this just in...

MEDIA ARE DISCOVERING WEROWOCOMOCO

It's midway through the 400th anniversary year of the founding of Jamestown and the nation's media are still discovering Werowocomoco.

This year it's been hard to keep up with media references to Werowocomoco, the site of Chief Powhatan's capital city in the early years of Jamestown. The site of Werowocomoco was discovered several years ago. The Werowocomoco Research Group, headquartered at William and Mary, is conducting an ongoing archaeological excavation of the York River site, the subject of the cover story in the Spring, 2006 issue of *Ideation*.

Writers and producers came to the Peninsula to see about Jamestown in 1607, and the more thoughtful among them found that they couldn't tell the story of the colony without including the story of Werowocomoco.

Lead Werowocomoco archaeologist Martin Gallivan, associate professor of anthropology at William and Mary, found himself in demand for interviews—by phone, in person and on camera. He and his students were featured in "Pocahontas Revealed," an episode of the PBS program *NOVA*, in early May. The program was premiered locally on May 1 in Williamsburg's Kimball Theatre to an enthusiastic audience of archaeologists, scholars and others involved in the production of the show, notably members of the Virginia Indian tribes with lineal connections to the Powhatan people.

"The Virginia Indian community were completely indispensable to the project," said Evan Hadingham, *NOVA*'s senior science editor. Among the attendees were Anne Richardson, chief of the Rappahannock, and her granddaughter Ashlee Harless, who portrayed Pocahontas in the reenactment segments of the show.

Producer-directors Kirk Wolfinger and Lisa Quijano Wolfinger singled out the contributions of Buck Woodard, a graduate student in William and Mary's anthropology department, who "built an entire Indian village in a day."

"Pocahontas Revealed" focuses on discoveries and revelations that continuesto yield new information about Powhatan, his people, and their relationship with the Jamestown colonists.

Other television documentaries are in the works. William and Mary researchers also contributed to a *National Geographic* article and accompanying web site.

—Joe McClain

WATCH FOR THE SHOWS—CHECK OUT THESE WEB SITES

http://www.pbs.org/wgbh/nova/pocahontas/

http://magma.nationalgeographic.com/ngm/jamestown/

look who was here...

Planetary geologist Ellen Stofan, a 1983 graduate, came to the geology department of her alma mater in April to talk about her analysis of the exotic geology of Titan, a moon of Saturn.

Charles Fefferman of Princeton (left) talks with Nahum Zobin, math professor at William and Mary. Fefferman, the winner of the Fields Medal—the "Nobel Prize" of mathematics, gave two talks here in May.

Nobel Laureate William Phillips makes a point during the William Small Distinguished Lecture in Physics, part of the annual Graduate Research Symposium held in March. Phillips won a share of the 1997 Nobel for his work in the development of methods to cool and trap atoms with laser light.

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RESEARCH & SCHOLARSHIP AT WILLIAM & MARY

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SUMMER 2007

ideation

RESEARCH & SCHOLARSHIP AT WILLIAM & MARY

Neuroscience!

AT WILLIAM & MARY? YOU BET!

plus:

21ST CENTURY MAGI

CHOREOGRAPHING POLYMERS

MYSTERY OF A CONFEDERATE SUBMARINE

shameless self-promotion department

You are reading the fourth issue of *Ideation*, a look at some of the research and scholarship that's going on at the College of William and Mary. Just before we went to press, we received notification that *Ideation* had won a bronze medal in the Circle of Excellence program conducted by the Council for the Advancement and Support of Education.

As editor of and chief contributor to *Ideation*, I am particularly pleased by this medal, which was awarded in the category of Periodical Resources Management. A win in a category recognizing results possible from a modest set of resources is appropriate to a magazine covering the intellectual activity at William and Mary.

Nearly three years ago, I came here from a big research university and was almost immediately overwhelmed by the attitude of the scholars and researchers. The collaborative, "we found a way to make it work" ethos here was refreshing after so much of a culture that seemed to be based on the researcher as a central cog in a machine, often not engaged with other cogs, intent on stamping out a prescribed number of papers in academic journals.

The integration of undergraduate students into research activity—even in departments such as physics with full graduate programs—is one of the principal characteristics of the William and Mary way of doing research and scholarship. The neurosciences program, subject of our cover story, page 2, contains many instances of undergraduates doing work that, at Big Research U., is reserved for only a few high-performing graduate students. And it's not just the hard sciences, either; read about a hands-on Sharpe Seminar in history on page 22.

The deep involvement of undergraduates in research activity is an aspect I try to showcase as much as possible in *Ideation*. (I suspect William and Mary has more per capita undergraduate co-authors of peer-reviewed journal articles than any other U.S. school—but there's no agency that keeps track of this info on a nationwide basis. If you know different, please let me know.) There's a movement afoot to hard-wire our numerous faculty-undergraduate research connections into the curriculum; you can read about it on page 25.

Ideation's bronze medal was one of only two medals awarded in this category; no one got a gold. Bronze, of course, is an alloy—a chemical collaboration yielding a metal with properties superior to copper or any of its other components alone. *Ideation* is a creative alloy of the contributions of many people; most of them are listed on this page. I won't go so far as to say that bronze is better than gold, but a metal versatile enough to be used for sculpture, ship propellers and two of the layers of the divinely-forged shield of Achilles seems more symbolically appropriate for this magazine, a collaboration that reports on work often being produced by other collaborations.

Whether the topic is producing a magazine or addressing the big problems posed by our understanding of our world, it's silly to pretend that moderate resources are better than full staffs and full pockets. Support for William and Mary's research comes from the usual alphabet soup of funding agencies, governments, foundations and quite often from involved people stepping up in ways ranging from Board of Visitors Secretary Suzann Matthews' continuing support of summer research projects (page 26) to undergraduate Jason Lunze dipping into his own pocket (page 20) for argon to treat samples.

There is an Edisonian quality to all this that might seem quaint or endearing, as long as you're not one of the people like Jason who have had to pay for supplies and wonder how or if you can get reimbursed. Research and scholarship needs and deserves our support, figurative and literal.

Joseph M. McClain
Editor

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.

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ideation

RESEARCH & SCHOLARSHIP AT WILLIAM & MARY

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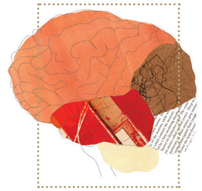
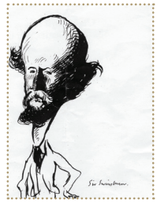
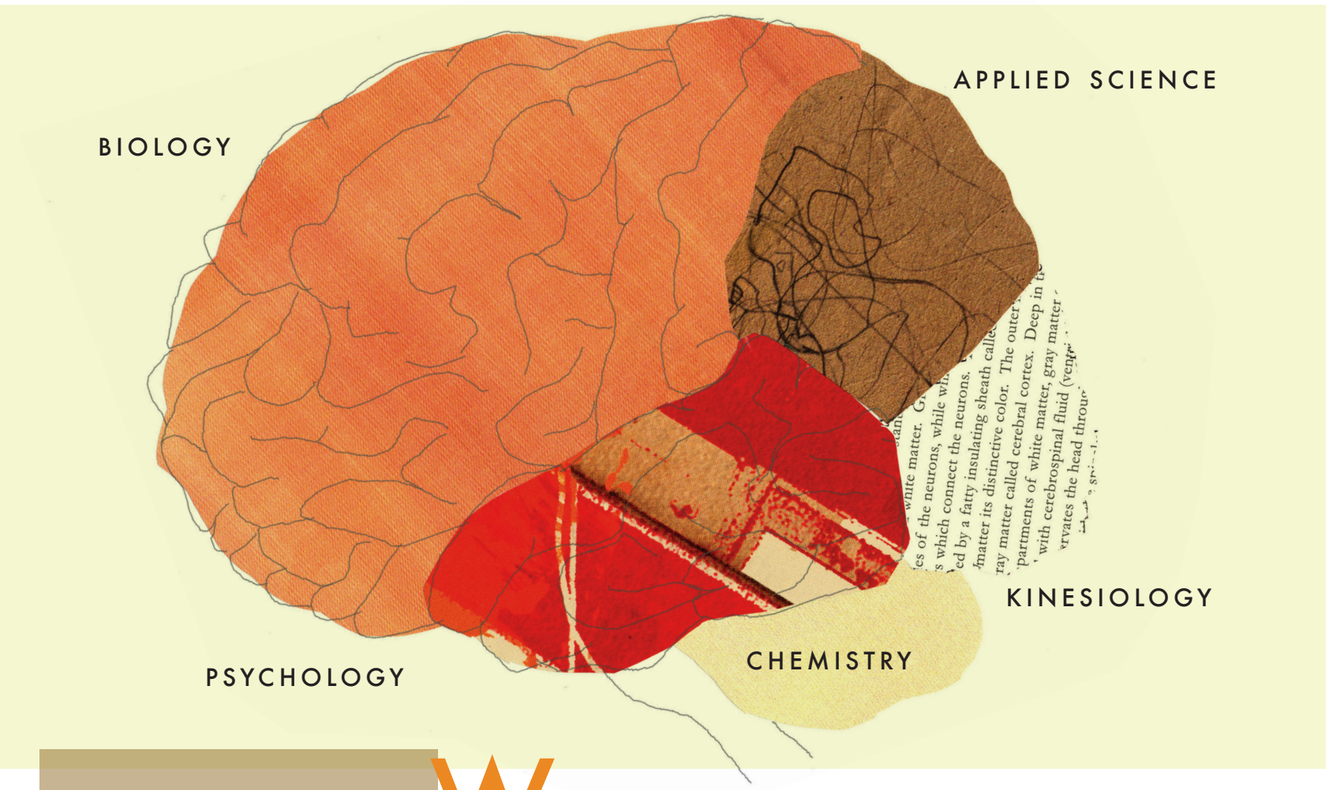




All photography by Stephen Salpukas, unless noted.

CORPUS COLOSSAL

Neuroscience program connects work of faculty from five departments



Like the lobes of the brain, faculty from several William & Mary departments work together in the neuroscience program.

by Joe McClain

What is the sound of one neuron firing?

"It's like a pop-pop-pop-pop," John Griffin says. "When they're nice and sharp they're really crisp and high-tone, and as they get sicker, the recording gets bad. The actual potential broadens. We call them thumpers, because they start going thump, thump, thump, and then they disappear."

Griffin studies how the brain's hypothalamus regulates body temperature. The procedure involved is simple, yet painstaking. A bit of tissue sliced from a rat or mouse hypothalamus is kept alive in a Petri dish so that Griffin, or one of his undergraduates, can insert a probe to record how the neuron reacts to changes in temperature. A properly seated probe will amplify the tiny electric signals of the neuron, generating the pops Griffin described, which degrade to thumps as the tissue begins to die.

Griffin is the director of William and Mary's interdisciplinary neuroscience program, presiding over a brain trust of 17 faculty members spread over five departments—Griffin himself is an associate professor in the biology department. In four years, neuroscience has grown to be among the most popular interdisciplinary major at the College and one of the most popular majors overall. The neuroscience major is as rewarding as it is demanding. Neuroscience grads find ready acceptance into programs at the nation's top medical schools and graduate programs. Griffin is careful to keep track of the program's graduates.

"So last year I knew that 21 percent were going to med school, about 8 percent to graduate school—this is out of 60-some students," he said. "Four of the graduates went to M.D./Ph.D. programs, and those are the ones that we are most proud of. I mean these are fully funded programs. They get their medical school and their graduate programs completely paid for. They get a stipend to live on through those seven to eight-plus years it takes them to complete both degrees. So when you think about how much that is, we're talking about a quarter million dollars a student."

> "Many brain disorders are actually vascular disorders. Stroke is a vascular disease, it's not a brain disease."

SCIENCE...AND SCIENTISTS

The program produces high-quality science in tandem with high-quality scientists. Griffin keeps track of current activity, too. Right now there are 98 William and Mary undergraduate students working in neuroscience faculty labs. The neuroscience faculty have produced 109 papers in research journals, many of which have William and Mary undergraduates as co-authors.

Such collaborative productivity is made possible only by the participation of what Christopher Del Negro calls "absolutely, absolutely, fantastic undergraduates." Del Negro is an assistant professor in the Department of Applied Science. Other neuroscience faculty come from the departments of biology, kinesiology, chemistry and psychology.

Del Negro's research concerns the neural mechanisms regulating breathing in mammals. The unconscious, seemingly simple, act of breathing is governed by a quite complex system in the brain.

"While it would be great to study a behavior like how do people give presentations or how do people think through complex problems, you can't really bring that kind of neuroscience problem into the laboratory," he said. "Whereas breathing really is just a fundamental rhythm which needs to be regulated to live."

He is part of a productive group, which includes undergraduates as well as graduate students in applied science. He and his group published four articles just this year detailing advancements in the understanding of the role in respiratory rhythm played by a group of brain cells in the preBötzinger Complex, a region of the lower brain stem. In addition to the four papers published by the group, two separate articles comment favorably on their work.

The lead author on the most recent article from Del Negro's lab is Erin Crowder, a member of the class of 2007. Erin's senior thesis ended up being good enough to be accepted into the prestigious, peer-reviewed *Journal of Physiology*. It makes a nice bookend to an undergraduate career that began the first semester of her freshman year.

"She came in and said 'I want to learn how to do research'," Del Negro said. "It also happened to be my first semester as a new faculty member and so Erin helped me build the lab. And she trained right from the get-go on how to do these experiments and she's worked with me every single semester and every single summer that she's been here. I would rate her as good as a third-year graduate student in any department."

Del Negro's methodology is similar to a degree to the one used in Griffin's lab. He and his colleagues manipulate brain tissue to retain the rudiments of behavior, essentially the motor rhythm that drives breathing movements. They use fluorescent marking to make the target respiratory neurons glow, so that they can record the neurons' activity at a number of levels.

Griffin and Del Negro, both cellular guys, collaborate a lot and have complementary skills. For instance Griffin relies on Del Negro's expertise when it comes to injecting dye into cell nuclei, while Del Negro acknowledges "John is a better microscopist than I am."

Neuroscience at the cellular level will get a big boost from the establishment of a new microscopy facility in William and Mary's Integrated Science Center, now under construction between Rogers and Millington halls. The ISC will be the permanent home of the neuroscience program's new confocal microscopy facility. The instrument itself, which Del Negro calls "the best thing we can possibly get, the best microscope around," arrived in April and has been set up temporarily in Millington.

BLOOD FLOW

If the brain is to work well, it needs a steady supply of oxygen-bearing blood. A problem in the blood supply leads to a problem with the brain.

"Many brain disorders are actually vascular disorders," Robin Looft-Wilson points out. "Many dementias are caused by vascular disease in the brain. Stroke is a vascular disease, it's not a brain disease."

Looft-Wilson is an assistant professor in the kinesiology department at William and Mary and insists that she's "a physiologist and not exactly a neuroscientist." Nevertheless, she is presiding over important work in the neuroscience program regarding the understanding of how blood vessels work and how their workings contribute to the health of the brain. One of the projects she is working on concerns a condition known as hyperhomocysteinemia, the excess of a certain amino acid in the bloodstream.

"Hyperhomocysteinemia is a very common cardiovascular risk factor in the population," Looft-Wilson said. "It's an independent risk factor like high cholesterol and everybody's heard about cholesterol. And hyperhomocysteinemia is typically the result of low B vitamins in the diet, which is actually very common."

Hyperhomocysteinemia, she explained, tends to increase oxidative stress—that biological imbalance we try to counter by consuming foods rich in antioxidants. Oxidative stress is involved in the physical manifestations of the aging process, as well as a number of disease states, notably Alzheimer's and atherosclerosis—hardening of the arteries.

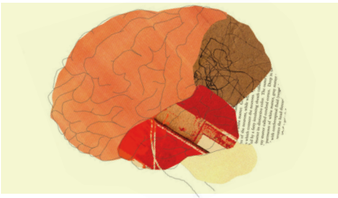
"High oxidative stress makes blood vessels not function properly. It interferes with lots of chemical reactions," she said. A healthy blood vessel, she explains, produces plenty of that critical and versatile biological messenger, nitric oxide. Looft-Wilson knew that hyperhomocysteinemia reduces nitric oxide availability, but how?

She and a group of students working in her lab ("They are all

continued on next page

CORPUS COLOSSAL

The program produces new science...and new scientists.



neuroscience majors.") recently concluded a study that shows hyperhomocysteinemia alters the regulation of endothelial nitric oxide synthase (eNOS), an enzyme that triggers production of nitric acid. They wrote up their findings in a paper—with four undergraduate co-authors—for a journal and also presented at a physiology conference in Washington, D.C., that attracts thousands of scientists, of whom only a hundred or so are undergraduates.

LEARNING AND MEMORY

Pamela Hunt studies learning and memory—which, from her point of view, are intertwined. She is associate director of the neuroscience program and an associate professor in William and Mary's Department of Psychology—and says that developmental psychology and neuroscience are intertwined, too.

"How do we get this brain? How does it develop? How does it grow? What are the processes involved? That's a really big area of neuroscience," she says. "So developmental psychology, where there's an interest in how psychological processes develop—behavior, learning, memory, eating behaviors, attachments, whatever—must correspond to the development of the body, and the brain in particular."

One of Hunt's major areas of research concerns a problem she characterizes as "a terrible condition, 100 percent preventable"—fetal alcohol syndrome. She notes that while the cause and effects of fetal alcohol syndrome are well documented, the number of cases continues to rise. Education hasn't seemed to help, she said.

"There are more and more kids that are diagnosed with fetal alcohol syndrome and some related disorders that are the result of prenatal exposure to alcohol," Hunt said. "So, rather than devoting all of our time and energy into prevention, which so far has not seemed to work, now the trend is to try to focus on the afflicted individual—the baby."

Hunt's lab uses a technique known as "fear conditioning" to study behavior. Fear conditioning, she explains, draws on the primitive defensive response to the threat of predation. It's a tool by which researchers can understand acquisition in a simple learning process—what Hunt calls the neuromechanisms of learning. The behaviors are similar for mice and men.

"How do we avoid predation? Well, one way that we do that is to exhibit a variety of behaviors that allow us to protect ourselves," she said. A mouse, for instance will freeze at a shadow that might be a hawk, an evolved response that helps the mouse avoid detection. "They stop moving, their heart rate decreases and they increase their attention and their vigilance to the environment."

Children born with fetal alcohol syndrome (FAS) often, but not always, look different from other kids. Alcohol also is detrimental to the development of the brain and Hunt's concern is with how learning and memory are affected in FAS.

"I have become very interested in ways that we might be able to take an individual who has problems as a result of alcohol in the memory domain and try to improve that, try to overcome that," she said. "Maybe if we train the individual using a different technique, they could learn. We might be able to give them a drug treatment that would be able to facilitate their memory and help them perform better in school."

Hunt has received funding from the National Institute on Alcohol Abuse and Alcoholism, one of the National Institutes of Health, to investigate such possibilities in animal models. One of the most promising ways to improve memory/learning, she says, is through choline supplementation.

"We found that the animals that are given alcohol exposure for a model of fetal alcohol syndrome are deficient in some kind of fear conditioning," she said. "And then we give the animal extra choline, which is just basically like giving you extra broccoli when you were a kid or a vitamin supplement. Given extra choline, they actually perform much more normally later on in that particular type of memory task."

> 'How do we get this brain? How does it develop? How does it grow? What are the processes involved?'

APPLICATIONS

This article has given an overview of work by just four of the seventeen faculty in the neuroscience program. It's easy to see the potential application of Pamela Hunt's work with memory and learning problems associated with fetal alcohol syndrome. The basic science being done in William and Mary's neuroscience labs also contributes to medical application. John Griffin's work with neural regulation of temperature has implications

continued on next page

Christopher Del Negro's group is having a phenomenal 2007, publishing four papers on the neural regulation of breathing.

Robin Looft-Wilson says she's a physiologist, not a neuroscientist, but points out that many diseases of the brain are actually vascular problems.

'PERFECT STORM' FOR HIGH-ACHIEVING UNDERGRADUATES

The neuroscience program at William and Mary brings together "perfect storm" conditions for undergraduates looking forward to medical school or neuroscience graduate programs—particularly the elite M.D./Ph.D. programs at major research universities.

"Out of about 60 graduates in 2006, we had four who went on to M.D./Ph.D. programs," said John Griffin, director of William and Mary's neuroscience program. "They get their medical school and their graduate programs completely paid for. They get a stipend to live on through those seven- to eight-plus years it takes them to complete both degrees and so when you think about how much that is, that's about a quarter million dollars a student."

Griffin likes to keep track of where his neuroscience grads end up; he posts updated stats on the program's web page. Many waver between medical school and graduate programs and Griffin asks indecisive students a simple question.

"My question to them is: Do they ever want to see patients? Do they want to be on the clinical side?," he said. "With an M.D., you can be a clinician or you can be a research scientist. With a Ph.D., obviously there's no clinical side of that."

The interdisciplinary nature of William and Mary's neuroscience program provides a high degree of versatility, and graduates have taken a variety of paths. Once the basics are covered, a neuroscience major can pick a number of directions.

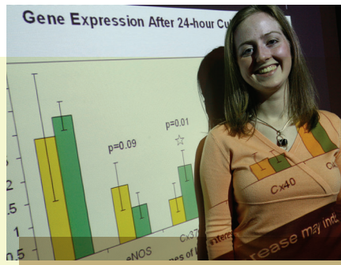
"So Student A can say, 'I really like neuroscience, I've been exposed to it and I have the basic science background but I really like behavior," Griffin said. "That kind of student is going to take behavioral courses and maybe apply to a behavioral neuroscience graduate program. Student B says, 'I really like cell-molecular...' They're going to take more cell-molecular courses and apply to a cellular-molecular-based neuroscience program."

One of the program's goals is to get as many neuroscience students into the lab as possible. Griffin says a third of the papers published by faculty in the program have undergraduate co-authors. Papers in important journals with undergraduates as first authors are not unknown.

Research requires dedication and tenacity from the students. In turn they bring the usual virtures of youth—not least of which are the fine motor skills necessary for some of the neurological lab work. Christopher Del Negro says a pair of "pretty decent hands" are necessarily for fine neural work and that young people are able to get the knack more often than not.

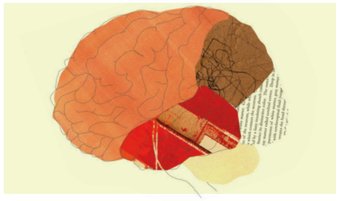
"I mean I've worked with students who have been practicing neonatal medicine for years and years who just cannot learn this dissection that we do in the lab," he said. "But most 19-year-olds can learn it in about a week." Students unable to perform the fine dissections need not give up on neuroscience, he said—there are other opportunities, such as microscopy and mathematical modeling. It comes back to the interdisciplinary nature of the program, Griffin said.

"I think our program is different in that we really try to create a well-rounded scientist who has had exposure to all these different disciplines, who's had exposure to all the different aspects of neuroscience," he said. "I think that's what makes our students so sellable when they graduate. That's why they are getting snapped up, by professional programs—med schools, pharmacy schools, veterinary schools—as well as by the top graduate programs."



Janelle Billig, who works with Robin Looft-Wilson, presents findings at the 13th annual Undergraduate Science Research Symposium.

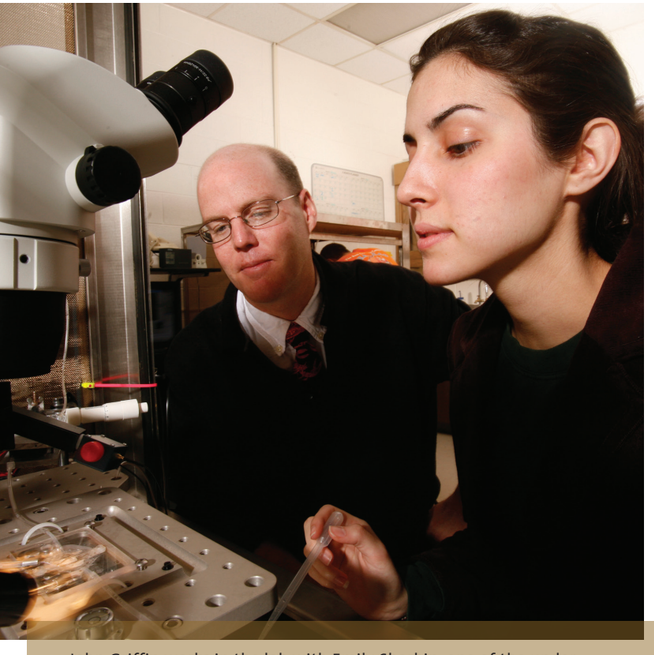
CORPUS COLOSSAL



for the understanding of fever and menopausal "hot flashes." Medical science certainly knows more about the regulation of breathing thanks to the research done by Christopher Del Negro and his colleagues. One of their recent papers disproved a long-held belief about the molecular mechanics of respiration. Robin Looft-Wilson's group has contributed much to the understanding of how the brain receives critical blood flow. Their research has been supported by the Jeffress Trust and Looft-Wilson recently received funding from the American Heart Association to continue her work.

The neuroscience program at William and Mary is a loose confederation, rather than a department, and its participants have managed to capitalize on the strengths of each of the contributors, turning out a respectable body of work while also producing an annual stream of some of the nation's most promising future physicians and scientists.

> "Oxidative stress is involved in the physical manifestations of the aging process, as well as a number of disease states, notably Alzheimer's and atherosclerosis—hardening of the arteries."



John Griffin works in the lab with Emily Sherbin, one of the undergraduates involved in his work on how body temperature is regulated.

Pamela Hunt's study of learning and memory has immediate implications for treatment of fetal alcohol syndrome.

The Three Wise Men

Global trouble spots: Iraq, North Korea, Latin America, Northern Ireland. They've been there and seen that—and earned the wisdom of experience.

That's why three William & Mary faculty members are prominent in the Rolodexes on desks of wire services and TV newsrooms across the country. You've read their comments in the major stories and seen their heads talking. Now George Grayson, Mitchell Reiss and Lawrence Wilkerson, above, get a chance to talk about the global issues, how much we really know and how often the media gets it right. —Ed

continued on next page

The experts speak their minds

William and Mary's Director of News Marketing Suzanne Seurattan spends a certain large percentage of her time arranging with the national media interviews and appearances for George Grayson, Mitchell Reiss and Lawrence Wilkerson. She e-mailed a set of questions to the three experts. The responses, edited for length, are below. Be forewarned: few punches are pulled. Opinions expressed below are those of the individuals, not *Ideation* or the College of William and Mary.

bio

George Grayson

The Professor

EXPERTISE

Latin American politics —especially Mexico

PORTFOLIO

Lectures regularly at the U.S. Department of State

Senior associate at the Center for Strategic & International Studies in Washington, D.C. Associate scholar of the Foreign Policy Research Institute in Philadelphia

Democratic Virginia legislator—1974-2001

BOOKS/PUBLICATIONS

Publications include more than 20 books and monographs on international affairs, including:

Mexican Messiah, (Pennsylvania State University Press, to be published in July 2007)

Strange Bedfellows: NATO Marches East (University Press of America, 1999)

Politics of Mexican Oil (Pittsburgh University Press, 1980)

Grayson also is a frequent CNN commentator and writes a regular column for *Milenio Semanal*, a weekly magazine in Mexico

AT WILLIAM AND MARY

Class of 1938 Professor of Government

SOUND BITE

"[Mexico spends] frightfully small amounts on health care, on education, on job training. And now I think they want to pull the wool over the Americans' eyes and have American taxpayers foot the bill for responsibilities that the Mexican elite should be assuming."

Lou Dobbs Tonight, CNN, May 22, 2007

Is there still a "world order"?

REISS: Yes. The United Nations and other international institutions, such as the World Bank and International Monetary Fund, still play an important role in what is referred to as a global world order. Sometimes it is easy to overlook this because of all the global disorder that is out there.

WILKERSON: There is always a world order because there is always power. At times, to the casual observer it may look more like world disorder; but so long as there is power to be had and wielded in the world, there will be men—and increasingly women—to wield it. What we are criticizing when we label the world as full of chaos and disorder is the way men rule.

GRAYSON: There is not a world order in the sense that the Westphalian system remains intact with nation-states dominating the international arena. Rather, there exists an "international mosaic" composed of diverse actors and protean rules of the game. These include three iterations of "superpowers"—Russia, which is waning in influence, but retains a potent nuclear capability plus world-class energy resources; the United States, which has begun to decline politically and economically under the George W. Bush administration, but whose dollar remains the currency of choice and whose culture permeates the world; and China, which is surging in the growth of GDP and exports. At the same time, there are a plethora of important, formal international agencies: the UN, the International Monetary Fund, the World Bank, the World Trade Organization, et cetera. These are complemented by private international players: non-governmental organizations, multinational corporations, terrorist groups like al-Qaeda, immensely wealthy drug cartels, networks of immigrant smugglers. Last but not least are the financial markets that can affect the global economy as we witnessed in the activities of the Shanghai and Shenzhen stock exchanges just after the Chinese New Year.

What are the top 3 global security threats?

REISS: The conjunction of terrorism and weapons of mass destruction, the spread of infectious disease and the real possibility that the U.S. will retreat from its global responsibilities.

WILKERSON: First is the proliferation of nuclear weapons—and the principal source for this is Russia, not Iraq, Iran or the Democratic People's Republic of Korea. Then, the possibility of a devastating disease such as avian flu sweeping the globe. Third is the collapse of world markets led by the collapse of the U.S. economy because of its enormous dependence on massive debt. Were I allowed a fourth threat, I would say planetary warming—and if nothing is done soon, I would move that danger to the top of my list.

GRAYSON: For me, it's the arrogant, preemptive, militaristic foreign policy of the Bush White House; the increasing readiness of the U.S. government to lie—blatantly—to its own people and world as it pursues quixotic policies in the Middle East, while placing a low priority on forging a modus vivendi between Israel and the Palestinians; and the pusillanimous unwillingness of the U.S. Congress and most presidential candidates of both parties to challenge executive decisions that are devastating to our national interests and standing in the world.

> "Desk-bound journalists thrive on submitting "Headless Man Found in Topless Bar" articles."

photo illustrations: Lillian Selby

What should the United States guard against in the Middle East? In Mexico and Latin America?

WILKERSON: The U.S. should be wary of a single power—such as Iran—gaining hegemony over the region and, thus, being able to dictate outcomes to other countries in the region. This is true particularly if Iran remains a theocracy with objectives that are antithetical to U.S. and other free nations' national interests.

REISS: Wholesale retreat. We need to remain engaged in the Mideast peace process and with the Gulf states in particular.

GRAYSON: U.S. presidents focus on Mexico when an economic or energy crisis erupts below or above the Rio Grande. Mexico is an extraordinarily rich country—oil, natural gas, silver, gold, beaches, historic treasures, incredible museums, a robust industrial sector, fisheries and wonderful, hard-working people. However, Mexico's elite pay little in taxes, benefit from ubiquitous corruption, live extremely well, spend anemic amounts on education, health care and job-training, and seek to use the border as an escape valve so that American taxpayers shoulder the responsibilities that the Mexican power structure shirks.

On a scale of 1-10 rate the security threat posed by Iraq. How about Iran and North Korea?

REISS: Objectively, there is no difference in the threat North Korea poses to global security today than a year ago, although the world is much more aware of this threat because of the October 9, 2006, testing of a nuclear device. North Korea poses a threat to the security of U.S. forces in northeast Asia—and of our friends and allies in the region. If Pyongyang decides to export its expertise, technology or fissile material, then it would obviously pose a severe threat to international security.

WILKERSON: The Iraqi people pose no threat to the security of nations in or out of the Middle East region. Certain leaders in Iraq, were they to gain control over the levers of power in Baghdad and rule Iraq—leaders such as Moqtada al-Sadr—would potentially pose a threat to neighboring countries. That threat I would rank about a 5 on a scale of 1 to 10. The chaos that the U.S. and its allies have brought to Iraq, is another matter altogether. That chaos presents a regional threat on an order of 8 or 9 and a threat to nations outside the region of 5 or 6—principally due to any significant disruption in the flow of Iraq's oil into the international market. Iran poses no significant threat so long as it does not possess nuclear weapons. If it gains such weapons and remains in the hands of the current theocrats, it would be a grave danger.

Is the American public well informed about world events? If not, whose fault is it, the public's or the media's?

GRAYSON: We are a parochial nation. Yet, as Bill Moyers pointed out in a recent PBS special, officials in Washington manipulate the mainstream media—including *The New York Times*, *The Washington Post*, and the three largest TV networks—as if they were yo-yos. A case in point is the abject failure of most print and electronic journalists to scrutinize the administration's insistence that Iraq possessed weapons of mass destruction. Consequently, the American public is poorly informed—and often misled—about national and international affairs. Stereotypes dominate the view of Americans toward Mexicans (and toward other foreigners).

REISS: I think people are better informed today than ever before, due largely to the rise of electronic media.

WILKERSON: No—and it is the fault of both the media and the people. The media cater to the market, to the sound-bite, and to the dramatic and

continued on next page

bio

Mitchell Reiss

The Diplomat

EXPERTISE

North Korea, Northern Ireland peace process, nuclear weapons proliferation

PORTFOLIO

Special Envoy to Northern Ireland, U.S. State Department

Director of Policy Planning, U.S. State Department

U.S. Chief Negotiator, Korean Peninsula Energy Development Organization

National Security Council, U.S. Council on Foreign Relations, the Ford Foundation

BOOKS/PUBLICATIONS

Bridled Ambition: Why Countries Constrain their Nuclear Capabilities

Without the Bomb: The Politics of Nuclear Non-Proliferation

Nuclear Proliferation after the Cold War (co-editor/author)

The Nuclear Tipping-Point (editor)

AT WILLIAM AND MARY

Vice Provost for International Affairs and former Dean and Director of the Reves Center for International Studies

SOUND BITE

"At issue is not whether North Korea can be trusted to keep its part of any bargain—it can't. Rather the challenge is to craft reciprocal steps so that at any point in this process the United States is not in a worse position than it would be otherwise should North Korea start backsliding."

—*The National Interest*, May-June, 2007."

The Three Wise Men

entertaining, not to sound analysis. The people seem to want the entertainment, though increasingly they are tuning out the sound-bite and the more egregiously slanted reporting. With regard to the public, their disinterest is also a part of the failure of our school systems, public and private, to deliver a meaningful education, particularly where that education should find a focus on civic responsibility and duty in a democracy.

When you are interviewed, do the media seem to have a good understanding of world events?

WILKERSON: Normally, no. One of the great failings of our democracy in the past 20 years has been the almost total transformation of the Fourth Estate into an entertainment industry rather than an essential element of our republic, an element whose main mission is to speak the truth to power. If you are in the entertainment business, detailed, careful analysis and study of an issue is unnecessary.

REISS: Almost always, yes. What they sometimes lack is (1) a broader understanding of the regional or international context, (2) a deeper understanding of the particular details, and/or (3) knowledge of the Administration's policy approach.

GRAYSON: There is enormous variation. The White House Press Corps, for instance, specializes in the activities of the chief executive and knows little about Mexican and Latin American nations. As a rule: (1) personalities trump politics, (2) politics trump policy, and (3) policy trumps digging into the (often bureaucratic) subtleties of policy formation.

> "My appearances on Al Jazeera have been very satisfying, unlike most of my appearances on U.S. media, which are very short and rarely explore issues in depth."

Always good for a quote—or a quip—William and Mary's trio of international-affairs experts meet with Director of News Marketing Suzanne Seurattan (top). From left are Lawrence Wilkerson, Mitchell Reiss, Seurattan and George Grayson. Note the recorder.

When the press reports on world events, are they getting it right?

REISS: They generally get the big things right, but the largest constraint on accurate reporting is the limited amount of space their editors allot to the stories. It is difficult to get all the pertinent information in 800 words.

WILKERSON: First, they do not, as a rule, concentrate on world events. In short, "blood leads" and, with regard to world events, if there is no blood there is rarely any real media interest. Secondly, when the media do focus on world events their reporting is shallow, largely uninformed and geared to the market. By this I mean that, once again, entertainment is the principal motivation.

GRAYSON: With few exceptions, the American media does an abominable job of covering Mexico. Desk-bound journalists thrive on submitting "Headless Man Found in Topless Bar" articles. That is, they focus on quaint indigenous customs, the skullduggery of politicians and exotic religious practices. Meanwhile, someone like Lynn Walker of the Copley News Service really pursues stories and spends time sorting out fact from factoids and fiction. Lisa Adams at Mexico's Associated Press bureau, Ginger Thompson of *The New York Times*, and Marla Dickerson and Sam Enriquez of *The Los Angeles Times* also do high-quality reporting. The electronic media—with the exception of CNN and (occasionally) NPR—strain for the sexy sound-bite.

Do you see a bent toward political partisanship in the press? A bent toward entertainment?

REISS: The opinion piece writers, like Nick Kristof of *The New York Times*, have a partisan approach. Most others are trying to get the story as accurately as possible.

WILKERSON: As I said previously, I certainly see the latter. Depending on the medium, I also see quite frequently the former. I can almost always, for example, count on Rush Limbaugh or *Fox News* to deliver the hard-line Republican point of view, even at times the extreme margins of those views. On the world scene, an interesting contrast is made by Al Jazeera, the largely Arab network owned by the Emir of Qatar. Despite heavy criticism by members of the Bush administration, this network does attempt in-depth and detailed analysis of and reporting on issues. My appearances on Al Jazeera have been very satisfying, unlike most of my appearances on U.S. media, which are very short and rarely explore issues in depth.

What should the media be reporting on that they're not?

WILKERSON: I find that the most disturbing omissions are generated by an abysmal lack of historical knowledge. For example, one of the most searing aspects of U.S.-Iranian relations today is in part a direct result of U.S. policy toward Iran since U.S. complicity in the *coup d'etat* that overthrew the first democratically-elected government in Iran in 1953, the subsequent installation of the shah, and U.S. support of that incredibly poor ruler for the next quarter century, until he was overthrown in 1979. I have listened to hours of media reporting on Iran and have never heard a word of this in-depth understanding of why we find ourselves today in the dangerous situation that confronts us with regard to Tehran.

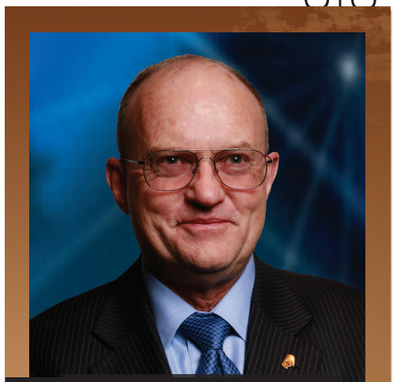
REISS: It is difficult for reporters to cover foreign stories because of the financial cuts at newspapers—there are not as many overseas offices as before. It is also difficult to cover stories that depend on scientific or technical knowledge and those that lack a dramatic hook. Global warming fits the bill for both of these.

GRAYSON: First, the media should inform their readers and viewers about the ominous threat that Mexico poses to the national interests of the United States in terms of the flood of illegal immigrants, the narco-gangs that control major bi-national crossing points, and the monopolies, oligopolies and bottlenecks that impede Mexico's efficiency and productivity. Second, the melting of glaciers and the migration of animals provides ample "photo ops" for journalists to hammer away on the dangers posed by global warming. Third, rather than tout the virtues of ethanol (because of corporate sponsors), the Fourth Estate should zero in on other bio-fuels in addition to the enormous advantages of conservation, including much tougher CAFE standards. Finally, except for Lou Dobbs—with whom I disagree on trade—few journalists are illuminating the ever-more skewed income distribution in favor of the super-rich in "egalitarian" America.

Best/worst/most memorable media encounters?

GRAYSON: Best: When the local press in Culiacán, the capital of Sinaloa state, interviewed William & Mary observers at the fall 2005 gubernatorial contest, our students came through with flying colors. Worst: A late-night call from a White House reporter for a major newspaper, who asked for "a couple of good questions" he could ask at a news conference at a summit meeting in Mexico City the next day. An invitation to a fancy White House dinner goes a long way in co-opting the Fourth Estate whose members—with a few exceptions—have become toothless tabby cats.

WILKERSON: My most memorable was when the media began to pick up on and report somewhat in-depth on the detainee abuse issue (with respect to the U.S. abuse of those personnel captured in the so-called Global War on Terror). My worst moment was when I was a member of the Bush administration and on background I commented on how stupid U.S. Cuba policy was—and, later, my comments were written up and attributed to me. However, I have since found a little moral courage and no longer find that revelation embarrassing, but exhilarating.



Lawrence Wilkerson
The Colonel

EXPERTISE
National security, strategy, U.S. foreign policy, public policy

PORTFOLIO
Colonel, U.S. Army (Ret.)

Special Assistant to Chairman of the Joint Chiefs of Staff, General Colin Powell

Faculty, Naval War College in Newport, RI

Deputy Director and Director, U.S. Marine Corps War College at Quantico, Va.

Chief of Staff to Secretary of State Colin Powell

BOOKS/PUBLICATIONS
Featured in *Undermining Science: Suppression and Distortion in the Bush Administration*, Seth Shulman, (2007)

The Greatest Story Ever Sold: The Decline and Fall of Truth from 9/11 to Katrina, Frank Rich (2006)

The Best War Ever: Lies, Damned Lies, and the Mess in Iraq, Sheldon Rampton and John Stauber (2006)

"Architect of his own collapse", *The Los Angeles Times*, May 18, 2007.

With Joseph Margulies, "Guantanamo prison observes sad anniversary" *The Miami Herald*, January 28, 2007

AT WILLIAM AND MARY
Pamela Harriman Visiting Professor of Government

SOUND BITE
"When Defense Secretary Donald Rumsfeld picked Wolfowitz in 2000 as his deputy—to make all the trains in the Pentagon run on time—those of us who were familiar with Wolfowitz knew a train wreck would occur. It did, almost immediately, as nothing got through the roadblock of the deputy's office."

Guest column, *The Cincinnati Post*, May 21, 2007

Outside the lines

Why are our schools looking less and less like the neighborhoods they serve?

By Erin Zagursky

Choice is generally thought to be a good thing. But with any choice comes consequence—intentional or otherwise. When it comes to choosing where our children go to school, researchers have found as educational choices increase, our public schools become more racially segregated.

Salvatore Saporito and Deenesh Sohoni, faculty in William and Mary's sociology department, wanted to see if the racial mix and poverty rates of students in public schools matches those of the neighborhoods the schools serve. For instance, if census data identifies the population of the area served by a certain elementary school as 48 percent white, 37 percent black and 15 percent Hispanic, then shouldn't the school's enrollment reflect that mix?

Illustration by Hank Selby

It should, but research by Saporito and Sohoni indicates that it often doesn't, at least in many of the nation's largest school districts. So what's going on? It's important to know; so important that their research is part of evidence presented in two current U.S. Supreme Court cases.

Their research draws a connection between school choice and segregation, but hasn't yet tackled the "whys." Are some parents more financially able to exercise school choice than their neighbors? Are there racial motives? And what motivates parents to keep their children in neighborhood schools, because staying in the local schools is also a choice—or is it?

Saporito and Sohoni's next step is to investigate those thousands and thousands of individual family decisions that drive the trend—the individual tiles that make up the mosaic their research already has revealed. The size and scope of their work so far will make that next step a daunting task, but their mastery of mapping technology will make it a little easier.

mapquesting and map-questing

The researchers first examined the racial composition of the populations within the 22 largest school districts in America. Defining exactly where school districts were located and then creating a new set of population data for those areas had never been done before and proved to be very labor-intensive.

"We went on a map quest," said Saporito, assistant professor of sociology. The quest yielded school attendance boundary maps, including the old-fashioned paper kind. What that led to was a data set no one else had ever created.

"We have been able to collect a data set that nobody else has ever had—we were the first ones to do it," Saporito explained. "Not only were we able to conceive of it but we were willing to put in the time and effort to collect the data and put in the technical expertise to marry all of these research methods together. It was sort of like a person who plays five or six instruments at once."

The researchers entered coordinates of the school attendance boundaries into a geographic information system (GIS) program. This required the researchers to learn a good deal of computer programming.

"Programming is very tedious because one keystroke error can cause the whole program to have problems. We had to troubleshoot the programs until they would run correctly, which often would take a couple pair of eyes," said former student researcher Laura Nixon, a 2005 graduate who currently works at the Census Bureau on special projects sponsored by the National Center for Education Statistics. "We learned a lot about programming by figuring out those issues, and I even use those same troubleshooting skills in my current job, which requires a lot of programming."

The GIS approach allowed Saporito, Sohoni and their student researchers to correlate each school's area of service with census data on the racial and ethnic mix of children living in the same area. They then compared that information to the actual enrollment statistics for schools, using information from the Common Core of Data, a U.S. Department of Education's program that annually collects fiscal and non-fiscal data about all public schools in the United States. The researchers were then able to see if the racial mix of the public schools matched that of the neighborhoods they served.

no match

They didn't. The research revealed that fewer white children attend public schools than minority children, particularly when neighborhoods are mostly integrated.

"If a school should have been 50 percent white, based on residential composition, it was on average 40 percent white," said Saporito.

continued on next page

Outsidethelines

> “It’s one of the big issues in sociology lately: Where you find racial segregation, is it due to race, or is it due to the high correlation between race and economic status?”

Take the case of Alpha Elementary School—a hypothetical example, but typical of Saporito and Sohoni’s actual findings. The population of the fictional neighborhood served by Alpha Elementary would be 48 percent white, while the school enrollment is about 38 percent white, making the school significantly less integrated than the neighborhood.

Researchers also found that public schools with private, parochial and/or magnet schools within their boundaries have even fewer white children enrolled than others without private or magnet schools nearby. Private schools in particular have a strong negative impact in the percentages of white students in public schools.

For instance, let’s say our hypothetical Alpha Elementary has 300 white children living within its boundaries and 270 of them will attend the school—the 10 percent difference between population and enrollment cited above. But if there is a private school within Alpha’s boundaries, only 265 white children would attend Alpha, increasing the population/enrollment disparity to 11.6 percent.

Salvatore Saporito began his examination of the effects of school choice in Philadelphia and expanded it to include the 22 largest school districts in the U.S.

Add two or three private schools in the neighborhood, and Alpha would enroll about 258 white children, a 14 percent disparity. And if there are four, Alpha would enroll 239 white children, increasing the disparity to more than 20 percent.

Remember, if all of the children living within Alpha Elementary School’s attendance boundaries would attend the school, Alpha’s enrollment would be 48 percent white, 37 percent black and 15 percent Hispanic, just like its neighborhood.

The research was supported by a National Academy of Education/Spencer Foundation Postdoctoral Fellowship and also by the American Educational Research Association. The results of the researchers’ study were published in *Sociology of Education* in April 2006.

race or economic status

An important question is whether the schools really are segregating along racial—as opposed to economic—lines.

“It’s one of the big issues in sociology lately: Where you find racial segregation, is it due to race, or is it due to the high correlation between race and economic status?,” Sohoni said. To address the question, researchers applied the same mapping method they had used on race to investigate economic segregation.

Saporito and Sohoni compared poverty rates in neighborhood public schools with corresponding school attendance areas. They linked maps of elementary school attendance boundaries in 21 of the largest U.S. school districts with data from the 2000 Census and the Common Core of Data. The results of the study were published in *Social Forces* in March 2007.

The research showed that the percentage of poor children in neighborhood schools is greater than that of the neighborhoods they serve. Surprisingly, the data revealed the economic gap was on average between 15 and 30 percent.

They also found that the enrollment/neighborhood economic difference tends to be greater in neighborhoods in which white people are not a majority. For instance, at Beta Elementary (another hypothetical school), let’s say half the children are poor and more than half are white. The numbers would show a 15 percent difference between the poverty rate of the neighborhood and the school. It would be different across town at the hypothetical Gamma Grade School, where half of the children are poor and less than half are non-white. Gamma’s student body is 30 percentage points poorer than the neighborhood it serves.

“Wealthier children are leaving those schools that have higher percentages of black children and also are poor at much greater rates than they are leaving schools with higher percentages of white children but the same amount of poverty—so race is clearly part of the puzzle here,” said Saporito.

school choice? or desegregation?

Pick one, but only one. Numbers similar to those of Alpha, Beta, Gamma and other units in the Hypothetical City School District play out in real city schools in urban neighborhoods across the nation. These real-life, real-school findings contribute to recent debate on whether the government should eliminate desegregation programs in schools in favor of expanding “free-market” initiatives that promote school choice.

Proponents of school-choice programs argue that increasing educational options of families—particularly poor, inner-city families—will create greater educational equity as well as race and class integration across schools. They argue that choice give disadvantaged students the option to leave under-resourced and under-performing schools.

But, former student researcher Megan McQuiddy was surprised to find from the research that what was happening in reality was a completely different story, especially since, as a teenager, she had attended a magnet school in Richmond.

“As soon as I started seeing the results of our research, it intuitively made a lot of sense,” she said. “I think it’s surprising that these schools were sold as something that was going to reduce racial differences when in fact, given any thought at all, you can see that based on what’s happened in the past, it didn’t make sense.”

Since the ruling against school segregation in Brown v. the Board of Education in 1954, the factor of race has been nearly removed from consideration when deciding which schools children should attend. However, integration programs such as those in Louisville, Kentucky, and Seattle, Washington, which use racial quotas to decide school attendance, have generated a great deal of controversy. Opponents of such programs say that using race as a factor in deciding where a student should go to school—even to the ends of making a school racially balanced—is illegal.

In December 2006, the Supreme Court began considering the legality of the Seattle and Louisville voluntary integration plans. An *amicus* or “friend of the court” brief was presented to the Supreme Court to help in the decision, citing the research of a number of prominent social scientists and scholars, including Sohoni and Saporito, on issues related to school desegregation, diversity and race relations in K-12 schools.

Although their research was cited in the brief as supporting race-conscious policies, Saporito and Sohoni know that proponents of the free-market approach sometimes cite their work as well.

“Nobody is challenging our findings, but people can interpret them in different ways. However, our research clearly shows that creating more choice would end up exacerbating economical segregation in schools,” said Sohoni.

Decisions in the two cases before the Supreme Court (Parents Involved in Community Schools v. Seattle School District No. 1 and Crystal Meredith v. Jefferson County Board of Education) are expected by the end of the court’s term this summer and could impact public schools across the nation.

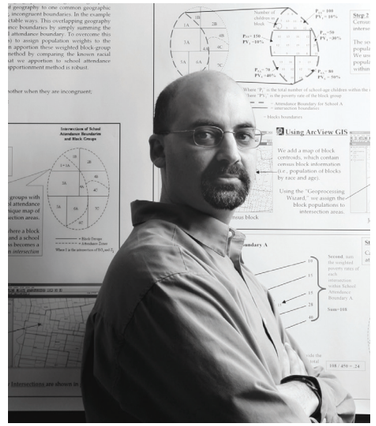
USING GIS

GIS—Geographic Information System—is basically the analysis of data points superimposed on a map. The technique has been around for centuries, but computing power and the Internet has made GIS a powerful and multifaceted tool for researchers in a surprising number of fields.

“The way we first used GIS was to make pretty pictures,” Sal Saporito said. “It was descriptive—a way for people to visualize trends. Then we were able to tap into it deeper.”

A deeper understanding of GIS techniques is excellent for sorting out huge clumps of raw data. For instance, Saporito’s team is able to sort the addresses of thousands and thousands of school kids into the service area of their neighborhood schools by superimposing school-boundary lines onto a map dotted with coordinates corresponding to the home addresses of all of the kids.

GIS applications are increasingly being used by researchers to interpret data, as well.



Deenesh Sohoni (top) and Megan McQuiddy, a student researcher who graduated in 2006

what’s driving the data?

The research conducted by Saporito, Sohoni and their students can show differences in the populations of children within school boundaries and those actually attending the schools, but those numbers have not allowed the researchers to examine individual choices.

“We can’t say what’s happening on an individual level,” said Sohoni. “But that’s what we want to find out.” Saporito has made a start, though, investigating the dynamics of individual choice through analysis of individual school magnet applications from the School District of Philadelphia.

“My assumption was that I’d be one of

Continued on page 33

A chemical choreographer

by Joe McClain

Conjugated polymers can really shine, but you have to know how to make them dance

Chemist Elizabeth Harbron uses body language in her Rogers Hall lab to depict the cis-trans dance of isomers: "Wouldn't it be cool to make them do that with a light signal?"

Elizabeth Harbron is describing a bit of choreography: "There are two groups and they start out like this, OK?" she says, right arm out, bent at the elbow, with forearm vertical. Her left arm also is extended, forearm dangling. Both wrists are bent and her fingers are gently curled.

"And in the light, they do this," she nods, crisply drawing her right arm across her body and coiling herself up slightly. "Then...they go back."

Harbron, a photochemist, is talking about the dancing of molecules, not people. She is demonstrating how a group of polymers change shape when activated by light, using her arms to demonstrate the action of azobenzene side chains coiling and uncoiling around a central molecular backbone. The chemically literate will recognize that she is acting out the process of cis-trans isomerism.

Her lab is investigating the properties of conjugated polymers, long-chain molecules that can be made to glow, even change colors, when they convert from cis to trans. The fluorescent properties of conjugated polymers can be activated by light or by electric charge, which makes them good candidates for a new class of commercial-product display screens based on polymer light-emitting diode (PLED) technology.

Conjugated polymers give a number of advantages to displays. Their fluorescent properties make for nice bright, high-contrast readout. This means that future cell phones equipped with PLED displays won't require backlighting. PLED technology is especially appealing for computer monitors. Think of your laptop screen offering 180-degree visibility, even in the sunlight.

"Because this is a polymer, it's plastic, right? In theory, you could make these flexible. So you could imagine some sort of flexible computer monitor," she said. "The technology just isn't there yet, but that's where it's headed."

Some European consumer products, cell phones— even an electric razor—already use conjugated-polymer displays, Harbron said. But basic science always comes before cell phones and laptops and other consumer products. "We're not going to be making cell phones here in my lab," she said. "My group will never be widget producers, but we're going to learn more and more things about what these polymers can be made to do. What we do may some day help the widget makers."

Harbron is an assistant professor in William and Mary's Department of Chemistry. To support her investigation into the characteristics of conjugated polymers, she has received funding totaling $404,000 over the next five years in the form of a CAREER award from the National Science Foundation's Organic and Macromolecular Chemistry Program.

STARTING WITH LIGHT

Harbron's work is based on coming up with new conjugated polymers that have groups attached to them that respond to light signals. "Conjugated polymers will fluoresce if you put electricity through them, but we've focused on light because it's very straightforward and an easy thing to do," she said. The groups of polymers being investigated will fluoresce differently—brighter or a different color—depending on how they are shaped. Her work choreographing azobenzenes, for instance, has revealed that they respond differently to ultraviolet light than they do to blue light.

"If you made them coil up, they would glow a different color than when they're all spread out," she explained. "So I thought wouldn't it be cool if we could force them to do that with a light signal? Just say 'do it now' and 'now go backwards'."

She characterized her lab's work with azobenzenes so far as "finding out what we could do." They discovered, for instance, techniques for changing the color of a conjugated-polymer solution, making the liquid change from yellow-orange to green and back again. She also has developed an approach to fluorescence modulation—a way to make the polymer glow brighter and dimmer.

"Once you can talk to the azobenzenes

continued on next page

. . . but does it work in film?

and figure out how to make them brighter and dimmer, you ask, 'OK. Now, can we go completely on, completely off, just with a light signal?" she asked. "And that's one of the places we're headed."

THE FILM'S THE THING

Basic investigation of the properties of any conjugated polymer begin in solution, as it's easier to observe and record characterizations, but work on promising molecules must quickly advance to the film state.

> "We're a physical organic lab. That means everything we study, we have to make. You can't go out and buy this stuff."

"Because film's where it's at," Harbron said. Commercial conjugated-polymer applications would consist of a layered display screen, with the polymers suspended in a thin liquid film sandwiched among conductive layers to provide electricity and insulating layers to keep oxygen from the polymers. "Anytime anyone reviews one of my papers, they'll say 'well this is all really great and everything, but how does it work in the film?'"

Harbron's group this year published its first "film" paper, describing how some of the actions demonstrated by azobenzenes in solution happen in almost the same way in a film roughly 100 microns thick.

"We did not know if there would be enough room in the film for the molecules to coil and uncoil," she said, "but it turns out that there is." She said that her students were able to use a laser and a 20-micron-square sample of azobenzene film as a sort of polymer-fluorescence Etch-a-Sketch. They wrote an "H."

"Well, maybe it's a tribute," Harbron said, "but it is easier to do straight lines with the laser. If my name had been Smith, I don't know what we would have gotten."

The NSF grant will allow Harbron and her company of undergraduate chemists to advance to the next level, including the pursuit of groups beyond azobenzenes. "We want to take the effects we have and try to make them stronger, by swapping out the azobenzenes with other kinds of photoactive molecules," she said. "The one we're looking at now is called spiropyran."

For a photochemist, the difference between azobenzene and spiropyran is the difference between choreographing four-limbed and ten-limbed dancers. Spiropyran is a more complex molecule than azobenzene, Harbron explained, and therefore offers more properties that could be made to change in response to light or electrical stimuli.

"That may help us achieve the total intensity-on,intensity-off effect that we're looking for," she said. "It also may help us do some fancier and more dramatic color-change applications."

POLYMERS FROM SCRATCH

The first step to beginning work in earnest on spiropyrans, is to have a supply of the polymer, she said, starting from scratch.

"We're a physical organic lab. That means everything we study, we have to make," she said. "You can't go out and buy this stuff. So we're kind of in a synthesis phase right now, where we're figuring out the best way to make the spiropyran polymers."

Once the spiropyran polymers have been synthesized, Harbron's lab will begin solution characterization of their samples, then move into films. She also has a list of other photoactive molecules that might prove to be promising.

Harbron's lab already has made a number of important contributions about conjugated polymers to the scientific literature. Typical of many labs at William and Mary, Harbron relies on a steady supply of high-performing undergraduates as collaborators. In May, two seniors, Matthew Imm and Deana Hadley, were finishing up some work in the lab

Continued on page 33

COLOR ME CONJUGATED

Not quite all colors of the rainbow—yet. But conjugated polymers do come in a wide range of hues. The idea is to get them to change color and/or intensity when excited by light (left) or electric current.

When you do research on conjugated polymers, you get the added visual satisfaction of working with a veritable Crayola of substances.

"So much of organic chemistry is taking a white power and dissolving it into a clear, colorless liquid and maybe adding another clear, colorless liquid and isolating a product that is going to be another white powder," Elizabeth Harbron said. "So it's exciting for the students, I think, that everything we work with is colored. A lot of times you'll know if a reaction has succeeded or failed just on the basis of color: Just look for the color change!"

Conjugated polymers, Harbron explains, have a pattern of alternating single and double carbon-carbon bonds throughout their backbones. "Things that are highly conjugated become colored. Beta-carotene, in carrots, is so orange because it has a conjugated backbone," she explained. "And that's a small molecule; we work with polymers—they're even more conjugated, so we're going even further into the spectrum."

Most of the polymers in Harbron's lab are various shades of deep red. Spiropyran side arms are alternately purple and yellow, depending on whether they're in cis or trans state.

"We don't know what color our new polymers are going to be yet, because we don't have them. We're not sure what's going to happen when purple meets red. We may be making brown sludge today," she said. "We'll find out."

Victorian poetry's BAD BOY

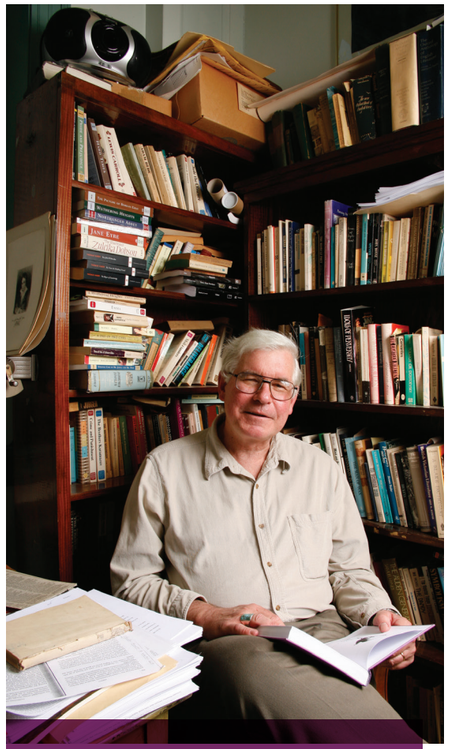
By Erin Zagursky

It's a handle Algernon Charles Swinburne would probably relish. He loved to push opposites to the point where they would meet—where pain becomes pleasure, where love becomes hate.

But it's been nothing but love for the work and life of Swinburne from William and Mary English Professor Terry Meyers, who spent almost 20 years working on a collection of the poet's correspondence.

"Perhaps not everyone would agree with Henry James' claim that 'everything about being such a being as (Swinburne) becomes and remains interesting.' But the great collector and student of Swinburne John Mayfield and his wife emphatically did. And so do I," Meyers wrote in his introduction to *The Uncollected Letters of Algernon Charles Swinburne*.

Swinburne was born into a prominent English family in 1837 and was educated at Eton College and the University of Oxford. A pre-Raphaelite poet who touted *ars gratia artis* nearly a century before MGM, Swinburne produced work that was edgy and anti-theistic. His subjects, including masochism, something the poet himself enjoyed, still raise eyebrows today. Even Swinburne's death stirred controversy; he was posthumously denounced by the vice-dean of Canterbury Cathedral for the "pollution" he had introduced into English poetry.



Terry Meyers believes the time has come for Algernon Swinburne to get the recognition due a great Victorian poet.

Meyers had never heard of Swinburne until he was a graduate student at the University of Chicago in the late 1960s.

"I read one of his poems, 'The Garden of Proserpine' which was very melodic, very beautiful and very atheistic and I thought, 'Whoa, what is this guy doing?'," said Meyers.

As Meyers continued to study the poet, he found that Swinburne was an early admirer of Percy Bysshe Shelley, Charles Baudelaire and Walt Whitman. He also found that Swinburne had written a groundbreaking critical book on William Blake during a time when Blake was not yet taken seriously. In 1892, when Tennyson died, Swinburne's work was so well known that there was talk of his becoming the next poet laureate. However, his controversial works and political views kept him from the post.

37 YEARS OF SWINBURNE

Intrigued by the poet who resisted the conventional pressures of the Victorian age and whose melodic poetry "pushes language to the point where sound and sense find their edge," Meyers decided to write a thesis on him.

"I have now been working on Swinburne for 37 years and I'm still having fun," he said.

Meyers began work on his uncollected letters in 1985, with grants from the National Endowment for the Humanities. Working before the advent of the Internet, the research was extremely time consuming, and Meyers relied heavily on assistance from libraries, Victorian-era scholars, book collectors, family members and students. Meyers wrote to libraries and private collectors for copies of letters and even spent hours pacing through libraries, leafing through collections of letters by Swinburne's contemporaries on the off chance of finding a connection to the poet.

"There was a lot of serendipity in that," he said.

Even when the Internet became widely used and Meyers could look at Swinburne's work online, the subjects of some of Swinburne's poems were still so controversial that Virginia law prevented Meyers from reading some of them on his office computer without prior permission from the state.

As the collection of letters came together, he was surprised both by the number of letters he had been able to collect and by the number of letters he found to Swinburne, including letters from strangers. Meyers said the letters to Swinburne help to illuminate the milieus he lived in – from familial and intellectual to social and professional.

VICTORIAN FREETHINKERS

"One thing that becomes apparent from Swinburne's correspondence: There was a larger network of skeptics and freethinkers during the time than we might think," Meyers said. "It was an age of great religious piety where books of sermons were bestsellers, and yet there is a network of people who, despite strong pressures, are freethinkers and skeptics."

An intriguing part of Meyer's collection is a series of letters between Swinburne and his cousin Mary Gordon Leith, who is thought to have rejected a marriage proposal from him in their youth. In the

Continued on page 33

A geology student examines rusticles to help solve mystery of a Confederate submarine

Sub Chaser

By Joe McClain

In its brief career, the *H.L. Hunley* was a success and a failure. Now, years after its resurrection, the Confederate submarine is a mystery and a research project.

The *Hunley* was the first submarine in history to sink an enemy vessel. On a quiet February night in 1864—six years before Jules Verne's fictional *20,000 Leagues Under the Sea*—the *Hunley* rammed a spar into the stern area, planting a torpedo into the hull of the *USS Housatonic*, one of the Union ships blockading Charleston harbor. The *Hunley*'s crew reversed its crank drive, backing away from the *Housatonic* before detonating the torpedo, sinking the *Housatonic*. The *Hunley* surfaced to send a "mission accomplished" signal, but like Verne's *Nautilus*, the *Hunley* didn't come back.

William and Mary geology student Jason Lunze is no Captain Nemo, but shipwrecks have always fascinated him. As a kid, he would walk the beach near his grandparents' home on Mobjack Bay and pick up Colonial-era pipe stems and other artifacts. His interest in the Confederate submarine dates back to grade school.

"I was aware of the *Hunley* probably since I was about six years old," Jason said. "One of my first grade school teachers had noticed my interest in shipwrecks and lent me one of his personal books. At that time they were still looking for the Confederate submarine. I thought it rather fascinating but I never thought they would actually find it; it is rather a small article to find lost in a rather large ocean."

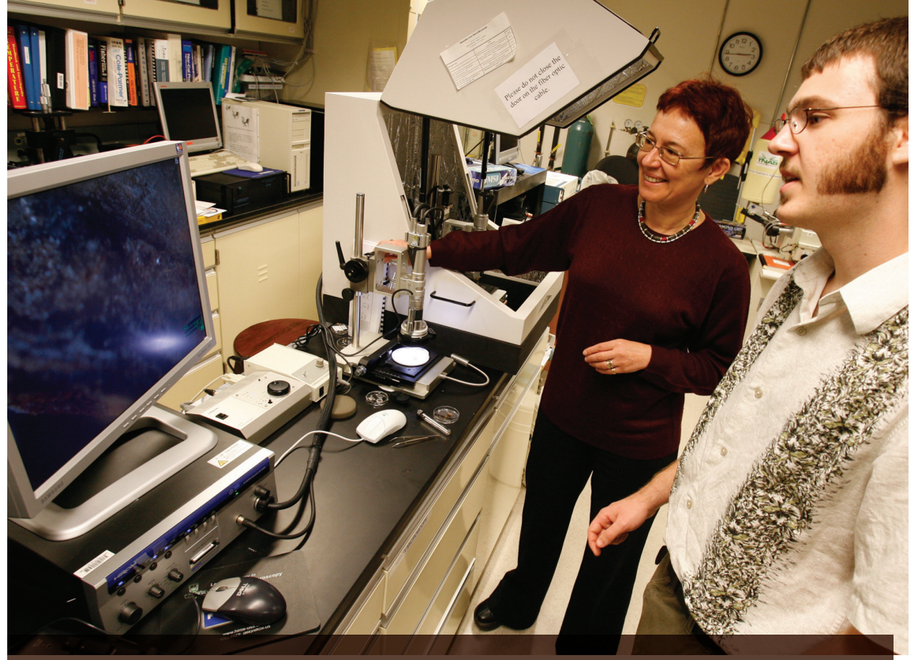
'WHERE' BECOMES 'WHY'

Not only was the *Hunley* found, in 1995; it also was recovered. In fact, the *Hunley* is on public display at the Warren Lasch Conservation Center in Charleston, South Carolina. If you want to see the *Hunley*, you'll have to go on a Saturday, because during the week, archaeologists are working to preserve the *Hunley* and to solve the remaining mystery—why did it sink?

"The *H.L. Hunley* was the first submarine to sink an enemy vessel, but it was lost shortly thereafter," Jason said. "It was somewhat of a technological marvel of its day and that can be emphasized by the secrecy in which it was moved from Mobile to Charleston. A special train car was constructed to conceal its identity during its entire journey."

Not all the work on the *Hunley* is being done in Charleston. Jason Lunze is adding pieces to the solution of the mystery from the College of William and Mary. A geology major and marine archaeology buff, Jason got involved through Rowan Lockwood of William and Mary's geology department, who put him in touch with M. Scott Harris of Costal Carolina University, a William and Mary alumnus who has a record of collaborating with faculty at his alma mater. Harris is temporarily reassigned, working on the *Hunley* team.

Jason thought work involving the sedimentation of the *Hunley* might make a good geology project, but Harris told him there was no suitable sedimentation work. "But he had a project on the formation of rusticles within the submarine and I said that I'd love to work on the project," Jason said.



Working in the Surface Characterization Lab of the Applied Research Center, Jason Lunze runs some tests with lab tech Olga Trofimova. Jason hopes to add a little piece to the puzzle of why the *Hunley* sank.

BACTERIAL CONDOS

Scientific examination of the bacterial colonies that create rusticles (see inset)—and the minerals produced by the bacteria—can provide insight into a number of conditions, present and past, in sunken iron vessels. Jason received five rusticles removed from the sub's interior.

"The samples that I collected from the *H.L. Hunley* are dead colonies," Jason said. "The submarine was in-filled with sediment which stopped their growth. This gives us a good view of what the inside conditions were like before the sediment in-fill completely killed off the colonies."

He has been using a variety of nondestructive analytical techniques to examine his rusticles. He has worked with Bob Pike of William and Mary's chemistry department, but does the majority of his work in the Surface Characterization Lab in the Applied Research Center. Jason keeps his rusticles wet, to avoid oxidation. In fact, the entire *Hunley* hull is kept under water in a preservation tank.

"The samples have to be dry in order to run the analytical techniques," Jason explained. "So I have to dry them out first." The drying process involves placing a rusticle sample in a desiccating vacuum chamber, adding argon gas, which helps the process by displacing air.

Jason, who expects to graduate in 2008, will be busy on rusticle tests for the next four to six months. He will write up his findings in a senior thesis and hopes to have a paper accepted into a peer-reviewed journal. He characterizes his work as "a small brick in the wall of knowledge" on the *H.L. Hunley* that ultimately may solve the mystery of the innovative warship that accomplished its mission, but didn't come back.

WHAT A HUNK

"It is a hunk of rust, but it's a little bit more than just a hunk of rust," Jason Lunze says. The term "rusticle" is recent, dating from the mid-'80s discovery of the wreck of the *Titanic*. Sinking an iron ship like the *Titanic* or the *Hunley* is like tossing a cupcake into a flock of pigeons. Iron, Jason explains, is not very abundant in sea water, and communities of bacteria that live in the ocean need iron for their life processes. The iron-starved bacteria flock to the iron and form a biofilm on the surface and begin extracting the iron. The collection of bacteria gets thicker, Jason explains, until it begins to slump. After enough bacteria have eaten enough of the iron, a stalactite-shape rusticle begins to form. Rusticles are valuable research tools because examination of the types of bacteria colonies that built the rusticle can tell you a lot about the changing water conditions over the years.

Taking history to the BANK

Back in the day, Richmond's Jackson Ward was home to a thriving African American community every bit as vibrant as Harlem or Atlanta's Sweet Auburn. A great deal of the credit for Jackson's prosperity properly goes to Maggie Walker.

By Joe McClain

The name of Maggie Walker is not forgotten in Richmond. It lives on in the Maggie L. Walker Governor's School for Government and International Studies, a magnet high school. Her home, at 110½ E. Leigh St., is a National Historic Site administered by the National Park Service, open for tours.

But honor and recognition have not extended to the seat of the Walker enterprise, the building that housed Mrs. Walker's bank and served as the economic powerhouse of the community during the early decades of the 20th Century. Today, the Independent Order of St. Luke's bank building at 900 St. James St. is a plywood-clad, graffiti-tagged four-story structure, long vacant, with little to remind anyone of its place in history. Heather Huyck and the participants of her Sharpe seminar hope to change all that. Huyck, a visiting assistant professor in William and Mary's history department, has based the content of her first-year seminar on the building and—just as important—on the historical and social milieu in which the bank was conceived and grew. She and her nine freshmen want to see the bank building listed as a National Historic Landmark—and they've prepared the nomination document themselves.

The Sharpe Community Scholars Program at William and Mary combines community activism with academicism. Scholars live in a common residence and enroll in one of a group of specially designated courses—Sharpe seminars—that are the basis for year-long service-learning projects. Huyck's seminar adds a research component to the mix.

Freshman seminar hopes to secure National Historic Landmark status for St. Luke Building

LIBERAL ARTS ORIENTATION

"To me, what we're doing goes to the heart of what a liberal arts education is," Huyck said. "A liberal arts education is about not the specifics as much as having foundational skills and the attitude that you can make a difference."

Huyck, a retired National Park Service historian, is an ideal professor/mentor for the project. Last year, she taught a class on national parks and Monica Griffin, director of the Sharpe program, asked Huyck if she would be interested in doing a freshman seminar this year.

"I said 'twist my arm!' so she did. I really wanted to do a seminar that was very rigorous in terms of the students working on their communication skills and their analytical skills, so I push them hard on their reading and research and writing," Huyck said. "At the same time, I really wanted them to have an understanding that I don't think any of them had. They were mostly white kids from suburbia and through the readings, through visiting the sites—and most importantly, through some of the African Americans that they met—they came to have a very different understanding of what African American history is about and how you can't understand American history unless you fully understand African American history."

Maggie Walker was active in the First Baptist Church of Richmond and became involved in the Independent Order of St. Luke, a fraternal, mutual aid society whose aims included "to educate and assist its members in thrift." The Independent Order of St. Luke provided an established structure on which she could build, plying her entrepreneurial genius to fill needs denied to African Americans by law and/or custom—

continued on page 24

Sharpe seminar students Jennifer Benison (left) and Alison Ballard flank Klydie Thomas, museum curator at the National Park Service's Maggie Walker National Historic Site. The St. Luke Building was headquarters for Maggie Walker's numerous business enterprises, including St. Luke Penny Savings Bank, today called the Consolidated Bank and Trust Company—the oldest surviving African American bank in the U.S.

"The students came to have a very different understanding of what African American history is about and how you can't understand American history unless you fully understand African American history."

insurance, a bank, a newspaper—"the tools and institutions that helped people be middle class," Huyck explains. Maggie Walker established the *St. Luke Herald* in 1902 and chartered the St. Luke Penny Bank in 1903.

BUILDING COMMUNITY INFRASTRUCTURE

"Early on, Mrs. Walker could see the need for these kinds of institutions and she really took something that had already been there and made it much more than it had been," she said. "Her real gifts were for incredible organizing and for creating the kinds of institutions that white middle-class Americans take for granted."

Not every enterprise founded by Maggie Walker was a success. For instance, Huyck said the St. Luke Emporium on Broad Street failed for a simple, sad reason: white wholesalers refused to do business with it. But Walker's legacy is one of business success and community economic empowerment. An incredible woman in any context, she was not only the first African American woman bank president, but the nation's first female bank president of any race. She was one generation away from slavery, and a member of what Huyck describes as "that fortunate cohort of African Americans that got a high school education before that door closed again." Today, this daughter of a laundress would be called a "rainmaker," an entrepreneur who built up a collection of enterprises that enriched her community as much as it did herself. The center of operations is the St. Luke Building.

"The building that the seminar is focusing on was Mrs. Walker's bank, her insurance company, her printing office, her newspaper publishing and her regalia department where they made incredible sashes and other pieces that showed who you were in the order," Huyck explained.

EXPLORING CULTURE AND THE BUILDING

Members of the seminar have made several trips to Richmond, exploring the building and meeting with the building's owner and with people from the National Park Service. Huyck has held seminars in her home: "It's within walking distance so there's no excuse." She also conducted one session by conference call from her hospital bed after an emergency appendectomy. Readings and discussion address not only issues of historic preservation, but also African American history and culture.

"I asked two colleagues of mine, African Americans, one in her 40s and one in her late 70s to come and speak to the class. I held that class at my house because I wanted it to be as hospitable as possible," Huyck said. "Both of these women are extremely articulate. They were very frank—as I expected them to be—about the daily travails that they encounter as African American women even in this day and age. The students were really listening to those two women; they could hear Maggie Walker's life in a different way."

Preparing the National Historic Landmark nomination document was a heady challenge for a freshman seminar. "It's only 30 single-spaced pages but it's written almost like a legal document where every syllable counts," Huyck says. It's tough to make the grade, too. She said that 75,000 properties are on the National Register of Historic Places, compared to fewer than 2,500 on the more elite list of National Historic Landmarks. The seminar students got their draft application in on time and are working on revisions for a final submission in the fall. A lot of work, but earning a place on the list carries real value.

"The building then becomes eligible for grants. It also gets recognition and a certain amount of park service oversight for its condition," she said. "So getting the NHL status is a way of helping the building get more resources for preservation and more support for its interpretation."

Huyck will teach the seminar again in the fall, focusing on identifying uses for the building and raising its visibility. She brings to the nomination task considerable experience with the park service, plus more than eight years working for the House of Representatives subcommittee on national parks, but she stresses that she's just a "partner" in the task taken on by her seminar students.

"They are really getting first-hand experience in how these projects get started and the kind of intense work it takes to get them going," she said. "What I'm really trying to do is give them the skills through the freshman seminar, because I have experience in these kinds of projects. I'm trying to give them support and encouragement and trying to open my park service contacts to them."

TEACHING WITH RESEARCH—A MODEL

The Sharpe seminar centered around the St. Luke Building is a great model for incorporating research into humanities curricula, said Joel Schwartz, director of William & Mary's Roy R. Charles Center.

Schwartz was instrumental in securing a grant from the Mellon Foundation to help incorporate research experiences into the undergraduate curriculum. (See facing page.) The Charles Center, among other functions, coordinates undergraduate research opportunities and the College's interdisciplinary programs.

"Here is a case of what the students are learning on civil rights and race relations is all coming through a research project that they're doing. Rather than just reading history books on the period and biographies, they're actually doing their own original research," Schwartz said. "Like most schools, at William and Mary, the sciences have been out ahead of the social sciences and arts when it comes to incorporating students into labs. We hope to be able to do more of this, getting research integrated into the curricula of humanities and social sciences."

Look for even more student-faculty collaborations in the future

Classes and projects involving faculty-mentored undergraduate research—such as the one centering around the St. Luke Building—will become more common at William and Mary.

In September, the College began a new faculty-student research initiative, which has received important support from the Andrew W. Mellon Foundation in the form of a $300,000 grant. The new grant will enhance the College's ongoing commitment to faculty-student research, supporting initiatives that will more fully incorporate research into the undergraduate curriculum from freshman through senior year.

Joel Schwartz, director of the College's Roy R. Charles Center, which facilitates William & Mary's honors program and promotes undergraduate research and scholarship, cited Heather Huyck's Sharpe seminar as a model class for the kind of "learning through research, inquiry and creative activity" that the initiative will promote.

"Our plan is to integrate the teaching and research missions of William and Mary, so they're not competing, but so that they're cooperating with each other and that both are winning as a result of this collaboration," said Schwartz. "The underlying logic is to find ways to bring research into the curriculum so that it will have a structural impact on how we interact with students, so that even more students will be involved with research."

The undergraduate experience at William and Mary already holds many opportunities for research, said Carl Strikwerda, dean of arts and sciences. "Mellon Foundation support will allow us to begin a systematic incorporation of faculty-mentored research into curricular offerings," he said. "We want research to be a part of each student's William and Mary education—beginning in the freshman year as often as possible." This effort will be supported by a full-time undergraduate research coordinator, a new position made possible by the Mellon grant.

William and Mary has received previous support for undergraduate research from the Mellon Foundation as well as from a number of additional sources, such as the National Science Foundation, the Howard Hughes Medical Institute and individual donors. Previous Mellon funding has made possible the Mellon Teaching Fellows Program, in which faculty introduce group research projects into large mid-level courses, with the assistance of experienced upper-level honors students who serve as peer-mentors and project coordinators. The foundation has also provided significant support for the College's highly regarded Environmental Science and Policy Program.

The strategy is to build research into the curriculum along two dimensions. A temporal dimension will address undergraduate research as an activity that will unfold from the freshman to the senior year, Schwartz said. At the same time, a scale, or size dimension will establish curricular structures ranging from single-course ventures to initiatives that include several faculty—and often several departments.

"The College, long bearing the standard for the integration of exceptional research and teaching, is elated to have the Mellon Foundation's support," William and Mary President Gene Nichol said. "We're very grateful to be able to take another hard look—through our curriculum—at how our students and faculty can together advance the cause."

A private philanthropic institution with assets of approximately $5 billion, the Andrew W. Mellon Foundation makes grants on a selective basis to institutions of higher education, independent libraries, centers for advanced study, museums, art conservation and performing arts organizations.

> "The College, long bearing the standard for the integration of exceptional research and teaching, is elated to have the Mellon Foundation's support."

Stepping up...and staying up

BOV secretary finds supporting research to be fulfilling

By Joe McClain

Recipients of Matthews Summer Research Grants got together at a recent faculty reception. From left are Matthew Liebmann, Anne Harper Charity, Silvia Tandeciarz, Suzann Matthews and Elizabeth Harbron. Not pictured: Seth Aubin.

In 2002, when Suzann Matthews joined William and Mary's Board of Visitors, she got on board just in time for a big budget squeeze.

"Funding for the College was at sort of a low ebb," Matthews said. "The entire summer research grant program was eliminated. We also heard about how funding would affect every single department—how they would have to eliminate this course and that program, et cetera."

Matthews, a 1971 graduate of William and Mary, knew that young faculty typically are in a particularly vulnerable stage of their career, often struggling to raise money for travel, supplies or other support necessary to budding research projects. The College shares in the vulnerability, too: Promising, yet undersupported, young faculty are in danger of being wooed away to another school.

"All of us were very concerned about this, especially knowing what it meant to the younger faculty members and how much they wanted to stay here, but they just weren't able to do their work," Matthews said. "One night in the middle of the night, I was thinking. I looked at this amount of money and I said, 'Well someone should just be able to step up and take care of at least part of this problem, and then I thought: Oh my gosh, maybe that should be me!'"

And so a committee was formed to choose recipients for Suzann Wilson Matthews Summer Research Grants, a process in which Matthews herself does not get involved. "I leave the selection entirely up to the committee," she said. "I'm perfectly thrilled. I have absolute faith and trust in what they're doing."

Five years later, Suzann Matthews is secretary of the College's Board of Visitors and William and Mary is in fiscal circumstances that—while a long way from flush—could not legitimately be described as near the dire levels of 2002. She has continued her support of summer research, which she says she finds quite rewarding.

"It's incredibly rewarding to watch as the younger faculty's careers progress, and fascinating to learn about what they are doing," she said. "Their research is so cutting-edge that they keep William and Mary in the vanguard of many fields, either by adding to general knowledge of a subject or by making possible the practical applications of their work. And our students are also beneficiaries of the summer research program. Sometimes they are able to assist in the research directly—as many do. Other times they benefit indirectly, through the increased knowledge and experience the faculty bring back to the classroom in the fall."

One of the criteria for Matthews grants is that recipients should not be receiving significant funding from other sources. Occasionally a recipient has to withdraw from the program because he or she is notified that a grant request has been funded. It happened this year, when chemist Elizabeth Harbron withdrew after receiving a big award from the National Science Foundation.

"The Suzann Matthews summer program has made an immense difference to our faculty," said Dennis Manos, vice provost for research. "Suzann provides support for our faculty as they start to define their research programs, the most difficult time on the academic path. When people visit our campus, they are awed by the abundance of superb research programs involving so many students and faculty mentors. We recognize that many of these great teachers might not still be with us had it not been for generous givers like Suzann."

SETH AUBIN, PHYSICS

Ultra-Cold Atomic Physics Research

In the basement of Small Hall this summer, Seth Aubin will be setting up apparatus for producing very, very, very cold atoms. The idea is to observe matter when it stops behaving according to the dictates of classical physics—but matter only does that in extreme conditions, which Aubin will provide.

"At very low temperatures—about 100 nanoKelvin, that's about one billion times colder than room temperature or Antarctic temperatures—the quantum nature of matter becomes apparent," explains Aubin, assistant professor of physics. "This means that the wave nature of matter drives physical processes and matter behaves more like laser light than discrete atomic particles."

Ultra-cold atoms present a wide variety of applications. Aubin plans to create very accurate rotation sensors and atomic clocks, for instance. His work will also advance the understanding of the physics of new types of superfluid states, with potential applications to semiconductors. It also has potential to test aspects of theoretical physics, including aspects of string theory that predict that gravity between small objects behaves quite differently than the force we're used to.

ANNE HARPER CHARITY, ENGLISH

Assessing Teacher Evaluations of African American English

For many children, the language of their homes and neighborhoods is very different than the language of the school. Anne Charity is examining whether the speech patterns that students bring to school pose specific challenges to teachers in order to understand how language variation is perceived in school. Charity, assistant professor of English and linguistics and director of the College's linguistics lab, has developed an on-line survey where teachers can listen to sound files of children speaking and respond to questions about the child's social development and academic skills (https://helpuslisten.wm.edu). The second part of her work will be to design materials to aid teachers in more effectively helping children learn the language of the school in order to improve the student's overall academic success.

"I want to get a sense from teachers about how they understand the relationship between variation in spoken language and the process of learning to read and write," she said. "I am interested in the pedagogical challenges that arise due to differences in the home and school language."

ELIZABETH HARBRON, CHEMISTRY

Photocontrol of Conjugated Polymer Fluorescence in Photochromic Poly(p-phenylenevinylene) Derivatives

After receiving a $404,000 grant from the National Science Foundation in April, Elizabeth Harbron withdrew from participation in the program. You can read about her work on page 16.

MATTHEW LIEBMANN, ANTHROPOLOGY

Examining the Archaeology of the Pueblo Revolt in New Mexico, 1680-1696

In 1680, the Pueblo Indians of the American Southwest united in a rebellion that drove out Spanish colonists and missionaries, ushering in a 12-year period of independence. The 80-year pre-revolt colonial period is documented by journals kept by the Spanish, as is the time following the Spanish return to the area in the 1690s. Matthew Liebmann, assistant professor of anthropology, has been researching the dozen years in which the Pueblos were free of the colonial influences of the Spanish.

"We know that the leaders of the revolt told the Pueblos, 'We need to get rid of all the Spanish influence in our lives and go back to the way things were.' What I want to do is see how that attitude is or is not manifested in the architecture and ceramics of the time," Liebmann said.

In his initial research, he found examples in which Pueblo artisans revived archaic, pre-colonial elements of architecture and pottery designs, and other instances in which they created styles based in the past, but which were entirely new creations. This summer, he will visit another Pueblo site in New Mexico, combing steep scree slopes below the high mesas for pottery samples.

SILVIA TANDECIARZ, MODERN LANGUAGES AND LITERATURES

Theaters of Memory: Grandmothers of Plaza de Mayo and Teatroxlaidentidad

Among the victims of the "dirty war" perpetrated from 1976 to 1983 by Argentina's military dictatorship are the hundreds of babies taken away from their birth parents and often raised by families of the very people who had imprisoned and tortured their parents.

"These were babies born in captivity or babies taken from homes that were ransacked by the military when they were looking for so-called subversives," Silvia Tandeciarz explains. "Because they were children, they have no memory of their biological parents or their history, so the process of recovery is all the harder. The *abuelas* are an organization that was formed in order to recover those children lost during the dictatorship."

The *abuelas* are the Grandmothers of the Plaza de Mayo, who have put together a theater for identity, or *teatroxlaidentidad*—one of a number of grass-roots "cultural interventions" countering the official government treatment of the "dirty war" period. Theatrical works commissioned by the *abuelas* address Argentines aged 24 to 30 and ask: Do you know who you are?

The work with the Grandmothers of Plaza de Mayo is one piece of Tandeciarz's larger book project, *Citizens of Memory*, addressing how the history of the dictatorship years is being reconfigured in the collective imagination of today's Argentina.

PAST MATTHEWS SUMMER GRANT RECIPIENTS

2004

JULIA BRYAN
School of Education

REGINA ROOT
Department of Modern Languages and Literatures

M. LYNN WEISS
Department of English

2005

CHRISTOPHER DEL NEGRO
Department of Applied Science

ANDREW FISHER
Department of History

REGINA ROOT
Department of Modern Languages and Literatures

2006

FRANCIE CATE-ARRIES
Department of Modern Languages and Literatures

CHRISTOPHER DEL NEGRO
Department of Applied Science

JOHN EISELE
Department of Modern Languages and Literatures

ALAN GOLDMAN
Department of Philosophy

BEFORE THE BEGINNING

Barbara King is anxious about being misunderstood.

King is the author of the book *Evolving God, A Provocative View on the Origins of Religion*. In the weeks surrounding its mid-January release, King was featured on National Public Radio shows, in *Salon* and other media. The book explores evidence of behaviors among extinct hominids and modern living apes that King says are the root of what eventually became religious practice.

She is anxious that *Evolving God* not be taken as an attempt to discredit religion. Today's religious practitioners seem to understand.

"I get lots and lots of enthusiastic correspondence from pastors and mentions in church sermons," King said.

To properly understand evolutionary thought, you have to be wary of generalizing and to be aware of distinctions. Some of the distinctions are small, if vital. For instance, there's a "rule of tail" separating apes from monkeys. (Generally, monkeys have tails; apes don't.) And King is adamant that while certain behaviors among chimpanzees may superficially resemble human religious acts, chimps are not religious.

"Could you even call it proto-religious?," she echoed in an interview. "Well, no! I'm going to reject the premise of that question. What chimps do is chimplike and I embrace the chimpness of it all, but for a scientist it's a big mistake to project human feelings onto what these chimps are doing."

Maybe most important among the distinctions to King—for she sometimes writes it in large letters on the blackboard on the first day of class—is a basic fact of life involving our relationship to other primates: WE DID NOT EVOLVE FROM THE APES. Apes and humans, rather, share a common ancestor.

In the genesis of religion, a concept King refers to as "belongingness" serves as the equivalent of eohippus or the hominid fossil "Lucy." The need for belongingness, she writes, is "a fundamental characteristic of all primates." *Evolving God* draws on King's extensive experience observing the social dynamic of primate groups in the wild and in zoos.

"I am convinced that apes are highly sensitive and tuned in to one another, starting with infancy, when a baby starts to negotiate with its mother about its needs," she writes. Many passages about adult-child interaction contain references to King's own experiences as a mother.

Barbara King: Belongingness is the key

From belongingness stem what King refers to as "early precursors to religion": empathy, meaning-making, rule-following and imagination. She cites observed examples among ape groups and evidence of such precursors in sites associated with hominids and Neanderthals.

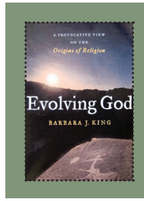
One intriguing artifact discussed in *Evolving God* is a piece of jasperite known as the Makapansgat cobble. Found in a South African cave known to have been used by australopithecine hominids millions of years ago, the stone bears natural marks that resemble a face, or rather two faces.

"Look one way and a modern face is clearly visible," King writes. "Turn the cobble around, and the face that appears looks, at least to modern eyes, very much like that of an ancient hominid."

She says the cobble was likely carried into the cave by hominids, although she is careful to note alternative explanations for its presence. "It is probable that the Makapansgat hominids would have recognized the face-like features in the cobble," she writes, "and might have been intrigued enough to collect, and even curate, the cobble as a result."

If hominids did indeed collect the Makapansgat cobble, she said, it could represent a sense of self-awareness and meaning-making, but she is unwilling to go as far as some of her colleagues who suggest the stone represents evidence of early-hominid spirituality.

For King, the "tipping point" of spiritual and religious development is found in Neanderthal burial sites. To enter the world of the species King calls "arguably the most fascinating hominids of all" is to enter a world clearly containing symbolism and ritual.



Evolving God, A Provocative View on the Origins of Religion

BARBARA KING
Doubleday

"When Neanderthals and Homo sapiens are co-existing in the world, they both are involved in burial of the dead, but the Neanderthals—just as much as our own species—are doing this with apparent emotion," King said. "There is evidence of grave goods, grave markers, ceremonies at the grave site. You just don't see it among australopithecines or early Homo species."

King says that the evidence of the care that went into Neanderthal burial sites very likely represents a spiritual component of Neanderthal life. Her William and Mary undergraduates, she says, often challenge her on the point.

"My students ask me some very good questions," she said. "They ask 'couldn't it just be hygienic?', a way to deal with the dead body and all its germs. Or 'couldn't it be to avoid predators?' " Her response: "You need a grave for that, but you don't need bones arranged very carefully in the grave, a fire over the grave, marked antlers on top of the grave."

—Joe McClain

THE GRAMMAR OF INK, BRANDS AND SCARS

Identifying Marks: Race, Gender, and the Marked Body in Nineteenth-Century America

JENNIFER PUTZI
University of Georgia Press

Melville describes the arm of Queequeg as "tattooed all over with an interminable Cretan labyrinth of a figure." Ishmael's harpooner buddy from *Moby Dick* may have the most famous tats in 19th-Century American literature, but he doesn't have the market cornered on body modification. Far from it. Putzi looks at marked men and women in classics and lesser-known works, exploring how tattoos, scars and brands alternately serve as stigma and as emblems of healing and survival.

Jennifer Putzi is an assistant professor in the English department. She specializes in Nineteenth-century American literature, women writers and American silent film.

THE NUNS ARE ALL RIGHT

Habits of Compassion: Irish-Catholic Nuns and the Origins of the Welfare System

MAUREEN FITZGERALD
University of Illinois Press

In the early 20th Century, the poor of New York City—especially women—had a hard lot, but at least they had the Irish Catholic sisters on their side. Members of the protestant majority had their own idea of charity, often larded with blame and condemnation. Fitzgerald's book documents how the nuns championed the rights of the poor and disenfranchised while laying the groundwork for what eventually became a comprehensive set of government-supported social programs by marshalling New York's Irish political structure. (Tammany Hall probably never knew what hit it.) The book is part of the Women in American History series.

Maureen Fitzgerald is assistant professor of religious studies and American studies. She is currently researching and writing on the historical process of secularization in 20th Century America.

BANGS AND WHIMPERS

Background Radiation

HENRY HART
Salt Publishing

Background radiation, the legacy of the Big Bang, is all around us and always has been. This aptly titled collection of poems deals with events from our history and our natural world that shape our everyday life even though they're not necessarily part of our immediate day-to-day experience. For example, you needn't be a Manhattanite to fully appreciate the imagery of New York losing its two front teeth.

Henry Hart is the Mildred and J.B. Hickman Professor of Humanities. This is his third book of poetry.

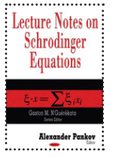
UNCLE SAM WANTS YOU— TO BUY STUFF

Sold American: Consumption and Citizenship, 1890-1945

CHARLES McGOVERN
The University of North Carolina Press

At some point in our history Americans changed from being a nation of citizens to become a nation of consumers. McGovern shows us how it happened through the vectoring of the forces exerted by the seemingly disparate forces of advertising and consumer advocacy. The admen set up a consumption-based American dream while the consumer advocates warned us to be skeptical and not to be taken for a ride.

Charles McGovern is an associate professor of history and American studies. His interests include 20th-Century popular culture; popular music and the culture of American capitalism.



PANKOV ON SCHRÖDINGER

Lecture Notes on Schrödinger Equations

ALEXANDER PANKOV
Nova Publishers

This volume in the Contemporary Mathematical Studies series starts, appropriately, with "a bit of quantum mechanics" and works its way up through the Hilbert-Schmidt theorem and perturbation theory before examination of one-dimensional, multidimensional and periodic Schrödinger operators and a look at the nonlinear Schrödinger equation. In an episode of *The Sopranos*, a scientist talked about Schrödinger equations with Tony; this book goes into more depth.

Alexander Pankov is a visiting professor of mathematics. His specializations include partial differential equations, mathematical physics, nonlinear analysis and calculus of variations.

All book vignettes by Joe McClain

AWARDS

JOHN HENRY HAMMERS HOME TRIO OF PRIZES

Scott R. Nelson's book, *Steel Drivin' Man: John Henry, the Untold Story of an American Legend* was awarded three significant book prizes this year.

"It's thrilling to get prizes in black literature, in music and in American history all for the same book," said Nelson, Leslie and Naomi Legum Associate Professor of History at William and Mary. "It feels a little bit like cheating. The people on the prize committees are huge names in their fields; it's truly an honor to be recognized by them."

For decades historians have argued whether the story of the American legend John Henry was based on truth. While collective wisdom of recent times said no, Nelson found evidence in Virginia penitentiary documents that pointed to yes. Tenaciously he connected the dots. His research cumulated in *Steel Drivin' Man*.

In March, Nelson received the Organization of American Historians' (OAH) Merle Curti Award for the best book published in American social/cultural history. In awarding the prize, the OAH said of the book, "Elegant, accessible, and engaging, *Steel Drivin' Man* reveals the archaeological process of historical research and history writing, compelling readers to understand how all of us come to understand the past."

He also received the inaugural National Award for Arts Writing, awarded by the Arts Club of Washington. The $15,000 prize is in recognition of excellence in writing about the arts for a broad audience. Describing Nelson as "a master storyteller," the judges call the book, "engaging and utterly charming."

The Anisfield Wolf Book Award will be presented this year at a ceremony in Ohio and carries a $10,000 prize. The awards were created in 1935 by Cleveland poet and philanthropist Edith Anisfield Wolf. She designed the awards for books that expose racism or explore the richness of human diversity. The awards are endowed through a fund at the Cleveland Foundation.

—Suzanne Seurattan

Beckman Scholar Program supports undergrads' passion for scientific research

That can't-keep-them-out-of-the-lab quality

When Margaret Saha met Arnold Beckman, he was nearly 100 years old, but he still had a spark in his eye.

By Erin Zagursky

It's the same spark she sees in the students whom his program benefits. It's a passion for scientific research and for excellence.

The Beckman Scholars Program supports undergraduate research students in chemistry, biochemistry and the biological and medical sciences at select institutions throughout the country.

At the time of the program's inception in 1997, William and Mary was one of only 20 four-year institutions to receive the award. Since 1998, the College has received the award four times—something that only four other universities (California State, Carnegie Mellon, Hope College and San Francisco State) have achieved.

"I think we're a natural fit for the program because the goals of the Beckman Scholars Program and the goals of William and Mary really dovetail completely," said Saha, a professor of biology at the College. She also is director of the Howard Hughes Medical Institute Undergraduate Science Education Program at William and Mary, which offers research fellowships and grants to undergraduate biology students. Programs such as the Beckman scholars and the HHMI Undergraduate Science Education Program are particularly important at William and Mary, which offers masters degrees—but not the Ph.D.—in biology and chemistry.

INSTITUTIONAL HONOR

It's an honor for an institution to be selected for a Beckman Scholars Program. Saha, who was chairperson of the Beckman Scholars Program Advisory Board last year, said that "excellence" is a key word when considering which schools would receive the awards. She likes to quote founder Arnold Beckman as saying, "There is no satisfactory substitute for excellence."

Scholars participate in the Beckman Scholars Annual Symposium and work under the close supervision of a faculty mentor from the applied science, biology or chemistry departments. Since the start of the program, a dozen College students have completed the Beckman Scholars Program, and five more are receiving scholarships from the 2006 award. Saha said students who are picked to be Beckman scholars must possess something more than a high GPA.

"They have to be very strong academically, but in addition to that, they must have a very strong, passionate interest in research, in pursuing a research career, and that natural curiosity—that can't-keep-them-out-of-the-lab quality," she said. "The students who would be doing this no matter what—that's the kind we are taking. If they didn't get the Beckman, they would still be doing it."

RARE ENVIRONMENT

Edith Bowers, a member of the class of 2003, was a 2001-2002 Beckman scholar who worked with chemistry professor Deborah Bebout on a research project entitled "Development of New Techniques for Studying Protein Structure and Folding."

"William and Mary is uniquely positioned to train young scientists since we are a primarily undergraduate institution," said Bowers. "I think we attract faculty that are much more interested in teaching young students and undergrads than necessarily having the most prestigious research publications—I just feel like the goal is really to train undergraduates. It's really a rare environment."

Vijay Dondeti worked with Saha as a 2003-2004 Beckman Scholar to study neural differentiation and plasticity in the African clawed frog using microarrays.

"The most important thing I got out of being a Beckman Scholar is seeing first-hand how research and science really work," the 2004 graduate said. "Experiments are not as easy as described in textbooks. They take a long time to do and require a lot of planning and even then things can go wrong. In spite of this, I find that I enjoy research even more than I could have imagined. The moments at which you get the actual results, after week-long experiments, make the effort really worthwhile."

Beyond the research experience, the program also provides networking opportunities for participants.

"The Beckman Scholars Program is really pretty special because I wasn't just part of a select group at William and Mary. I really became part of this larger Beckman scholar community," Bowers said. "It was a wonderful opportunity to talk to other undergraduate research students and see not only what they are doing now but what they plan on doing with the rest of their lives and careers. So it was really useful in my personal career development to be part of that group."

The annual symposium that the scholars attend provides the perfect opportunity for students to share their ideas and be inspired by the impressive lineup of speakers, often including Nobel laureates, Saha said.

"This was an amazing opportunity for me to interact with other students and faculty from all over the country. And also, I got a chance to personally interact with great scientists from leading institutions," Dondeti said.

For Bowers, the symposium also provided a unique opportunity to push herself by giving a scholarly presentation.

"I think I am naturally kind of a shy person and I sometimes have difficulty in speaking up and putting forth ideas ... and that experience, which was very intimidating at the time, has made it really easier for me giving research presentations now," she said.

Bowers is currently a graduate student at Duke University working to earn a Ph.D. in pathology and working in the lab of Salvatore Pizzo. She said her Beckman experience gave her an understanding of the dedication required of researchers and the frustrations that are part of the profession.

"Sometimes things aren't always going to work out and you can spend weeks or months in a direction that just doesn't work. Understanding the frustration and the work involved really prepared me for the Ph.D. program," she said. "I think it also helped me make the decision to pursue research in the future. A lot of people leave Ph.D. programs because I don't think they knew what they were getting into and once they get there, they realize that's not something they want to do. Whereas that long-term research experience really helped me feel confident that this is something I could do and this was indeed something that I wanted to do."

Photo by Tim Jones

Vijay Dondeti (right) works in the lab with professor Margaret Saha during his time as a 2003-04 Beckman scholar. While at William and Mary, Dondeti published his first paper as a first author. He is now in a Ph.D. program at the University of Pennsylvania.

Dondeti is currently a graduate student at the University of Pennsylvania working on a Ph.D. in the cell growth and cancer group with Dr. M. Celeste Simon. Like Bowers, he said his experience in the Beckman Scholars Program was invaluable to his current academic pursuits.

TEAMWORK

"I really got to see what research was like—the hard work involved and how long it takes to get results. I clearly saw how teamwork-oriented it is. Any successful project requires a group effort to get all the parts right," he said. "I also learned how important it was to be able to communicate the results of a project to the scientific community through the publication process. As an undergraduate, I got my first first-author publication. I had to learn how to write scientific papers. All of these skills have prepared me very well for my graduate research."

The community also benefits from the program as the scholars are required to complete an appropriate service or volunteer experience. Katherine Fisher,'06, a 2005-2006 Beckman scholar at the College, served as a mentor and teacher with the College's Science Training and Research (STAR) Program.

"During both of my summers as a Beckman scholar, I was able to present my research to students in STAR, a program for disadvantaged teenagers, as well as interact directly with them in the laboratory and introduce them to hands-on science experiments," she wrote in her stewardship report to the Beckman foundation. "I consistently strived to serve as a teacher and mentor to the younger students in the lab. I was assigned as the mentor to one younger student in particular, and I have taken great pride in helping her develop her own independent research techniques and problem-solving skills."

Saha said the service aspect of the program is vital. "I think it's really important now for scientists to reach out. Among the public, there's so much lack of information, misinformation about what scientists do, how we do it, what our goals are, that we really need to educate the broader public, but also I think it's very important that we give back so that it's a continuous circle," said Saha.

BEING BECKMAN

How do you get to be a Beckman Scholar? First your college is chosen—then you are.

After William and Mary receives a Beckman Scholar Program institutional award, between one and five students from the biology, chemistry and applied science departments are chosen by a faculty committee to participate. If you are chosen, you'll receive scholarship support for two summers of undergraduate research, plus free college housing and a one-year academic research scholarship. You'll also receive up to $3,300 over the life of the award to cover travel expenses and research supplies.

The 2006 Beckman Award will benefit five students at the College over a three-year span. The most recent Beckman scholars are 2007 graduates Maria Happel (chemistry) and Natalia Golub (biology).

By Lillian Kelly Stevens

THREE WIN YEAR-LONG NEH FELLOWSHIPS

Three William and Mary faculty members have secured prestigious year-long fellowships from the National Endowment for the Humanities (NEH).

NEH fellowships support individuals pursuing advanced research that contributes to scholarly knowledge or to the general public's understanding of the humanities. Recipients usually produce scholarly articles, monographs on specialized subjects, books on broad topics, archaeological site reports, translations, editions or other scholarly tools. Full-term NEH fellowships carry a stipend of $40,000 and allow recipients to take time off from teaching and other faculty duties in order to work full time on their research projects.


courtesy S. Zandi-Sayek

Sibel Zandi-Sayek

TURKISH URBAN TRANSFORMATION

Sibel Zandi-Sayek, assistant professor of art and art history, will use her fellowship to finalize her book *A World in Flux: The Politics of Space in 19th-Century Izmir.*

A World in Flux is about 19th-Century Izmir/Smyrna (in present-day Turkey) and the difficult processes by which this cosmopolitan Mediterranean seaport was transformed between the 1830s and the 1880s in the context of Ottoman modernization reforms and European capitalist expansion.

As an architectural and urban historian, Zandi-Sayek explains that her focus is on the built environment both as a site and a means for larger power struggles. She studies specific conflicts over the reorganization of physical space, such as the provision of modern infrastructure, the registration/taxation of urban property, and the uses of and right to the streets and public spaces.

"On the whole," she says, "*A World in Flux* will show how urban space was an indispensable tool used by various competing interest groups to promote their visions and priorities."

Alan Goldman

EXPLORING HUMEAN HUMAN MOTIVATIONS

Alan Goldman, William R. Kenan, Jr., Professor of Humanities and professor of philosophy, will spend a year supplementing and reorganizing his writings into a book titled *Reasons from Within: Motivation and Practical Reasons.*

Having won a summer grant a couple of years ago (which he used to write and publish the book *Aesthetic Value*), this is Goldman's second NEH award. Goldman will produce a book that will defend a Humean internalist view of practical reasoning and practical reasons.

"Eighteenth-century Scottish philosopher David Hume believed that reason was—and should be—the slave of the passions," says Goldman. "This account holds that the reasons we have for acting in various ways are determined and limited by the motivations we have. These motivations include not only specific desires, but broader and deeper concerns and values that underlie specific desires."

Goldman hopes that this book should be of interest to non-philosophers as well as philosophers interested in practical reason and he believes that it will provide a healthy antidote to the quasi-religious quest for objective values and reasons in recent analytically oriented philosophy.

Carl Lounsbury

ECCLESIASTICAL ARCHITECTURE

Carl Lounsbury is a visiting associate professor in the Lyon G. Tyler Department of History. He is also a member of the Architectural Research Department at the Colonial Williamsburg Foundation.

After teaching a summer field school, Professor Lounsbury will use his year to focus on his book, *Early American Churches and Meeting Houses.* "This is," he says, "my opportunity to pull together about two decades of research. For the past 20 years I've traveled up and down the eastern seaboard looking at churches and meeting houses roughly dating from the late Seventeenth Century through the very early Nineteenth Century and during that period I've probably been in about 400 buildings from Maine to Georgia."

A scholarly work based on primary research, Lounsbury also envisions color images and drawings which will set forth the history of the architecture of ecclesiastic buildings in early America. He hopes to put American buildings into context of European buildings and has conducted research into English, Dutch and German churches.

A footnote on W&M grants workshops: "The workshops that were held at William and Mary for faculty grants were of great value," says Zandi-Sayek. "I would encourage my colleagues to participate in them."

Outside the lines

Continued from page 15

the first to move beyond examining the hypothetical choices people make in a fictional setting and examine their real choices in an actual setting and examine a whole set of variables beyond race and racial composition," said Saporito.

The William and Mary researchers are currently laying the groundwork to expand the work started by Saporito in Philadelphia by examining millions of individual choices in the nation's largest school districts.

Although the new research project will be labor-intensive, the researchers find satisfaction in what they already have been able to achieve.

"We feel like what we were doing is going to be cited, and whether it's intuitive or not, you need the research to back it up and say this is what's really happening, and now we have that," McQuiddy said.

Like McQuiddy, student researcher Amin Vafa, '06, is proud to have a hand in work that might influence future decisions on school choice programs. "I thought these programs, like the voucher program, were put into place so that people could get the best education that they could and we found the exact opposite conclusions," he said. "So, I was really excited that some policy decisions can be hopefully based on our research conclusions because it shows that these inner-city schools need more attention and money and that parents' and individuals' choices have such influence over the characteristics of these schools."

Chemical choreographer

Continued from page 18

before graduation. Both were co-authors with Harbron on papers in peer-reviewed journals. Both are chemistry majors and both are going to medical school, Matthew at Ohio State and Deana at the University of Virginia.

"When you interview for medical school, they love to hear that you've been published. They eat that up," Deana said. Neither found it odd to be headed for med school after being so deeply involved in Harbron's conjugated polymer lab.

"Doing research is an experience in itself," Matthew said. "It's about understanding how science works—how to do an experiment, how to interpret results."

"Here at William and Mary, it's a lot easier to be published as an undergrad because we don't have a whole lot of graduate programs," Deana said. "I've never been lead author though. I've always been listed behind Professor Harbron—but ahead of Matt."

BAD BOY

Continued from page 19

correspondence, which had never been published before, the two write in code and role-play as schoolboys interested in masochism.

"It's very curious correspondence," said Meyers. "It's interesting to see these letters that were exchanged when they are both very, very mature and had reopened this old love relationship. It's a curious, intriguing psychological exploration."

He sent in the final proofs for his collection 19 years after beginning the project. After it was published in 2005, it received critical acclaim for its rich new letters and informative annotations. One reviewer remarked that the work confirmed Meyers's status "as the leading biographical expert on Swinburne."

Meyers still works on the collection, using a Web site for addenda, corrigenda and errata. Additionally, he is currently working on an edition of several notebooks of unpublished poetry by Swinburne and hopes to work as co-editor of the first scholarly edition of Swinburne's poems, a project he started 30 years ago but had to abandon because of the pre-Internet difficulty of communicating with his co-editor in England.

Meyers hopes that all of these years of research and work will result in increased recognition for Swinburne.

"He's just a fascinating character, so I've had a lot of fun with him. I've met a lot of interesting people, gone to interesting places, and I'm still having fun. What's been frustrating to some extent is that he's still not regarded as a great writer and I think he is," said Meyers. "He's a figure whose accomplishment has been belittled because of his politics and his amorality and his free thinking. Even today, he's controversial. It's been a little frustrating to not see his stock rise as I think it should. I hope that before I die I can see Swinburne get some more of the recognition he deserves."

beginnings

Continued from page 37

and Technology Forum. Designers, makers, testers and users of sensors and related technology, with a leaven of folks representing government and capital gathered together on the theme of Measuring and Protecting our Environment. The sessions included presentations from several faculty members at VIMS.

VIRGINIA IS THE RIGHT PLACE

Roger Mann, the director of research and advisory services at VIMS, gave the keynote address, "Why Virginia? Why Now?: The Right Place for Emerging Sensor Technologies." Mann told the sensor forum that Virginia, and Hampton Roads in particular, is at the center of a cluster of emerging issues and conditions that include burgeoning residential and commercial development, water resources and global warming. "We're going to have a boom economy," Mann said. "And what's driving it all—water?"

New and larger locks in the Panama Canal will increase the importance of ports in the eastern United States, he said. "Hampton Roads is going to be an increasingly important economic hub," he said. "It may be a really stupid place for an economic hub, but we have to take care of what we have. One of the many things your sensors will do is to protect this economic hub."

Wallach honored for teaching art history

Alan Wallach, the Ralph H. Wark Professor of Art and Art History and professor of American studies at William and Mary, received the 2006 Distinguished Teaching of Art History Award from the College Art Association.

The award is given annually to individuals who are noted for their influence as scholars and their dedicated work with students.

Wallach is the first professor from William and Mary to receive this award in its 29-year history. He shares it this year with Wanda Corn of Stanford University. The award was conferred on the two professors at the CAA's annual meeting in February, 2007.

When notified of his winning the honor, Wallach said he felt as if he had hit the jackpot. "There is no award, no form of recognition, I would rather have," he said.

Wallach is cited for the far-reaching significance of his publications, including "The Museum of Modern Art as Late Capitalist Ritual," "The Universal Survey Museum" and "Making a Picture of the View from Mount Holyoke." Wallach was also co-editor with William Truettner of the exhibition catalog *Thomas Cole: Landscape into History* (Yale University Press, 1994) for which he wrote the principal essay, and he is the author of "Exhibiting Contradiction: Essays on the Art Museum in the United States" (University of Massachusetts Press, 1998). "My aim has always been to put history back into the history of art—a field that has at times tended to consider works of art apart from their historical contexts," Wallach said.

Beyond his scholarly achievements, the award also cites Wallach for his teaching abilities.

"I am not interested in students memorizing dozens or hundreds of works of art but in learning to think critically about the history of art through close scrutiny of a limited number of works. Dialogue is essential," said Wallach. "Although the work of art may be a given, we all see differently. Sharing with each other what we see and know, we begin to learn."

The CAA is a member of the American Council of Learned Societies and is the professional organization for art historians and artists, with 13,000 individual and 2,000 institutional members.

—Erin Zagursky

VIMS researcher Deborah Steinberg (left) discusses her research with William and Mary Chancellor Sandra Day O'Connor during the chancellor's spring tour of VIMS facilities.

Eddies fuel mystery ocean blooms

Researchers from the College's Virginia Institute of Marine Science were members of a team that helped to solve the mystery of how vast blooms of microscopic plant life form in the middle of otherwise barren mid-ocean regions.

An article in a May 2007, issue of *Science* outlined the group's discovery that episodic, swirling current systems known as eddies pump nutrients up from the deep ocean to fuel such blooms.

The EDDIES project, a multi-year study of eddies in the Atlantic Ocean, was led by Dennis McGillicuddy of the Woods Hole Oceanographic Institution (WHOI), and includes VIMS Associate Professor Deborah Steinberg, post-doctoral researcher Sarah Goldthwait, graduate student Bethany Eden and research technician Joe Cope.

They found that ocean productivity was surprisingly high when stirred by mid-ocean eddies. These huge swirls of water were teeming with diatoms (a type of phytoplankton) in concentrations 10,000 to 100,000 times the norm—among the highest ever observed in the Sargasso Sea, an otherwise barren mid-ocean region south of Bermuda.

"Eddies have a dramatic ripple effect on the open-ocean food web," Steinberg said. Her team found up to three times as much zooplankton within eddies as they did in surrounding waters.

—from reports by Stephanie Murphy/WHOI and David Malmquist/VIMS

Griffioen is elected APS Fellow

Keith Griffioen, professor and chair of William and Mary's physics department, has been elected a Fellow of the American Physical Society (APS). Fellowship is a distinction awarded each year to no more than half of one percent of the APS membership.

A particle physicist, Griffioen was nominated by the American Physical Society's Topical Group on Hadronic Physics. The nomination citation reads, "For definitive experimental studies of the spin structure of the proton and neutron, both in the perturbative, deep-inelastic regime, and in the non-perturbative resonance region."

Much of Griffioen's current research is conducted at the Jefferson Lab. He is active in the Go experiment, which is investigating the quark substructure of protons and neutrons, and the Q-weak project, a "new physics" initiative that aims to challenge predictions of the Standard Model.

Founded in 1899, the APS is the leading international organization for physicists. As part of its mission "to advance and diffuse the knowledge of physics," APS publishes a number of the leading physics journals.

2007 Goldwater scholars

Kelly Hallinger and Ashwin Rastogi, students at the College of William and Mary, have been named 2007-08 Goldwater scholars. They are among 317 U.S. sophomores and juniors recognized by the Barry M. Goldwater Scholarship and Excellence in Education Foundation.

The one- and two-year Goldwater scholarships will cover the cost of tuition, fees, books, and room and board up to a maximum of $7,500 per year. A third William and Mary student, Dan Zabransky, received an Honorable Mention from the Goldwater Foundation.

Kelly Hallinger (left) and Ashwin Rastogi

Kelly Hallinger is a sophomore biology major from Lancaster, Pa. She has been studying the effect of mercury contamination on the songs of birds of the Shenandoah Valley, working with Associate Professor Dan Cristol of the biology department. Kelly began research as a freshman at William and Mary, operating a mass spectrometer in the chemistry lab of Associate Professor J.C. Poutsma. Her career goal is to earn a Ph.D. in applied ornithology, then to teach at the university level and conduct research, with particular emphasis on conservation biology and ecotoxicology.

Ashwin Rastogi is a junior from Fairfax, Va. He is a junior math/physics major, working with Christopher Carone, Class of 1963 Associate Professor of Physics, on a project involving particle physics. The work is aimed at constructing a mathematical model for unifying two of the fundamental forces of nature: electromagnetism and the weak force. His goal is to get a Ph.D. in physics and to "conduct research that will make a meaningful contribution to the modern theories and understanding of physics at an academic institution."

Goldwater Scholars are selected from a national field of 1,110 mathematics, science and engineering students.

—Joe McClain

Virginia's healthiest community?

Poquoson is the healthiest community in Virginia, according to a study by the College's Schroeder Center for Healthcare Policy.

The top ten in the center's first ranking also contained Fairfax County, Loudoun County, Falls Church City, Arlington County, Powhatan County, Highland County, York County, Stafford County and Fauquier County.

Communities were evaluated on 14 types of risk factors and outcomes, such as prevalence of smoking, motor vehicle deaths, lack of health insurance, poverty, activity limitations and cancer deaths.

"We are continuing the analysis to understand whether some communities develop public policies that increase their capacity to be healthier," said Louis Rossiter, director of the Schroeder Center.

—Suzanne Seurattan

Center for Piezoelectrics by Design gets grant to fund new high-performance computer cluster

A $500,000 grant is buying a new computer cluster to study the qualities of piezoelectrics—materials that convert energy from one form to another.

The money will be used to install a high-performance computer cluster at the Center for Piezoelectrics by Design (CPD), a multi-institution collaborative based at William and Mary. Henry Krakauer, professor of physics at William and Mary, is director of the CPD. Krakauer's funding was part of a slate of $41.2 million in research-equipment grants announced by the U.S. Department of Defense under its Defense University Research Instrumentation Program.

Piezoelectrics are a common component in military applications, such as transducers for naval sonar systems, in which the piezoelectric properties of the materials convert sound waves into electricity and vice versa. There also are many civilian uses of piezoelectrics, including transducers for medical ultrasound, acousto-optic modulators in telecommunications lasers, sensors in automobile engines and auto-focus piezoelectric motors in cameras.

There are a vast number of alloys, ceramics and other materials that exhibit piezoelectric properties, but some work better than others in various applications. Traditional evaluation of piezoelectric materials has been based on time-consuming and inefficient trial and error processes, but the mission of the Center for Piezoelectrics by Design has been to develop highly efficient computational techniques of evaluating piezoelectric materials. Krakauer, and his co-workers, have received significant amounts of defense funding since 2001 to develop computational methods for designing advanced materials.

Science and math developed by CPD researchers and others are advanced enough to give researchers the ability to predict the performance of materials.

The recent $500,000 grant, awarded from the Office of Naval Research, will allow the CPD to install a specialized computer cluster to implement its testing methods. The new equipment will increase the CPD's computing power tenfold.

"We were delighted to hear the news from the Department of Defense," said Dennis Manos, William and Mary's vice provost for research. "The infrastructure for Henry's important work, which has generated almost $7 million in funding over the past five years for the College, will now be renewed and improved, so that he and his colleagues can press the boundaries of computation even farther."

Some of the immediate technological challenges being tackled at the CPD will result in increasing the performance, effectiveness and longevity of naval electronics. In addition to the technological advances, the CPD also produces many highly trained graduate students and postdoctoral researchers.

The Center for Piezoelectrics by Design is based at the Applied Research Center (ARC) in Newport News. Senior participants come from eight research universities, including William and Mary. The ARC, a seven-story, 122,000 square foot research facility, serves as the flagship laboratory incubator in a 200-acre research park. In addition to the CPD and other facilities associated with the College of William and Mary, the ARC houses the operations of four other universities, offices and laboratories of the Thomas Jefferson National Accelerator Facility, high-tech business start-ups, and high-tech business support services.

—Joe McClain

LAB & FIELD LIBRARY

Seeds sow ideas about Jamestown

Seeds four centuries old, found in a well at Jamestown, are sprouting new clues about the early days of the Jamestown Colony.

The seeds were mainly from food plants native to the area such as berries, cherries, persimmons and grapes. Most intriguing to archaeobotanist Steve Archer are the implications of three tobacco seeds, including one undamaged specimen dating to 1611, preserved by the wet, anaerobic conditions in the well.

Archer, an adjunct instructor in William and Mary's anthropology department, is employed by the Colonial Williamsburg Foundation. He said undamaged tobacco seeds are a comparatively rare find in archaeological digs and a determination of the species of the lone tobacco seed might reveal evidence of the initial American cultivation of what became Virginia's first profitable crop.

The wild native tobacco growing in Virginia, Archer said, is *Nicotiana rustica*, a variety with a much higher nicotine content than the *Nicotiana tabacum* strain, brought to the James River region from the West Indies by John Rolfe, the colonist who later married Pocahontas. The native *rustica* tobacco was valuable to the indigenous population, but was too strong and coarse to satisfy the growing cravings of the expanding European market. Rolfe's imported *tabacum* variety became not only the basis of his personal fortune, but also the basis of the viability of the Jamestown Colony.

"The question," Archer said, "is how well developed is the commercial production of the *tabacum* species in 1611?"

Archer took the tobacco seeds to William and Mary's Surface Characterization Lab at the Applied Research Center in Newport News where lab manager Amy Wilkerson and her team put the 1611 seed under their HIROX 3-D digital microscope to compare it with a known *tabacum* seed from the early 20th Century.

Surface characterization comparison proved inconclusive and Archer said that DNA testing may be next for the 1611 seed.

National Geographic magazine is funding the Jamestown archaeobotany study.

—Joe McClain

Chrisochoides awarded Guggenheim Fellowship

Nikos Chrisochoides was awarded the 2007 John Simon Guggenheim Memorial Foundation Fellowship in Medicine and Health, one of just two such awards given this year and William and Mary was the only U.S. university to receive the award in this field.

Chrisochoides, Alumni Memorial Distinguished Associate Professor of Computer Science, is also the only recipient from a Virginia college or university. Guggenheim fellows are appointed on the basis of distinguished achievement in the past and exceptional promise for future accomplishment. The 2007 fellowship winners include another 188 artists, scholars and scientists selected from almost 2,800 applicants from the U.S. and Canada.

Chrisochoides is working on geometric and numerical algorithms and software for image-guided neurosurgery, a therapeutic intervention in the treatment of brain tumors. Survival rate and quality of life for a patient greatly depend on the accuracy and precision of tumor resection, which can be significantly improved by utilizing pre-operative brain scans as an aid in decision making during the procedure. However, during the course of intervention the areas of interest may dislocate due to brain shift/deformation, and thus invalidate existing pre-operative brain images. Chrisochoides' group in the Parallel Experimental Systems Lab (PESLab) at William and Mary uses intra-operative MRI and many clusters of computers to track brain deformation.

"William and Mary is proud of the interdisciplinary research that our faculty do," commented Carl Strikwerda, dean of arts and sciences at the College. "Professor Chrisochoides is one of our distinguished scientists doing cutting edge research bringing together information science and medicine."

In November of 2005 Chrisochoides' group with their colleagues at Harvard Medical School were the first team of doctors and scientists to complete in real-time the alignment of pre- and intra-operative brain images using landmark tracking across the entire brain and present the results to neurosurgeons at BWH during the tumor resection procedure.

"This work would not be possible without the generous support from the National Science Foundation and more specifically without the vision, hard work and tenacity of Frederica Darema, senior science and technology advisor at NSF," said Chrisochoides, who has received more than $2 million in NSF funding over the seven years he has been at William and Mary.

"Progress made in this very difficult problem is a result of a large scale collaboration and involves a group of neurosurgeons lead by Dr. Peter Black and Dr. Alexandra Golby, a group of radiologists lead by Dr. Ron Kikinis and Dr. Simon Warfield at Brigham and Women's Hospital (BWH) in Boston, Mass, and an INRIA (Sophia-Antipolis), France team including Dr. Oliver Clatz and lead by Professor Nicholas Ayache – all part of a large interdisciplinary team put together during the last 14 years by Dr. Ferenc Jolesz and Dr. Ron Kikinis at Harvard Medical School," Chrisochoides said.

Nikos Chrisochoides

He added that "the Guggenheim fellowship will help us to set the foundation for the next steps which require, one, the use of the web and many supercomputers around the country to improve the accuracy of current results, two, widen the use of our work, through the web, from other hospitals in US and around the world, and three, train the next generation of researchers that can carry out a noble objective—better and more affordable health care for all."

"This fellowship means quite a lot to my research," said Chrisochoides. "The fellowship is in medicine and health, not computer science as one would expect, and it will open many more opportunities for our project." Chrisochoides added that he will use the Fellowship to establish a new Center for Real-Time Computing at William and Mary and design three new courses on Medical Image Analysis at the College. He also hopes to find time for writing the first book on parallel mesh generation. "Parallel mesh generation is critical for real-time medical image analysis," he added.

Chrisochoides is the fourth professor to receive the John Simon Guggenheim Memorial Foundation Fellowship while on faculty at the College of William and Mary. Past William and Mary fellows are Professors James Axtel (history), Barbara King (anthropology), and Talbot Taylor (English).

The foundation notes that since 1925 it has granted over $256 million in fellowships to more than 16,250 individuals. Fellowship decisions are based on recommendations from hundreds of expert advisors and are approved by the foundation's Board of Trustees.

—Suzanne Seurattan

Can Hampton Roads become the sensor capital of the known universe?

In the world of sensors, Bill Bean is a facilitator, a matchmaker, a quarterback. Above all, he is an "honest broker" trying to introduce people working on sensor technology in Hampton Roads to people who can use sensor technology—and to each other.

Bean is director of the Technology and Business Center at William and Mary and his sensor evangelism is just one part of his job.

"We are trying to make greater Hampton Roads become known as a sensor center," he said. He works with two groups to accomplish this goal—the Hampton Roads Technology Council (HRTC) and the Hampton Roads Research Partnership (HRRP). Each has a sensor component. Bean explains that the Sensor Science and Technology Forum, a branch of the Hampton Roads Technology Council, is "industry driven," while the Hampton Roads Research Partnership has a "university-centric" sensor cluster.

"As they both focus on sensors and related activity, they share a lot of commonality but they are separate programs," Bean explains. "Because I manage both of them I try to leverage them together simply because of available hours in a day."

FOUR AREAS OF TECHNOLOGY

The sensors cluster is one of four areas of technology identified as showing promise for academic development by the "university-centric" HRRP. Each cluster is based at a school. Atmospheric science is centered at Hampton University, biomedical devices at Eastern Virginia Medical School and modeling and simulation at Old Dominion University.

"Although there's a huge amount being done by all of these universities—every single one does something with regard to sensors," Bean said. "There's none of them that really stand out as the 'sensor school'."

William and Mary, and Bean, became host of the sensor cluster, in large part because of the work being done with sensors by faculty at the College's Virginia Institute of Marine Science (VIMS).

Bean quickly developed a core group of sensor-savvy faculty members at William and Mary and other schools in Hampton Roads who were doing sensor-related research. He also put together a group of people from the corporate world ranging from giants like Northrop-Grumman to smaller business such as Pressure Systems in Virginia Beach. And then he put the two groups together, with the sensor cluster holding its first meeting in 2005.

"The meetings that we've had have been remarkable because the participants may have heard of each other. They are working on similar things and I see how they could collaborate on research for their common benefit or make a link with one of companies there," Bean said. The driving force behind the sensor cluster meetings, he added, is economic opportunity. There are challenges in bringing academic sensor researchers to meet with people in industry, or even with each other.

"A lot of these guys are highly siloed and most of them are on a tenure tract so they still have to publish and teach, but through this program, by bringing them together, you can begin to break down the silos," he said. "Silo dissolvers-R-us."

In early 2007, the Hampton Roads Research Partnership received a grant from the Economic Development Agency, an arm of the U.S. Department of Commerce. Bean's sensor cluster will share in the grant.

photo by Joe McClain

At a recent Sensor Science and Technology Forum, Rick Lally, chairman of the Hampton Roads Technology Council, watches Mark Patterson of VIMS set up Fetch, a sensor-laden submarine.

> "We've gone on the radar of a lot of people, because no one dreamed that William and Mary had anything to do with this stuff."

CROSS-POLLINATION

Bean's sensor components in the Hampton Roads Research Partnership and the Hampton Roads Technology Council benefit from a high degree of overlap and cross pollination. William and Mary benefits from Bean's activities as well.

"I don't think William and Mary had very much presence at all within certain segments of the technology community," he said. As a result of these programs the visibility that William and Mary receives as a leader in some of these technologies has gone way up in the community. We've gone on the radar of a lot of people, because no one dreamed that William and Mary had anything to do with this stuff."

Bean organized an early May symposium of the HRTC's Sensor Science

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