


ideation

SPRING 2008

RESEARCH & SCHOLARSHIP AT WILLIAM & MARY

A photograph of three women with brown hair, wearing dark blouses, holding large white puzzle pieces. The woman on the left wears glasses. The puzzle pieces they are holding form a large, irregular shape in the center of the image. The background is dark.

The
annuity
puzzle

(YOU
MAY BE A
PIECE OF
IT.)

plus:

TRAPPING EAGLES

THE MUSEUM IS A LAB

WHERE THE VILLAGES HAVE NO NAME

on marketing ...or something like it



I always try to assume an attentive, yet noncommittal, expression when someone first mentions the term “marketing.” It’s one of those words that has multiple meanings, so I’ve found it best to nod sagely until the other person introduces enough context to let me know whether they’re talking about focus groups or pitching stories to newspaper reporters or brand expansion or some other arcana entirely. “Marketing” is a term that embraces all of those activities and I like to stay mum until I’m sure that the conversation isn’t about selling fancy veggie slicers at the county fair.

The superfluity of meaning surrounding the term doesn’t seem to bother professional marketers very much, a fact well known to anyone whose dinner has been interrupted by a phone survey. On top of all that, marketing as an academic pursuit examines how and why we make important decisions. Our cover story “Rational Misbehavior” (page 2) shows the insidious results of even a very slight “slant” embedded in the presenta-

tion of information. The work involved a collaboration of a large group of people, with the core being an economics professor, a finance professor and, yes—a marketing professor. It should be required reading for anyone who uses money.

The research depicted in the story depended heavily on the involvement of William and Mary students and the peculiar culture of inquiry that has grown here. (I mean “peculiar” in a good way.) The heavy involvement in research of students, graduate as well as undergraduate, is itself a large component of this culture and I like to highlight it as often as possible. Quite often, a student will institute a project on his or her own and it becomes something spectacular, as in Roshan Patel’s work in the wilds of Kenya (page 6).

It’s always a treat to talk with someone from William and Mary’s Center for Conservation Biology (page 9). Their bald eagle trapping project is just one of the many downright cool things that they’re involved in.

Group interviews often present challenges, but it worked out all right when I sat down in the physics department with the three members of its High Energy Theory Group to talk about the Large Hadron Collider and the search for the Higgs boson (or something like it)—page 12.

Venture capitalist Dick Ash teaches entrepreneurship, and one of his entrepreneurial specialties is technology transfer, as related on page 14. He’s genial and avuncular, the kind of uncle who teaches nieces and nephews how to swim by lovingly tossing them into the deep end. (Spoiler: nobody drowns.)

Our own Muscarelle Museum just turned 25 and has grown into much more than a set of galleries for the viewing of art. See page 17.

We all know that the making of legislation, like the making of sausage, is something best not witnessed. But Larry Evans and a group of his students (page 20) are tracking the effects of political influence through scholarly examination of working documents known as whip counts.

As usual, there’s also the Books, Briefly section and Lab, Field and Library. Our Beginnings page details a student-faculty effort to get a biofuel plant going in a modest way, transmogrifying old restaurant fryer waste into fuel to heat a church and power College vehicles.

It was gratifying to receive responses from many readers supporting the continuation of a print *Ideation*. Your comments will be a lot of help as we plan for the future.

Thank you and I hope you enjoy the issue.

Joseph M. McClain
Editor

traditionally innovative

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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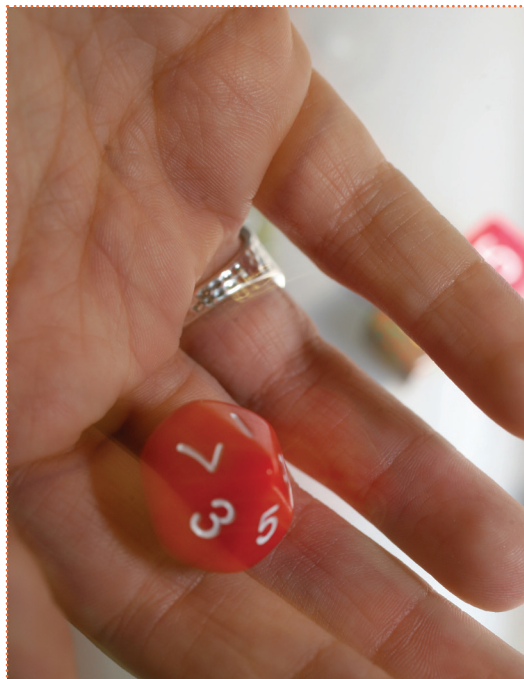
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What used to heat fries may soon warm churchgoers.

On the cover: Researchers (from left) Lisa Anderson, Julie Agnew and Lisa Szykman have been putting together pieces of the "annuity puzzle," a phenomenon in which people who say they want conservative investments end up making high-risk choices.

All photography in *Ideation* is by Stephen Salpukas, unless noted.

misbehavior^{rational}

by Erin Zagursky

Conservative investor with a high-risk portfolio?
You're a piece of the 'annuity puzzle.'

Ah, fixed lifetime annuities. They're the sure thing: A check every month until you die. No matter what the market is doing—bull, bear or pig in a tutu—you're going to get paid.

But investors face a myriad of other choices: including higher-risk investment vehicles that offer the *possibility* of higher payoffs. Because of their steady nature and their guarantee of payments until death, economists have expected that more people planning for retirement would choose annuities over higher-risk options. After all, in many cases, it's the rational choice.

That theoretical assumption of rational behavior by investors has long been demonstrated not to apply to real, live people when they make financial decisions for their retirement or other long-term goals. The question left on the minds of economists and finance experts is, "Why?" They've even given the phenomenon a name. They call it the "annuity puzzle." If perfectly normal people aren't basing their financial



Researchers (from left) Lisa Szykman, Lisa Anderson and Julie Agnew, whose respective specialties are marketing, economics and finance, have put together several pieces of the "annuity puzzle," showing that skewing a presentation can influence investors.

decisions on perfectly logical financial rationale, then what *is* influencing their behavior?

Researchers at the Mason School of Business and the faculty of Arts and Sciences at the College of William and Mary found that a few tweaks in a PowerPoint presentation can make all the difference in the choices a person makes when it's time to invest.

Applying the rational

Faculty members Julie Agnew, Lisa Anderson and Lisa Szykman and former faculty member Jeff Gerlach collaborated over the last two years to put together at least some of the pieces of the annuity puzzle. Funded by a \$250,000 Financial Investor Education Foundation grant and staffed by a group of dedicated William and Mary students, they designed an experiment to determine who chooses annuities and why.

"What we sought to do with our experiment was to control some of the rational reasons—like unfair pricing—why people wouldn't buy annuities," said Agnew, an assistant professor of economics and finance in the Mason School. "By getting get rid of all these rational reasons, we were able to focus on other reasons."

The researchers recruited about 1,200 people between the ages of 18 and 87 from the College's campus and from greater Williamsburg to participate in the experiment. The participants were grouped into six general categories: male and female retirees, male and female working adults (early-, middle- and late-career), and male and female students.

From the summer of 2006 through the spring of 2007, the researchers brought the participants to the College and ran them through the experiment. The participants were first quizzed to determine their financial literacy and risk preferences. Next, each participant sat through a narrated PowerPoint session presenting a set of investment options. The sessions were designed to be very similar to those familiar investment-choice presentations conducted in human resources departments and the offices of financial-planning firms across the country.

Thickening the plot

Now, here's the twist: the PowerPoint sessions weren't all the same. One session was scripted to show a preference towards annuities.

Another was biased toward other investments. The third was neutral. Each participant saw one of the three different presentations.

After sitting through the PowerPoint session, the fun began. Each participant was given \$60 cash American and played what the researchers titled the "Retirement Game." Players were asked to choose to either buy an annuity or to invest in a self-chosen portfolio with a risk-free asset and a simulated market. Once participants had made their decision, student researchers rolled a ten-sided die to determine how long participants "lived," that is, stayed in the game.

Participants who chose the annuity received \$16.77 for every round they survived, up to a maximum of six rounds. Those who selected the investment option had to choose how much to withdraw and allocate between the market and their risk-free asset. The allocations were made every round until the subject "died." The returns on the investments were determined every round with additional dice rolls.

Every round represented one month of real time, and participants were paid in post-dated checks. Most participants walked away with about \$50 in checks, and some made more than \$100. After the game ended, as the checks were being processed, the participants took an 11-page survey to collect information on demographic traits and real-life investment choices.

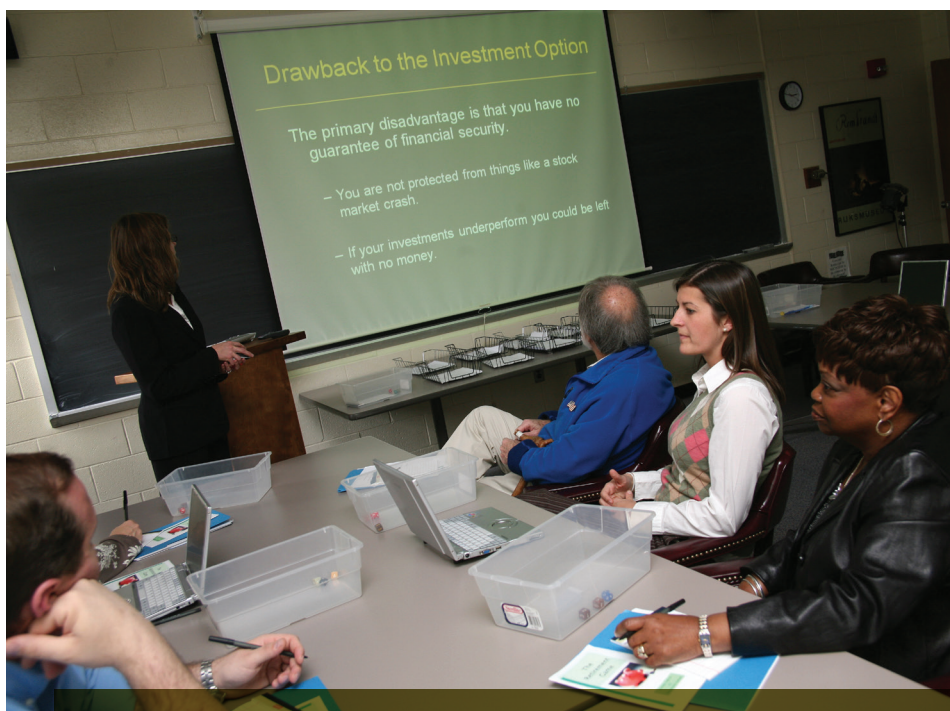
"We wanted to make sure that we captured every possible variable that might explain what people did in the experiment," said Anderson, a professor in the economics department of Arts and Sciences.

After examining the data from the experiment, researchers found that people were strongly influenced by the presentations they had received. People who saw the presentation skewed toward annuities were likely to choose the annuity option in the Retirement Game. Those who were in the session slanted toward other investments overwhelmingly made higher-risk choices.

What you saw is what you chose

"Basically, whatever five-minute presentation people saw, that pretty much governed the choice that they made," said Szykman, an associate professor of marketing at the Mason School. "So, in other words, we were able to push people in one direction or another based on a five-minute marketing presentation."

Szykman said that marketers have known for years that the way information is presented has a huge impact on decision-makers. How-



One of hundreds of presentations explaining options in the Retirement Game. A cadre of William and Mary students conducted most of the informational sessions, which were designed to resemble closely real, live personal-finance presentations.

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A casino? No, it's an experiment!



Blowing on the dice—although not a usually recommended portfolio management strategy—was all a part of the Retirement Game. Lauren Queen '08 accommodates a participant's desire to try to improve his return. Successful investments (as determined by the dice) paid off on the spot in cash.

It's a matter of life or death. The red, ten-sided die tumbles across Lauren Queen's fingers before she sends it flying through the air and crashing into the cardboard box. The retiree watches the die make its final turns, anxiously waiting to see if it will finally be "game over" or if he'll live to play another round of the Retirement Game.

At the next station, another player blows on a pair of dice. "For good luck," she says, handing them back to Russ Waddell. Across the table, Yannick Kroger is laying crisp dollar bills in the palm of a lucky investor. Like a Vegas pit boss, Matthew Woodall sits to the side, keeping meticulous track of the action before him.

It may vaguely look like casino action, but it's actually a game that simulates one of the most reputable financial activities in the book: investing. The Retirement Game was invented by professors, but the sessions themselves were run by William and Mary students. Waddell, Kroger and Woodall graduated in 2007; Woodall with a Mason School

M.B.A., the other two with undergraduate degrees.

A large number of people—students, faculty and staff—were involved in the Retirement Game's two-year run. Ellen Sutton is the meeting event coordinator at the Center for Public Policy Research at William & Mary. She served as project manager for the experiment, putting up posters, contacting local organizations and placing newspaper ads to recruit participants. She said that she had no trouble in getting willing subjects.

"Some got nervous about participating, but I said, 'I guarantee you're going to have fun,'" said Sutton.

Much of the experiment was researched, developed and run by students. Nearly every presentation over the course of the experiment was given by Erin Ward, who worked on the project as a Chappell Fellow before graduating in 2007. She was the default presenter for a reason.

"Because that was our main treatment, we wanted the presentation to be the same," said Lisa Anderson, a professor of economics at the College.

Amanda Rowe '06, M.B.A. '08 helped design the marketing materials used in the experiment as an independent study. Rebecca Carvatt '06 and Christopher Landry '08 helped design the spreadsheet that was used. Whitney Dunner Turner '07 constructed the database and managed the data input. Woodall M.B.A. '07 did data entry and kept track of the demographic composition of the sessions. Waddell managed the computers. A number of other students helped with every aspect of the experiment, including setting up the sessions, running the experiment and doing data entry.

Now, all of their hard work is paying off as the experiment's results are just beginning to yield findings that are on the cutting edge of behavioral economics research.

"I'm so proud of our students," said Julie Agnew, an assistant professor of economics and finance. She added that the students' strong contribution wasn't too surprising since the College strongly supports undergraduate research.

"It's not shocking, it's William and Mary," she said.

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ever, bringing these theories into the world of economics, where experts assume that people act “rationally” based on financial outcomes, is something very new.

“We’re going into this area now and saying, look, take something as simple as telling people they could lose money in the stock market. If you highlight what their losses could be, then they’re going to be more likely to not want to do that and they’re going to flip over and do the annuity instead,” she said. “This is called negative framing.”

Positive side of negative framing

Agnew added that the concept of negative framing is used extensively in fields like healthcare. “How do you get someone to get a colonoscopy? Emphasize that you can die if you don’t get it,” she said.

Despite their findings, the researchers said they do not want their research to be taken as a marketing lesson for people trying to sell annuities. Rather, they want financial planners and the public to be aware of how hidden biases can affect investment decisions.

“If you realize these biases exist, then maybe you will process that information differently and not be as susceptible to them,” said Szykman.

Agnew said that their study is particularly relevant now, as increased concern about the health of the Social Security system, coupled with a decline in defined-benefit plans, have more people taking retirement planning into their own hands.

“This is big,” she said. “Given what’s happening with retirement and Social Security right now, this is just a hot area that people are looking at. It’s not just the academics.”

The experiment provided researchers with a wealth of data, which they are still interpreting. One early finding that has surprised them was the difference in how women and men responded to the biases.

“Men are affected by both biases, versus the neutral condition. They can be pushed to the annuity choice or pushed to the investment choice,” said Agnew. “Whereas with women, it’s only the investment bias that influences them. We have to test and do other studies to find out why that is.”

Lauren Queen ’08, a marketing and economics major who helped conduct the experiment, said that the experience taught her the importance of collecting detailed information on individual participants. She is interested to see what further interpretation of the data reveals. For instance, she’d like to know how

“Basically, whatever five-minute presentation people saw, that pretty much governed the choice that they made. So, in other words, we were able to push people in one direction or another based on a five-minute marketing presentation.”

many people were accurately able to see that the presentations were biased.

“In two-thirds of the cases, there was a bias,” she said. “I’d like to know how many participants were able to pick up on that bias.”

The professors said that this research would not have been possible at many other schools. For instance, they said, the College’s emphasis on undergraduate research provided them with help from undergraduate students from a variety of relevant programs and majors, including neuroscience, psychology and finance.

“The things that are unique to our school made it possible,” said Szykman.

The professors also said that this kind of research was unique to William and Mary because the College allows professors the freedom to work collaboratively across disciplines.

Szykman said that at any other school, faculty within a marketing department (such as herself) wouldn’t get much credit for this research because it wasn’t published in a marketing journal.

“But here, it’s celebrated,” she said. “Our business school’s philosophy is such that they’re only looking at the research—and they’re thrilled with this. It’s good research that makes a difference.”

“This highlights the benefits of interdisciplinary work,” said Anderson. “Clearly economists have something to learn from other fields and vice versa.”

The professors have published a paper on their research in a recent issue of *American Economic Review*. They expect to be able to publish several other papers from their research because of the large and diverse population they sampled. Among other things, they are currently examining differences between how students and adults chose to invest and how the kind of returns participants received influenced how they chose to invest in the next rounds.

“All of this is paying off now,” said Agnew. “We’re at the fun part of the project.” **i**



Regular six-sided dice are used to determine performance of each participant's investment. This ten-sided die is spun each round as a matter of life and death, determining how long each player stays in the Retirement Game.

Where the villages have no name

story by L.H. Brumfield '08

photos by Roshan Patel '08
and his Maasai students



He may not be the king of beasts, but Roshan Patel seems to have found his place in the circle of life.

"Kenya literally felt like *The Lion King* every day, with a big sunrise behind the acacia tree and lions and elephants everywhere," said Patel.

Patel, a member of the class of 2008 at the College of William and Mary, spent seven weeks of the summer of 2007 in the middle of this untamed scenery, teaching Maasai children the basics of digital photography in the hopes that they will continue to document their richly biodiverse, almost untouched environment. Combining his love of biology with his passion for photography, Patel taught children in the third to fifth grades to take wildlife portraits and expansive, 360-degree landscape shots with digital cameras. He also showed older children, in the sixth to eighth grades, how to record locations of wildlife sightings using global positioning systems. In his down time, Patel tagged along with elephant researchers and captured stunning and intensely personal portraits of elephants, lions, cheetahs and goshawks.

Self-taught photographer

A biology major, Patel's photography skills are entirely self-taught. During his family's frequent visits to relatives in India, Patel began experimenting with photography, and soon realized how much he enjoyed it. Patel's interest in photography began to take a serious turn after he came to William and Mary. Con-

stantly snapping photos of wildlife in his biology courses, Patel's work drew notice from his professors, and his photographs began popping up in lectures and presentations. Then he began selling his images. With the proceeds of selling his wildlife shots, some business school event gigs and a few portraits, Patel invested in a digital SLR camera, and began to seriously consider the role of photography in his life. In



Roshan Patel shares a jubilant moment with some of his photography students, members of a nomadic Maasai tribe.

In a land with no electricity,
children use digital
cameras to document their
environmental heritage.



January 2007 Patel approached faculty advisor Dan Cristol, professor of biology, with the idea for a summer conservation project.

"I knew that I really just felt passionate about trying to work with education programs to do conservation, and I wanted to try really hard to make photography fit," Patel said. "I wanted to work on a conservation project in a country that was relatively untouched and pretty receptive to conservation work. And I do photography. So I said, 'How do I incorporate that into it?'"

Patel says he was inspired in part by the documentary *Born into Brothels*, which depicts how director Zana Briski gave cameras to a number of children in Calcutta's red light district and taught them to expand their world through photography.

Patel wanted to get kids involved in seeing their own world through a camera lens, perhaps

noticing the changing landscape and considering the value of the fauna and flora surrounding them every day. "The idea of giving them a new way to look at what they typically wouldn't notice—it was an exciting thought," said Patel.

"Originally, I was skeptical that he could pull it off, but I didn't let on—I hope," Cristol said. "I can't take much credit for this. It was completely Roshan's idea and he executed it all by himself. In my experience, student projects usually work out less wonderfully than originally envisioned, but this case was very much the opposite."

Fueled by the Charles Center

Awarded a \$3,000 International Summer Research Grant from the College's Roy R. Charles Center, Patel began to look for sites for his project. He wanted to work in a place with

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Editor's note: Roshan Patel was fortunate to be able to work in Kenya before the African nation was rocked by unrest and violence following disputed elections in December.

His words, as we go to press:

My time in Kenya led me to believe the political climate was clearly tense, but seemingly rational, so this news was surprising. Since most of my time was spent outside of Nairobi, I am unaware of how exactly this is unfolding. Kenya has political issues to resolve, but after corresponding with villagers in southern Kenya, where I was located, I learned that the issue really seems to be largely confined to the Nairobi area. Since the Maasai are not involved in this specific political tension, the area remains functioning and relatively unaffected by the fighting to the best of my knowledge. They are hopeful that this issue will resolve soon, but none are quite sure of what the solution might be.

Top left: A Maasai student's panoramic photograph of the undeveloped savannahs. These wide-view photos will be used to document changes to the landscape over time.

Bottom left: An elephant herd of the Rombo region, near the border of Tanzania. Taken by a student.

Bottom right: Student-taken photo of a nocturnal genet cat. The students practiced focusing the cameras by photographing the patient animal hundreds of times.

Additional photos at
www.rpphotogalleries.com





Maasai children sing each morning as part of their school's opening exercises.



In his free time, Patel went into the field with elephant researchers and photographed wildlife, including this male lion.

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fairly untouched habitats in a nation with an environmentally-friendly attitude. Focusing on Africa and Brazil, Patel contacted elephant researcher Hamisi Mutindo, who worked with a small Maasai village in the Rombo region of southern Kenya. Mutindo put Patel in contact with the villagers, and the local school agreed to participate in the project.

"Kenya ended up a good location because they already have a pretty good emphasis on wildlife management," Patel said. "As far as convincing people to do a conservation project, it would be a lot easier there than perhaps working with public school systems in America."

The easy part: getting cameras

Acquiring cameras for the project was unexpectedly easy. "I basically wrote a letter to Canon and they followed up on it and said they would just give me discontinued cameras that weren't going to be sold anyway," said Patel. The digital cameras donated by Canon even came with a lifetime warranty. "It was actually really simple, and surprisingly less paperwork and meetings than I had thought it would take."

Armed with his ten Canon digital cameras,

Patel boarded a plane for Africa in late June, eventually arriving in a mud-hut village near the Tanzania border, an hour and a half from the nearest electricity. The villagers, he said, are nomads and don't give names to their villages.

"It was literally the most middle of nowhere I'd ever been," he said. For the first two weeks of his project, Patel worked without the cameras, ensuring the village school's commitment to the project, but he said it didn't take much to get everyone completely on board and excited about the project.

The digital cameras introduced a very different experience for children who had never lived with electricity before. At first, the children were almost too excited about the project.

"Initially it was very hard to work with them, to be honest," Patel said. "We'd take the cameras out just to practice the actual features on the camera, and they would take six hundred, seven hundred pictures in a day, just firing it whenever they saw anything."

Focusing on focusing

Eventually, the novelty of the cameras began to wear off, and the children began to focus on the actual quality of the pictures they took. The group learned to take panoramic images from the tops of hills and practiced their photography techniques on a convenient (and patient) genet cat, a nocturnal animal that sat perfectly still in a tree most of the day.

The village school keeps possession of the cameras, the digital photographs and the specific GPS locations of wildlife encountered on field trips. Patel hopes that this data might allow the children to see firsthand the effects any future development or agriculture might have on wildlife populations and landscapes profiles. This project also gave the village a solid set of wildlife counts to support a petition for wildlife reserve status, should they choose.

"The other element of why I decided to do this project was because I think that people are disconnected from conservation efforts. Especially after talking to a lot of people down there, I realized that a lot of conservation is seen as 'white people's work,' where foreigners come in and tell the tribes what to do with their land," he said. It's not that they're questioning the importance of conservation itself, but there's a kind of lack of ownership over the process."


A question of conservation

Despite his hope that the Maasai village will embrace the cause of protection of their wild and relatively pristine surroundings, Patel intends to approach the rest of this project, and possible future projects, with a hands-off attitude.

"I don't think any individual can convince everybody that conservation is an important thing to do. It's something they have to understand for themselves. Hopefully I can assist them getting there, but I don't want to be overbearing in my role," said Patel.

The wider acceptance of environmentalism is a big focus for most scientists, and Patel is no exception. "Right now, I'm thrilled that on any given day on the news you'll see some environmental issue being brought up, because the push in general is to have people thinking about it, for them to have it on the forefront of their minds," he said. "I'd like to take environmentalism out of classrooms, or if it is involved in classrooms, it should be involved in a more fun and local way. I think ultimately people need to relate to the field if they're going to care about it."

When asked about his future plans, Patel expressed an interest in bringing his experience home. He had initially looked to initiate a similar program on the Eastern Shore of Virginia, but the logistics of the U.S. school system required a greater time commitment than he had to offer.

"Maybe next year," he said. "You don't necessarily have to go somewhere dramatic to be able to do something like this. I want to make the sciences more accessible, using a pretty straightforward tool." 



Images courtesy of the Center for Conservation Biology.

the EAGLE TRAPPERS

Researchers try to keep the national bird out of harm's way at Aberdeen Proving Ground

by Joe McClain

Aberdeen Proving Ground, up at the head of the Chesapeake Bay, is a busy place.

Since 1918, U.S. armed forces have used the 114-square-mile facility for testing new equipment and ordnance

from helmets to tanks. In recent years, the nation's armed forces have had to share the facility with a growing population of the nation's bird.

Aberdeen is a magnet for bald eagles, according to Bryan Watts, director of William and Mary's Center for Conservation Biology, but it's a dangerous one. Watts is leading a group of researchers investigating issues surrounding accidental deaths of eagles at Aberdeen. Based on the use of high-tech GPS technology, the research will not only help the bird colonels and bald eagles coexist on Aberdeen, but also will contribute to the general knowledge of daily movement patterns and seasonal migration of eagles.

Several spots on the Bay along its major tributaries tend to attract breeding eagles. Aberdeen is one of those spots, but it draws more eagles than just those looking for a place to nest.

"Aberdeen probably supports more eagles than any federal property on the Atlantic coast," Watts said. "It's not just a breeding population. They have 40-some nests there and it's growing all the time, but in January we get northern birds."

Watts said the northern birds come down from an area that stretches from the Maritime

Provinces of Canada and Maine and that probably extends through New York. Aberdeen is one of the places they congregate in big numbers. "We get the reverse of that in May," he said. "We get birds from Florida to South Carolina coming up and they spend the summer and leave in the early fall."

The northern and southern migrant populations hatch and raise their chicks in their own home ranges, Watts said. He has noticed communal roosts of migrant birds quite near nesting residents, surprising for eagles, which are territorial nesters and usually jealous of any intrusion, he said.

"This is the only place on the continent where you get a resident breeding population—with chicks—with an influx of migrants," Watts said. "These birds come in when our birds still have chicks in the nest. There's nowhere else where that occurs."

Dangerous landings

Migrants and nesters seem to get along, he noted. Any troubles the eagles run into are man-made, not eagle-made. At Aberdeen Proving Ground, Watts said, eagles often run into trouble literally—colliding with electric lines. Other dangers to the eagles come from the nature of the place.

"Up at Aberdeen, they shoot munitions all the time or they explode things and test them," Watts said. "So one of the concerns is how the activity of the tenants influences the mortality patterns and such. There is a long history of concern."

The military and the eagles can co-exist up on Aberdeen Proving Ground, Watts said, if the armed forces know how to accommodate

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where the eagles fly

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the eagles' habits. Some of the infrastructure, particularly power lines, may need to be moved, he said, but rescheduling activities can be beneficial as well.

"If you know that the eagles leave their roosts on trees in the interior by 9 a.m. to go down to the shoreline to forage, you can postpone any operations you have in that area until 9:30 or after the eagles leave," he explained. It's a good idea in theory, but to put it into practice, you have to know how the eagles move.

This is where the Center for Conservation Biology comes in. Watts and his colleagues at the CCB are the "go-to" team for eagle research. Libby Mojica, a raptor specialist, is managing the project. She joined the CCB about a year ago, after completing her master's thesis on bald eagles.

"The master's work that I was doing at the University of Georgia was on migrating Florida

eagles. A lot of them come up to the Aberdeen Proving Ground and spend the summer there," she said. "This job specifically appealed to me because now I'm working with those same birds and the local birds and the northern birds and how they all interact on base."

Flying with a payload

For the Aberdeen project, Mojica and her team brought in some ordnance of their own in the form of a set of eagle-sized solar-powered GPS backpacks.

"These units are fantastic," Watts said. "They're expensive—they cost about \$4,000 apiece and the satellite time to track a bird is about \$2,000 a year. So for the first year, it's about \$6,000 a bird, but there's no other way to get that data."

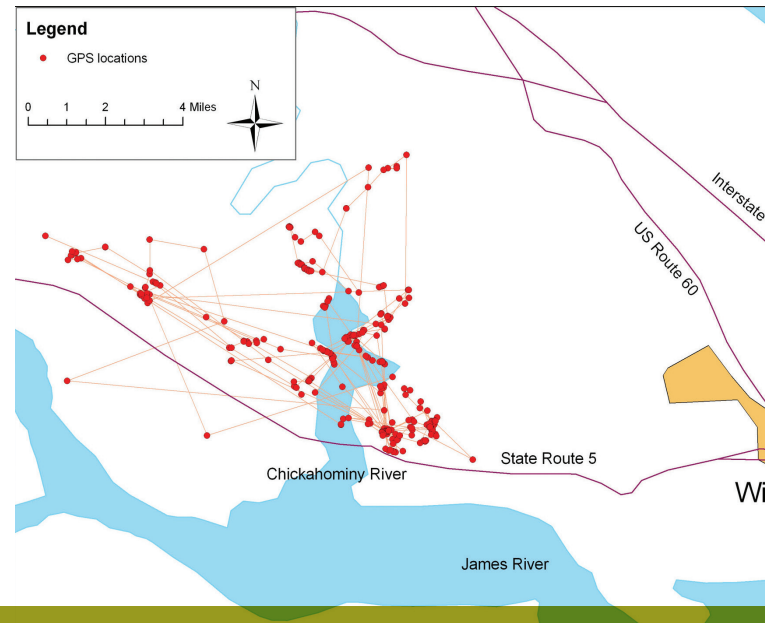
Each GPS unit is programmed to send out a dozen or so fixes a day, so the researchers can

pinpoint the location of the eagle, within a meter, roughly every hour of the bird's waking day and a couple times during the bird's sleep period. Technically, the GPS units can give altitude, as well, providing researchers with a three-dimensional fix to indicate if the bird is roosting, on the ground or in the air. However, the researchers chose to sacrifice the altitude function in order to get a larger number of two-dimensional fixes on each bird. Watts said his team intends to equip 64 birds with the backpacks, a deployment that will generate more than 900 fixes a day. The target population is resident adult eagles.

"These Aberdeen birds are resident year-round, so they're going to give you the most local data," Watts said. "And then we want to put a certain portion of the units on the northern migrants and a certain portion on the southern migrants. We're going to track how long the



The backpack itself goes on quickly and doesn't seem to bother the birds; they usually fly off and preen for a while. The CCB team trapped one eagle which had been carrying an older Virginia Tech model since 1991.



A Google Earth interface can generate graphic representations of the comings and goings of individual birds, such as this one which flew down from Aberdeen to visit the Williamsburg area.

To trap an eagle

Eagle trapping is like fishing, Bryan Watts says, in that it involves a variety of techniques and a whole lot of patience. Watts, Libby Mojica and the Center for Conservation Biology team use three methods to trap eagles.

1. **Baited water snares.** A dead catfish is stuffed with styrofoam and rigged in a monofilament loop anchored in open water. When the eagle grabs the floating bait, the loop closes around its talons.
2. **Padded leg-hold traps.** Raccoon-sized traps are customized with padded grips and weaker springs designed to grab and hold—but not injure—a raptor. They're baited with fish.

3. **Rocket nets.** Eagles are attracted to a nice ripe deer carcass, then caught under a 30x60-foot net fired from a device 50 feet away using blank howitzer rounds.

The first two techniques are passive methods and the leg-hold traps tend to catch more vultures than bald eagles. The rocket nets are effective and selective, but require a crew to sit quietly in a blind for hours, waiting for a bird to descend to the bait before they pull the trigger. Mojica says the rocket netting is only used in the winter, because eagles won't key in on the deer bait until the cold weather makes fish, their preferred food, scarce.

"It is like fishing," Watts said. "Eagles are hard to trap. They are incredibly wary birds and they will watch a bait for hours to see if

eagles stay on the installation to give us some idea of their vulnerability at Aberdeen.”

To make sure the distribution of GPS units contains the desired mix of native, southern and Yankee eagles, it’s important for the researchers to distinguish resident birds from migrants.

“That’s turned out to be a little bit tricky. There’s a latitudinal variation in body size, so the southern birds are quite a bit smaller,” Watts said. “There’s also sexual dimorphism in size—the males are about 30 percent smaller than females. When we’re out doing surveys and you see a little male, it looks more like a red-tailed hawk size. When I was an undergrad working up at Pautuxent, we had a little southern male we named Pee-Wee. Just a tiny little thing.”

Northern eagles are larger

In turn, the northern eagles run quite a bit larger than the Chesapeake Bay native birds, he said, but there is enough individual variation in size to make for a frustrating amount of overlap. “We have difficulty telling, for example, the northern males from our birds here,” Watts said. “The same thing goes for our birds versus the southern females.”

Watts’ earlier research leads him to suspect that a substantial portion of the birds that die at Aberdeen are from one of the migrant populations. “There is a peak in the mortality during the May-June period, which suggests that it might be more skewed toward southern birds,” he said. “So is it these newly arriving birds that are more likely to run into things because they don’t know what the infrastructure is? You would think that the resident birds are familiar enough with the hazards that they wouldn’t be at risk.”

Eagle researchers have been working at Aberdeen for years, but analysis of data from the movement of birds bearing the GPS backpacks will add a needed new dimension. “We know how many birds are up there from year to year, but we don’t know how many individual birds that represents,” Watts said. “This gives us an

idea of what the turnover rates are like, so we can figure how many total birds are using that piece of land.”

The primary objective of the research is to generate recommendations for making Aberdeen more eagle-friendly, but the data collected also will add to the CCB’s understanding of how the Chesapeake Bay’s populations of our national bird—resident and visitor—roam, migrate and live out their days. Mojica said the GPS tracking may help answer a number of questions about eagle interaction.

“We know that northern adults migrate, but we really don’t know if the adults in the southern population migrate,” she said. “The eagles we know to be southern birds at Aberdeen are juveniles.”

The Center for Conservation Biology has served as “eagle central” on the Atlantic Coast for decades. Watts and other researchers conduct seasonal aerial census flights along the shoreline of Virginia’s portion of the Chesapeake Bay and its tributaries and will be conducting similar flights in North Carolina. The CCB will soon start a study on depositional mercury in eagles in the Virginia Piedmont.

Watts also has been doing eagle research at Indian Head naval base, in Maryland on the Potomac River, a site with “an incredible density of eagles—ten nests on a little piece of ground not more than a couple hundred acres.” This spring, he and his associates will be climbing the big hardwood trees of Indian Head to take blood samples from eagle chicks still in the nest.

The CCB researchers have 64 GPS backpacks to fit on the eagles at Aberdeen. As of early March, they were exactly halfway finished,

with 32 more eagles to trap at Aberdeen. As if trapping and subduing bald eagles doesn’t generate enough thrills, working on a military munitions testing ground can provide an additional dose of excitement. Mojica remembers one winter day when a car pulled up just as the team had secured two eagles. A military contractor jumped out and told the researchers that a test firing was imminent and that they were on the edge of a danger zone. The team needed to evacuate immediately.

The contractor offered Mojica a ride out of the danger zone. She hopped in the car, cradling in her arms a newly caught specimen of the national bird, bound and hooded, but still very much wild. “I don’t think he knew what we were doing when he drove up to our site,” she said. “He kept on looking over as he was driving. He was just ecstatic to have an eagle in his car.” **i**



Bryan Watts prepares to release an adult female bald eagle, one of the northern migrants to the Aberdeen Proving Ground.

there’s anything suspicious. They’ll sit up there on their roosts and watch the crows come in, then the vultures, before they decide that it might be all right to come down and have a look. Sometimes you sit out there all day and never get a bird. You’re just waiting for that big strike.”

The eagle researchers are supplied with bait by cooperative biologists and game wardens in the area. Biologists from the Virginia Department of Game and Inland Fisheries shock up catfish, while army game wardens at Aberdeen maintain a cache of fresh road-kill deer. When a bald eagle is snared or netted, the action becomes less like fishing and more like a raptor rodeo, the

researchers hustling to subdue and secure the eagle without harm to the bird or themselves. “Oh, I’ve been bitten a time or two,” Mojica said. “Bryan has too. It’s not bad; more like a bruise than anything.”

Watts explained that the crew tries to get a hood on the eagle as soon as possible. Once visual stimuli are shut down, the eagle settles down, allowing the researchers to secure its wings and talons. (Ace bandages come in handy to immobilize the birds.) The captured bird is fitted with its GPS transmitter and released. The hood is the last restraint removed. “When you take that hood off, it instantly becomes a different bird,” Watts says.

approaching the altar of 'the god particle'

by Joe McClain

Consider the Higgs boson—everybody else is. Everybody involved in theoretical particle physics, that is.

The Higgs boson is the top seed among informed scientific speculation as a key to a puzzle:

How do particles get mass? Put another way, what makes anything a thing, as opposed to everything being one form of energy or another? It's a fundamental question that most of us don't even think about, but think about this: Apples (and most everything else) had been falling to earth long before Newton thought that the same force that makes apples fall also keeps the moon in its orbit.

Particle physics theory is based on what is known as the Standard Model, an understanding of a number of elementary particles and their interactions. Over the years, many theoretical aspects of the Standard Model have been verified by experiment but even as the blanks are filled in, one big question remains.

"Why do all particles have mass? It's something that doesn't currently have an experimental answer," said Christopher Carone, associate professor of physics and a member of the High Energy Theory Group. "The Standard Model is a successful theory in that what it describes it does to great precision—that's something that's been confirmed by experiment. But there's a sector of the theory that has to be put in that explains why the particles we're studying aren't all massless. So that's a pretty important question. That sector of the theory has new particles in it. The LHC will be directly probing that sector of the Standard Model that will explain the origin of mass."

Anticipation of the theorists

Carone and the other two members of William and Mary's High Energy Theory Group, Joshua Erlich and Marc Sher, have professional interest in the anticipated summer 2008 start-up of the LHC—the Large Hadron Collider (see sidebar, opposite). They've spent substantial portions of their careers formulating answers to what might be found when protons start colliding under the landscape of two nations and they are aware of the magnitude of the event.

"You can think about the importance of it on the scale of William and Mary's existence," said Sher, professor of physics. "About the time William and Mary started, Isaac Newton came up with a description of what mass was. And now

in the next two or three years, we're finally going to find out how mass arises. Kinda cool."

The Higgs boson is the theoretical missing link between massless particles and elementary particles having mass. It's been dubbed "the god particle" by physicist superstar Leon Lederman, a characterization that Carone says "probably makes all particle physicists just cringe, but which probably helped to sell a few of his books."

...or something like it

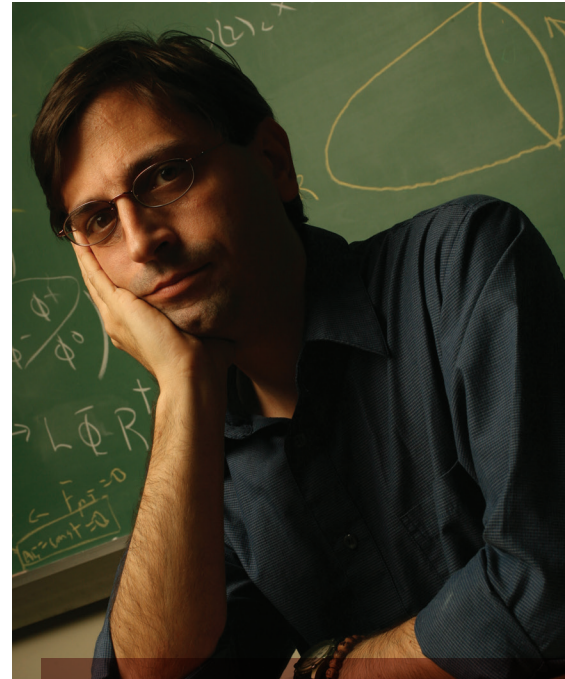
When Carone, Erlich or Sher speak of the Higgs boson, they are always careful to add "...or something like it." The three aren't necessarily Higgs skeptics, although they have collaborated on a Higgsless theory of the origin of mass.

Their theoretical work has dealt with not only the main question of the origin of mass, but also interesting phenomena—such as the formation of black holes and evidence of extra dimensions—that might be revealed by the LHC detectors. Theory, they say, acts as the bread in a scientific sandwich, with experiment as the filling.

"Our job as theoretical particle physicists is sort of two-fold," Erlich said. "One, we try to anticipate what could be seen. You have to do that in order to know what to look for. Then the experimentalists go look for that. At the Large Hadron Collider, the experimentalists feed back to us what was actually seen. Then we come to the second part of our job—interpreting what is actually seen in the context of the predictions that we've been making."

There are some problems with the Higgs boson, even in theory. Erlich explained that a theoretical Higgs boson, inserted into a Standard Model calculation, comes out immensely heavier—"some factor of 10^{16} times too heavy to be consistent with current experiments," he said. To make the Higgs boson work, theorists posit a number of special conditions. Very special conditions.

"Maybe it's there, maybe the Higgs boson really is as light as it has to be, but it's a mystery why," Erlich said. "Now in order to try to understand why the Higgs would be as light as it has to be in order to be consistent with current experiments, then some miraculous



Christopher Carone

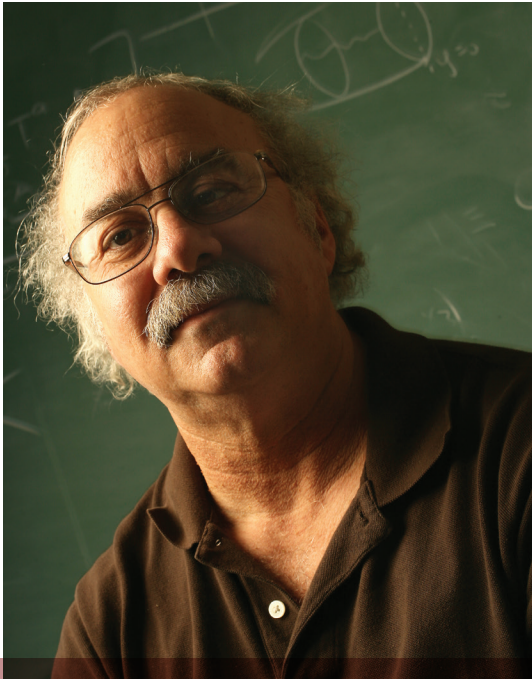
possibilities pop up. If there are extra dimensions of space, that could help explain why the Higgs boson would be so light. If there is supersymmetry, which predicts all sorts of new particles that haven't been seen so far—some of which would be detected at the Large Hadron Collider—that could explain why the Higgs boson would be so light. These possibilities are really grandiose and we might actually see evidence, for example, of extra dimensions, if those ideas are correct. Those are the kinds of things we like to think about."

Why we need extra dimensions

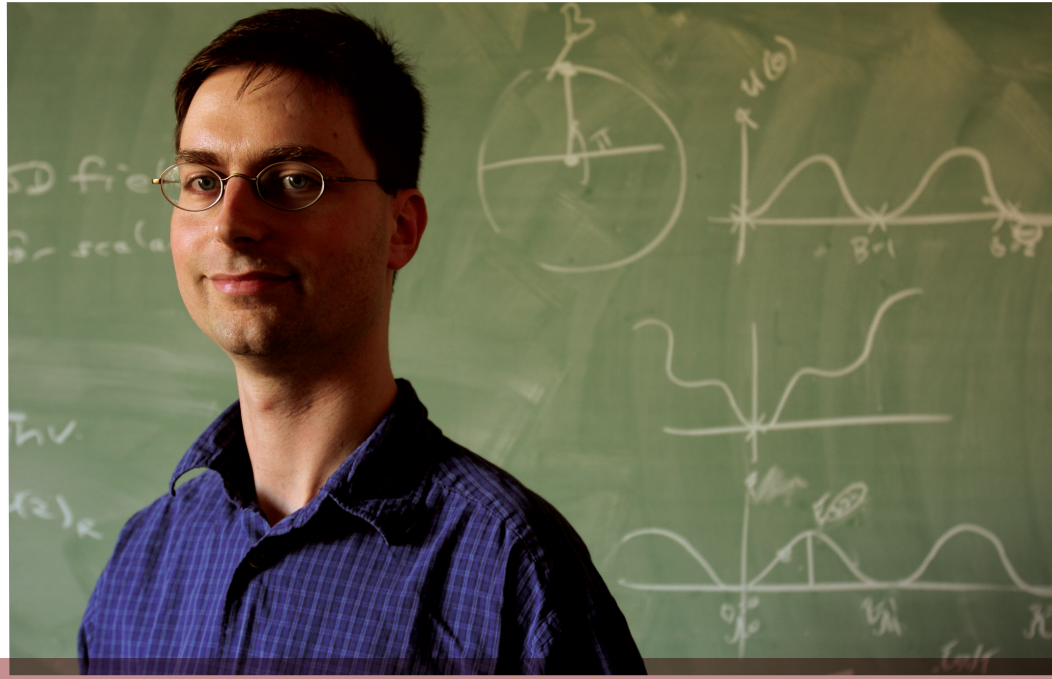
Carone said he is less interested in the LHC's potential to reveal the Higgs boson than he is in the possibility of finding evidence of extra dimensions, particularly as they relate to string theory—a theoretical attempt to reconcile gravity with the three fundamental natural forces (electromagnetism, the strong force and the weak force) into what has been dubbed "the theory of everything." String theory, he said, requires the existence of extra dimensions to work.

"First of all, how could there be more dimen-

Physicists hope the Large Hadron Collider will reveal exactly how mass begins



Marc Sher



Joshua Erlich

sions than we perceive? If there was an extra dimension that I couldn't perceive directly, I could still imagine that I push Marc and he falls off into the extra dimension," Carone said. "He might not disappear, but just get farther away. He might get dimmer because he's actually farther away in this other dimension and the photons are more spread out."

Further, he explained, string theory says that the extra dimensions are not infinite in extent, but compactified so they form a circle. If Carone were to shove Sher hard enough, he'd go clear around the extra-dimension loop, eventually coming back to where he started from. No professors will be shoved into extra dimensions in the foreseeable future, but the LHC experiments may generate post-collision phenomena—energy loss, disappearing particles—that can be explained by extra dimensions.

"That is like science fiction. The Large Hadron Collider might be an extra-dimension gun. You shoot things and they disappear into the extra dimensions," Erlich said.

"When the extra dimensions start shooting back," Sher added, "then we have to worry."

Sher noted that extra dimensions, supersymmetry and other explanations for the lightness of the Higgs boson are separate questions from the quest to discover the Higgs boson itself (or something like it).

The nightmare scenario

"The nightmare scenario is that they find the Higgs and nothing else. No Higgs would be more interesting than just a Higgs," Sher said. "It turns out that a particular interaction probability becomes infinite if you do not have a Higgs, which obviously is nonsense. The Higgs—or something like it—is the only way we know how to stop that from happening. So, in a way, having no Higgs means something goes to infinity at some point and the fact that that doesn't happen is going to tell us something."

Members of the High Energy Theory Group won't have to go to Europe to keep tabs on data from the LHC, because, as Carone says, "the Internet is a very good thing." The proton beams in the LHC will generate a trillion collisions a second—more than can possibly be recorded, let alone analyzed.

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Just what is the LHC?

It's housed in a 27-kilometer long tunnel near Lake Geneva, straddling the border of Switzerland and France. Built over the course of 20 years by the European physics consortium CERN, it contains 1,200 superconducting magnets and four detection chambers. Protons will be shot through the tunnel at speeds just short of the speed of light. The magnets, each of which must be cooled to 456 degrees below zero Fahrenheit, keep the speeding protons on track before they collide in the detection chamber, releasing enormous amounts of energy and, hopefully, providing enormous amounts of insight into how the universe is constructed.

The Large Hadron Collider is scheduled to begin operation in early summer.

THE MENTOR

He drives down from Jersey to teach young entrepreneurs how to get technology out of the labs and into the markets.

by Joe McClain



Richard Ash meets in the Swem Library board room with some of the members of the entrepreneurship Career Acceleration Module. From left are Mack Lindsey, Amanda Rowe, Wolfgang Klauber and Anuj Shah from the Mason School of Business M.B.A. class of 2008. M.B.A. students joined with law students in a three-team competition to put together a business plan for technology developed at Jefferson Lab.

Some people go into a lab, look at the work in progress, and ask “What is it good for?” When Richard Ash goes into a lab, his question is “What *else* is it good for?”

Ash is clinical professor of entrepreneurship and private equity at William and Mary’s Mason School of Business. He drives down to Williamsburg each week from his home in Princeton, N.J., to preside over entrepreneurship seminars at the Mason School.

An attorney, Ash’s background includes running the financial division at J.P. Morgan and teaching at the University of Virginia’s Darden School of Business. He’s also served as an advisor to NASA and the Department of Energy.

But above all else, Dick Ash is a VC—a venture capitalist. At William and Mary, Ash is an entrepreneurial evangelist, spreading his brand of venture-capital gospel among the ranks of business and law students.

“I want William and Mary to create an entrepreneurship program that’s world-class,” he said. “We started from scratch and now we’ve established an entrepreneurship program that goes from the B.B.A.s to the M.B.A.s.”

Ash takes advantage of a vehicle called Career Acceleration Module, or CAM. The Mason School offers a number of CAMs, which integrate academic and real-world experiences into intensive seven-week programs. There are finance CAMs and marketing CAMs and operations CAMs; Ash runs entrepreneurship CAMs.

Ash hand-picks a few high-performing Mason M.B.A. students each semester to join

one of his groups. “I do due diligence on each one of them,” he says. He sorts the group into competitive two- or three-person teams.

Ash brings scientists in from their labs at William and Mary or the Virginia Institute of Marine Science or the U.S. Department of Energy’s Thomas Jefferson National Accelerator Facility. The researchers discuss their discoveries and potential for moving those discoveries into the commercial arena. They meet with the whole group—and privately, with each individual team. The assignment is for each team to create a business plan for bringing the technology into the market. And may the best CAM win.

The questions begin

After the scientist presents his or her emerging technology, the teams have to start looking into the standard questions. Ash ticks them off on his fingers: “Is there a market there? How big is the market? Is there an ease of entry? How are the intellectual property positions—the IP? As an attorney I can tell you, we focus very



Ash to students: "When you're in a business meeting, watch the hands. Look for the person who is 'steeppling.' That's going to be the decider, and when you see the steeppling, you know they're starting to make their decision."

heavily on do you have the IP and if not—you better get it."

Once they understand the nuts and bolts, the students have a couple of challenges to overcome to get through the process. One is overcoming their natural youthful optimism. Ash wants his charges to get enthusiastic, but not over-excited, about the prospects for their program.

"You gotta remember I spent 25, 30 years in venture capitalism and I've really pretty much seen the Olympics of misery," Ash said. "You gotta show me, and I've heard every pitch. Yeah, I get excited about something, but then I go and I research the hell out of it."

Students also have to learn how to work with the people who make the discoveries they're trying to bring into the market.

"For researchers, scientists, bench technologists, the beauty is writing papers and publishing," he said, "and very often they've missed the chance to nail down their intellectual property

and they show you their discovery and tell you about the uniqueness of it all. And you look at it and you tell them, 'That's pretty interesting,'" he said. "Now what else will it do?"

Enter the scientist

One chilly February evening, Ash presided over a freewheeling working-group meeting that was half physics lecture, half entrepreneurial sermon and half brainstorming session. The participants were William and Mary School of Law students mixed with Ash's M.B.A. students and formed into three competitive teams.

All three teams were on hand to listen to and ask questions of Gwyn Williams, a scientist from Jefferson Lab in Newport News. Williams had been briefing the three teams on advances made at Jefferson Lab in technology based on terahertz light or T-rays. T-rays are the part of the spectrum between infrared and microwaves. Thanks to a power source developed in part by Williams, the technology shows promise for a

wide variety of working and contractual options available. Ash's colleague Neal Robinson, an adjunct professor at the law school, helped with a rundown of the contractual menu—CREDA, work-for-others and two types of licenses.

Not only did the teams need to select the most advantageous license or contract with Gwyn Williams, they also couldn't forget that Williams isn't a free agent. Ash pointed out that the business plans based on federally funded research, like that going on at Jefferson Lab, must include a provision for Uncle Sam. "You may want to hire the scientist, but the lab may not agree. The government wants money to pay for all this research," Ash said.

The focus of the session jumped around. Technology, law and business all were discussed, sometimes simultaneously. There were many variations on the Ash theme song: What else will it do? Williams fielded questions about his hopes for seeing his work benefit humanity

Out of the box...and into the pool

Not all of Richard Ash's projects involve potential start-ups. His students have twice used INCOGEN, a well-established Williamsburg-based bioinformatics firm, as a basis for projects. It was a mutually rewarding experience.

"I have to say, we got a good bit of information out of it," said Maciek Sasinowski, INCOGEN CEO. "It wasn't anything that made us a billion-dollar company, but the students worked very hard and I was very impressed with the insights they were able to gain after a relatively short amount of time and fairly limited conversations with us."

Sasinowski is a William and Mary alum, as are several of his employees, and the firm has enjoyed a cordial working relationship with the College. INCOGEN has even been involved in a number of research collaborations with William and Mary faculty and other researchers, so the company was a natural subject for Ash's working groups.

"Even at the very first meeting, they were well informed," Sasinowski said. "It wasn't one of those meetings where they just showed up and had to be told what INCOGEN was about. They clearly spent time on our web site getting acquainted with our company and industry and came prepared—it made a good first impression. I asked them to take a close

look at our current business model and our strategy, and to explore whether there were other uses for our technology for which it made sense to consider outside financing, like venture capital."

He said he incorporated some of the group's insights into his operation, and was impressed by one group's "what else can it do?" suggestion. The groups were apparently inspired by the success of INCOGEN's cooperative effort with the Virginia Institute of Marine Science to adapt technologies originally developed for the analysis of biomolecular data for use on marine buoys monitoring the state of wind, waves and water in the York River.

"So the students thought that we should use our existing technology to develop a consumer-level product to remotely monitor water quality in swimming pools," Sasinowski said. "The idea was to attach a probe to one of those automatic pool cleaners and have it send data to your home computer to tell you the pool temperature, pH and let you know if there's a problem. We didn't pursue that, because ultimately we felt it would defocus us too much, but it was refreshing to see the students think out of the box. That's what business is all about, whether in the start-up phase or ten years down the road, and it was clear that Professor Ash inspired and encouraged those attitudes in his students."

because they have published too soon. So, somebody's got to be watching the intellectual property rights or you could lose it right there."

Finally, Ash teaches his students the knack of looking past the scientist's intention.

"You develop a rapport with some researchers

number of commercial uses, including the next generation of high-tech security devices.

The three seven-member teams were competing to put together the best business plan for marketing T-ray technology. But first, the business students and law students needed to understand not only the technology, but also the

at large, but mostly about how his T-ray technology works.

"What is spectroscopy? What does that mean?" a student asked.

"Spectroscopy means colors," Williams explained. "There is a very broad spectrum of

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At the altar...

continued from page 13


Results from the LHC will be released in a stream of scientific papers posted on web sites, the usual orderly, cautious scientific manner of disseminating information. But Sher doesn't see his colleagues around the world waiting to read papers.

"The way it will happen is that there will be rumors," he said. "When you have a thousand people, there are going to be leaks. So there will be these rumors that they see a bump that was not expected. There are always bumps in the data, because it's statistical. Then the three of us will say, 'Did you hear about that bump?' Then we'll all start to think about what could make that bump. So will everybody else; some people will even write papers. By the time the bump is confirmed, there already will be dozens of papers on it. Most likely the bump goes away, so those dozens of papers become meaningless."

Bumps and other data relayed from the LHC have enormous significance to the world's thousands of theoretical physicists, including, of course, those at William and Mary. What goes on in the LHC will, as noted, require interpretation, but it also will set the course of future theoretical inquiry and show the relevance—if any—of work to date.

"It's interesting that 90 percent of all the papers that I've written in my career are, within the next five years, going to be gone, dead, meaningless. But I just don't know which 90 percent," Sher said. "That's fine. It's expected. If you weren't having your theories ruled out, you wouldn't be doing a very good job."

Physicists aren't sure what they will see revealed within the chambers of the LHC. It could be the Higgs boson. It might be something like it. The one thing they don't expect to see is nothing.

"When people ask the question, 'What if the LHC doesn't see anything?,' Most of the time it's a misguided question," Carone said. "People have this idea it's like a box and if I open the box, I'll either find something or not find something. That's too simplistic a way to approach this. We have theories now that work and they're based on quantum mechanical principles that will go haywire if we don't see anything. So there is strong reason to believe that something will be there. Now the Higgs boson, the minimal Higgs boson, is probably the simplest model that you can write down that works. But what are the chances that the first stab at the simplest model will turn out to be the exact mechanism that's realized in nature? So I think the safest bet is that something is there, but the excitement is that we don't really know what it is—and there's a wide variety of possibilities." 

The mentor...

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colors. Some of them you can't see with your eye, but you can through spectroscopy in the range of terahertz frequencies."

Showtime

April 15, tax day, and the three teams reassemble in the Blow Hall lecture room for presentation of their plans. Gwyn Williams is back, along with some colleagues from Jefferson Lab, including Rhonda Scales, legal counsel at the lab, who works with actual tech-transfer licensing deals. The role of Jefferson Lab personnel for the evening was to evaluate the technical, as well as the commercial, feasibility of each of the three plans. Ash and Robinson would deliver verdicts as well.

"Here's the rules," Ash called out. "You have twenty minutes to make your pitch. Watch me for arm signals; I'll let you know when you have ten and five minutes left. Then you'll have twenty minutes to answer questions and defend. Neal and I have absolute confidence in you. Talk slow and remember—it's a sales job."

The first team proposed establishment of a firm called New Wave Technologies, which will seek to manufacture a T-ray quality-control device "similar to a large photocopy machine." Their plan was to identify the best markets from broad fields within pharmaceuticals, paper/lumber, food products and the automotive industries.

The second group, hoping to dba as ThzTech, took dead aim at the pharmaceutical markets, identifying niches in quality control and drug discovery and development. They proposed a terahertz-based drug compound analyzer followed by another machine that would mass-scan batches of pharmaceuticals for quality control.

The final pitch was made by a group who identified themselves as TeraScan, with proposals for medical imaging technology. They presented a plan to partner with scientific labs and university medical centers to use terahertz technology to make instruments for medical imaging.

The judges confer

Each presentation takes place below a projected PowerPoint, team members explaining their plans for capitalization, IP, licensing, marketing, corporate structure and so on. After each presentation there was a round of questions, often pointed, from the Jefferson Lab crew.

"So what you're saying," Scales asked one team, "is that Jefferson Lab is going to be


“You gotta remember I spent 25, 30 years in venture capitalism and I’ve really pretty much seen the Olympics of misery. You gotta show me, and I’ve heard every pitch.”

empty-handed for the first year of your operation?” The answer was a very quiet yes.

After the three teams filed out the Jefferson Lab audience conferred and awarded points. Ash joined the deliberations near the end and added his own comments.

"We saw a lot of naiveté up there this evening," he said with a smile. One team was decidedly weaker than the other two, but the Jefferson Lab participants and Ash differed on which of the two offered the greatest chance of success.

Failure is not just a featured event in Ash's Olympics of misery; it's also a big part of the life of the venture capitalist, the lawyer and the entrepreneur. Ash doesn't browbeat or patronize but he doesn't shelter his students from failure, either. His manner with the CAM members is avuncular, but he's the kind of uncle who teaches nephews and nieces to swim by tossing them in the river.

"I want our students to understand what the real world is like," Ash said. "A lot of times these new companies go belly up and that's the way, you know—not everything is good. And they have to learn how to react to various problems." 

the museum is a

the Muscarelle is more than a
bunch of pretty faces



by Lillian Kelly Stevens

So how do you put your best face forward when the audience is constantly changing? And who is the audience on any given day?

The Muscarelle Museum at William and Mary just celebrated its 25th birthday amid much splendor, including its recent coup, an exhibition from Italy's famed Uffizi Gallery. But just as impressive is that side which might be invisible to some audiences: the teaching, the research and the partnering between museum and classroom.

"The museum really has two faces," says Muscarelle Director Aaron De Groft '88. "One which is very public, the town-and-gown face. But there is also the face that looks in, toward the campus, to serve the students and the faculty."

By all accounts, the museum is looking both ways, offering a wide array of experiences—artistic, cultural and academic—to internal as well as external users. For example, William and Mary students participate in the conservation, acquisition, cataloging and writing that goes on behind the scenes in this special place. There are students conducting research; there are docents, interns and volunteers. There are MUSE (Museum University Student Exchange) students working closely with staff to publicize events.

It's this face of the Muscarelle, the one that turns toward campus, that De Groft says brought him back to Virginia from a position at a top-tier art museum in Florida. In his two years since taking the helm, De Groft has guided the museum into uncharted waters as an academic partner on campus, creating a laboratory of sorts for faculty and students.

"The Muscarelle is a vehicle for teaching and research," says De Groft, "that goes to the core of William and Mary's academic mission."

"This is a place," De Groft said, "that
continued on page 18



William and Mary alumni hang—literally as well as figuratively—in the Muscarelle Museum at Lamberson Hall. A white-gloved Becky Shields, curatorial fellow at the museum, hangs Thomas Sully's copy of the famous Gilbert Stuart portrait of the first president. The Owens Foundation, established by alumni Patty and Carroll Owens, has loaned several works to the Muscarelle, including this George Washington portrait.

“This is a place that goes to the very heart of what a museum originally was conceived



Margaret Collerd and Muscarelle Director Aaron De Groft work on text and labels for an exhibition. Student work at the museum is mentored, not directed.



Special Projects Administrator Ursula McLaughlin-Miller '99 and Adriano Marinazzo, an Italian cultural exchange intern, move display pedestals in the Graves Gallery.



Student curators learn professional techniques, such as the use of a light meter to work on paper won't be damaged.

continued from page 17

goes to the very heart of what a museum originally was conceived of in Greece—a place where people come together for discussion and learning.”

Not just for arts majors

Working in the Muscarelle is not just for the arts majors. Some of the students who work at the museum help with exhibitions and lighting; others help with painting. A group of business school students recently managed an entire traveling exhibition, marketing materials from design and concept to implementation and production, even creating a flash DVD.

“We also have a lot of independent study students,” says De Groft. “They are serving internships for credit—real-world projects—that they can use on their résumés. This kind of experience gets them into graduate school or into the workplace.”

Art students study techniques and conduct research, taking advantage of some 3,000 drawings and prints in the Herman Prints and Drawing Room. A photography class visits to see over 275 original photographs from some of the greatest American artists.

“They come to look at the great photographs,” De Groft says, “because there is something value-added about seeing how they’re printed, the color and surface of the paper—all of these dealing with the real object—that is the lab component that reinforces the classroom which is the same model for a lot of other things around campus.”

Beyond art and photography, other classroom clients include visitors from

Japanese film studies, art and art history and Russian studies. A geology class even walked over from McGlothlin-Street Hall to study geological formations in Clyde Butcher’s landscape photography. There have been Spanish students writing papers on works of art (in Spanish, of course), and visits by Charles Center students and Sharpe Scholars.

“I really do think,” says Carl Strikwerda, dean of the faculty of arts and sciences, “that one of the things Aaron has done so skillfully is that he has sized up the

resources the College faculty has, and has brought them into the museum while taking the resources of the museum and making them available to what is being taught in classrooms across campus. There is real integration going on.”

Bring in the deans

De Groft forges his link between museum to the classroom, starting with a committee whose core includes Strikwerda, Dean of the University Libraries Connie Kearns McCarthy and

Leaving their prints

Three William and Mary students stepped up as curators for a major exhibit at the Muscarelle Museum. The exhibit, *Impression and Expressions: Masters of Modern American Printmaking*, includes more than 30 prints and artists’ books from artists including Jasper Johns, Sol LeWitt and Helen Frankenthaler. The show will run through July 27.

Schuyler Lolly '09, along with Mary Ramsey '08 and Margaret Collerd '08 started working on the exhibit at the end of last year when museum Director Aaron De Groft asked if they were interested in curating a show.

“When Aaron told us that he wanted us to curate an exhibit, I thought he meant ‘Well, you’re going to kind of be helping,’ but no, it was really like, ‘Here’s the list—go!’” said Ramsey, an art history major.

De Groft said that this was the first time in his memory that students had curated a major exhibition for the museum. He views the experience as an integral part of the Muscarelle’s mission.

“This is no different than chemistry lab, or modern languages listening labs, where academic class work is reinforced and followed by practically applied laboratory work where real-time experiences are progressed,” he said. “It is extremely important to the museum to provide this atmosphere and valuable service.”

—Erin Zagursky

this just in...

Mercury: It's not just in fish anymore

Songbirds feeding near the contaminated South River are showing high levels of mercury, even though they aren't eating food from the river itself, according to a paper published by William and Mary researchers in the journal *Science*.

Lead author Dan Cristol said his paper has wide-ranging international environmental implications. Mercury is one of the world's most troublesome pollutants, especially in water. The South River, a major tributary of Virginia's Shenandoah River, has been under a fish consumption advisory for years, as are some 3,000 other bodies of water in the U.S.

The paper shows high levels of mercury in birds feeding near, but not from, the South River. Cristol and his colleagues also identify the source of the pollutant—mercury-laden spiders eaten by the birds. The *Science* paper is one of the first, if not the first, to offer scientific documentation of the infiltration of mercury from a contaminated body of water into a purely terrestrial ecosystem. Their work was featured in a story headlined "A different kind of meth lab" in the fall, 2006 issue of *Ideation*.

"In bodies of water affected by mercury, it's always been assumed that only birds or wildlife that ate fish would be in danger," said Cristol, a professor in William and Mary's Department of Biology. "But we've now opened up the possibility that mercury levels could be very high in the surrounding terrestrial habitat, as well. It's not just about the fish, the people who eat the fish and the animals that eat the fish. We've also got



Dan Cristol

Big juicy spiders are a favored food for songbirds, but researchers have found that the arachnids sometimes come with a side order of methylated mercury.

to look at a strip of habitat all the way around the lake or river that is affected."

Cristol and his co-authors, all students at the College of William and Mary, have been researching mercury impacts on birds along the South River for the past three years. The waters of the river were polluted with industrial mercury sulfate from around 1930 to 1950. He explained that mercury enters the food chain through a process called methylation, in which bacteria convert the mercury to a more potent form. The methylated mercury is passed up the food chain, becoming more concentrated in the bodies of larger animals through a phenomenon known as biomagnification.

Biomagnification of mercury in fish and fish-eating birds and other animals has been studied extensively, while little attention has been paid to the effects on animals near the river, but with no direct connection to the aquatic ecosystem. The researchers studied the food actually brought by songbird parents to their nestlings.

"The birds eat a lot of spiders. Spiders are like little tiny wolves, basically, and they'll bioaccumulate lots of contaminants in the environment. The spiders have a lot of mercury in them and are delivering the mercury to these songbirds," Cristol said.

"The question that remains is this: How are the spiders getting their mercury?"

Cristol's group is a part of the Institute for Integrated Bird Behavior Studies at William and Mary. Co-authors on the paper are master's degree students Ariel E. White '07, Rebecca L. Brasso '07, Scott L. Friedman '07 and Anne M. Condon '08, along with undergraduates Rachel E. Fovargue '09, Kelly K. Hallinger '09 and Adrian P. Monroe '08. Cristol and his group will continue their studies of the effect of mercury in the songbirds of the Shenandoah Valley, including an examination of the effects of the contaminant on the reproduction and lifespan of the birds. **i**

—Joe McClain

College of William & Mary
P.O. Box 8795
Williamsburg, VA 23187-8795

ideation

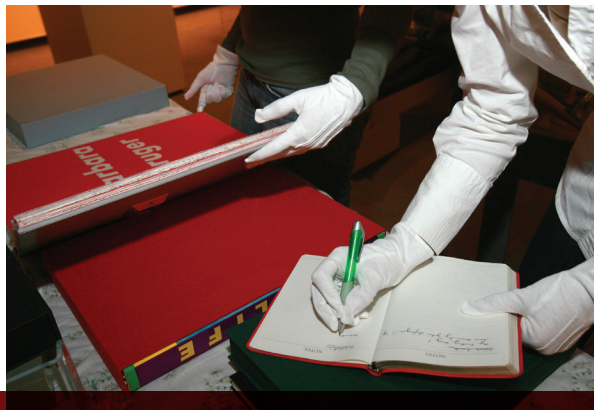
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ved of in Greece—a place where people come together for discussion and learning. 2



Professional museum methods such as using cameras to make sure sensitive works are properly managed by too much light.



Mary Ramsey and Schuyler Lolly make exhibition notes wearing white gloves, *de rigueur* to avoid marking—and potentially damaging—art prints and books.



Student curators (from left) Margaret Collerd, Mary Ramsey and Schuyler Lolly collaborate on self-assigned components of the exhibition.

Dean of the School of Education Virginia McLaughlin. Sometimes he brings in folks from Special Collections at Swem Library or department chairs or still others depending upon the projects he has in mind. Everyone brainstorms and themes emerge.

“It helps to have an excellent library and enthusiastic colleagues,” De Groft says. “Connie McCarthy has been a great collaborator, with [library staffers] Bea Hardy and Amy Schindler, in brainstorming and opening up their collections. There is fascinating stuff, but it just can’t be in the private playground of the people who get to deal with it.”

In 2007, as all eyes were on Jamestown’s 400th anniversary, the museum partnered with the anthropology department’s American Indian Resource Center to co-curate an exhibition which effectively kicked off the Muscarelle’s Year of American Art. The exhibition was titled *Jaune Quick-To-See Smith: Contemporary Native American Paintings and the Response to Colonization...Anniversary of the Beginning...Beginning of the End*.

“We addressed provocative and difficult issues of a Native American artist’s response to colonization, as well as exhibiting very important early documents and special collections of the College that represent the beginnings of the Americans and the Native Americans,” De Groft said.

The museum is housed in a brick building that is small by standards of great museums, but don’t let size fool you.

This is the museum that just showcased *Painting the Italian Landscape: Views from the Uffizi*, covering five centuries of landscape painting and featuring more than 40 works from renowned artists like Botticelli, Nicolas Poussin and Canaletto.

Even when the Old Masters aren’t in town, the Muscarelle holds plenty of names. The rotating permanent collection boasts more than 3,000 works of art, a number that might be considered small by some standards.

Small, but mighty

“But step inside the front door,” invites Becky Shields, curatorial fellow at the Muscarelle, “and you’re greeted by an original O’Keefe. Five feet to the left, a Titian. Just a few steps to the right, a Velazquez. By any standard, it’s a good day at the museum.”

Portraits are central to the permanent collection, beginning with the very first piece—a portrait of physicist Robert Boyle given to the College in 1732 by the third Earl of Burlington. There are 200 years of English and American portraits of the 17th, 18th and 19th centuries but also an extensive collection of American and European art and landscapes. Within the permanent collection, there is African art, Asian prints and ceramics and American abstract expressionist paintings.

De Groft and the Muscarelle are always open to ideas. Last year a group of students approached De Groft about displaying a traveling exhibition called *PostSecret*. The exhibition was fairly shocking, De

Groft said, and consisted of thousands upon thousands of postcards sent to an address from a web site. In their postcards, people share their deepest secrets—tragic, terrible, therapeutic, scandalous, loving, happy or sad.

“These are cultural artifacts—art of their time—so we hung the exhibit in the middle of the permanent collection,” says De Groft.

De Groft also oversees the President’s Collection of Faculty and Student Art and enjoys working with Bob Knowlton of the University Center, to display pieces in the UC from that collection as well as other student-arranged exhibitions. The University Center offers space which is accessible and dramatic, and provides a fitting backdrop for pieces that do not require museum-quality lighting and security.

In collaboration with the Student Health Center, the AIDS quilt hung in the museum for a week. In addition, the museum participated in a University Center exhibition of a collection called *The Art of Surviving*, undertaken with the College’s sexual abuse counselors, and arranged an international volunteerism display when Governor Tim Kaine was on campus in January.

“And for our fourth exhibit at the UC,” says De Groft, “we are helping the International Studies Club with photographs which they will produce—which we will mount and hang—reflecting what their group has done in terms of volunteer efforts.” **i**



by Suzanne Seurattan

It's civics 101: Before any piece of legislation becomes law, it must first be voted on and passed by both the U.S. House and Senate. It sounds simple enough in theory, but in reality, the process is often neither simple nor straightforward.

For the last four years Larry Evans, with the help of a revolving cadre of undergraduate research collaborators, has been looking behind the generally closed doors of Congressional leadership at what he sees as one of the central investigations among political scientists today—the role that political parties and their leaders play in the legislative process. His window on this process has been the tally sheets, or “whip counts,” that congressional leaders use to track the positions of members prior to major roll call votes.

“It’s actually kind of difficult to measure the impact of leaders and parties on the legislative process,” said Evans, Newton Family Professor of Government at William and Mary. “For instance, if you are looking at a roll-call vote, if it is an important issue more often than not you are going to have a party-line outcome with the Democrats on one side and the Republicans on the other. But the question is why?”

Evans noted that political scientists can suppose numerous reasons for the frequency of the party-line split. After all, Democrats and Re-

publicans alike display a high degree of political cohesion, both naturally ideological or driven by interest groups or constituency concerns. Evans says another possible cause is that each party’s leadership is stepping in and influencing members. The individuals who are charged with making sure there are no surprises when the votes are tallied are called “whips.” In the Senate and the House, each party has a member who serves as the whip and is assisted by many deputy whips and expert staff.

ing yes,” “no,” “leaning no” or “undecided.” The papers logging the responses are called whip counts and are the raw material for Evans and his students.

Whips do more than just poll the members of their party. When the vote count isn’t solid, whips begin the second part of their jobs, using their influence to turn some yesses into nos—or vice versa.

A public whipping

Sometimes a whip’s actions are, literally, front-page news. In March, 2008, current Democrat whip James Clyburn’s successful efforts to get the last few votes to pass a crucial ethics bill were very visible on the House floor. The process was televised by C-Span, reported in the *Congressional Record* and chronicled on page A-1 of the *Washington Post*.

Congressman Clyburn’s high-profile whip work is the exception. Generally, Evans says, the influence of the party whips is exerted more privately. Therefore, the only way to examine how the whips do their jobs is to track changes in the whip counts. To examine patterns in

are even included for members who are absent because they are ill or out of town. To date, approximately 500,000 member responses have been coded into the database on over 800 major pieces of legislation considered before Congress since World War II.

Getting the raw data hasn’t been easy. While Congressional roll call votes are public documents and recorded in the Congressional Record, whip counts are not. To get them, Evans and a number of his student researchers have traveled to archives around the country, poring over countless files, looking into the records of former Congressional whips. Evans estimates that they have photocopied more than 10,000 pages of documents.

Logan Ferree ’07 traveled with Evans to visit the archives of former House Speaker Newt Gingrich at the University of West Georgia. “Although I had been interested in government when I first came to William and Mary, working on the project helped turn that interest into a passion that has resulted in a career in politics,” he said in a recent email.

The researchers have also found the congres-

a *PEEK* behind democracy’s closed doors

publicans alike display a high degree of political cohesion, both naturally ideological or driven by interest groups or constituency concerns. Evans says another possible cause is that each party’s leadership is stepping in and influencing members. The individuals who are charged with making sure there are no surprises when the votes are tallied are called “whips.” In the Senate and the House, each party has a member who serves as the whip and is assisted by many deputy whips and expert staff.

The whip’s first job is to count votes—or rather, potential votes. Before important bills are considered on the House or Senate floor, whips often see that members of their party are individually polled, in person or by e-mail or phone. The whip usually marks each member’s response in one of five categories—“yes,” “lean-

ing yes,” “no,” “leaning no” or “undecided.” The papers logging the responses are called whip counts and are the raw material for Evans and his students.

Whips do more than just poll the members of their party. When the vote count isn’t solid, whips begin the second part of their jobs, using their influence to turn some yesses into nos—or vice versa.

Evans credits the students with the bulk of the coding, a time-consuming and painstaking process. He has even conducted a summer research program for the last four years, in which students lived on campus and worked full-time on the project. Nearly 80% of the students involved in the overall project have participated in the summer program.

The students have gone through data from the whip counts of House Democrats from 1955 to 1986 and from House Republicans from 1975 to 1980 and from 1989 to 1994. Some 35 students and counting have worked on the project. No detail has been overlooked. Entries

sional archives to be a rich source of contextual evidence into the effectiveness of party influence wielded on House votes. This contextual information is being developed through case studies examining what factors move a whip count—for example, leadership lobbying, constituency pressure, team playing, etc. The case studies were completed in Evans’ seminar classes and summer research program by student researchers such as Ricky Trotman. Trotman’s initial exposure to the project was through an assignment in a freshmen seminar, American Political Development, taught by Evans.

“I did an overall analysis of a 1980s bill funding Angolan rebels. My assignment was to explain why the Democrats failed to defeat that bill. So I coded a bunch of variables like the percentage that Reagan won by in that represen-

tative's particular district, minority populations, age brackets, funding received from the party," he explained. "What it ended up coming down to is there were a large number of Hispanics in Florida and the Democrats were overwhelmingly represented in Florida at that point but they swung for the bill and it was that constituency that really put the bill over the top, which I found to be very interesting. Because for that particular whip count there had been, I think, three different polls taken. So you see a progression—maybe like an undecided, an undecided and then, 'No, I'm not voting with you.'"

A Pickle paper

Claire Grandy '09 wrote a seminar paper on former Texas Democrat J.J. Pickle's amendment to the House's 1977 Social Security financing bill in her freshman year. "I was pretty certain (and I still suspect) that no one had ever devoted much more than 15 words to the Pickle amendment," Grandy said of the experience. "But Professor Evans walked us through the process and the research turned out to be fun—and unique."

The whip count project is funded by a large grant from the National Science Foundation and has received additional funding from the Carl Albert Congressional Research and Studies Center at the University of Oklahoma and the Roy R. Charles Center of the College of William and Mary. The project has already yielded numerous papers—many of which have been

'Whip counts' can track political influence through the legislative process.

presented by the students at political science conferences—as well as two book chapters in edited volumes. A complete book is also on the horizon.

One paper written by Evans and five members of the class of 2005—Sarah Brown, Keith Devereaux, Kristen Haase, Will Marlow and Josh McHenry—received the Patrick J. Fett Award for the best paper on Congress and the Presidency in 2006 at the Mid-west Political Science Association Convention.



Many files require many researchers. Larry Evans is flanked by some of the nearly 40 students who have worked on the project. From left are Jessica Lane, Ricky Trotman, Walter McClean, Evans, Lauren Merrill, Josh Litten and Brent Schultheis.

Since his freshman seminar, Trotman, who also participated in the summer program, has written a second paper for the project, "Parties, Preferences and Contrasts in the 1980s House" with Evans and co-authors Miguel Matamoros, Walter McClean and Laura Whipple. The four undergraduates and Evans presented the paper at the Western Political Science Conference in San Diego in March.

Charting the path of influence

Evans, whose research focuses on American national politics, hopes his project will not only provide scholars and others the information necessary to analyze how Congressional leadership and political parties routinely exert their influence but provide a method for tracking this influence over time.

"Because we've got this whip-count data which provides a peek at the decision-making

process, you can open up the black box of member decision making in really a rich way," he said.

Followed over time, the patterns of the whip counts and final vote tallies can be telling, especially when paired with the additional contextual information being generated by Evans' project.

"The evidence we have gathered is really useful for evaluating the independent impact of the leadership, allowing us to shed light on a major scholarly debate that really has confounded most of the top scholars in the field," Evans said.

Still, he added, the papers that he and the students have written only scratch the surface in this area of research. "A long-term goal of the project is to develop and maintain one of the more valuable and highly-used research web sites about the American legislative process," he said.

In addition to influencing scholarship about Congress, the project has affected its participants.

"Most of all, through this project and my government seminar the next semester, I gained a great appreciation for good research practice and was delighted to carry over some of the data I'd worked with into coursework completing my major," said Brent Schultheis '08. "I feel more confident now that I can tackle whatever research demands I'll have in law school or the working world."

Trotman admits he was initially overwhelmed by the project, but the history and international relations major now notes he wouldn't trade the experience.

"It was definitely worthwhile thinking back on it now," he said. "Writing the paper at three or four o'clock in the morning, I wasn't thinking it was so rewarding then, but it definitely was worth it. I see a lot of value in the project and it's definitely something that can shape the future study of congressional politics."

The idea that party leaders and presidents are influential in the votes cast in Congress is not entirely a new one, but this project offers a novel way for scholars to add empirical evidence to their theories, Evans said.

"There are all kinds of stories about the techniques that leaders use to influence outcomes," he said. "But, we don't really know systematically how that occurs over a lot of bills, over a lot of years, and this evidence—gathered by all my students and me—sheds a lot of light on that." **i**

A people and a religion

The Jewish presence in what is now the United States began in 1654, with the arrival of 23 refugees in what was then New Amsterdam, stepping off the boat from Brazil, of all places.

"We actually know the names of the 23 Jews that came from Brazil," said Marc Lee Raphael. "This community had lived under the Dutch in Brazil, but the Portuguese took over Brazil and brought the Inquisition. And the Jews left."

Raphael, the Sophia and Nathan S. Gumenick Chair of Judaic Studies at William and Mary, is the editor of *The Columbia History of Jews and Judaism in America*. Published in early 2008, the book is the first one-volume history addressing both the Jewish people and Jewish religious life in America.

"So far, every historian has written about one or the other. In fact, overwhelmingly they wrote about Jews because that's more interesting than religion," he said. The term "Jewish," he noted, is singular in America, because it refers to an ethnic group as well as a religion.

"Let me tell you sort of a joke: What's the definition of a Jew? The definition of a Jew is someone who asks what is the definition of a Jew," Raphael said. "And that has a lot of truth, because non-Jews don't ask the question. There is no definition of a Jew that has universal acceptance. Less than half the people in the U.S. who say 'I'm Jewish' also say 'I go to a synagogue.' So you have Jews who don't go to the synagogue, but could be ethnic, who like to go to Jewish films or eat Jewish food or read Jewish books."

Not an auspicious start

America's first Jewish community didn't have it easy, Raphael said. Dutch New Amsterdam became English New York within a decade, but it would take much, much longer for the Jewish presence in America to grow in influence and affluence, eventually producing cultural icons such as Leonard Bernstein, Woody Allen and—as Raphael, an L.A. native, is sure to mention—Dodgers pitcher Sandy Koufax.

"The Dutch governor did not like Jews and so those people were persecuted by the Dutch governor like they would have been by the Portuguese," he said. "They struggled to survive. It took another almost 100 years for anything that we would call a Jewish community to emerge in New York."

In America, Raphael said, Jews found the op-



portunities that were utterly absent in Europe. If they found some doors closed to them, he said, America was big enough for Jews to create their own opportunities.

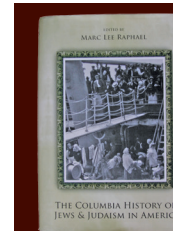
"Whatever example you might give me of discrimination, what Jews could do in this country was go somewhere else," he said. "That is, if the country club down the street excluded you, you were free to create your own country club. And so we had Jewish country clubs and Jewish fraternities and sororities. And if the law firm said you couldn't be a partner, then we'll just create a Jewish law firm. If Cornell Medical School wouldn't take you, then we'll go to Ohio State—or Wisconsin or Illinois or Case Western."

The Columbia History of Jews and Judaism in America consists of 18 essays by scholars on America's Jewish people and the several varieties of the Jewish religion. Six of the essays address chronological periods; the remainder are topical, speaking to subjects as varied as Holocaust consciousness, Jews in the South and the nexus of feminism and Judaism. Raphael said he had the chapter topics roughed out before pitching the book idea to the acquisitions editor of Columbia University Press in a Manhattan pastry shop.

A progressive tradition

Raphael said one of the more important Jewish contributions to American life is a tradition of civic involvement and progressive thought, a legacy of Jewish activism in the Ashkenazi communities of central and eastern Europe.

"Especially in Poland and Russia, Jews over-



The Columbia History of Jews and Judaism in America
Marc Lee Raphael, editor
Columbia University Press

whelmingly supported liberal causes, and were active in things that translate into ideals of the Democratic party more than the Republican party in the U.S.," he said. As a result, Jewish Americans have supported such issues as environmental action, civil rights and union organization in disproportionate numbers. Raphael recalled his own experience as a freedom rider in 1962 or 1963.

"When the bus first left Los Angeles to go to Mississippi, I knew almost everybody on the bus," he said. "They were all from Jewish youth groups in L.A."

The outlook for Jewish life in America is mixed, he said. The glass-half-full outlook is that Jews are more interested in learning about their heritage and religion and the spread of Jewish studies programs in academia makes it more possible for them to do so.

"On the other hand," he said, "the half-empty sign would be that every year there are fewer Jews in the U.S. The percentage of Jews in the U.S. declines; even the absolute number of Jews declines."

—Joe McClain



It grew from a senior honors thesis *Greening Aid?: Understanding Environmental Assistance to Developing Countries*

Robert L. Hicks, Bradley C. Parks, J. Timmons Roberts, Michael J. Tierney
Oxford University Press

There is a lot of money flowing from rich nations to help manage and protect the environment in poorer lands. *Greening Aid?* looks at the impact of hundreds of thousands of development projects by more than 50 donors to the environment of more than 100 recipient nations between 1970 and 2001. The book had its genesis at the Green Leaf in Williamsburg, where the authors were observing solemnities appropriate to the stellar performance of Brad Parks on his undergraduate senior honors thesis. The other three authors comprised Parks' honors thesis committee and were so inspired by their student's exploration of environmentally directed foreign aid that all four decided to devote the summer of 2003 to expanding the thesis into a book. Once they started, they found gaps and other discrepancies in the collected data that turned a "piece of cake" project into a four-year process of starting from square one and collecting and classifying data. Parks' thesis not only led to this book, but also to the establishment of Project Level Aid, better known as PLAID, which has encompassed data collection and review of virtually all bilateral and multilateral foreign aid.

—Joe McClain

Robert L. Hicks is associate professor of economics at William and Mary. Bradley C. Parks '03 is a development policy officer in the Department of Policy and International Relations at the Millennium Challenge Corporation. J. Timmons Roberts is professor of sociology and director of the William and Mary program in environmental studies. Michael J. Tierney is assistant professor of government at William and Mary.

We're Listening to...



Franz Joseph Haydn's Die Schöpfung (The Creation)

College of William and Mary Choir
James Armstrong, Jr., conductor

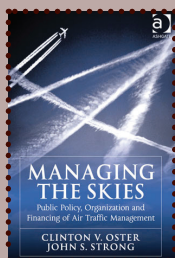
The Choir of the College of William and Mary has produced a CD of performances from Franz Joseph Haydn's oratorio *Die Schöpfung* (The Creation). This oratorio, written in the late 18th century, expresses the Austrian classical composer's vision of the creation as told in the Holy Bible and John Milton's poem *Paradise Lost*. It is widely considered to be Haydn's greatest work.

Conducted by James Armstrong, Jr., the Choir gave performances of *Die Schöpfung* in April 2007 with an orchestra of period instruments and professional soloists. This historically-informed performance represents a milestone in the performance of classical era music on period instruments in the United States.

—Lillian Stevens

This is James "Jamie" Armstrong, Jr.'s, twelfth year as the College's director of choirs. He is also the interim chair of the Department of Music, and an associate professor of musicology and conduct. His research interests range from 18th-century Viennese sacred music to indigenous vocal music of South Africa and historically-informed performance.

Stacked up under O'Hare



Managing the Skies: Public Policy, Organization and Financing of Air Navigation

John Strong
with Clinton Oster, Jr.
Ashgate Publishing

Managing the Skies does a public service by devoting considerable space to the demystification of the system which keeps airplanes from running into each other—or is supposed to. It offers interesting and often sobering insights into how air traffic control is funded, structured and managed in markets such as the United States, Canada, Australia and New Zealand, the United Kingdom and Europe. It also examines practices in Russia, China, India, Africa and South America. The book also documents yet another area in which the United States once led, yet now lags.

—Joe McClain

John Strong is CSX Professor of Business Administration, Economics and Finance at the Mason School of Business at William and Mary. He has written extensively on the economics of the airline industry.

About French novels



Scènes d'intérieur: Six romanciers des années 1980-1990.

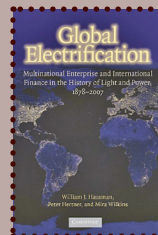
Maryse Fauvel
SUMMA

This book is in French; the title translates to *Interior* or *Scenes: Six Novelists from the 1980s and 1990s*. The author provides the following synopsis: Although aimed at ephemeral gratification, the novel of the 1980s-1990s, in its openness to the other, provokes enduring questions, which have become key issues in the 21st century. It no longer reflects the coherence of one culture, of a corpus (the novel) or the purity of a language (like it was claimed before), but rather a multiplicity of trajectories that demonstrate strategies of coexistence. These novels reconfigure the

representation of France's perceived characteristics in order to fashion a new master narrative of French national identity.

Maryse Fauvel is professor of French studies at William and Mary. She has published numerous articles on contemporary French/Francophone literatures and cultures, including Franco-Chinese and Franco-Vietnamese literature and cinema. She is currently finishing a manuscript on French cinema.

When the lights came on



Global Electrification: Multinational Enterprise and International Finance in the History of Light and Power, 1878-2007

William J. Hausman
with Peter Hertner

and Mira Wilkins
Cambridge University Press

Multinational enterprises were major players in the wiring of the world, at least through the 1930s, when the role of these international groups started to be supplanted by electric utility providers operating on national structure. This book examines how multinational electric concerns were "domesticated" through buy-outs and other mechanisms, including downright confiscation. It also shows how the pendulum is starting to swing back toward the multinational model.

—Joe McClain

William J. Hausman is the Chancellor Professor of Economics at William and Mary. His areas of specialization include economic and business history, as well as the history of the electric utility industry.

Jazzy lyrical indigo verse



Dolores is Blue / Dolores is Blues

Hermine Pinson
Sheep Meadow Press

You can't judge a book by its cover, and the same thing holds true for judging a poem by its title. Consider "A Chick Poem," which might lead you to believe it's about someone getting her groove back, but once you break the delicate crust of the breeding you find you've bitten into something that reveals that once they've come home to roost, few of us are free of the imperative to get out and peck. There's also a nod to Gershwin—or rather to Gershwin's characters—in "Sermon on Catfish Row." Meaty stuff for preaching or singing...or just reading and pondering.

—Joe McClain

Hermine Pinson is an associate professor in the English department at William and Mary. Her areas of specialization include modern African American literature, literature of the African diaspora and writing poetry and fiction.

Plumeri starts faculty support fund

Joseph J. Plumeri, a member of William and Mary Board of Visitors, has committed \$2 million to establish the Plumeri Awards for Faculty Excellence.



Joseph J. Plumeri

"It is a privilege for me to give back, to honor and support our faculty's efforts," said Plumeri, a member of the class of 1966. "The faculty is the DNA of the College and each day they work passionately to challenge the minds of our exceptional students. Their research and other pursuits extend well beyond the campus."

With an annual payout of \$200,000 over 10 years, the Plumeri Awards will provide 20 members of the faculty with \$10,000 for research opportunities, summer salaries or other stipends associated with scholarly endeavor.

"This extraordinary gift from Joe Plumeri will make a real difference for the better at William and Mary," said Interim President W. Taylor Reveley III. "

Candidates for the Plumeri Awards will be nominated by the deans of their respective schools, with the final decision made by Provost P. Geoffrey Feiss. The first awards will be announced and presented during the 2009-2010 academic year and will continue each year for 10 years.

"This is a tremendous demonstration of support for the College and most particularly for its faculty," said Feiss. "Mr. Plumeri's unyielding loyalty and generosity to his alma mater will create opportunities for our faculty to extend their preeminence in teaching and research—and thus enhancing the experience of every William and Mary student—and we are incredibly grateful for his generosity and passionate devotion to the practice of great teaching and mentoring."

Plumeri has long been a generous supporter of the College, including establishing a scholarship and other endowments in the Mason School of Business. He also provided funds to build Plumeri Park, the College's baseball stadium; to create the Plumeri House, a guest residence for visitors to campus; to endow scholarships for business students and student-athletes; and to establish the Plumeri Pro-Am, a golf tournament that annually raises thousands of dollars for the College's athletic program.

—Renell Franklin

Roberts honored for contributions to environmental sociology

J. Timmons Roberts, professor of sociology and director of William and Mary's environmental science and policy program, was recently awarded the Buttlet Distinguished Contribution Award for his contribution to the field of environmental sociology.

The Buttlet Award, the highest award presented in the field, recognizes Roberts' contributions to the field of environmental sociology. The award is presented to a current member of the Environment and Technology Section of the American Sociological Association (ASA) for outstanding scholarship, service and innovative teaching in the field of environmental sociology. Roberts serves as

chair of the Environment and Technology Section of the ASA, but was excused from deliberation of the award candidates.

"This award is a great honor for me," says Roberts, "since my peers have seen fit to recognize the body of all the work I have done. It is especially an honor since I had the pleasure of knowing Fred Buttlet from co-authoring, organizing conferences and repeated intellectual, professional and social interactions with him. Fred was an amazing man, a wonderful person and a brilliant sociologist, bridging areas of rural sociology, political economy and environment."

In addition to teaching sociology and directing the environmental science and policy program at the College, Roberts is a James Martin 21st Century School Fellow in the Environmental Change Institute at Oxford University. He is one of the founding members of Project-Level Aid (PLAID), an interdisciplinary project based at William and Mary that tracks foreign aid by sovereign nations as well as multilateral entities such as the World Bank. He has published numerous articles and co-authored five books in the field of Environmental Sociology. He is a co-author of *Greening Aid?: Understanding the Environmental Impact of Development Assistance*, recently published by Oxford University Press. (See page 23.)

—L.H. Brumfield



J. Timmons Roberts

Kinesiology students win research fellowships

This summer, two William and Mary kinesiology students will be performing laboratory research as undergraduate fellows of the American Physiological Society. Their undergraduate summer research fellowship program supports full-time undergraduate work under the guidance of an established investigative scientist, with the aim of encouraging students to explore future careers in scientific research. Kristen Berberich '09 and Kyle Horst '10, both interested in pursuing medical science careers, will be working in the kinesiology laboratories of Robin Looft-Wilson and Brennan Harris, respectively.



Kyle Horst (left) and Kristen Berberich

"This is a significant achievement for these students and for the Department of Kinesiology," said Harris, associate professor. Only two other institutions received more than one fellowship award this year, which Harris says speaks well of William and Mary's expanding emphasis on undergraduate research. "That both the College's awards were

to students in the Department of Kinesiology particularly reflects the significant impact we are having on undergraduate physiological research."

Berberich will be continuing work she began in Looft-Wilson's vascular physiology laboratory this past semester. Looft-Wilson's lab investigates the effects of different cardiovascular risk factors on the functioning of arteries, and Berberich's research will be exploring

the relationship between shear stress, a mechanical force on blood vessel walls, and ENaC, a sodium channel in the membrane of cells within blood vessels. Her work this summer hypothesizes that ENaC is critical to normal functioning of arteries, and will further scientific understanding of blood vessel function and, potentially, heart disease.

This summer will be Horst's first introduction to laboratory research. She will be working in Harris's molecular and cardiovascular physiology laboratory, studying the interaction between eNOS, an enzyme that controls blood vessel dilation, and cdc37, a protein that interacts with the enzyme. Horst predicts that if changes in the levels of the protein affect the enzyme as hypothesized, her summer work may lead to therapies for vascular diseases such as hypertension. After her undergraduate work, she plans on pursuing an M.D./Ph.D., which will allow her to translate scientific procedures into patient treatments.

The American Physiology Society awards a maximum of 24 undergraduate fellowships a year in the U.S. based on previous research projects and academic achievement. The students will be expected to present their work at an APS conference within the next year.

—L.H. Brumfield

Law professors receive Fulbright grants

Glenn George and Trotter Hardy of William & Mary Law School will lecture overseas in 2009 in China and Portugal, respectively, as part of the Fulbright Scholars Program. The program, funded by the U.S. Department of State, each year sends scholars and professionals to more than 140 nations. Its namesake, Senator J. William Fulbright, championed the creation of the program after World War II to foster "mutual understanding between the people of the United States and the people of other countries of the world."



Glenn George



Trotter Hardy

George has never visited China before and said she applied to lecture there because of the country's increasing importance in the world economy and her desire to learn about the country and its culture. Her five-month term as a lecturer will begin in February 2009 and she is awaiting word on what university will serve as her host institution. Her scholarship centers on employment discrimination, labor law, sports law, and civil procedure. George is leaving the Law School this summer to join the law faculty of the University of North Carolina at Chapel Hill.

Hardy, an expert in copyright, intellectual property, and trademark law, has accepted an invitation to lecture at the Portuguese Catholic University in Lisbon for three months beginning in January. He will teach both an undergraduate and graduate-level courses on intellectual property with a comparative focus. Hardy has not traveled to Portugal previously and said he applied to teach at the university because of its international program's exceptional reputation in his specialties. Both professors will lecture in English.

—Jaime Welch-Donohue

Graduate students showcase their research

William and Mary's seventh annual Graduate Research Symposium was held March 28 and 29 at the University Center.

The following awards were won by work done by William and Mary graduate students:



Wendy Korwin, a graduate student in American studies, answers a question on her symposium presentation comparing the judging standards of contemporary dog shows with those of old slave markets.

Market Access International, Inc. Award for Excellence in Scholarship in the Humanities and Social Sciences: Erin Krutko, American Studies. Advisor: Charlie McGovern. "Public Memory and Racial Reconciliation in Little Rock"

Incogen, Inc. Award for Excellence in Scholarship in the Natural and Computational Sciences: Ningfang Mi, Computer Science. Advisor: Evgenia Smirni. "Performance Impacts of Autocorrelated Flows in Multi-tiered Systems"

Award for Excellence in Scholarship in the Humanities and Social Sciences: Wendy Korwin, American Studies. Advisor: Leisa Meyer. "Spectacles of Breeding: Kinship and the American Dog Show" *Honorable Mentions:* Natalie Brito, Psychology. Advisor: Peter Vishton. "Influences of Motor System State on Ebbinghaus Illusion Magnitude" and Shereen Singer, Psychology. Advisor: Jennifer Stevens. "The Power of Imagery: Using Mental Imagery to Reduce Food Cravings"

Award for Excellence in Scholarship in the Natural and Computational Sciences: Jonathan Holley, Biology. Advisor: Randolph M. Chambers. "Water Quality in Headwater Streams: A Test of Best Management Practices" *Honorable Mentions:* Mary Levillain, Psychology. Advisor: Pamela S. Hunt. "Can Nicotine Ameliorate Memory Deficits Found in Fetal Alcohol Syndrome?" and Meghan Revelle, Computer Science. Advisor: David Coppit. "How To Find a Needle in a Digital Haystack"

Posters representing the work of graduate students were displayed in the University Center lobby throughout the symposium and a number of graduate students gave 15-minute oral presentations in the various rooms of the University Center.

The keynote address was delivered by former diplomat Mitchell Reiss, vice provost for international affairs at William and Mary. Titled "Bridging the Gap: From the Ivory Tower to the Corridors of Power," Reiss addressed how the skills and lessons accumulated during graduate studies can benefit leaders beyond campus in the diplomatic, political and business worlds.

The Graduate Research Symposium was hosted by William & Mary's Graduate Student Association of Arts & Sciences and the College of Arts & Sciences' Office of Graduate Studies and Research.

—Joe McClain

Oceanographer named 'Outstanding Faculty'

Carl Friedrichs, an oceanographer at the School of Marine Science/Virginia Institute of Marine Science at the College of William and Mary, has received the Commonwealth's highest honor for professors.



Carl Friedrichs

Friedrichs was one of the 12 statewide recipients of 2008 Outstanding Faculty Awards (OFA), sponsored by the State Council of Higher Education for Virginia and by the Dominion Foundation. The award recognizes the finest among Virginia's college faculty for their demonstrated excellence in teaching, research and public service. The General Assembly and governor created the award in 1986.

Since the first presentation in 1987, members of the William and Mary faculty have received the award 31 times, more often than professors of any other Virginia college or university, public and private.

The fourth OFA award winner from the faculty of the School of Marine Science/Virginia Institute of Marine Science (SMS/VIMS) since 1987, Friedrichs is a professor of marine science. He joined VIMS as a visiting assistant professor in 1993, the same year he received his Ph.D. in oceanography from a joint program conducted by Massachusetts Institute of Technology with Woods Hole Oceanographic Institution.

Friedrichs's research covers a wide range of topics in geological oceanography, physical oceanography and marine science and touches on many issues of environmental concern. Some of his most notable work has involved marsh morphodynamics—the study of how coastal wetlands respond to pressures of sea level rise and coastal development. He also has made important contributions to the study of continental shelf sediment transport, the investigation of how material eroded from the shore finds its way into the ocean, ultimately forming the deposits that create sedimentary rocks and trap fossil fuels.

VIMS Dean and Director John Wells says, "Carl is truly deserving of the SCHEV award. He's an outstanding scientist, an excellent teacher and an advisor who cares deeply about the success and welfare of his students. His research benefits the Commonwealth, and he has an enviable record of producing students who go on to make a difference in academia, industry and government."

—Joe McClain

Mellon grant funds two new environmental programs

The Environmental Science and Policy program at William and Mary has received a \$1.5 million grant from the Andrew W. Mellon Foundation. The grant will allow the College to establish two new highly innovative programs: a Center for Geospatial Analysis and a "teacher-scholar" postdoctoral program in the interdisciplinary environmental science program.

The Environmental Science and Policy program is one of William and Mary's most successful interdisciplinary programs, drawing dozens of participating faculty from several departments and from the Virginia Institute of Marine Science. Timmons Roberts, a professor of sociology, is the program's director. Two other faculty members will take lead

roles in incorporating enhancements to the program. John Swaddle, associate professor of biology, will oversee the establishment of the postdoctoral fellows program. Swaddle also is the program's director, but is currently on research leave. Greg Hancock, associate professor of geology, will coordinate the establishment of the Center for Geospatial Analysis (CGA).

The second aspect of the Mellon grant, establishing the postdoctoral program in environmental science and policy, also will benefit both students and faculty across the College.

Strikwerda said that a series of postdoctoral fellows on staggered two-year terms, two at any one time, will participate in the program. Postdoctoral fellowships are temporary positions held by scholars with new Ph.D.s., and are more common in large research-oriented institutions, although William and Mary typically has a few in the physics and applied science departments. Strikwerda explained that \$800,000 of the Mellon grant is to start an endowment for the post-doctoral program. The College must raise an additional \$1.6 million to complete the endowment. For this matching endowment the College will turn to private donors—many of whom are eager to see their resources support the role the College can play in our collective understanding of environmental concerns. Roberts pointed out that the Mellon Foundation has been a stalwart supporter of William and Mary's environmental program for years.

—Joe McClain

College participates in HHMI initiative

This fall, a group of freshmen will begin their first year participating in a long-term biology research project, part of an initiative to reform science education by the Howard Hughes Medical Institute (HHMI).

William and Mary is one of 12 schools nationwide to be selected for participation in the Phage Genomics Research Initiative, a program conducted by HHMI's Science Education Alliance (SEA).

"The phage genomics course is the beginning of the transformation that the Science Education Alliance hopes to bring to science education," said Tuajuanda C. Jordan, a biochemist and director of the SEA. "The institutions that we have chosen really see the long-term impact that the program can have on their students and their institutions. The participating faculty have support at all levels for implementing and expanding on the program."

At William and Mary, the two-semester course will be taught by Margaret Saha and Mark Forsyth of the College's biology department. The inaugural phage genomics course will consist of one section of 20 students or two sections of 15 students, depending on the degree of interest.

"I really think that this ranks as one of the most innovative and exciting ideas that I've seen in science education in a long, long time," Saha said. "This dovetails perfectly with the mission of William and Mary, too. It's what we do here already—blend research and teaching."

Participants will use a variety of sophisticated scientific research techniques to study the genetic makeup of phages—bacterial viruses found in soil. The phage genome project is the first major educational initiative of the Science Education Alliance. William and Mary will receive three years of support from HHMI to assist with faculty



Margaret Saha in her laboratory

training, reagents, computing support and DNA sequencing services for the course. Saha said incoming freshmen will be notified about the application process for the program. If the program is successful at William and Mary, she said it will be expanded to any interested biology major and continued past the three-year HHMI support period.

"It's actual research. It's not 'research-like.' It's not playing at research or teaching how to do research," Saha said. "It actually is research with the goal of discovering new knowledge."

—Joe McClain

A birdhouse for the chancellor



Murray Scholars Program Director Dan Cristol presents a special-edition birdhouse to College Chancellor Sandra Day O'Connor before the retired U.S. Supreme Court justice had lunch with the College's Murray scholars during Charter Day weekend. Watching from the couch are, from left, Murray Scholars Isabelle Cohen '12 and Jennifer MacLure '11.

Musick honored for lifetime opus

Jack Musick of the Virginia Institute of Marine Science has been awarded the Commonwealth's Lifetime Achievement in Science award for his work on the ecology and conservation of marine fishes and sea turtles. The award was announced by Virginia Governor Tim Kaine and Science Museum of Virginia Director Richard Conti.



Jack Musick

Musick, emeritus and former Marshall Acuff Professor of Marine Science at VIMS, has earned an international reputation during a 40-year career in which he has authored or co-authored 150 research articles and advised 89 graduate students, the latter likely a record for marine science graduate education in the U.S. His annual field trip to study Virginia's freshwater fishes—the Roanoke Round-up—has become a favorite tradition of VIMS graduate students.

Musick has also written or edited 12 books. Three of these—*Biology of Sharks and their Relatives*, *The Biology of Sea Turtles and Fishes of Chesapeake Bay*—are considered classics in their fields.

"Jack's achievements are the envy of his peers," says VIMS Dean

and Director John Wells. "His research underlies conservation and management efforts for sharks and sea turtles worldwide, and his accomplishments in education are extraordinary. By personal example and direct training he teaches graduate students how to do science of the highest caliber. Jack is a scholar who produces scholars."

—Dave Malmquist

VIMS scientists to study blue-crab disease



VIMS post-doctoral fellow Terry Miller checks blue crabs as part of the *Hematodinium* study.

Jeffrey Shields of the Virginia Institute of Marine Science received a five-year, \$2.4-million federal grant to study how fishing pressure and declines in water quality affect the emergence and spread of a blue crab disease in the seaside bays of Virginia's Eastern Shore.

The grant to study *Hematodinium*, a parasite, comes through the Ecology of Infectious Diseases Program, a joint effort of the National Science Foundation and the National Institutes of Health.

Shields is joined on the project by VIMS researchers Kimberly Reece and Harry Wang, along with Mark Butler of Old Dominion University. The grant supports three new post-doctoral fellows and three graduate students at VIMS.

Shields notes that fishing pressure is known to affect the movement, aggregation, feeding and mortality of marine organisms, and therefore the transmission of disease.

"Anecdotal evidence suggests that some fishing practices may help to spread the disease," says Shields. "These include culling of the catch between locations, re-baiting with infected animals, and in some cases using male crabs as bait to attract pre-molt females for the soft-shell fishery."

—Dave Malmquist

Editors organization honors George Greenia

George Greenia was awarded the 2007 Distinguished Editor Award by the Council of Editors of Learned Journals (CELJ). Greenia was honored for his leadership of the research journal *La corónica*.

Professor of Hispanic studies and former director of Renaissance and medieval studies at the College, Greenia has also edited the public scholarship magazine *American Pilgrim* as well as an encyclopedia of medieval Spanish literature.

An international organization of humanities journals, the CELJ presents this award to editors who have left a lasting impression on their professional fields, guiding research of lasting archival value.

Loosely translated from Spanish as "the Chronicle," *La corónica* publishes scholarly work on medieval Spanish language, literature and cultural studies. In his 14 years as editor-in-chief, Greenia expanded the former newsletter into a "full-fledged first-tier journal of international rank," according to the tribute published by the CELJ.

—L.H. Brumfield

Shorebird researchers to fly over Panama again

Two researchers from William and Mary's Center for Conservation Biology will travel to Panama this fall to study populations of migrant shorebirds.

Bryan Watts, director of the center, and Bart Paxton, a research biologist, will continue research the Center for Conservation Biology (CCB) began in 1997 in the Bay of Panama after the U.S. agreed to turn the Panama Canal over to the nation of Panama. The Bay of Panama, at the Pacific entrance to the canal, is an important wintering

grounds and stopover point for many species of shorebirds.

Watts explained that the bird's wintering grounds were endangered by urban sprawl from Panama City and by shrimp farm operators, who ruin habitat by gouging out mangrove forests for their operations. When they return to Panama, Watts and Paxton will conduct low-altitude shoreline flights over mudflats, the plane flushing up birds by the hundreds

and thousands to be counted. The two William and Mary researchers will compare numbers and species distribution in the area to the benchmark surveys of 1997 to evaluate any changes over the past decade.

The project is funded by the U.S. Department of Defense Legacy Resource Management Program.

—Joe McClain

A matter of timing: Student aces physics GRE

Ashwin Rastogi, a member of William and Mary's class of 2008, scored the highest possible score on the physics Graduate Record Exam. His score caused dropped jaws throughout Small Hall, home of the College's physics department.

"I checked with everyone in the department and even with all the emeriti I could get hold of," said Christopher Carone, Rastogi's faculty advisor. "No one has ever heard of anyone at William and Mary having a score this high."

Rastogi scored a 990, the highest possible score, on his first attempt at the physics GRE. He attributed his success to a timing strategy suggested by Carone.

"If you had five or ten minutes to solve the questions on the physics GRE, anyone with a physics background could do it," Rastogi said. But with 100 questions to calculate and answer over a mere three hours, rationing of time is of the essence, because it works out to an average of a little over a minute and a half per question. Rastogi perfected his pace on the four available practice tests for the physics GRE.

"I told Ashwin that the important thing about the practice tests is that you use them to get your timing down," Carone said. "In a test like this, what can really mess you up is that can you run out of time and miss a third of the questions."

Rastogi's GRE achievement places him in the 97th percentile, a score almost certain to make him attractive to schools in the stratosphere of graduate physics study, Carone said. He has done research in three departments, having worked with faculty in math and chemistry as well as collaborating on a physics project with Carone.

Rastogi also won the Thomas Jefferson Prize for Natural Philosophy, the College's award for the top science student of the year. At commencement, he was awarded the 2008 Lord Botetourt Medal, presented to the graduating senior with the highest distinction in scholarship.

—Joe McClain

Ashwin Rastogi double-checks his score on the physics Graduate Record Exam as faculty advisor Christopher Carone applauds his highest-possible score.



Are we losing terrapins to crab pots?

Megan Rook, a graduate student in William and Mary's Department of Biology, has received \$20,000 in funding to allow her to continue her studies of diamondback terrapins.

The grant funds came from the National Oceanic and Atmospheric Administration and the National Estuarine Research Reserve System. Rook is working with faculty advisor Randy Chambers of William and Mary's W.M. Keck Environmental Field Laboratory.

Rook's project examines the effects of the Chesapeake Bay blue-crab fishery on the diamondback terrapin population.

"The blue crab industry is huge in the Chesapeake Bay and the turtles can get into the crab pots and they get stuck in there and they drown," Rook said. "This is becoming a very big threat in certain parts of the terrapin's range."



Megan Rook stacks terrapin traps.

This summer, Rook will compare terrapin populations and their relative vulnerability to crabbing at two York River locations. She said that though the diamondback terrapin were fished out during the early 1900s, the species has made a comeback through most of its range, including the York River. Today, terrapins face other dangers than crabbing, she said, citing road deaths and predation, especially of nests, by raccoons.

Rook has been continuing work started by Matthew Wolak, who graduated in 2007. She will assemble a team of undergraduates to assist in the project this summer.

—Joe McClain

From the fryer into the van

In a corner of the Keck Environmental Field Laboratory sit an old water heater, a plastic holding tank and a few pumps, set up in a purple-painted particleboard frame with the air of an eighth grade science project.

In a terrarium a few feet away, tiny turtles sun themselves and swim, either unaware or unconcerned that they are neighbors to William and Mary's first biodiesel fuel plant.

The fuel plant will process waste cooking oil into usable biodiesel, with an octane content that the project sponsor says should be similar to regular diesel. Although the fuel plant is still in experimental stages, participants expect their recycled french-fry oil to power College vehicles and warm a Williamsburg church.

Inspired by the projects of the Backporch Energy Initiative, a non-profit environmental organization recently started by William and Mary graduates, a seminar group of College freshmen decided to operate the biofuel plant as a community-building project.

A Sharpe Scholar program

The students are all Sharpe Community Scholars, members of a program that engages first-year William and Mary students in civic engagement and community outreach. Sharpe Scholars conduct year-long service projects, designed and implemented by the students as part of a for-credit service learning seminar.

"It's not just the environmental aspect that's important," said Dennis Taylor, faculty sponsor of the project and professor at William and Mary's Virginia Institute of Marine Science. "The question is, how do you establish relationships in a community?" By using waste cooking oil from a local restaurant in their biodiesel plant, Taylor said this year's environmental seminar aimed its project at actively involving community businesses and local organizations in an environmental exchange.

A member of the congregation of the Williamsburg Unitarian Universalist Church donated much of the equipment to the project. In return, the church will receive a large share of

Beginnings takes a look at particularly intriguing and/or promising work at an early stage.

the processed biodiesel to be used as heating oil. The waste cooking oil is being donated and delivered by the Aberdeen Barn, a local Williamsburg restaurant. Like many other restaurants, the Aberdeen Barn produces large amounts of waste oil every week, and normally pays to dispose of the oil, Taylor said.

Although the project took shape during the fall semester, the Sharpe Scholars built the actual fuel plant equipment in January, and just began testing around the last week of March. The students run the oil through the water heater, slowly heating the oil, before allowing it to settle and separate in the holding tank. The process takes around six hours to complete.

After bubbling water through the holding tank to clean out impurities, the biodiesel is siphoned out, and the process is ready to begin again. Taylor estimates that a single run processes around 35 gallons of waste cooking oil, producing 85 percent biodiesel, with around 15 percent waste product and glycerin byproduct.

Warming the church

While the majority of the biodiesel will be given to the Williamsburg Unitarian Universalist Church. Some will also be used in campus transportation. The Sharpe Scholars are still



Students (from left) Matthew Ryan and Clare Stankwitz pour waste cooking oil into the processor while Chelsea Estancona and advising community member Craig Marcuson look on.

working on finding a use or a safe disposal for the glycerin and waste product.

"We still have to work out whether the benefits of this project outweigh the costs," said Taylor. He explained the group will have to examine how to dispose of the process's byproducts and factor in the cost of the electricity to produce the biodiesel.

"It's still in its experimental stages, so we just don't know," he added. "We have to look at the big picture." 