OLD DOMINION UNIVERSITY’S
RESEARCH • INNOVATIONS • BREAKTHROUGHS

QUEST

COVER STORY:
Women Stir Up Physics

ALSO INSIDE:
GEOTRACES Expedition
Advice for Nonprofits
Old Dominion researchers reached a major milestone earlier this year in the university’s storied maglev vehicle research project. Led by Thomas Alberts, professor of aerospace engineering, and Jerry Creedon, director of transportation research, the team was successful in levitating and propelling a 12-foot-long test sled on 50 feet of elevated track. The demonstration for school officials and local media indicated that some of the problems that have arisen with slower-speed maglev transportation have been solved.

And while newspapers celebrated with headlines like “ODU scientists have liftoff on maglev experiment,” many of us on campus were reminded of the vitally important role universities play in challenging conventional wisdom to create new opportunities, innovative technologies and fresh ideas. It was not so long ago that the project had hit a wall and seemed doomed. “Problems with Old Dominion University’s maglev train raises red flags,” said one headline. “Maglev train hits bumps,” declared another.

But the university—in the form of its talented faculty researchers and determined students—persevered in a project it believed to have great potential. Alberts, Creedon, their colleagues and their students tasted the sweet victory that comes from more than three years of largely unnoticed toil in a machinery shop of the Frank Batten College of Engineering and Technology.

There are still many miles to go before maglev is a qualified success. But the accomplishment of ODU’s maglev research team teaches us why universities should continue leading the way in research, even when the way isn’t so easy. You can find more about the demonstration on the back cover of this magazine.

Elsewhere in this issue of Quest you will learn more about cutting-edge research and breakthroughs at ODU. You will find articles about faculty and students from all six of the university’s colleges, and each of their accomplishments holds lessons for us about dedication and innovation.

The cover story provides yet another glimpse of the extraordinary performance of our faculty. Gail Dodge, chair of the Department of Physics, and her colleague Lepsha Vuskovic, are proving to be very successful mentors of female graduate students. More than 30 percent of the physics Ph.D. students at ODU are female, and that’s close to twice the national average.

The regular dinners that the physics professors hold in their homes for the female students help to explain why our university is making such a fine contribution to gender equity in a traditionally male discipline. I must admit, I was intrigued by Professor Vuskovic’s latest menu, especially the gibanica.

John R. Broderick
Acting President
CONTENTS

Comment ................................................................. 2
News Briefs ............................................................... 4
International GEOTRACES
Taps Expertise at ODU ........................................ 9
Gas Behaving Strangely .......................................... 13
Women Flock to Physics ........................................ 16
Dealing with Differences
Nursing Educators Are Leaders in
Helping to Bridge Cultural Gaps .............................. 21
For-Profit Marketing Strategies
for Nonprofit Organizations ................................. 24
Postscripts ............................................................... 28

Opinions expressed do not reflect the official views of the university. For permission to reprint text from Old Dominion University's Quest, contact the editor, Jim Raper, Institutional Advancement, 100 Koch Hall, Norfolk, VA 23529; (757) 683-5585; fax (757) 683-5501; e-mail jraper@odu.edu
Socialism was as big a failure for scientific research as it was for economics. Almost 20 years have passed since the collapse of communism in Eastern Europe and, in my perception, scientific research is still operating, at least in Bulgaria, under the previous socialistic model.

The strength of American science is the peer-review system that rewards good ideas whether they come from senior or junior scientists. The United States never bought into the classical European educational system where only the senior professors could determine the course of research. Europe, mainly France, Germany, England and Italy, made this system work because, even though it took seniority to set your own agenda, the quality of science determined who were the seniors in charge. Internal politics played only a small role at great universities such as Cambridge and Goettingen.

The communists expanded on the worst aspects of the European system by making party membership and, hence, politics a determining factor in selecting the science to be pursued and the scientists to be supported. Central planning of science was a disaster. Remember the incredible efforts of the Soviet Union to be a leader in the space research? Even though they shocked the world by putting the first artificial satellite in orbit in 1957, they never duplicated the American effort of putting a man on the moon in 1969.

The ability of the U.S. peer-reviewed system to select young, bright scientists for research funding was evident in my experience as a program director at the National Science Foundation in 1982-83. I handled the review of 200 proposals in analytical chemistry that year. Of the 70 that were chosen for funding, for an average of $100,000, only two applicants received the full budget they requested. They were both assistant professors in their first academic appointments. They were the best two proposals I saw that year.

I saw the political system at work in the communist countries when I served on the U.S. Committee of the International Union of Pure and Applied Chemistry (IUPAC) from 1986-92. IUPAC sets chemical standards and defines nomenclature and literature systems for chemistry worldwide. There are more than 100 member nations and getting worldwide agreement is a formidable task. The U.S. team worked well together as every member was a leading research chemist from a university, industry or national laboratory. However, the teams from the communist countries were not only not leaders in their science, many had no science training at all but had obtained their prestigious appointments politically. Not much of note ever came from these members.

In 1992-93 I served as the Provost in the founding of the American University of Bulgaria. Bulgaria is slightly smaller than Virginia and has about the same population. I became well acquainted with the Bulgarian research establishment and I was appalled. The entire country was not as well equipped as the chemistry department of one major university in our country. A political unit called the Bulgarian Academy of Sciences controlled the entire research effort of the country. There was no competition and very little was accomplished.
At that time I wrote, “Will Bulgaria join the West? Not for a long, long time. The gap is very far. My fear is that countries like Bulgaria will settle into some form of mediocre socialism. Maybe it’s the best that they can hope for.”

I was recently asked to serve on a review team on chemical research in Bulgaria for the minister of education and science. Here was a chance to see what had transpired in the last 15 years. In May I led the review team that included the former minister of science of Slovenia and a leading German university chemist on a weeklong review of the seven chemical institutes and central laboratory of chemistry within the Bulgarian Academy of Sciences. We also visited the two universities conducting chemical research. All units were located in the capital, Sofia.

Bulgaria became a member of the European Union in 2007 and a lot of progress has been made. If things like transportation infrastructure are any indication, Bulgaria is better off than Russia, which I also visited this summer. However, the scientific establishment is just where it was 15 years ago. Only the most senior members of the Academy of Sciences are allowed any influence in setting the agenda. Institutes, which vary greatly in quality, continue to be under-funded at approximately the same level as in the past. There are no incentives for progress.

Let me give you a poignant example. Under communism, Bulgaria had a thriving microelectronics industry. They exported computers and control devices throughout the communist world. The industry was so successful that it spun off an Institute for Research in Solid State Physics to pioneer developments that could be commercialized. When communism collapsed, Bulgarian microelectronics products were not competitive with those of the West and the industry died. I visited the several acres of manufacturing buildings that once housed the industry and now stand vacant on the outskirts of Sofia. But, across the highway, the Institute for Research in Solid State Physics is still in business. It just doesn’t have a customer. The weeds on the grounds of the Institute are four feet high and it doesn’t look like a modern instrument has been purchased in 20 years. However, the Institute is still doing the same kind of research that it did when Bulgaria had a successful industry within the non-competitive communist world.

Needless to say, our recommendations to the minister do not include small changes in the research operation. We basically said they have to create an incentive system to reward success and start supporting their young people. Among their other problems, virtually all of the top science and engineering graduates in Bulgaria immigrate to Europe or the United States. There is nothing for them at home.

In “The Demon-Haunted World,” Carl Sagan parallels science and democracy, stating that both are based on the principle of open debate, have mechanisms for correcting errors and do not depend upon authorities that must be believed and obeyed.

America has set the standard for the world by freeing its young people from the authorities of the past and establishing systems to attract good thinking and reward good thinkers. The incentive mechanism is just as important in research as it is in economics. Systems that fail to reward innovation are bound to become obsolete. Universities and industries that want to participate in the future, instead of the past, can do so only by attracting bright young people and supporting them.

Isenhour is a professor of chemistry and biochemistry and former ODU provost.
Old Dominion University’s first teraflop compute cluster, which has been given the name Zorka, was installed in the fall of 2008 on the fourth floor of the E.V. Williams Engineering and Computational Sciences Building and is already winning rave reviews from the university’s research community.

A teraflop equals 1,000 gigaflops, and this is a measure of performance that Zorka can attain when running even at partial capacity. (An average desktop system peaks near 5 gigaflops.) The new, Dell high-performance cluster can handle the data crunching required for complex studies and simulations in fields such as aerospace engineering, mathematics, oceanography and bioelectric engineering.

Michael Sachon, assistant director for research computing in ODU’s Office of Computing and Communications Services (OCCS), said the Zorka cluster is rated at 1.5 teraflops and offers the nifty combination of high-performance computing and fast disk space within the cluster to allow applications to run at very high speed and with low latency. This setup solves a problem akin to traffic congestion that researchers have encountered with the university’s older equipment. Sachon refers to it as a “bottleneck” in the link between the compute processors and the external disk space that, during peak usage, was like the Hampton Roads Bridge-Tunnel on a Friday afternoon in the summer.

Michael Dinniman, a research scientist with ODU’s Center for Coastal Physical Oceanography, is an example of a satisfied customer. He moved quickly to begin using Zorka in his computer modeling to simulate the ocean circulation and sea-ice dynamics on the western side of the Antarctic Peninsula. His simulations, which will provide valuable information about effects of climate change, are running on Zorka more than four times faster than they did on the university’s aging Orion cluster.

Other than Sachon, the university’s Research Computing Group includes Ruben Igloria, who focuses on high-performance computing applications and is the lead systems administrator; Mahantesh Halappanavar, who focuses on parallel programming and grid computing; Amit Kumar, who focuses on parallel applications and cluster and research storage; and George McLeod, a systems engineer for Geographic Information Systems.
Case Studies at Heart of Special Education Text

It was a daunting task to combine 39 years of professional experience and the first eight years of a child’s life into one textbook, but Old Dominion University professor Sharon Raver-Lampman said she loves a challenge. Her new textbook, “Early Childhood Special Education—0 to 8 Years: Strategies for Positive Outcomes” (Merrill/Pearson), does just that, providing strategies for intervention and aiding the development of children with special needs.

Applying her professional knowledge and experience to 12 case studies of special education students, Raver-Lampman presents a great amount of information in a manageable and interesting way. “Before I came to ODU I taught in public schools for 17 years, so I have a very practical view about what teachers in training need,” said Raver-Lampman.

Applied strategies, family case studies and end-of-chapter application exercises are some of the features she built into her textbook to aid these future teachers. It is designed to be an introduction and strategies text for preservice teachers who want to teach children with special needs from birth to age 8.

For two years, the book was all Raver-Lampman thought about. “I actually turned it in early, which very few ever do,” she said. “In the summers, I’d do nothing but get up, write and go to bed.”

She characterizes her book as more “applied” than many others that focus primarily on theory. “I saw what was out there and thought I could do better,” she said.

Currently, nearly 40 universities are reviewing the book for possible adoption. “I’m optimistic. I’m hoping it will be well received. My last book, ‘Intervention Strategies for Infants and Toddlers with Special Needs: A Team Approach,’ was used by Eastern Virginia Medical School, Johns Hopkins University and Vanderbilt University, and so I think this book has a good chance of adoption,” she said.

—Bryoney Hayes

Researcher on Trail of Ancient DNA

Old Dominion University faculty member Alex Greenwood had a busy fall of 2008 because of his research into the disease-related extinction of island-bound rats 100 years ago and related research into the woolly mammoth, which became extinct 10,000 years ago. Greenwood, who is widely known for his research with ancient DNA, was a source for an Associated Press story distributed internationally in November. The story noted his expertise in exploiting DNA retrieved from preserved bits of long dead animals and quoted his assessment of the recent work of other scientists to decipher much of the genetic code of the woolly mammoth.

“An amazing achievement” is how the ODU researcher described the work of the other scientists, who studied DNA from mammoth hair that was found frozen in the Siberian permafrost. News media were quick to seize on the possibility that the deciphering of the full genetic code a decade or so from now could result in the recreation of a woolly mammoth. Greenwood received inquiries from several reporters seeking his evaluation of the report. After he talked with the AP reporter, he also did an interview to be broadcast on a television station in Washington, D.C.

Earlier in November, Greenwood was featured in another widely distributed AP story about his research, again utilizing ancient DNA techniques, that shows disease was responsible for the extinction of rats native to Christmas Island in the late 19th and early 20th century. The findings were the first to demonstrate that disease can lead to the extinction of a mammal. The study of Christmas Island rats also involved Greenwood’s colleagues in ODU’s Department of Biological Sciences, Kelly Wyatt, a graduate researcher, and Wayne Hynes, interim chair and professor of biological sciences, as well as researchers at the American Museum of Natural History.
Exhibition of New Curator Mines Self-Taught Art Collection

Ramona Austin, who became curator of Old Dominion University’s Gordon Galleries in 2008, got right to work by producing the exhibition “In Depth: the Hand of the Self-Taught Artist” from the collection donated by Baron and Ellin Gordon, for whom the facility is named. “In Depth” will run through Sept. 21, 2009.

The exhibition launched with a reception at which members of the ODU art faculty discussed artists in the collection and their place in contemporary art, giving scope to the collectors’ vision that has shaped this unique body of contemporary self-taught art. Housed in a dedicated gallery, the Gordon Self-Taught Art Collection is a donation of approximately 350 works in all media by many of America’s leading self-taught artists.

Austin is responsible for the accessioning, care and interpretation of the self-taught collection; planning and installing exhibitions in each of the facility’s galleries; and overseeing the documentation and registration of the university’s general art collection of more than 300 works dispersed around the campus.

The curator has considerable curatorial and directorial experience. She has been the director of the Hampton University Museum and Archives; the Margaret McDermott Associate Curator for African Art at the Dallas Museum of Art; and associate curator for African art, Department of Africa, Oceania and Americas, at the Art Institute of Chicago. She is finishing her dissertation for a doctorate in the history of art at Yale University.

The Baron and Ellin Gordon Art Galleries are located at 4509 Monarch Way in the University Village. The galleries are open 11 a.m. to 5 p.m. Tuesday to Saturday and 1-5 p.m. Sunday. Parking is available in the 45th Street garage.
When a permit is issued to allow wetlands to be filled for a construction project, the developer is often required by the permitting agency, such as the U.S. Army Corps of Engineers, to create elsewhere a comparable tract called mitigation wetlands. But questions exist about the efficacy of these tradeoffs, and Old Dominion University geologist Richard Whittecar has received a grant to examine reasons why mitigation wetlands sometimes produce disappointing results.

Whittecar is part of a team, which also includes researchers from Virginia Tech, that received $600,000 from the Peterson Family Foundation for a 36-month study on behalf of the Piedmont Wetlands Research Program. The researchers will assess existing procedures and models for their effectiveness in predicting groundwater and surface water flows in mitigation wetland sites typically constructed in the Virginia Piedmont. The models that prove to be most effective will be packaged as modules and incorporated into a software package that will be easy for wetland developers to use. In addition, the researchers will develop training materials and offer workshops to teach others to use the new software product.

Tiny Protists May Hold Clues About Climate Change

Old Dominion University oceanographer Alex Bochdansky has received a $540,000 grant from the National Science Foundation (NSF) for a three-year study of microbes that live in the deep oceans and how these tiny creatures may play a role in the ocean’s reaction to climate change.

Eukaryotic microbes—also called protists—of the deep-sea water column, most of which are flagellates that feed on bacteria, are important to the study of the carbon cycle. But they have resisted study because they live so far below the surface, and because their activities and very existence may be severely impacted if they are hauled up three or four miles onto a research vessel. To counter this, Bochdansky and his colleagues at the Royal Netherlands Institute of Sea Research have designed and built a pressure culture system that allows them to incubate deep-sea samples and then monitor the microbes at the same pressure and temperature that they encounter in nature. Bochdansky said a seed grant of $50,000 from NSF in 2005 enabled the development of the culture chambers and helped in the formulation of the hypotheses that will be tested in the three-year study.

“Our main hypothesis is that the abundance and taxonomic composition of protists serve as sensitive indicators of the strength and type—particulate or dissolved—of input of organic carbon into the deep ocean system,” said the ODU assistant professor of ocean, earth and atmospheric sciences. The oceans sequester large amounts of carbon that otherwise might be the atmospheric carbon dioxide that is a major constituent of greenhouse gases. For example, phytoplankton and other organisms on the ocean surface absorb carbon dioxide as they grow. Death and decay of this organic growth results in carbon sinking into the deep ocean. Decay is facilitated by bacteria, and the bacteria may be consumed by protists. So Bochdansky and his colleagues at the Netherlands institute believe that the distribution and ecology of the protists serve as indicators of how much carbon is present in these vast, dark zones.
Center for Accelerator Science Is Launched

Old Dominion University has established a Center for Accelerator Science that will tap into the rapid growth of particle accelerator technologies for atom-smashing experiments, as well as for materials processing, medical imaging and radiation therapies against cancer. The center will receive personnel and funding support from the U.S. Department of Energy’s Thomas Jefferson National Accelerator Facility in Newport News.

As its central mission, the center will train the next generation of accelerator and light-source scientists and engineers. The center also promises to bring more research funding to ODU and more high-technology economic development to southeastern Virginia, according to university officials.

Chris Platsoucas, the dean of the ODU College of Sciences, noted that the Jefferson Lab will participate in the design of a so-called “4th generation light source” facility that is expected to be built by the DOE somewhere in the Southeast. This facility, which is projected to cost upwards of $1 billion and produce the most brilliant light yet for laser and other applications in research, industry and medicine, will employ technologies already in use at Jefferson Lab.

Two years ago, ODU launched an accelerator physics instructional program with the help of Jefferson Lab, which agreed to provide three of its research scientists to serve as part-time members of the ODU faculty. The new center will strengthen ODU’s position as one of just a handful of universities—Cornell, Michigan State and Stanford are among them—that offer graduate programs in accelerator physics. Louisiana State University is the only other Southern institution that has such a program.

Andrew Hutton, Jefferson Lab’s associate director for the Accelerator Division, said the center will foster new research and enhance educational opportunities at ODU. “We have been collaborating with ODU for many years, and the center will enable even closer interactions,” Hutton said. “Jefferson Lab is committed to increasing educational opportunities in accelerator science and technology, and the new center will provide a way for students at ODU to enter this exciting field.”

The university’s Board of Visitors approved a resolution Sept. 19, 2008, creating the center effective Oct. 1.

Core members of the new center will include three full-time faculty members in the ODU Department of Physics: Professor Lepsha Vuskovic, Assistant Professor Alexander Godonov and Research Professor Svetozar Popovic. In addition, ODU’s three Jefferson Lab professors in accelerator physics, Jean Delayen, Geoffrey Krafft and Hari Areti, will be members of the center. Affiliated faculty will retain their full-time tenure track appointments in their home ODU academic departments.

ODU Releases 9th Annual State of the Region Report

The ninth annual State of the Region report examined a wide array of Hampton Roads issues, ranging from the economy to care for the mentally ill.

Published by ODU’s Regional Studies Institute, the report also looked at how local television stations cover crime and violence, and offered a review of the region’s housing markets. In addition, the 114-page report considered why women earn less than men in Hampton Roads; highlighted the economic contributions of German firms in the area; and analyzed the methodologies of the two most respected guides of metropolitan livability, paying particular attention to how Hampton Roads fares and compares in their latest rankings.

James V. Koch, Board of Visitors Professor of Economics and President Emeritus, serves as editor of the report, which received financial support from ODU and a number of local organizations and individuals. Koch notes that the report does not constitute an official viewpoint of the university.
or decades, scientists have known that they can learn a lot about the oceans from the trace elements—iron, lead and so forth—that they find within the water column and in the sediments at the bottom. But until now a global survey of trace elements has been hard to conduct, which is a problem Old Dominion University chemical oceanographer Gregory Cutter is trying to solve.

Cutter is one of the leaders of GEOTRACES, the largest research program ever in chemical oceanography, and which over the next dozen years is expected to cost more than $200 million and involve scientists from 30 countries. The research findings are expected to have a broad impact on our understanding of global climate change and seawater contamination.

Trace elements and their isotopes, or TEIs as they are called, are nutrients and contaminants in the oceans. They also reveal information about oceanographic processes, and, when found in layers of sediment, they often hold clues about ocean and climate conditions dating back hundreds of thousands of years. To the dismay of scientists, however, because insufficient data exist about the distribution and impact of TEIs in today’s oceans, they have difficulty interpreting the significance of evidence they find in sediments. They also are stymied in their attempts to create computer models based upon TEI evidence that could predict what’s in store for the oceans.

Trace Elements Reveal Health of Oceans

GEOTRACES will allow for the first time a coordinated, global assessment of ocean TEIs. It also will establish the baseline data set that scientists can use to better understand past phenomena and to measure in the near future how human activities and global warming are affecting the health of the oceans.

Cutter believes GEOTRACES can help assess global conditions that are of interest to everyone. Because TEIs, as both essential elements and toxins, “have a direct effect on phytoplankton at the base of the food web that take up carbon dioxide, their connection to the carbon cycle and global climate is pretty direct and not esoteric at all,” he adds. “That’s the answer that most people today can appreciate when someone asks who cares about trace elements in the ocean.”

The researcher says that the more we know about biogeochemical processes, the more we can learn about chemical signatures in the surface sediments. “And that allows us to develop proxies, as we call them, with which we can look into the ancient sediments. In other words, from what we find in GEOTRACES, we can then tell if those same things were happening in ancient oceans.”

In the Sept. 1 issue of Chemical & Engineering News, a publication of the American Chemical Society, an article about the launch of GEOTRACES describes Cutter’s role as chair of the program’s Intercalibration Committee. In June and July, he led an expedition in the Atlantic Ocean near Bermuda aboard the 280-foot research vessel Knorr to help establish what might be called the rules of the game for GEOTRACES.
Main Goal:
Keep Samples Clean

These rules, as it turns out, must be strict, while also allowing for procedural and analytic innovations that might come from a disparate set of scientists working all over the globe. The overarching rule is keep it clean, as in getting, storing and analyzing clean samples. This has been a pesky problem in the past for marine research involving TEIs.

Because trace elements, as their name implies, are found in minute quantities in the oceans, only a trace of contaminants can throw off research findings. In the past, TEI research has been compromised by traces of metals that come off the large instruments that are lowered into the water to collect samples. Other contamination can originate with sample bottles, the cables used to lower and hoist instruments into the ocean, films left on the water's surface by metals leaching off research vessels, airborne pollutants and even stray particles in laboratories.

Dependable research results also will require coordination of work going on in some 80 labs that will participate in GEOTRACES. It is the job of Cutter's Intercalibration Committee to make sure all of the program's researchers are operating as one, big, efficient machine. "To be usable, the results from GEOTRACES must come from collection, sample processing and storage, and analytical methods that agree with the community consensus of what the correct value is of TEI concentration," he explains.

"If we're going to research the chemistry of the oceans on a global basis and if you want to compare what's happening in the Indian Ocean with what's happening in the Pacific, you have to know that data are accurate and that the value one lab gets is the same as the other labs," he adds. One large sample of water from the expedition this past summer was divided into smaller samples and sent to all participating labs so cross-checking can be done and correct values established.

Dry Run Expeditions

Also during last summer's expedition, the researchers tested types of instruments and equipment that will be recommended for use in GEOTRACES, as well-rehearsed sampling and analysis procedures. This preliminary work is required before the central research mission can be undertaken. Next year, Cutter will lead a dry-run expedition in the Pacific Ocean, and after that he expects to continue to help guide research methodology in the U.S. portion of the program.

For the expedition, there were eight different labs on the RV Knorr that could conduct parallel tests on a single sample. In one exercise, three labs tested for iron and they got different values. "They said, 'Whoa! What's going on? What reagent are you using?"" Cutter relates. "They began swapping reagents," which, in this case, were substances used in a chemical reaction to help measure the iron, "and by the end they were getting the same values. This is intercalibration."

The researchers on the Knorr also had to overcome a problem with zinc contamination from sacrificial zinc anodes on a sampling instrument, Cutter says. Their experiences, such as solutions to the equipment glitches they encountered, will be shared in a GEOTRACES user's manual.

The GEOTRACES Scientific Steering Committee is co-chaired by Robert F. Anderson, a chemical oceanographer from Columbia University, and Gideon M. Henderson, a geochemist from Oxford University in England. The overall effort has been organized under the auspices of the international Scientific Committee on Oceanic Research (SCOR). Individual countries are funding their own portions of the GEOTRACES investigations. Cutter's work is supported by two National Science Foundation (NSF) grants, one for...
$529,000 for equipment and the other for the development of GEOTRACES scientific infrastructure for $1.4 million (ODU's share is $414,000). He is the sole principal investigator on the equipment grant and the lead investigator of the science grant. The funding "represents the first phase of this international program, but with the sampling facility based here, ODU will be involved in the program for its lifetime," Cutter said.

Equipment Is Custom Made

The equipment includes a specially designed aluminum and titanium sampling carousel that holds 30 12-liter plastic sampling bottles as well as sensors for depth, salinity, temperature, particles and chlorophyll fluorescence. This sampling package is lowered through the water column using a large winch that holds 18,200 feet of Kevlar conducting cable. Additionally, there is a 20-foot "trace metal-clean" sampling van that Cutter and his research team put aboard the RV Knorr for their intercalibration expedition this summer. This van, which serves as a portable laboratory for processing samples, and all of the equipment will be headquartered at ODU, but be available for use on a broad range of GEOTRACES expeditions.

The carousel is based upon a previous design, "but we supersized it in the grand American tradition," Cutter says with a smile. To minimize metallic contamination, the carousel is polyurethane powder-coated, and the latest design also has corrosion-resistant titanium parts, such as nuts and bolts.

Recent TEI research has been conducted with plastic equipment that doesn’t have the strength and sampling capacity of an aluminum and titanium carousel. "The plastic was effective, but time-consuming and physically demanding," Cutter says. For example, one sampling procedure might hoist back into the research boat two liters of water from 1,000 feet, and one stop at an ocean station might require continuous sampling for 24 hours. "But for an operation with the global scope of GEOTRACES, we needed to assure the sampling not only was clean and took sufficient volumes of water, but also fast." The new equip-
ment collects enough water over a broader depth range to cut time on station by half compared to traditional methods. While many TEIs serve as measures of the productivity of organisms in the oceans, there also are trace elements such as aluminum and manganese or stable isotopes such as carbon-13 that can give unique information about the continental sources of these elements. This helps scientists better understand ocean processes and the distribution of TEIs. Radioisotopes (unstable isotopes that are decaying and are the radioactive form of an element) such as thorium-230 can be “tracers” that provide information about the fates of trace elements—for instance, how fast they adsorb onto organic and inorganic particles.

Anderson, the Columbia professor who is co-chair of GEOTRACES, told Chemical & Engineering News that by studying “a suite of elements together, we can learn a lot more about the whole ensemble than we can by studying one element alone.” He added, “The community realized a few years ago that to make a big advance in understanding how these elements and isotopes operate in the ocean, we all need to work together.”

Cutter is Veteran Researcher

Researchers involved in GEOTRACES include chemical oceanographers such as Cutter, marine geochemists, paleoceanographers, radiochemists, trace-metal chemists, and specialists in contaminants and computer modeling. Curtis Barnes, an ODU oceanography equipment specialist, is in charge of the GEOTRACES equipment based at the university.

Cutter, who has faculty appointments in the departments of Ocean, Earth and Atmospheric Sciences as well as Chemistry and Biochemistry, has published more than 50 articles in journals, including Nature and Science, and has received funding in excess of $5 million for his research. Much of his support has come from the NSF. He is a principal investigator in the NSF-funded Hall-Bonner Program for Minority Doctoral Scholars in Ocean Science. In 2007, he was the recipient of ODU’s annual Faculty Research Achievement Award “for his outstanding research over more than 20 years at Old Dominion and for his international reputation as a scholar and scientist.” He has spent more than 500 days working aboard research vessels and was among an international team of scientists who participated in a 2005 trans-Arctic research expedition, gathering samples and data that will provide information about climate cycles through the ages and present-day global warming.

Richard Zimmerman, chair of the Department of Ocean, Earth and Atmospheric Sciences, says Cutter’s distinguished career at ODU includes a range of achievements outside of research. “We are equally proud of his contributions to our undergraduate and graduate education programs, as well as his service to ODU and the larger community. Two of the numerous examples of his contributions in these areas include his pioneering development of our senior capstone course sequence that gives all our undergraduate majors a real research experience in their final year at ODU, and his leadership as coordinator of the Hall-Bonner Program for Minority Doctoral Scholars.”

“With the sampling facility based here, ODU will be involved in the (GEOTRACES) program for its lifetime.” Gregory Cutter, chemical oceanographer.
When a gas flows through a gap that is significantly narrower than a human hair, strange things can happen and it has been difficult for scientists and engineers to quantify the phenomena that take over on such a small scale. But for two Old Dominion University researchers, mathematician Li-Shi Luo and engineer Ali Beskok, this is a problem that has become an opportunity.

The National Science Foundation (NSF) has invested $265,000 in their proposal to devise what might be called a composite computational model of microflows and nanoflows. Luo is principal investigator on the three-year grant and Beskok is co-PI. Their research scheme will draw from both men’s expertise and could produce results that promote further miniaturization of electronic devices and components, including disk drives and the micro-arrays of mirrors used in video projection. Fundamental research along these lines also could be applied to microsensors used in medicine or to test the air for pollution or toxins.

“T his is a case of 1 plus 1 adding up to more than 2,” says Luo of the collaboration. Several fateful interventions brought them together, and now the two men are poised to wring the best scientific conclusion possible from their good fortune.

As the university’s Richard Barry Jr. Distinguished Endowed Professor in Mathematics, Luo is a leading researcher in the ODU College of Sciences. His expertise in computational mechanics and scientific computing is useful in numerous fields. Before coming to ODU in 2004, he worked for the Los Alamos National Laboratory, the Institute for Computer Applications in Science and Engineering (ICASE) at NASA Langley Research Center, and the National Institute of Aerospace. The disparate posts reflect a multidisciplinary education; Luo’s undergraduate degree is in electrical engineering and his master’s and Ph.D. are in physics, the latter from Georgia Tech.

Beskok, who came to ODU in 2007 as the Batten Endowed Professor of Computational Engineering, is only 11 years removed from his Ph.D. studies at Princeton University in mechanical and aerospace engineering. But already he has established himself as a distinguished researcher in the rapidly expanding field of microflows and nanoflows. He is an author together with his doctoral adviser, G.E. Karniadakis, of the influential texts “Microflows: Fundamentals and Simulation” (Springer, 2002) and “Microflows and Nanoflows: Fundamentals and Simulation” (Springer, 2005).
Luo Meets Beskok

At the beginning of the decade Luo was conducting research focused on kinetic theory, and particularly on mathematical representations of how molecules behave in gases. Many of his journal articles expanded upon the theories of the 19th-century Austrian physicist Ludwig Boltzmann pertaining to movement and energy of particles in gases. The so-called lattice Boltzmann methods (LBM) are the bases for an advanced simulation technique for complex flows that usheres computational fluid dynamics away from models based on flows in a continuum—which treats a quantity of gas something like one, large blob—and toward simulations of imaginary particles as they propagate and collide in consecutive processes within an imaginary lattice mesh.

“For 100 years we’ve been very successful characterizing fluid motion using the continuum process,” said Luo. “Now the scenario changes to a collection of particles rather than a continuous mush.”

Take, for example, a rotating hard drive and the read/record head that flies just above the disk. “The gap between them is less than a micron, less than one-millionth of a meter,” Luo explained. “Now the questions are different. For anything too small, everyday intuition breaks down. The air in this room,” he added, waving his hand over the desk in his office, “is mostly molecules bumping into each other, as opposed to bumping into the ceiling, the walls, the floor. But with a small gap, what do you have? You have more molecules in the gas bumping against surface material.” So to predict the effects from air on a hard drive flying over a hard drive requires an understanding of the behavior of discrete particles rather than of a continuum flow. This can pose a computational nightmare, because modeling the kinetic whirl of discrete particles—even relatively fewer of them in a tight space—is much more difficult than modeling the behavior of a gas that is treated essentially as a collective continuum.

Shortcut is the Answer

“We have the equation, but when you get to an equation for each molecule, it becomes very tedious to solve,” Luo said. “Nobody, no computers can handle it. So we need a shortcut. We need to try to cheat and not get caught red-handed.”

That takes us back to the late 1990s when Luo was with ICASE and he first read of the work of Beskok. At that point, Luo was interested in downsized flows that are not adequately characterized by macroscopic fluid dynamics. About this time there was growing interest in microflows, which today are widely employed by the micro-electromechanical systems (MEMS) that are used as sensors and electronics components. In 2000, Luo contacted Beskok,
then an assistant professor at Texas A&M University, and the two men began putting their heads together.

Luo enlisted Beskok's help in planning meetings of the International Conference for Mesoscopic Methods in Engineering and Science (ICM MES), one of which, because of Luo's leadership, was held in Hampton in 2006. Luo's interest in mesoscopic methods applies to the scales that lie between the macroscopic world we live in, and which is governed by classical physics, and the world of individual atoms and molecules, which is governed by quantum physics. In Beskok, he had found someone whose interests meshed with his.

Beskok's connection to ODU actually goes back to 1990 when he was finishing a master's degree at Indiana University/Purdue University in Indianapolis. He applied and was accepted into the doctoral program in aerospace engineering at ODU, but he was also accepted at Princeton University. "I had to call Oktay Baysal (now the ODU engineering dean, but then a faculty member) and let him know of this situation, and he nicely suggested that I should go to Princeton."

The young engineer assumed that he would focus his doctoral research on turbulence modeling, which is a normal path for an aerospace engineer. But his adviser, Karniadakis, called him in and told him, instead, that they would be studying microflows. "It was a surprise, but I think I am lucky to have been there at the beginning of the field," Beskok said. "You have to work hard to establish yourself, but you realize that you can have a great impact on an emerging field."

Striving for Richer Algorithms

Beskok's early work helped to create a unified model to predict the characteristics of rarefied gas flows in pipes and ducts. The model has proven to be valid for various "regimes" starting with the mush of the continuum and tightening down to a slip regime, a transition regime and a free molecular regime. The latter, which involves flows at the nanoscale, falls into the area of molecular dynamics. "My work makes his algorithms richer through all of the flow regimes," Beskok says of his collaboration with Luo.

As it happened, when ODU was searching in 2006 for a researcher to fill its new Batten Endowed Chair in Computational Engineering, Luo was on the search committee and Beskok got the job.

With both of them on the same faculty, they have developed a plan, according to their proposal for the NSF grant, for "a comprehensive research program in the mathematical modeling of micro/nanoscale phenomenology and metrology, with the overall objective to develop a multi-scale, multi-physics simulation methodology based on the Boltzmann equation (BE) and molecular dynamics (MD) for micro- and nanoscale flows of engineering interest."

Beskok explains in layman's terms that when a particle in a gas interacts with the nanoscale components that make up a solid surface—for example a disk drive—the gas particle probably will bounce away as we would intuitively think. These collisions are controlled by force fields that are not significant at macroscopic levels, and there is a lot we do not understand about how these fields affect flows. Nanoscale interactions might interfere with disk drives as computers get smaller and smaller, or could make it difficult for micro-arrays of mirrors to make the graceful swivels that are required if they are to reflect light to project images.

What the researchers propose to accomplish in the NSF project is something akin to the statistical model utilized by pre-election polls, which project the outcome of millions of ballots based on a poll of a thousand voters. Their unified modeling approach will project flows through the regimes by utilizing representative snapshots of flows/interactions that they have modeled using lattice Boltzmann methods and molecular dynamics.

Luo calls it a simplified solid-particle equation. "It's a matter of figuring out some average interaction and going on from there." The researchers say the computation required will be neither tedious, nor prohibitively expensive.
On a winter’s evening a dozen or so Old Dominion University physics graduate students are sitting in a circle struggling with words such as *gibanica*, pasticada, kokos-rolat and cokoladne kuglice. An eclectic glossary is employed every day by these students in the practice of their science. They can tell you everything you need to know about Avogadro, couloms, niobium and quarks. But they clearly need to brush up on *gibanica* and the other buzzwords of the evening.

This does not seem to daunt them, however. They are not as interested in pronouncing *gibanica* (*ghee-bah-nil-sah*) as they are in tasting it.

The students are young women aiming toward doctoral degrees in physics at ODU and the fact that there are so many of them has something to do with *gibanica* and many other dishes that have been prepared for them by two of ODU’s top-ranking physics faculty members, both of whom are women.

In the United States, only about 17 percent of the Ph.D. students in physics are women. At ODU in the spring of 2009, the percentage was 32.6, almost twice the national average. The raw numbers: 15 women out of a total of 46 physics doctoral students.

This is a statistic that brings smiles to the faces of Gail Dodge, who is the...
chair of the Department of Physics, and Leposava Vuskovic, the internationally known expert in atomic physics who also cooks a delicious, flaky, cheese and phyllo pastry called gibanica.

For about a dozen years now, Dodge and Vuskovic have been inviting female students (both undergraduate and graduate), as well as postdoctoral research associates, in the department to their homes for what ostensibly are dinners, but always turn into rap sessions about physics and the challenges that women face in a traditionally male profession.

The professors have settled in recent years on a two-dinners-per-semester schedule, and occasionally they invite female physics students or other researchers from Thomas Jefferson National Accelerator Facility or the College of William and Mary.

Homemade Comfort Food

Dodge, who came to ODU in 1995, is a nuclear physicist with degrees from Princeton and Stanford. She says she and Vuskovic host the dinners because they want to create a supportive environment for women in the department, as well as to encourage the women to form their own sorority, of sorts. “We feel that this activity helps the women to connect with and mentor each other, as well as helping them to feel comfortable talking to us if they have a problem,” she explains.

“Comfortable” also is a word that Vuskovic uses when she gestures with a sweep of her arm toward the young women who have come to her home in a Norfolk riverfront community to eat gibanica, followed by vinegar- and bacon-laced stewed beef called pasticada. There is a thoroughly American-looking platter of vegetable salad to go along with the other dishes, but everything else, including the hostess’ half-dozen different dessert creations, hails from the land that once was Yugoslavia. Vuskovic is from that part of Yugoslavia that is now Serbia, and she was educated and taught in Belgrade before joining ODU in 1993.

“It is a relaxed time when we get together,” Vuskovic says. “We leave behind the pressures of the university.”

Janette Drake, one of the doctoral students, adds, “Being able to sit around and discuss personal, political and educational issues helps to make all the women in our department feel at ease. And this shows in the fact that we do have such a large population of female graduate students.”

The turnout at the dinners hasn’t always been so large. In 2001, ODU registered closer to the national average, with about 17 percent of its physics doctoral students being women. That number has risen each year since then to the current 32.6 percent. Nationally, the percentage stood at about 3 percent in 1973, so the overall trend is angling up.
Still, a 2007 report titled “Gender Equity” from the American Physical Society (APS) lamented that at the current growth rate, it will be 2028 before women make up 25 percent of the country’s doctoral students in physics.

Females Drift Away from Physics

Dodge and Vuskovic are the two women on a 20-person physics faculty at ODU, giving the university a female-to-male ratio of 1-to-10, which is the national average. About 11 percent of the degree-granting physics departments in the United States are like ODU in having a woman as chair.

“The physics workforce in academia and national laboratories remains one of the last areas in science where women are significantly underrepresented relative to their proportion in the population,” the APS report states. “The reasons for this imbalance are many, as are the solutions, but the primary motivation for changing this situation should be to provide greater encouragement to women to enter and remain in physics.”

The APS report notes that half of the high school physics students in the United States are girls, but that a significant “leak” starts in higher education, where even at the bachelor’s level females are awarded only about 25 percent of the degrees.

Dodge sees two separate challenges. One is getting females to begin university physics programs and the other is to keep them from quitting once they start. “Perhaps the biggest hurdle is getting them to begin in the first place,” she says, noting that it was an inspiring, male high school teacher who helped her pick her career path. Her resume is rich in community service, much of it physics- and science-related outreach to public school students.

Still, she acknowledges that the strongest contribution she can make at present to women in physics is to create a supportive environment in the department for the females who have already chosen to major in physics.

The students at the women’s dinner counted several reasons for their large numbers in their department. The first was the comfortable climate, but also they pointed to the opportunity to be mentored by two top-tier female physicists; ODU’s good reputation in physics, especially nuclear and atomic physics, and the university’s establishment in 2008 of a Center for Accelerator Science; and, finally, to the university’s cooperation with the Thomas Jefferson National Accelerator Facility, the $600 million atom-smashing electron accelerator in Newport News. Both Dodge and Vuskovic do research and in conjunction with Jefferson Lab.

A 2005 report published in Science magazine found that women planning careers in science or technology are often thwarted by the lack of role models and encouragement, as well as by hostile campus climates and unconscious discrimination. (See sidebar.) The American Institute of Physics reported in 2006, based on a survey of about 1,400 women physicists in 70 countries, that the underrepresentation of women in the field was, with few exceptions, a global issue. “I always have to justify why I as a woman have chosen physics. Men never get that question,” wrote a Swedish respondent on her survey form.

Vuskovic shakes her head when she is asked about barriers she faced as a physics student. “It was different, totally different in Belgrade,” she says. After World War II, Yugoslavia had a diminished male population and the economy was so poor that women were forced in great numbers to take jobs outside the home, she explains. “The study of science was open to women and men, and I did not feel discrimination.”

Gender-based Difficulties Minimal at ODU

Both Vuskovic, who is a Fellow of the American Physical Society and received ODU’s Doctoral Mentor Award for 2008, and Dodge, who received the College of Science Faculty Excellence Award in 2003, are known for their genial natures and positive outlooks. So they are not likely to dwell on obstacles, and the climate they have fostered in the department is remarkably relaxed about gender issues.

As a physics student, Drake says, she has never experienced any problem related to her gender. “I believe that my male colleagues, both here at ODU and at the various conferences I attend, do not see me just as a woman, but as a fellow physicist and researcher. Of course, having two female mentors helps. Dr. Dodge has always been interested in making sure that all students in our department feel safe and secure both in their classes and also in life. Dr. Vuskovic is the same, and I...
Still Plenty of Room for Improvement for Women in Science

Physics is not the only field in the sciences that has a hard-to-shake tradition of being male-dominated. At Old Dominion University, as well as throughout the nation, many fewer women than men are found in graduate programs in geology and computer science.

Carol Simpson, who became ODU's provost in 2008, is an expert in structural geology and tectonics and a Fellow and counselor of the Geological Society of America. But she acknowledges that her professional experiences include some that were very discouraging. When she began her geology studies in the United Kingdom in the 1970s, she remembers, "The department head said, ‘Carol, you are wasting your time. There are no jobs for women in geology.’"

When she interviewed for faculty jobs, the treatment was sometimes worse. "During one of my early interview dinners, a dean and department head, both male, became obnoxiously drunk and sent me off to help in the kitchen. During another interview, the chair of a male-only department gave me a field exam to test if a woman could really do field geology, and also asked me to spend an evening socializing with the faculty wives. Neither task was required for any of the male candidates."

Simpson adds, "However, as geology became more focused on analytical and quantitative analysis, and less about climbing mountains with sacks of rocks and bottles of whiskey in remote, bear-infested regions, the number of women students began gradually to increase."

For Nora Noffke, an associate professor of geology at ODU who has won broad recognition for her work with fossil evidence of microbes on Earth nearly 3 billion years ago, her opportunities as a woman in the sciences began to open when she emigrated from her native Germany to the United States.

"During my diploma and Ph.D. work in Germany, I ran into difficulties with my advisers, who did not value a female student with a lot of energy and her own ideas," Noffke says.

"Things for me changed drastically when I came to the U.S. to do postgraduate research. For the first time, my work was valued when I conducted my research at Harvard University with Professor Andy Knoll, and with colleagues from MIT. I applied for faculty positions here in the U.S. and received five job offers right away. What a difference from Germany! Here, I enjoy participating in our search committees and it never has been a question if the candidate is female or male. People have not even mentioned it."

Michele Weigle, a young assistant professor of computer science at ODU who has significant research funding from the National Science Foundation, believes more female faculty members in her field will promote gender equity among computer science students.

"My undergraduate adviser was a significant influence on my career," she says. "She helped me develop confidence to continue in the field of computer science and eventually become a professor. Because of the small numbers of women in my computer science classes, there wasn’t much of a peer group that I could turn to when things got difficult. My adviser was always willing to talk about her experiences in computer science classes where she was the only woman present."

"Her encouragement kept me from changing my major and put me on the path to graduate school with the goal of becoming a professor," Weigle adds. "To encourage more women to pursue and continue in fields in which there have been traditionally low numbers of women, it is vitally important to have female faculty members. Not only is the opportunity for mentoring available, but also it can be encouraging for female students to have proof that women can, and do, succeed in the field."

QUEST • SPRING 2009 19
believe I have excelled because of her help and support as my research adviser.”

Another doctoral student, Mary Hing-Hickman, adds, “Despite the low number of women entering physics, ODU has never made me feel as if I would contribute less because I am a woman. I would say that the women’s dinners only solidified what we all experience with all of our professors. I’ve heard horror stories from other universities, but those things didn’t occur at ODU.”

Dodge, who has a daughter in elementary school, is also known for helping women in her department cope with care-giving pressures at home. Hing-Hickman, who has been working on her Ph.D. for over a decade, says the department has “allowed me to continue my research part time through the birth of my two sons and continues to help and guide me through the Ph.D. process.”

Outreach to Males, Too

Sharon Careccia, another student at the dinner, breaks into a laugh when the subject of a “male-dominated field” comes up. She grew up with only brothers as siblings, she served in the Navy on a ship with 14 male crewmen for every female, and then she worked for awhile in engineering technology, which is a field distinctly male-dominated. “So starting a physics career was not that big of a change for me. I have always worked well with men. I do find that having a woman for an adviser and a mentor has been a wonderful experience and one I have never had before.”

Both Dodge and Vuskovic emphasize that they are careful not to slight male students while they are helping females. For both genders, Vuskovic says, “When I accept graduate students in my research program I am accepting them into the circle of my intellectual family.” She and her husband, ODU physics researcher Svetozar Popovic, invite male students to their home sometimes, too, to celebrate special occasions. “I always find time to talk with my students in both professional and private matters as much as this is needed,” she says.

There is a large contingent of international students among the females in physics at ODU, and Vuskovic believes that by sharing her experiences gained from immigrating to the United States she can help ease pressures on students from India, Serbia or Egypt. “Almost all of my graduate students began as socially insecure people. International students, in particular, are rarely exposed to the environment of a developed democratic society. For that reason, I do all I can to expose my students to various social and professional environments in order to develop their communication and social skills.” For instance, Vuskovic says, she insists on sitting with her students at conference banquets and introducing them to prominent researchers.

Dodge agrees that the physics Ph.D. program is so demanding that male students, too, need a lot of encouragement to stick with it. Day in and day out, she adds, the support she gives to students has a lot less to do with gender than it does with physics.
DEALING WITH DIFFERENCES

Nursing Educators Are Leaders in Helping to Bridge Cultural Gaps
Medical professionals often complain that they have trouble dealing effectively with patients from minority cultures or subcultures. But, thanks to researchers at Old Dominion University, help is on the way.

Faculty members in the university's College of Health Sciences, led by Carolyn Rutledge, associate professor of nursing, received a grant worth $765,000 from the U.S. Health Resources and Services Administration (HRSA) in 2008 to develop ways to better equip nursing educators and administrators to deal with cultural diversity and other barriers to health care.

This project is the latest in a series of research initiatives that have established ODU's School of Nursing as a leading designer of training programs that address potential clashes and miscommunication between healthcare professionals and certain types of patients. Since 2003, the school has received more than $3 million for cultural awareness projects led by Rutledge, as well as Richardean Benjamin, chair of the School of Nursing, and Laurel Garzon, associate professor of nursing.

Two decisions by the ODU researchers have distinguished their work. The first is the broad definition they have given to "culture." "I have a problem being too narrow with the definition," Rutledge said. "It involves a lot more than ethnicity." In fact, she often refers to "subcultures" and "people of similar orientation" to describe groups—teenage Goths, overweight older women and gay people, for example—who often report unsatisfactory health-care experiences.

Don't Roll Those Eyes

The second strategy that has led to the researchers' success involves their use of diverse resources. One is ODU's vaunted distance learning program, which is one of the largest of its kind, beaming live lectures and making online courses available to students scattered about the nation and the world. Another resource is Monarch General Hospital, a virtual hospital training facility in the recently updated College of Health Sciences Building. Also, according to Garzon, the researchers are relying on help from the Theresa Thomas Professional Skills Teaching and Assessment Center at the nearby Eastern Virginia Medical School. The center is recognized nationwide for its program with standardized patients (SP), actors who are specially trained to help healthcare professionals hone their patient interviewing and diagnostic skills.

"There is no way you can teach students everything they need to know about every culture," Garzon explained. "What we can teach is a process to help you work with various people, and then we can give you the opportunity to put that process to work with standardized patients." The researchers contracts with the Thomas Center to use SPs for cultural diversity training.

Rutledge said three previous $750,000 grants, each from the HRSA, which is part of the U.S. Department of Health and Human Services, have allowed the School of Nursing to provide cultural competency training in the Nurse Practitioner Program, Nurse Midwifery Program and undergraduate Registered Nurse Program. The latest grant, which extends through June 30, 2011, will provide the training to the graduate Nurse Administrator Program and Nurse Educator Program.

Value in Teaching Teachers

Rutledge sees the upcoming initiative as potentially more valuable than the predecessors because the researchers will be designing training for advanced professionals who can, in turn, train and influence many nursing students and nurses. "The project will refocus the master's-level Nurse Administrator Program and the post-master's Nurse Educator Program in order to address issues of cultural competency, health disparities and barriers to care," Rutledge said.
A nurse practitioner, Rutledge took a position at EVMS in 1988—and still sees patients there—before moving to ODU in 2002. Garzon credits Rutledge with being the “grant writer extraordinaire” who has made the cultural competency initiatives possible.

The latest grant is designed to have auxiliary benefits, such as helping future leaders in the field of nursing to understand the need for healthcare professionals to be culturally competent in their dealings with co-workers as well as patients. Rutledge also believes the project’s design will make minorities feel more welcome in advanced nursing courses and could lead to more diversity among healthcare professionals, and to more nursing educators overall. “The nursing shortage is really a problem caused by a shortage of nursing educators,” she said.

Two decades ago, Rutledge spent a few years living in West Berlin, where her husband was stationed as an Army dentist, and she said she never forgot how diverse the people were. “We had the British, the Russians, the French, the Americans, the Turks, the Germans and so forth, and I found it fascinating trying to understand the different cultures. It opened my eyes about diversity. What is acceptable to some is not acceptable to others.”

Her interest in diversity merged with her professional interest in access to health care to produce her current push for cultural competency. She says the researchers want to take students who may be “unconsciously incompetent” or “consciously incompetent,” depending on how aware they are of their prejudices, and move them to categories of more tolerant behavior. “Consciously competent” describes someone who wants to be nonjudgmental, but who has to consciously work at it. The best category, “unconsciously competent,” describes someone who is open to diversity and sensitive as a general practice, Rutledge explained.

In a word, the ODU researchers, along with faculty colleagues Kimberly Tufts and Karen Karlowicz, want to eliminate any spoken language or body language with which a healthcare professional might belittle or insult patients, preventing the patients from getting the care they need.
For-Profit Marketing Strategies for Nonprofit Organizations

Research Turns Up Surprising Findings about Relationships with Donors

BY JOHN B. FORD

My interest in researching nonprofit organizations came out of a visiting professorship at Henley Management College in Henley-on-Thames, England, in 1998. Prior to that time I had been focused primarily on international advertising theory and practices, and in particular on women's depictions in advertisements. While at Henley, a colleague asked for my input on a funding proposal for a research project in which we would look at the perceptual determinants of donor giving behavior in a cross-cultural study of the top charities in the United States and United Kingdom. I am interested in cross-cultural research, and the possibility of developing and testing donor choice models in the two-country setting was too interesting to pass up.

The Aspen Institute found our proposal sufficiently worthwhile and funded our project with a grant of $50,000. I had experience with focus groups and in-depth interviews, and I ran a series of focus groups in Henley probing the various driving forces behind charitable giving. This led to a series of successful quantitative studies that had interesting ramifications for charitable organizations.

We found that donor giving was driven first by feelings of trust that were established in the mind of the donor. This trust was driven by: 1) how well the donor believed that the charity had performed its mission to address the cause in question and 2) the quality and frequency of communications that they had received from the charity. What we also found, contrary to the expectations of a number of the charities that we were working with, was that donors did not build trust in the charity by having the charity at their beck and call.
My own practical experience with charities in the Hampton Roads region of Virginia had convinced me that these charities felt that making donors feel important and responding to their every whim was important in building a meaningful relationship, but we found that telling the donor how their donation had made a difference in a personal letter with a thank-you was far more important to them. We also found that trust plays an important part in building commitment to the charity. If donors believed that the organization was having an impact on the cause and was regularly communicating with them, they would then develop a commitment to that charity. The commitment was driven by: 1) the emotional benefits (feeling good for helping someone in need, etc.) associated with giving and 2) the family benefits connected to giving (parent affected by the cause in question). Again, my experience with local charities suggested that donors needed to have some tangible benefits from giving such as social status and community recognition, but this was not found in our study. These benefits were not able to build donor commitment to charity giving.

**Why Do Donors Keep Giving?**

Another important question that we researched involved why people might come back and make another donation to the same charity. In our studies we found that donors would give to the same charity again if: 1) they believed that the charity would continue to have a significant impact on the cause in question and 2) they believed that the charity would continue to perform its duties in a professional manner. A related question dealt with what it would take to get donors to increase their pledges to the charitable organization, and we found that this would depend upon: 1) the donor’s perception that the organization had made a significant difference to the charity, and 3) the donor’s trust that the organization would continue to have a significant impact on the cause and was regularly communicating with them. If donors believed that the organization to truly buy into its stated mission and embrace a guiding set of important organizational values. It is also healthy for boards to be restructured every so often since periodic re-energizing is a strategic necessity. Charitable organizations should also take the time and effort to develop meaningful mission statements and remember that these statements declare not only what they are, but also what they are not. They should avoid trying to be all things to all donors and focus their efforts on target donors. This also requires the organization to truly buy into its stated mission and embrace a guiding set of important organizational values. Without this, donors, as well as employees of the organization, will be confused.

**Volunteers Need Adequate Training**

These sets of values should be adhered to by everyone in the organization, from the executive director and the board to the lower levels of employees and volunteers. Persuading charities that volunteers need to be carefully managed can be a difficult “sell.” Professionals hired to do the work usually feel a higher level of accountability and are less likely to have the attitude of, “You are lucky to have me, so you can deal with me on my terms!” This kind of well-meaning help can be disastrous, especially when these volunteers have not been properly trained to do their particular...
jobs. Often professional management appears to be a luxury for this type of organization, but so many are now finding that their long-term survival and success in affecting the cause in question depends on the use of these professionals.

Strategic planning is as important for nonprofits as it is for their for-profit counterparts. Without clear goals and strategies driven by the mission statement and driving values, the charity will constantly be running into new obstacles and problems. This will force management to repeatedly fall into crisis mode—stepping back and taking corrective actions, while at the same time sending mixed signals to donors.

Proactivity is far more effective than reactivity. But the new initiatives that are undertaken should be driven by consistency with the mission and driving values of the organization. Trying new things just for the sake of new initiatives can backfire. This would also pertain to consistency of the image of the organization and its connected brand name, where coordinated integrated marketing communications strategies should be carefully followed. All communications from advertisements to employee e-mails and donor thank-you letters should be consistent with the image of the organization. This requires charity managers to take stock in what their important publics think that they stand for and act accordingly. Inconsistency causes confusion!!

Finally, an important practical marketing issue for nonprofits deals with brand positioning. The name of the charity will be associated with a variety of attributes, and charity management should be careful to assess this name and company image on a periodic basis. Our research has shown that most nonprofits use the same types of attributes to position themselves, and that all of these deal with such descriptors as caring and nurturing and compassionate. Our research has shown that if everyone uses these descriptors, then no one is standing out as distinct from the others. It is similar to saying that both General Motors and Ford stand for quality. Then neither really gets distinctively identified with this attribute. Our research suggests that charities that utilize such traits as bold, courageous, fun and exciting can trigger distinctive potential bonds with donors.

Nonprofit organizations are an interesting subject for marketing strategy research. There is so much more that needs to be done to understand donors and how to effectively attract and nurture them. What is clear to me is that the strategies for success are far more similar to those of their for-profit counterparts than would have been expected.

John Ford is professor of marketing and international business at Old Dominion University's College of Business and Public Administration.
Biologist Sonenshine Gets Prestigious Medal and Reason to Reflect about a Mentor

Daniel Sonenshine, Old Dominion University professor emeritus and eminent scholar of biological sciences, had a special reason to reflect on his career after being awarded one of the highest honors in his field of ticks and tick-borne diseases (Quest, Vol. 4, Issue 2).

In many ways, Sonenshine traces his rise to prominence in acarology—the study of ticks and mites—to his introduction almost exactly 50 years ago to Harry Hoogstraal, widely considered to be the 20th century's pre-eminent authority on ticks and tick-borne diseases. “I was a graduate student at the University of Maryland and he was a giant in my area of research, an icon, my idol,” said the 75-year-old professor. At the time, Hoogstraal was eight years into what would become an almost 30-year term as head of the Department of Medical Zoology at the U.S. Naval Medical Research Unit No. 3 in Cairo, Egypt.

At that first meeting, the two of them spent only a brief time together discussing tick research, but Hoogstraal apparently came away impressed. “Sometime later, I began to hear that he was recommending me (for a faculty position) to various universities, and I thought this was a gracious thing for him to do.” Later, after Sonenshine joined the Old Dominion faculty in 1963, Hoogstraal visited him and they did field work together related to Rocky Mountain spotted fever research. Still later, Hoogstraal invited Sonenshine to Egypt for a research collaboration and they were regular correspondents until the elder scientist died of cancer in 1986.

“Working with a person who is one of the great leaders of modern science can be humbling, but also exhilarating,” Sonenshine said. “You learn you can play in this game, but that you have to get better. I found that I had a lot farther to go than I thought, I learned what true excellence is, and I was inspired.”

The ODU emeritus professor has attained excellence himself as a scientist, and evidence of that came during the awards ceremony of the 57th annual meeting of the American Society of Tropical Medicine and Hygiene (ASTMH) on Dec. 7, 2008, in New Orleans. The recipient of the society’s prestigious Hoogstraal Medal for outstanding lifelong service internationally in medical entomology was Daniel Sonenshine, Old Dominion University.

Back in Norfolk a few days later, Sonenshine dug a satin-lined box out of his canvas tote and opened it carefully to reveal the Hoogstraal Medal. “It’s good to be recognized by your peers,” he said. The recognition reflects Sonenshine’s unique contributions to the ASTMH mission to promote global health through the prevention and control of vector-borne infectious diseases and other diseases that disproportionately afflict the global poor.

The Hoogstraal Medal is not presented every year, just when an exceptional candidate is nominated. Since its inaugural presentation by ASTMH in 1987, only 16 scientists have won it. Other recipients have been from universities such as Harvard, U.C. Berkeley, UCLA, Johns Hopkins, Wisconsin, Illinois, Maryland, U.C. Davis, and the universities of London and Liverpool.
The U.S. Patent Office awarded another patent late last year to Vijayan Asari, professor of electrical and computer engineering and director of the Vision Lab at Old Dominion University, for a video-enhancement technology that helps to define images in low-lighting conditions and can be used in numerous security and military applications (Quest, Vol. 7, Issue 2).

The patented technology, titled "Visibility Improvement in Color Video Stream," is the outcome of one of the research activities by Asari and Li Tao, who was an ODU graduate student at the Vision Lab when the application was filed in 2005. Tao graduated in 2006 with a doctorate in electrical and computer engineering and currently is a senior scientist at Samsung Technologies in Irvine, Calif.

This latest patent, which was awarded on Sept. 23, comes just five months after Asari was awarded a patent titled "Color Image Characterization, Enhancement and Balancing" together with Ming-Jung Seow, a former graduate student in the Vision Lab. Seow graduated in 2006 with a doctorate in electrical and computer engineering and currently works as a senior scientist at Behavioral Recognition Systems (BRS) Labs in Houston.

The visibility improvement in color video stream technology is based on an integrated, neighborhood-dependent, nonlinear approach for the enhancement of color images captured in various environments, such as extremely low lighting, fog or locations that are underwater.

Innovations produced by the Vision Lab can be useful for defense and homeland security applications, such as night-time surveillance and object recognition in low-lighting conditions. In addition to image- and video-enhancement technologies, Vision Lab is currently conducting homeland security and defense-related research projects involving robotics and other technologies. Brief descriptions of the research projects are at the laboratory Web site: http://eng.odu.edu/visionlab.

Asari, Vision Lab Busy with Inventions

Asari (third from right) in his busy Vision Lab.

ODU’s Vision Lab and Frank Reidy Research Center for Bioelectrics learned in the fall of 2008 that they are getting $1.6 million from Department of Defense’s 2009 fiscal year budget appropriation to study new ways for the U.S. military to minimize casualties and deal with them more successfully when they do occur.
Dual Awards for Peery’s Latest Work of Fiction

“What the Thunder Said,” the latest novel by Janet Peery (Quest, Vol. 6, Issue 1), university professor of English and creative writing at Old Dominion University, has won the 2008 WILLA Literary Award for Contemporary Fiction and the Library of Virginia Literary Award for Fiction.

“In ‘What the Thunder Said,’ the language and structure of the novel appear effortless,” the Library of Virginia contest judges stated. “The narrative voice is authentic and evocative of the Depression during the dust bowl years and Peery’s prose is beautifully lyrical.”

The WILLA Literary Award honors the best in literature published each year, featuring women’s stories set in the West. Women Writing the West (WWW), a non-profit association of writers and other professionals writing and promoting the Women’s West, underwrites and presents the nationally recognized award annually. The award is named in honor of Pulitzer Prize winner Willa Cather, one of the country’s foremost novelists.

Described as a novella and stories set in the Dust Bowl of 1930s Oklahoma, the book tracks the wayward progress of sisters Mackie and Etta Spoon, who leave home to forge their own separate paths, each setting off in search of a new life, and each finding a fate different than she expected. Through shifting perspectives, voices and characters, Peery follows the sisters, their children and those whose stories intersect with theirs as they range across the high plains of the West in the decades after the Great Depression.

A National Book Award finalist, Peery has received National Endowment for the Arts and Guggenheim Foundation fellowships, the Whiting Foundation Writer’s Award, citations in “The Best American Short Stories,” several Pushcart Prizes and the American Academy of Arts and Letters Richard and Hinda Rosenthal Award.

ODU’s Biodiesel Dune Buggy

The dune buggy that was zipping around the Old Dominion University campus in the fall of 2008 represented one more victory for the university’s pilot project for converting algae into biodiesel fuel.

Patrick Hatcher, the Batten Endowed Chair in Physical Sciences at ODU and executive director of the Virginia Coastal Energy Research Consortium (VCERC) (Quest, Vol. 10, Issue 2), got one of the first rides in the new, white buggy that was built by Jes Sprouse, the Prince George County entrepreneur who assisted ODU in creating a one-acre algae pond and biodiesel conversion facility about 70 miles west of Norfolk.

Sprouse ordered an Italian-made, 10-horsepower diesel engine and a transmission from a Web site, and then designed and built the buggy to showcase the biodiesel fuel being produced by ODU and VCERC researchers. Gov. Timothy Kaine helped formally open the facility in September. 
Hoffmann’s New Book About Women Journalists in Vietnam

Hoffmann’s New Book About Women Journalists in Vietnam


The 400-page hardback book from Da Capo Press includes rich detail not only about the women writers and photographers who worked as reporters in Vietnam, but also about the 1960s-era political and cultural climates in the United States, in Vietnam and in American newsrooms.

Hoffmann says she took on the project, for which she conducted more than 100 interviews, after preliminary discussions with two of the best known Vietnam War reporters, David Halberstam, author of “The Best and the Brightest,” and Frances FitzGerald, author of “Fire in the Lake.” The author said both discussions were significant “not only for the information I learned from them, but also—and perhaps even more importantly at that stage—for the way they validated my sense that there was an important story in the achievements of women who reported on the war.”

In addition to FitzGerald, women who reported in Vietnam and who Hoffmann includes in her overview include Gloria Emerson, Kate Webb, Dickey Chapelle and Beverly Deepe.
Joshi, Laroussi Elected IEEE Fellows

Old Dominion University faculty members Ravindra Joshi and Mounir Laroussi (Quest, Vol. 9, Issue 2), whose research has helped to advance bioelectronics and biomedical applications of cold plasmas, have been elected as Fellows of the International Institute of Electrical and Electronics Engineers (IEEE).

A citation from the IEEE board of directors said Joshi’s elevation to Fellow was for his contributions in “bioelectrics and simulation of cellular responses to pulsed power excitation.”

Laroussi received the honor for contributions to “biomedical applications of low-temperature, atmospheric-pressure plasmas.”

The men, both of whom are professors of electrical and computer engineering in the Frank Batten College of Engineering and Technology, join Karl Schoenbach, the Batten Endowed Chair in Bioelectric Engineering, as ODU faculty members holding the prestigious title. According to the IEEE, “The grade of Fellow recognizes unusual distinction in the profession and shall be conferred only by invitation of the board of directors upon a person of outstanding and extraordinary qualifications and experience in IEEE-designated fields, and who has made important individual contributions to one or more of these fields.”

Joshi was named a University Professor at ODU in 2007. Laroussi directs the university’s Laser and Plasma Engineering Institute.

Porter is Leading Red-Light Running Researcher

An article headlined “Red Light Running” in the August 2008 issue of Ladies Home Journal features the research and advocacy work of Bryan Porter, associate professor of psychology at Old Dominion University (Quest, Vol. 4, Issue 2).

Porter is an expert on the psychological underpinnings of various dangerous and bad driving habits. But in recent years it has been his red-light running research and his appeals for automatic-camera enforcement at dangerous intersections that have made him a go-to source for media around the world. He chaired the 4th International Conference on Traffic and Transport Psychology held in Washington, D.C., Aug. 31-Sept. 4, 2008.

The Ladies Home Journal article, written by Kelly King Alexander, recounts several accidents in the United States in recent years in which red-light runners killed innocent people. According to the Federal Highway Administration, red-light running is responsible for 100,000 crashes a year in this country, 950 deaths and 90,000 injuries. It is the leading cause of fatal crashes in metropolitan areas.
New Book by VMASC Researchers Demystifies Fast Growing Field of Modeling and Simulation

Two Old Dominion University faculty members have achieved a worldwide first—taking the modern, mystifying field of modeling and simulation and explaining it in a form that scholars outside science and engineering can understand. The book is more evidence that ODU’s Virginia Modeling, Analysis and Simulation Center (VMASC) is a leader in the field.

The first ever textbook in the field, “Principles of Modeling and Simulation – A Multidisciplinary Approach” was written and edited by two ODU professors, John Sokolowski and Catherine Banks. It debuted early in 2009.

There have been technical books written about the emerging field – which involves the creation of computer simulations and models to test out experimental concepts. But Sokolowski, director of research at VMASC, said this book is different because it takes a multidisciplinary perspective.

“Previous books, and there really aren’t that many, have been focused on a much more technical treatment of the subject, suitable to science and engineering majors,” he said.

The idea for the textbook came from Sokolowski and Banks’ belief that non-science and non-engineering students should be introduced to the modeling and simulation field because it has proven to be a useful tool across many disciplines.

“The modeling and simulation field as a discipline is just now being accepted,” said Banks, assistant professor of research at VMASC. “Experts in many different fields are just now learning the things that it can do.”

The book gathers expert scholarship from several ODU researchers, along with experts from the United States Marine Corps, Texas A&M University, the University of Florida, the University of Virginia, the University of Alabama-Huntsville and the University of Ottawa.

In the book’s preface, the authors write that “many universities are realizing that modeling and simulation is becoming an important tool in solving and understanding numerous and diverse problems. This text serves to provide an orientation to the theory and applications of modeling and simulation from a multidisciplinary perspective.”

To students, the book offers a concise look at the key concepts making up the field of modeling and simulation.

For instructors, the book covers a lot of ground on the creation of the discipline, how models and simulations are used to solve problems, real-world examples, human interaction with modeling and simulation, and the future of the discipline.

The authors see the textbook being used in both undergraduate and graduate programs, in fields from computer science to medicine, to provide an introductory reference and course. “We also see it being used by professionals in industry and government as a way of understanding this emerging field,” Sokolowski said.
It was a short trip, but a major milestone on a long journey. The Old Dominion University team behind the magnetic levitation (maglev) research project successfully tested a 12-foot-long train base car on the university’s elevated track in February. One magnetism system levitated the car and another propelled it.

“This is a significant milestone. We have always said that we wanted to show that we could levitate it and propel it, and we have done it,” said Jerry Creedon, ODU’s director of transportation research. This track test has been a long time coming. Levitation has been accomplished in the lab for three years now. ODU is working to develop an energy-efficient maglev train that can operate at slower speeds in an urban setting.

During the recent test, the 12-foot-long car, called a bogie, moved back and forth at several miles per hour. Its trip length was limited to about 50 feet because a control cable was required to run to the device, limiting back-and-forth movement.

Thomas Alberts, an aerospace engineering professor who heads the research team in magnetic levitation at ODU, said the group has been testing a linear induction motor for propulsion in the lab for a number of months. “We put the bogie on the guideway in December and began the first on-guideway testing of that vehicle.”

The engineers have moved the car back into the lab to prepare for more track tests in the summer.

— Brendan O’Hallam