE— IN THREE TO FIVE MINUTES

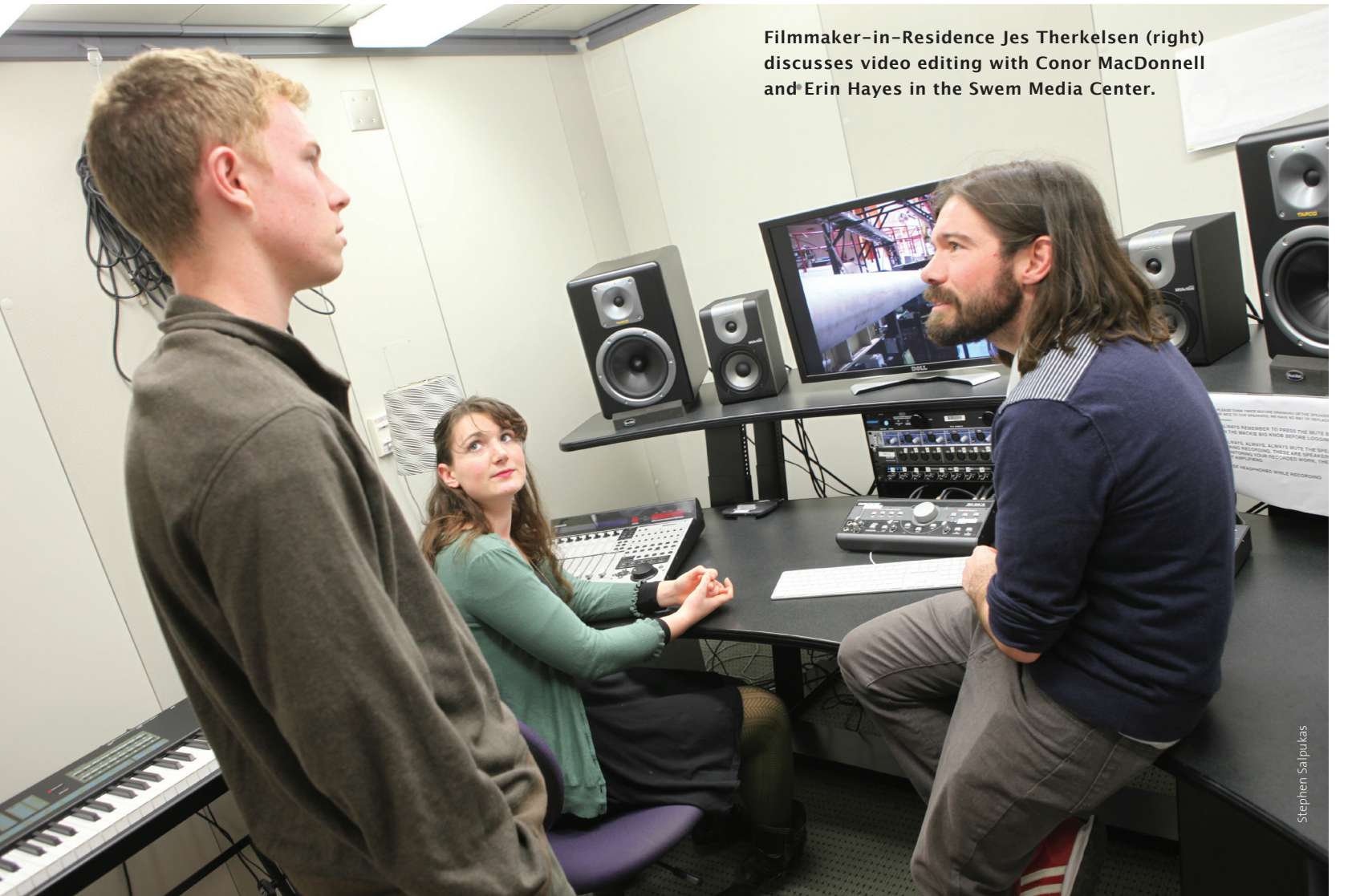
Student-made videos showcase the work of four scientists

By Justine Whelan

THERE ARE THE ARTS, AND THEN THERE ARE THE SCIENCES. There is literature, language and film, and then there is calculus, physics and experiments. Jes Therkelsen, filmmaker-in-residence at the College of William & Mary, wants to bring together those two poles of academia, instilling in his students a fusion between the humanities and the natural sciences.

A grant from the Andrew W. Mellon Foundation brought Therkelsen to William & Mary almost two years ago as a post-doctoral teaching fellow based in the Environmental Science and Policy Program (ENSP). Therkelsen launched a curriculum to provide students with the foundational basics of communicating science to the general public. In the fall of 2011, he teamed up pairs of his students with a scientist and said to them, "communicate."

"We had concentrated on video and the visual realm. The idea was for the students to start visually explaining complex scientific findings and ideas in a creative way," says Therkelsen. The students worked to convey the ideas and concepts behind the research of their partner professor by creating a short film.



Filmmaker-in-Residence Jes Therkelsen (right) discusses video editing with Conor MacDonnell and Erin Hayes in the Swem Media Center.

Stephen Salpukas

QUADRUPLE FEATURE—AND A BONUS! SEE THEM AT WWW.WM.EDU/IDEATION/SCIENCEIN3TO5

Jes Therkelsen assigned his students to make short films intended to convey the research of William & Mary effectively to the general community.

- **Jamie Hall '13 and Conor MacDonnell '14 produced "The Pollution of Noise," a look at ornithologist John Swaddle's research surrounding birds and noise pollution.**
- **"The Standard Model" and "Q-Weak," by Erin Hayes '14 and Carlos Quintela '12, talks about the wonders of quarks and Wouter Deconinck's advanced experimental physics work at Jefferson Lab.**
- **In "Like a Rock," Katie Frye '12 and Kevin Quinlan '12 interview William & Mary students and geologist Chuck Bailey to determine students' perceptions (or misperceptions) of geology and its relevance.**
- **Lily Rubino '12 and Molly Bashay '13 collaborate with Professor Kristin Wustholtz in their film "Colorful Collaborations" to detail her research using laser spectroscopy to identify pigments used in historic works of art.**
- **Bernice Chu, Therkelsen's teaching assistant for the class, took advantage of the class assignment as her Monroe Project in her film "Bumblebee Garden," which featured the development of a student-maintained garden at the local Blayton Elementary School. This video was later screened in the fall of 2011 in Washington Hall.**

THE RESEARCHERS BECOME THE SUBJECTS

Therkelsen enlisted four William & Mary professors as subjects: Chuck Bailey, professor and chair of geology; Wouter Deconinck, assistant professor of physics; John Swaddle, professor of biology; and Kristin Wustholtz, assistant professor of chemistry. Each of these scientists came to Therkelsen's class to speak about their science, research and current projects. From these sessions evolved a larger project in which students prepared short videos to highlight an aspect of a professor's research activity.

"The professors would try to work with the students to communicate how they might be able to use that information to determine who the audience is—and what is the purpose of actually creating the media," explains Therkelsen. "The students were able to learn the very important process of asking those questions before we even start on the video."

The students had six to seven weeks to complete their videos, which were to be five to eight minutes in length. One common challenge was to communicate advanced scientific concepts to a lay audience accurately, succinctly—and through the medium of video.

"It's difficult to show science in the visual realm," Therkelsen says. "For instance, Wouter works with the Standard Model of physics. He works with quarks. So how are we going to show quarks visually?"

THIS PING-PONG BALL IS THE NUCLEUS

To show quarks visually, Erin Hayes and her partner Carlos Quintela started with the atom. They placed a ping-pong ball in the center of William & Mary's football field to represent the nucleus of an atom and to show the relative space between the nucleus and the electron shells, represented by the grandstands of Zable Stadium. The video goes on to explain, mixing voice-over narrative and on-camera interviews with Deconinck, the difference between atomic particles believed to be fundamental (such as electrons) and the protons and neutrons of the nucleus, which has a substructure made of different quarks.

In "Colorful Collaborations," Molly Bashay and Lily Rubino used an animation they created with a computer program to explain and show how a laser is used to study the chemistry of paint used in historical portraits in the collections of Colonial Williamsburg. Bashay and Rubino go into the studio of Colonial Williamsburg conservator Shelly Svoboda to show how the surface-enhanced raman spectroscopy techniques of William & Mary chemist Kristin Wustholz provide a minimally invasive approach to paint analysis and its importance to the restoration and preservation of art.

ONE FOOT IN SCIENCE, ANOTHER IN ART

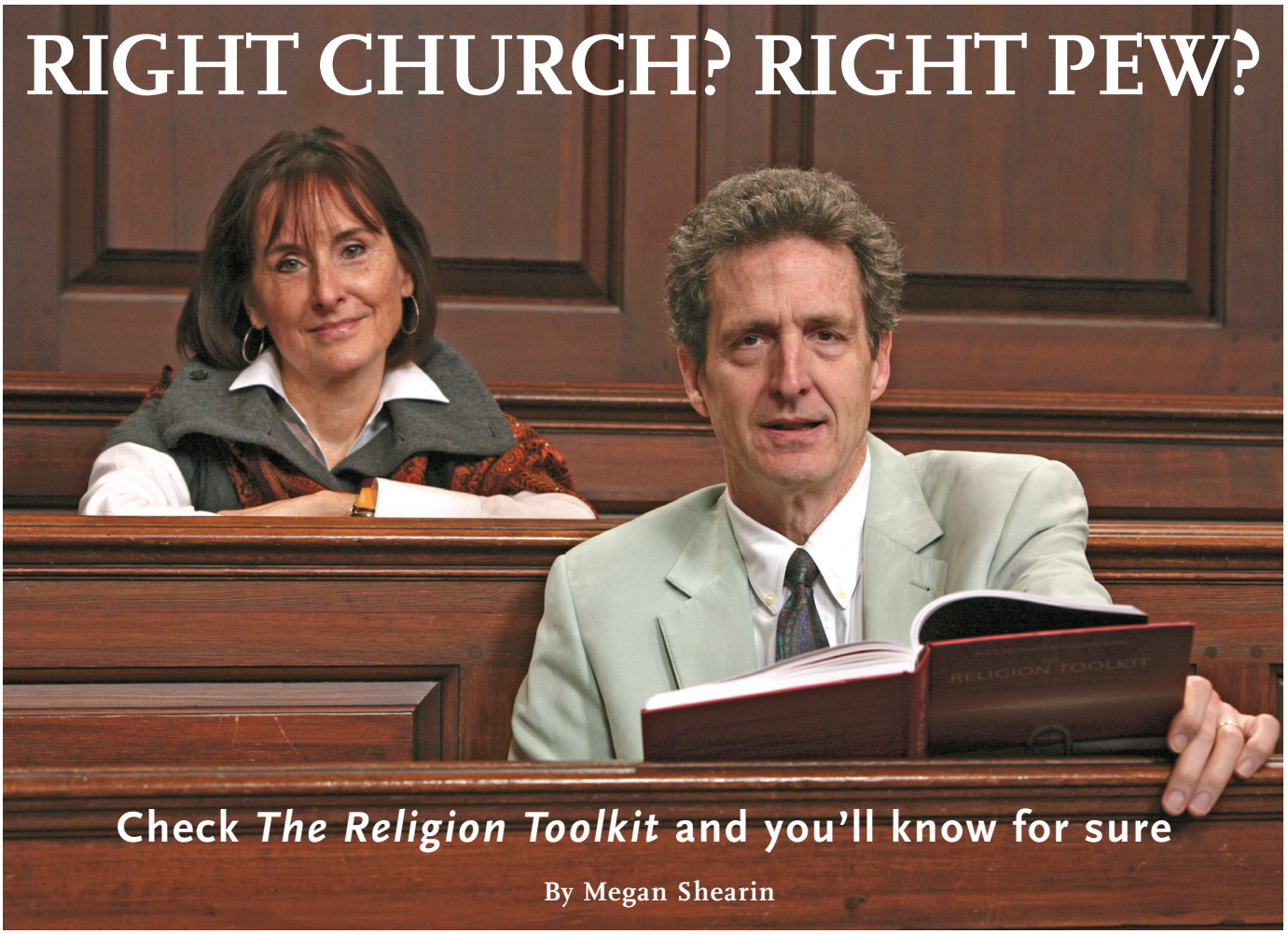
Like the project depicted in "Colorful Collaborations," Therkelsen has roots in the world of science as well as the world of art—he holds a bachelor's degree in geology as well as an M.F.A. in film and media arts. He sees the value of a more permanent presence of the combination of science and the humanities.

"It's the dialogue that is so crucial," Therkelsen says. "It's just phenomenal that a school like William & Mary is able to offer a class like this. I think that's extremely rare in higher education. William & Mary has a small feel, but we have big research projects where professors are bringing in a lot of grant money to do large projects and bring students to be involved."

Erin Hayes has embraced the foundation the class provided, and is already taking a more advanced filmmaking class. Therkelsen says he's glad to see such continuity in his students.

"Teaching these science students to think about communication, and visual communication especially, will help to prepare them for successful science careers, if that's the direction they choose to pursue," he said. "And if they choose to travel down other paths, then the skills they learned might prove useful there as well."

RIGHT CHURCH? RIGHT PEW?



Check *The Religion Toolkit* and you'll know for sure

By Megan Shearin

Stephen Salpukas

Tamara Sonn and John Morreall in William & Mary's Wren Chapel. Their book, *The Religion Toolkit*, takes a look at all of the major (and several of the minor) belief systems of the world.

IT'S A SAFE BET THAT MORE AMERICANS ARE ABLE TO NAME THE NINE REINDEER OF SANTA THAN THE TWELVE APOSTLES OF JESUS.

We Americans may boast the highest rate of religious affiliation of the world's developed nations, yet many of us are uninformed about the tenets, practices, history and leading figures of major faith traditions—including our own. How bad is it? The authors of *The Religion Toolkit* point to tests taken by American high school seniors in which half identified Sodom and Gomorrah as a married couple.

Two William & Mary scholars wrote *The Religion Toolkit: A Complete Guide to Religious Studies* with the aim of helping people understand religion better. In the book, published by Wiley-Blackwell, John Morreall and Tamara Sonn explore the major and minor religions of the world, from Islam and Judaism to Scientology and Wicca.

They also trace the history of the study of religion and explain the difference between studying a religion academically and learning a religion as one of its members. The introductory text provides a road map for students new to the field of religious studies.

"There are lots of religion books that cover the world's religions, and there are lots of other religion books that cover the field called 'religious studies,'" said Morreall, professor and chair of the College's Department of Religious Studies. "This is the first book that puts them together."

Religion, when studied through a global lens, is remarkably diverse. Chapter One, "Prepare to Be Surprised," explores the beliefs and practices humans hold sacred. *The World Christian Encyclopedia* counts 10,000 religions in the world, many of which are sub-divided. Christianity, for example, has 9,000 denominations and 34,000 sects, said Morreall. The diversity within some religions is so extensive that many religious studies scholars no longer use terms like "Christianity" or "Judaism."

"Instead, they talk about 'Christianities,' or 'Judaisms,'" Morreall said.

Another surprise Morreall and Sonn address in the first chapter is the difference between learning about a religion and learning a religion.

DIVERSE DISCIPLINES

In learning a religion, people are taught traditions; they are trained to follow certain beliefs, rituals and values. "Religious studies," introduced by 19th-century German scholar Max Müller, is the term used to describe the academic study of religious beliefs, practices and institutions. The field includes diverse disciplines such as anthropology, sociology, psychology, philosophy, history and even economics.

"When you're studying your own religion, you're usually being taught what's good or bad, right or wrong," said Sonn, the Kenan Professor of Humanities and Religious Studies at the College. "In the academic study of religion, you study what is considered good or bad, or right or wrong, in various contexts throughout history, across time, through different cultures; but you don't advocate for one, or argue in favor of one against another."

Religion, for many people, is a set of values deeply rooted in one's personal identity.

"Religion is the most personal aspect of anyone's life," Sonn said. People generally receive their religious training from family members, she explained. Scrutinizing those cherished values can cause all sorts of internal difficulties for students who may not have had a critical look at world traditions.

"Teaching religion courses is very difficult because most students come in with a set of beliefs and values they consider to be true," said Morreall. "So, if you talk about different beliefs and values, they may not recognize them as legitimate."

Many students also have significant preconceptions of religion. For example, Morreall says there are groups in the U.S. who teach that Roman Catholics are not Christians.

"When I have a student who's been taught that Roman Catholics are not Christians, I have to loosen up that student's mental framework," he said.

To help students think more openly, humor is incorporated throughout *The Religion Toolkit*. Each chapter in the book begins with a cartoon from *The New Yorker* and a critical quote from a major religious figure. Bishop Desmond Tutu opens the first chapter: "When the missionaries came to Africa, they had the Bible and we had the land. They said, 'Let us pray.' We closed our eyes. When we opened them, we had the Bible and they had the land."

A TOOL FOR LOOSENING UP

Morreall is an internationally recognized expert on humor and a founder of the International Society for Humor Studies. He has authored five books on humor, including the 2009 *Comic Relief: A Comprehensive Philosophy of Humor*.

"Humor is one of the best ways to get people to loosen up, relax...and think outside the box," he said.

Sonn, who specializes in Islamic studies and theories of religion, also approaches her classes with a keen sense of humor.

"I always tell my students that I would find it much easier to teach nuclear physics or quantum mechanics—something where there are answers and no one takes them personally," she joked.

"This text is, to my knowledge, the first introduction to religious studies that incorporates the cutting-edge discussions going on in the academy about what constitutes religion," Sonn said.

In their book, Morreall and Sonn trace the scholarly quest to understand what religion is, a task that is made even harder by the fact that many languages have no word that means the same thing as "religion" in English, Sonn explained. Scholars are not even sure where the term "religion" came from, she added.

Western scholars may not agree on exactly what "religion" means, but the majority acknowledge that there is a sacred sphere of life—encompassing supernatural beings, rituals and values—and a secular, public sphere, which includes politics and economics, Sonn said.

"In modern Christian society, there has been a distinction between those spheres," she said. "If we define religion that way, then we can only look to modern Western Christianity. Other traditions do not make that distinction."

Although in the public sphere there may be a vast increase in the number of reindeer on display as opposed to angels and wise men, Sonn predicts the global economic meltdown will cause an uptick in the importance of religion. She notes that many people have already sought counsel and guidance from religious leaders to deal with the struggles of financial turmoil.

"Religion becomes extremely important in people's lives during times of stress," said Sonn. "That's true for individuals and societies. New religious movements begin in times of social turmoil... They're meant to help people get through the really difficult times of life."

THEODICIES: EXPLANATIONS FOR EVIL

***The Religion Toolkit* describes an array of beliefs and practices as well as sets of theological explanations for knotty problems faced by believers.**

For example, monotheists employ explanations known as theodicies to account for the presence of evil in a universe ruled by a benevolent God.

"Many of them take human free will into consideration," *The Religion Toolkit* explains. The book outlines a number of theodicies.

Here are a few:

- **Punishment Theodicy: Evil was brought about by human disobedience (as in Adam and Eve).**
- **Warning Theodicy: Disasters are a heavenly reminder that we're not living right.**
- **Free Will Theodicy: God could make a world without evil, but only at the expense of free will.**
- **Soul-Building Theodicy: We need suffering in order to grow and to appreciate goodness.**

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in the works...

A Mission to Mars

by Joseph McClain

William & Mary might become the base for a mission to Mars.

It's called ARES—the Aerial Regional-scale Environmental Surveyor. Joel Levine explains that the idea is to send an airplane to Mars.

Here's the plan: The Mars flyer will parachute from its Atlas launch vehicle down to near the surface of the Red Planet, unfolding on the way. Once deployed, the robotic, rocket-powered craft will begin its historic flight, recording observations that will yield insights into some of Mars' greatest mysteries, such as a strange, unexplained area of high magnetism and the source of the methane found in the Martian atmosphere.

If selected for the mission, federal funding in the neighborhood of $500 million would be needed to support the ARES project, not counting the launch vehicle.

For the ARES project to happen, a lot of things have to go right, but Levine stresses that it's not as much a long shot as you might imagine. For one thing, ARES is substantially designed and tested.

For another thing, Levine says that NASA already likes the project. About 10 years ago, ARES was on a short list of four potential future NASA Mars missions, but NASA selected Phoenix, a stationary lander developed by the University of Arizona.

"ARES got really close," said Mark Hinders, chair of William & Mary's Department of Applied Science. "I was driving across Ohio at the time on my way back from a conference and I heard Joel on NPR talking about the Mars airplane."

In July, Levine returned to William & Mary as a research professor in the Department of Applied Science after a long career at NASA. He started teaching at the College in 1990 while still working at NASA Langley, setting up a program in atmospheric science.

His colleagues at NASA urged Levine to pursue the ARES mission from his new base at William & Mary. He is developing a proposal for the Mars flyer, to be submitted by William & Mary in conjunction with NASA Langley.

"NASA really likes university-led space missions," Levine said. "The College is a natural partner for a NASA Langley collaboration."

Levine says he anticipates the announcement of opportunity to propose ARES and other Mars missions for funding will come no earlier than mid-2013. The chances of the ARES mission are difficult to predict, Levine says—if NASA funds any Mars missions at all.

ARES will compete against Martian orbiters, landers and rovers, but Levine points out that a flyer offers a number of advantages. To begin with, a flyer is the best way to investigate a mysterious region on Mars that has the strongest surface magnetic field of any planet in the solar system.

"We just cannot put a rover down in that area; the terrain is too rough for a safe landing," Levine said. "There is no way you can investigate other than an aerial platform, an airplane."

NASA

Artist's conception of ARES cruising over Mars.

He said ARES could also be used to investigate the 2009 discovery of methane in the atmosphere of Mars. In the Earth's atmosphere, methane is produced mainly by biological activity. The third area of study is potentially vital for human missions to Mars—a scientific goal embraced as a national goal by the past two presidential administrations.

"We want to study the concentration and distribution of frozen water below the surface of Mars," he said. "We have an instrument called a neutron spectrometer that can make subsurface measurements of frozen water. That's very important because when we send humans to Mars, it's going to take nine months to get there, nine months to come back—and the astronauts will spend 500 days on the surface. You can't take enough water to supply the needs of the crew for such a long trip and visit on Mars."