

scope

SPRING 2003

A LOOK INSIDE THE COLLEGE OF PHYSICAL AND MATHEMATICAL SCIENCES



A “golden bullet” against cancer?

Could these two NC State chemists have found a new strategy to beat cancer? Their groundbreaking work may lead to effective future treatments.

College, alumni work together for meaningful involvement

The relationship between an educational institution and its students is a life-long connection. The challenge is how best to maintain that connection once students become alumni.

Research indicates that alumni have very specific interests when it comes to involvement with their alma mater—and this can vary widely from school to school, or even between disciplines.

As part of our efforts to improve the connection to our alumni, we're learning much about what alumni want and expect. In the last six months, we've initiated some new activities—a student recruitment reception in Charlotte, a Triangle-area spring picnic, a social at the national American Chemical Society conference in New Orleans, and personal visits with individual alumni across the U.S.

Alumni participating in these events were enthusiastic about the

opportunity to be involved.

We also recently conducted a focus group with 12 alumni of various ages and professions. They met on Centennial Campus in March to discuss how the College could better serve its alumni, and thus advance the vision of the College.

Through these various events and the focus group, we have learned that our alumni are most interested in learning about or helping with:

- research projects
- short lectures/seminars
- social events
- campus tours
- K-12 outreach
- student recruiting
- student and faculty support

We've also learned that our alumni are in agreement with the College's vision of educational innovation, research excellence

and targeted prominence in key areas.

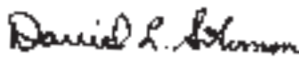
We plan to use this information for development of alumni activities and programs that will provide both the College and our alumni with rewarding experiences that benefit everyone involved.

I mentioned to you in the fall 2002 issue of *Scope* that we were making a new commitment to improving communications with our alumni. Our research has shown that our alumni enjoy *Scope*. We hope you enjoy our new magazine format, designed to offer a wide range of information for the diverse professions and interests represented by our alumni and friends.

We're also expanding the distribution list of *PAMS Focus*, a brief, popular electronic news bulletin distributed periodically by e-mail. You'll find something about that on page 14 of this issue of *Scope*.

Our Office of Development & College Relations is charged with the task of managing alumni relations. Our staff welcomes your feedback as we continue the process of improving our connection with you.

After all, our relationship didn't end when we handed you your diploma.



Daniel L. Solomon, Dean



PHOTO BY SALLY RAMEY

NC State alumnus Herbert Kirk (Natural Resources '66) chats with Dean Solomon at a recent gathering for College alumni and friends.

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SCOPE

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PHYSICAL AND MATHEMATICAL SCIENCES

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Eric Doggett honored as outstanding alumnus

Eric L. Doggett has been named the 2002 recipient of the College's Distinguished Alumnus Award.

The award honors alumni whose outstanding achievements bring distinction to the college and its programs.

A native of Raleigh, Doggett earned his bachelor's degree in physics in 1981 and later obtained his MBA from Duke University in 1989.

Currently president and chief

executive officer of Glenayre Technologies in Duluth, Ga., Doggett has more than 20 years experience in the telecommunications industry. He has served in strategic, operational, financial and leadership roles with Nortel Networks, Rein Capital, LLC, and Tandem.

He serves on the board of directors for the Cellular Telecommunications & Internet Association, the Wireless Communications

Division of the Consumer Electronics Association and SignalSoft Corporation.

Doggett has presented to many financial and industry audiences, including the Wall Street Analyst Forum, CIBC's Communications Food Chain, and CTIA Wireless IT. He is a member of TEC, an international organization of chief executive officers. He also serves on the board of advisors for the Metro Atlanta Chamber of Commerce.

While he may live and work in the Atlanta area, Doggett has never truly left home, or NC State. He and his wife, Kelly, serve on the board of directors of Safechild in Raleigh.

Doggett also is involved in fundraising priority-setting for our College, and is a longtime supporter of the Wolfpack Club.

"Eric Doggett has been a lifetime member of the NC State family," said Dean Daniel Solomon. "Eric's education in science and technology has served him well in his distinguished telecommunications career. His business acumen and management skills have earned him a reputation as an effective leader and strategist, known for tackling challenges such as managing huge product lines or turning entire companies around."



PHOTO BY SALLY RAMER

Enjoying the 2003 Distinguished Alumnus dinner at Raleigh's Cardinal Club are Kelly and Eric Doggett and Dan and Carolyn Solomon.

Science champ has been eating his Wheaties

Not many scientists get their pictures on Wheaties boxes, but Dr. Len Pietrafesa, director of external affairs for the College, was so honored as the 2002 National Champion of Science.

The honor and the customized cereal box (*yes, there is cereal in it*) were presented to him at a recent meeting of the University Corporation

for Atmospheric Research (UCAR) for his advocacy work in promoting science on Capitol Hill.

While his face on the famous box probably won't move a lot of cereal in local grocery stores, it might provide inspirational fuel for rising young atmospheric researchers.

Pietrafesa was also elected to UCAR's board of trustees at the

meeting. The organization represents 85 institutions with meteorology education and research programs. UCAR also manages the National Center for Atmospheric Research, and shapes the national education and research agenda in atmospheric sciences.

Bond projects to increase College's space by 50 percent

We're not packing moving boxes quite yet, but excitement is building over the College's new and renovated facilities.

In 2000, North Carolina's voters approved a \$3.1 billion bond project to allow the UNC system to build new facilities and renovate old ones to accommodate projected increases in the student population and changing needs. NC State's portion of it is just under \$500 million. To make the most of this opportunity, the university launched an extensive planning project across the campus.

An independent study of facility usage found that the College of Physical and Mathematical Sciences (PAMS) had the greatest facility deficit of any college on campus. Through collaborative planning involving faculty, facilities personnel, architects, and colleagues in other colleges, PAMS will gain significant new and renovated space through the bond build-out.

"Our plan adds both new space and renovated space," said Ray Fornes, associate dean for research and appointed coordinator of the College's bond build-out projects. "And the current economic climate is enabling us to get more for our money in our construction contracts. The bond build-out will position us very well for providing high-quality teaching and research facilities for students and faculty."

According to a 1999 facilities study, PAMS had 282,000 sq. ft. of space. After completion of the bond build-out projects in 2010, the College should have more than 420,000.

"While the success and growth of our programs will continue providing facility challenges, we're delighted to gain such a large amount of high-quality space," Fornes said.

In addition to space directly assigned to PAMS, the College will receive indirect benefits from new construction and renovation efforts

that impact the university's shared infrastructure and service areas, such as library support, wiring configurations and chilled water systems.

Undergraduate Science Teaching Laboratory (USTL) building

Now under construction at the corner of Brooks and Yarbrough on North Campus, the USTL will provide new, state-of-the-art laboratories for general chemistry and physics courses, replacing those in Withers Hall. In addition, the USTL will house classroom and conference space as well as teaching greenhouses for the Horticulture Program. PAMS will be the USTL's majority occupant.

The building will be fronted by an attractive mall area, replacing the greenhouses behind Kilgore.

An open house for the USTL will be held in December 2003, and students will begin using the building in January 2004.

Withers Hall will be renovated from laboratory use to general academic space.

Partners III

Ground was recently broken for Partners III on Centennial Campus. About 60 percent of the building, or 34,000 sq. ft., will be used for PAMS' nanotechnology-related education and research. This will involve both Physics and Chemistry.

Riddick Laboratories

The Physics Department will move into completely renovated laboratory space in Riddick Laboratories vacated by the College of Engineering after it moves into a new facility on Centennial Campus. Physics will occupy about 80 percent of the building.

Space vacated by Physics in Cox



COURTESY NC STATE UNIVERSITY ARCHITECTS

This artist's rendering shows the completed USTL Building as seen from the back of Kilgore Hall. Brooks Avenue would be just to the viewer's right, and Yarbrough Drive is behind the USTL. Hillsborough Street would be behind the viewer. The large lawn in the foreground is designed to provide much-needed green space in this section of campus. The Walk of Discovery (see inside back cover) will be close to the front of the USTL.

and Bureau of Mines will be assigned to other PAMS units as plans evolve.

Jordan Hall expansion

PAMS will gain more than 10,000 sq. ft., or one-third, of a planned expansion of Jordan Hall. The space will be used by Marine, Earth & Atmospheric Sciences.

Research Flex Building

Located at the corner of Avent Ferry Road and Varsity Drive, the Research Flex building is being used by campus units waiting while their permanent space is constructed or renovated. After completion of the bond build-out, PAMS will acquire about 15,000 sq. ft. in the building, for potential use by research centers being developed by the College.

Harrelson Hall renovation

The bond build-out program originally included renovation funds for Harrelson Hall. However, the university is studying plans to replace it with a better-designed building. The Americans With Disabilities Act, and other factors, led to this consideration. This project will primarily affect the Mathematics Department.

Patterson Hall

While not directly involved with the bond build-out, the Statistics Department has moved to Patterson Hall in space nearing completion of renovation.

For more information, photos and artist renderings about NC State's bond build-out projects, visit www.ncsu.edu/facilities/bondprojects/index.htm.

Mysterious blobs lead to groundbreaking discovery

There they were again. Blobs. Lots of tiny liquid and glassy blobs.

At first, Dr. James D. Martin, chemistry professor, dismissed them as a trash byproduct of his experiments. But eventually, he became curious about the blobs because they appeared so often when he designed and synthesized crystals.

His curiosity led him into the study of the molecular structure of liquids and glasses, an area not well understood by science.

“This new understanding allows us to create the materials that will be the foundation of tomorrow’s technology.”

— Dr. James D. Martin

In 1916, X-ray diffraction of liquids hinted at some sort of molecular organization. And the fact that most solids undergo a very small change in volume upon melting also suggests that molecules are somehow being held together by a structure.

Despite these clues, scientists have had a limited knowledge about the structure of liquids and glasses. In a typical freshman chemistry textbook, there are multiple pages on gases and solids, yet only a paragraph or two on liquids. And liquids are typically described as having randomly moving molecules, like a gas.

“That’s the mystery. What is the structure of something that’s not supposed to have a structure?” Martin said. “If similar bonding interactions hold molecules in liquids, glasses and crystals, then it should be possible to engineer the structure in liquids and glasses just like it’s possible to



Dr. James D. Martin uses a fast-food restaurant’s ball pit as a simple example of how liquid molecules maintain a structure even when flowing around foreign objects.

engineer the structure of crystals.”

This logic enabled Martin to pursue breakthrough discoveries that advance basic understandings of the nature of liquids and glasses at the atomic and molecular levels. He and his colleagues have discovered the chemical principles that allow them to design the composition and structure of glasses and liquids, then go into the laboratory and make them.

Funded by the National Science Foundation and featured in the Sept. 26, 2002, *Nature*, Martin’s work opens a new area of scientific research:

amorphous materials engineering.

News of Martin’s discovery created a buzz around the globe. Science publications in many foreign countries contacted him for interviews.

Martin foresees the ability to control the optical and electronic properties of glasses to produce specialized materials that will advance optical computing and communications technologies, among other applications.

“This new understanding,” he said, “allows us to create the materials that will be the foundation of tomorrow’s technology.”

A “golden bullet” against cancer?

For decades, oncologists have dreamed of a way to distribute cancer-killing drugs in the body that would somehow destroy cancer cells from the inside, minimizing damage done to normal cells. Many medical professionals refer to this idea as a “magic bullet.”

Current drugs can target fast-growing cells, but in addition to cancer, there are many healthy tissues in the body comprised of rapidly-dividing cells. This includes the stomach lining and hair follicles. Many drugs used in chemotherapy cause hair loss, nausea, immune deficiency and other unpleasant side effects.

Creating a delivery system that can tell the difference between healthy cells and cancer cells might sound like fantasy to some, but not to Drs. Dan Feldheim and Stefan Franzen. And it’s not magic—it’s gold.

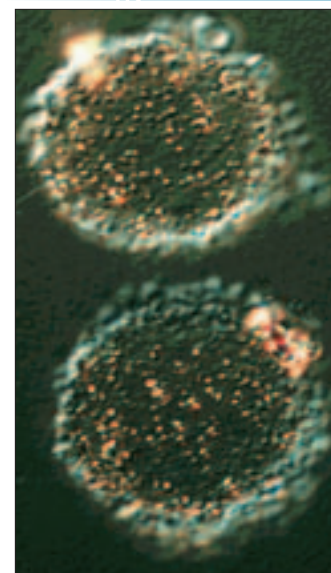
These chemists are studying the use of nanoscopic gold particles. They hope that one day these particles will be able to distinguish cancer cells from other fast-growing cells, then deliver DNA fragments with destruction instructions to the cancer cell’s nucleus.

“We’ve learned a lot from viruses,” Feldheim said. “They have certain proteins on their coatings that allow them to find a specific cell, unlock

the door and go right into the cell nucleus. We’ve attached to our gold nano-particles small peptide fragments from virus proteins that can detect and enter cancer cells while leaving other types of cells alone.”

While their work is laying the foundation for a “golden bullet” against cancer, much research remains to be done. Getting into the cell is one hurdle. Killing the cell is another.

Funded by the National Science Foundation and the North Carolina Biotechnology Center, Feldheim and Franzen are working with researchers at the UNC Lineberger Cancer Center and the Duke Comprehensive Cancer Center.



The red spots in these liver cells are actually nanometer-sized gold particles.

PHOTO BY DR. ALEX TKACHENKO, HUAN XIE, DONNA CD LEMAN

Ed Stejskal honored at magnetic resonance symposium

About 200 internationally recognized experts in the field of nuclear magnetic resonance (NMR) recently gathered in Raleigh for a regional conference and special symposium honoring the contributions of NC

State Chemistry Professor Emeritus Edward O. Stejskal.

“Ed’s career, which began more than 50 years ago, has been filled with many key discoveries and firsts that have shaped the way scientists

in a variety of disciplines practice their craft,” said Professor Jeffery White, symposium organizer and a long-time student of Stejskal’s work.

The symposium offered two lectures and seven presentations by researchers from across the country. At the symposium’s luncheon, Stejskal was recognized for his seminal research in pulsed-field gradient NMR and solid-state NMR. All modern NMR experiments used in the study of diffusion, structure in large molecules, multidimensional NMR, and NMR of solids have benefited significantly from Stejskal’s work.

The symposium was a kick-off event for the Southeastern Magnetic Resonance Conference, hosted by NC State and organized by chemistry faculty Alex Smirnov and Tatyana Smirnova. The two-day conference featured a diverse program of cutting-edge presentations in new instrumentation, biology and medicine, physics and materials science, and novel experimental methods.



Chancellor Marye Anne Fox congratulates Ed Stejskal after he received an award of appreciation from the Chemistry Department.

PHOTO BY CYNTHIA WERTZ

Detective work finds real cause of fish kill

In late summer 2000, large numbers of fish died in the Persian Gulf off the northern coast of Oman, alarming local officials.

Theories about the cause ranged from the release of contaminated

However, a research team representing NC State, the University of Miami and Oman's Marine Science and Fisheries Centre (MSFC) found the real culprit was a series of natural environmental changes that drastically reduced the Gulf's surface water oxygen content.

During the fish kill, NC State Professor of Oceanography John M. Morrison happened to be in Oman, where he was helping the Ministry of Agriculture to upgrade their remote satellite sensing techniques. News of the fish kill prompted the Ministry to ask Morrison for help in determining the extent of the situation and its cause.

"If the kill was caused by a toxic plankton bloom or red tide, the food supply would be contaminated. If it was oxygen depletion, then the seafood was safe to eat," Morrison said. The Gulf of Oman and Arabian Sea contain oxygen-poor water at depths of about 100 meters, partly because the area has ideal conditions for algal blooms. And the Arabian Sea has one of the world's thickest oxygen-depleted layers of ocean water. If the wind is right, these waters are upwelled to the surface.

Satellite imagery indicated just such an upwelling along Oman's coast, proving that the food supply was safe.

But the story doesn't stop there.

"Fish kills caused by oxygen depletion are typically preceded by unusually large catches," Morrison said. "This is because fish tend to gather in patches of high-oxygen water, and once located, these patches can easily be fished. Fish trapped in low-oxygen water are slower and easier to catch. But we need to know what's causing the fish kill before fishermen catch all these fish and possibly flood the market with tainted seafood."

Morrison and his colleagues at the MSFC and University of Miami conducted detailed research into the sea surface temperature, ocean color, water temperature, current patterns, biological productivity and surface winds.

They found that regional winds had made a drastic change in direction, pushing surface water away from Oman and allowing deeper, oxygen-poor water to upwell.

"Our goal is to understand the complex dynamics of upwelling and biological response, on a local and global scale," Morrison said. "This situation was a great example of how our data can provide practical benefits, such as for the seafood industry."

To learn more about this research effort, visit www.meas.ncsu.edu and click on "News and Announcements."

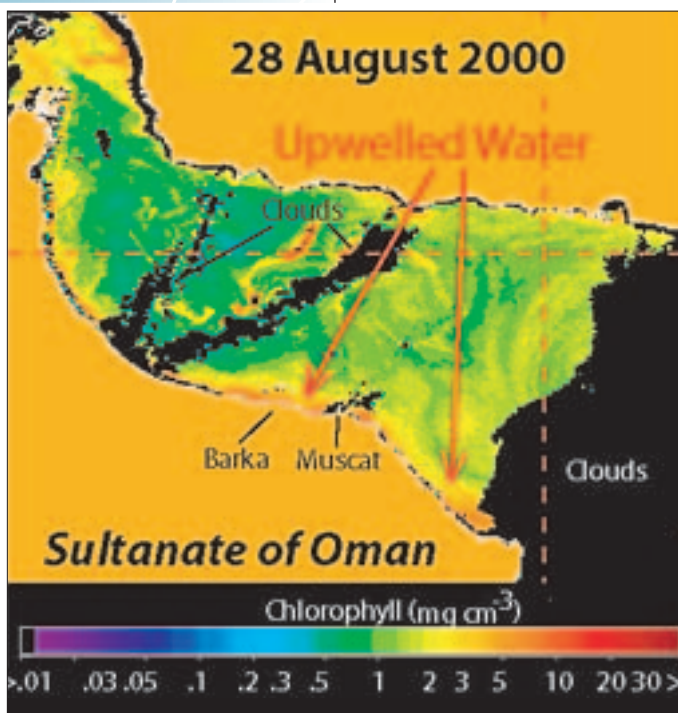


IMAGE COURTESY OF JOHN MORRISON

Ocean Color Image from the National Aeronautics and Space Administration (NASA) Sea-viewing Wide Field-of-view Sensor (SeaWiFS) satellite collected at the Satellite Receiving Station located in the Ministry of Agriculture and Fisheries, Muscat, Oman. The image is "false" colored to represent the chlorophyll-a content of the surface waters of the Gulf of Oman for 28 August 2000. Freshly upwelled, low-oxygen waters along the coast of the Sultanate of Oman are indicated by "red" in the figure.

ballast water from a U.S. tanker visiting the area, to a toxic algal bloom that could threaten Oman's seafood industry.

A gem of a town

Adam Smith (Meteorology, '02) has written a book on the unusual history of Hiddenite, N.C., a small town tucked in the foothills of Alexander County, N.C.

Hiddenite: Land of Discovery details the town's mining history and the many types of gems and minerals

found there—including emerald, gold, platinum and silver—as well as local points of interest.

The book is generating quite a buzz in western North Carolina. It's available in NC State's Natural Resources Library in Jordan Hall, some western N.C. Barnes & Nobles

stores, and also is available for purchase on Amazon.com.

Smith plans to attend a graduate program in climatology, but has another pressing need—his second book.

Wolf greets Jordan Hall visitors

A very special wolf watches over visitors to Jordan Hall.

The wolf was originally part of the Red Wolf Ramble, a public art campaign coordinated by the Raleigh Arts Commission. During the ramble, various organizations sponsored artists to paint almost 100 fiberglass wolf sculptures, which were displayed for several weeks before being auctioned to raise funds for the Arts Commission—unless their sponsors decided to keep them.

That's what happened in the case of the PAMS wolf, which was sponsored by the PAMS Foundation. Painted by local artist Jeff Christian and titled, "Red Wolves, North Carolina and the Universe," the PAMS wolf symbolizes the often-used comment that "the world is our laboratory."

With its front feet in the mountains and its back feet at the ocean, the wolf is covered with scenes representing the physical and natural environments of the state. It takes several minutes to find the wolf's many treasures—a bald eagle, a deer, a rainbow trout, a turtle, a waterfall, and a horse shoe crab, among others. Its head, lifted toward the sky in a

howl, is covered with stars, the moon and even a distant galaxy.

As with the other 10 wolves sponsored by NC State colleges, the wolf was displayed on campus.

Then Drs. Bob Morrison and Dick Patty decided that the wolf deserved a permanent home on campus, and the most appropriate place was the Department of Marine, Earth & Atmospheric Sciences (MEAS).

Morrison and Patty had been jointly managing the department while the College searched for a new department head. They had enjoyed this assignment so much that they wanted to leave the department a gift once a new head was hired.

Morrison and Patty reimbursed the PAMS Foundation for the wolf's sponsorship and the Arts Commission was notified that it wouldn't be auctioning our wolf away.

Tim Harvell, supervisor of the PAMS Instrument Shop, set to work on a permanent display base for the wolf. He built a brushed steel map of North Carolina, which is bolted to the wolf and the floor.



The wolf was presented to MEAS faculty and staff during a reception welcoming new Department Head Dr. John Fountain, and honoring the service of Morrison and Patty.

The wolf now stands just inside Jordan Hall's main entrance.

Tim Harvell, Jeff Christian, Dick Patty and Bob Morrison with the wolf after it was mounted on its new base and presented to the Department of Marine, Earth & Atmospheric Sciences.

Drought Conference wins CASE award

Last July's Drought Conference, hosted by the College and the State Climate Office, earned an Award of Excellence from the Council for the Advancement and Support of Education (CASE) District III. This distinction recognizes the conference as an outstanding entry in the Media Relations Project award category.

The conference was quickly organized by a unique team of university and state agency professionals, and designed to increase news media coverage and public

awareness about North Carolina's historic drought.

Following the conference, the number of public water systems on restrictions doubled and many systems noticed a 25 percent drop in public consumption. The conference also inspired municipalities across the state to organize additional meetings for discussing drought management on local and regional levels. Several communities developed new connections between water systems, and agreements on

sharing resources during shortages.

NC State's conference efforts were led by Ryan Boyles, associate state climatologist and NC State's representative on the N.C. Drought Monitoring Council, and Sally Ramey, director of college relations for the College. The conference was featured in a recent issue of *EOS*, a publication for earth sciences professionals.

The CASE District III competition is open to member colleges and universities throughout the southeastern United States.

Weir receives O. Max Gardner Award, UNC's highest faculty honor

Dr. Bruce S. Weir, William Neal Reynolds Professor of Statistics and Genetics at NC State and one of the world's foremost researchers on statistical analysis of DNA for forensic, human health and agricultural applications, has received the O. Max Gardner Award, the highest faculty award presented by the Board of Governors of the University of North Carolina.

The award is presented each year to one faculty member from the system's 16 campuses recognized as having "made the greatest contribution to the welfare of the human race."

The 2003 award carried a \$10,000 cash prize and was presented at a meeting of the board.

The award citation states, "Dr. Weir's research has resulted in improvements in the breeding of plants and animals, and led to advances in the understanding of human problems in medicine and forensics, all for the benefit of mankind. Perhaps the greatest social impact of Weir's work has emerged from his research in DNA forensics. His work in this area is fundamental

and is greatly responsible for how the courts in this country, as well as the rest of the world, treat the statistical issues concerning DNA evidence."

A true pioneer, Weir developed statistical tests of the frequency of genetic profiles that are now the standard for evaluating DNA evidence in forensic cases. He spear-

Bioinformatics Research Center. The program he heads is widely recognized as one of the world's leading research and graduate training centers for the design and application of computational and statistical methods to problems in genomics.

Weir is a Fellow of the American Association for the Advancement of

"I can hope that within the next 23 years one of my own students will stand before you in this place."

— Dr. Bruce S. Weir

headed reforms to the national guidelines on forensic DNA analyses, was instrumental in achieving acceptance of DNA evidence in courtrooms, and is co-author of the definitive textbook on statistical inference in forensics. Weir also established statistical measures of genetic linkage that are critical for mapping genes associated with human disease. The methods are widely used in gene mapping studies of complex traits such as diabetes and longevity.

Weir's work in genetic descent and recombination in inbred and mixed populations laid the foundation for describing genetic differentiation among groups of animals and plants and has led to continuing improvements in crop and livestock breeding.

Weir received his Ph.D. in statistics, with a minor in genetics, from NC State in 1968 and joined the faculty in 1976 as a professor of statistics. He is head of the program in statistical genetics, director of the NIH program grant in statistical and quantitative genetics, founder and manager of the annual Summer Institute in Statistical Genetics, and founding director of the

Science and of the American Statistical Association and an Honorary Fellow of the Royal Society of New Zealand.

Before joining NC State's faculty, Weir was senior lecturer and reader in mathematics at Massey University in Palmerston North, New Zealand. He received his bachelor's degree in 1965 at the University of Canterbury, New Zealand, and did post-doctoral work in genetics at the University of California-Davis. Weir is the author or co-author of seven books and more than 150 papers.

In a written response to the award presentation, Weir observed that 23 years earlier, he had attended the presentation at which his mentor, Clark Cockerham, received the 1980 O. Max Gardner Award.

"I could not have dreamed at that time that I would ever have the same privilege, and even today I'm not sure that I should," he said. "However, I can hope that within the next 23 years one of my own students will stand before you in this place."

Weir repeated one of Cockerham's sentiments, "Utopia is not just being allowed to do what you enjoy; it is also being recognized for doing that."



Bruce Weir chats with Noel Turner of the College of Charleston and Anne-Marie Gale of Memorial University of Newfoundland, both participants in the 2003 Summer Institute in Statistical Genetics.

Statistics program a VIGRE-ous success

Ask any number of students and faculty in the Department of Statistics about its NSF-funded VIGRE training program, and you'll get the same response: a winning smile that spells "success."

That success translates into graduating students who are excited about research and equipped with problem-solving skills acquired on real-world research projects.

The VIGRE (for Vertical Integration of Research and Education) program aims to recruit, retain and train qualified U.S. students in the mathematical sciences by involving them in well-mentored, collaborative research early in their careers.

"Research keeps our undergraduates and graduate students excited about the mathematical sciences," said Dr. Tom Gerig, director of the department's VIGRE program. "Our goal is to broaden the opportunities that students see for themselves."

The VIGRE program began in 1999 when the department won the prestigious five-year grant, the first ever to a statistics department. Each year since then, about 24 students and up to 3 postdoctoral fellows have received VIGRE funding.

bachelor's degree in three years thanks to a VIGRE traineeship.

"The VIGRE stipend for the summer after my junior year got me into the graduate program a year ahead of time," he said. Crotty is developing tests of spatial distributions based on partial data sets with Dr. William Swallow and also works part-time at SAS Institute.

"By getting involved in research, I got to see statistics in action," said Kristen Madsen. As a VIGRE undergraduate, she worked on forensic DNA analysis with Dr. Bruce Weir and on air pollution monitoring at EPA with faculty advisor Bill Hunt. Now a graduate student and SAMSI fellow (see related story, page 10), Madsen is designing large-scale weather models with Dr. Montserrat Fuentes.

VIGRE trainees affiliate with one of four interdisciplinary workgroups—biomedical, industrial, environmental, and statistical genetics. The workgroups provide natural mentoring environments in which more senior faculty and students mentor junior members.

Other opportunities for participatory learning abound—in collaborative



doctoral student in biomedical statistics. Doi will start his "dream job" teaching statistics at California Polytechnic State University this fall.

These opportunities are open to all students.

"We never wanted this to be an elite group of students," said Gerig. "Everyone is invited to all activities. Instead, we have tried to change the goals in the department to be consistent with the VIGRE program, because we wanted this to benefit all the department's students."

In implementing the VIGRE program, the department drew on its history of collaborative research with organizations such as GlaxoSmithKline, SAS Institute, Analytical Sciences, Inc., Becton Dickinson and EPA.

"This success story goes back to the vision of the department's founder, Gertrude Cox," said Dr. Daniel Solomon, dean of the College of Physical and Mathematical Sciences. "She saw applied statistics playing a vital role in the community. That's why VIGRE works—it's applied science."

Recruitment has also gotten a boost from the VIGRE program. "VIGRE has had a huge impact on our ability to recruit and support high-quality students, including members of under-represented groups," said Dr. Jacqueline Hughes-Oliver, who has helped lead the diversity initiatives in the department. The

VIGRE participants socialize for a few moments before a Statistics Department seminar. Shown are post-doc Kim Weems, faculty member Bill Swallow, graduate students Jimmy Doi and Tina Dube, faculty member Tom Gerig, and graduate student Michael Crotty.

"...VIGRE gives students extra time to broaden their training, and at the same time graduate sooner, because they can take additional classes and get an early start on research."

— Dr. Sastry Pantula

"By eliminating teaching assistant responsibilities, VIGRE gives students extra time to broaden their training, and at the same time graduate sooner, because they can take additional classes and get an early start on research," said Dr. Sastry Pantula, department head.

Michael Crotty completed his

research teams, interdisciplinary workshops, professional skills workshops, supervised consulting classes, undergraduate summer research institutes, and the Preparing the Professoriate program. Being strong in research and in teaching skills gives students an advantage in applying for academic positions, said Jimmy Doi, a VIGRE

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Student/ Alumni Notables

Andrea Hernandez of Miami, Fl., was named Miss Wolfpack 2002. A mathematics major, she is the first Hispanic student to achieve this honor.

Johnny Gatlin (Meteorology, '91) was named the 2003 Wake County Teacher of the Year.

New national institute addresses statistical, mathematical challenges

With \$10 million in principal funding from the National Science Foundation (NSF), Research Triangle Park (RTP) is now home to a unique research center designed to confront some of humanity's most difficult scientific challenges.

The Statistical and Applied Mathematical Sciences Institute (SAMSI) is a partnership of NC State, Duke University, UNC-Chapel Hill and the National Institute of Statistical Sciences (NISS) in RTP.

SAMSI is one of three new research institutes established by the NSF to help strengthen the mathematical sciences as the backbone for U.S. scientific and engineering research.

SAMSI is the world's first institute to focus on simultaneously enlisting

both the statistical and applied mathematical sciences to confront the hardest and most important scientific challenges in scientific modeling and data analysis. Those challenges are as diverse as global climate simulations and modeling the course of HIV infections.

SAMSI will attract both young and senior researchers from universities, government laboratories and industries in the U.S. and beyond for collaborative research, addressing problems whose complexity requires extraordinary levels of group multi-disciplinary interaction.

Statisticians use the tools of probability and data analysis to model complex phenomena. Applied mathematicians use mathematical

equations that describe the physical or biological properties underlying such complexities.

"In the past these problems have been addressed in two different ways by these different groups," said SAMSI Director James Berger, a Duke statistics professor. "These groups should work more closely together to find a new synthesis for modeling complex phenomena. The effect will be considerably more powerful than the two approaches separately."

The institute is led by a directorate that includes H. Thomas Banks, Drexel Professor of Mathematics and director of the Center for Research in Scientific Computation at NC State.

For more information, visit www.samsi.info.

A new look at Venn diagrams

Charles "Chip" Killian (Applied Mathematics '02) teamed up with faculty members at NC State and the University of South Carolina to solve a decades-old question—how to design a Venn diagram that includes all possible intersections while remaining symmetrical.

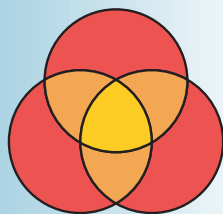
The symmetry can only be

obtained with prime numbers, and circles and ovals have their limits when it comes to including all intersections. Until now, Venn diagrams had only worked for prime numbers up to 11. Killian and his colleagues found a way to produce Venn diagrams for higher primes that bear resemblance to designs produced

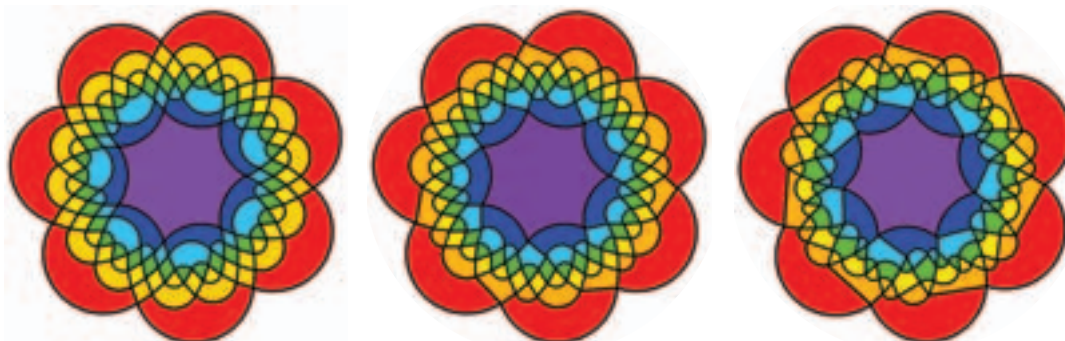
with a child's Spirograph set.

The team's work was featured on page 651 of the January 31, 2003, issue of *Science*. Killian's partners were Dr. Carla D. Savage, professor of computer science and associate member of the Mathematics Department at NC State and Dr. Jerrold Griggs of the University of South Carolina.

An old, familiar Venn Diagram



New Venn diagrams—good for when $n=7$



Degree and symposium honor statistical geneticist William Hill

William Hill, the world's leading quantitative geneticist and a 20-year collaborator with NC State's statistics and genetics departments, recently received an honorary degree from NC State and was celebrated at a symposium held in his honor.

Professor emeritus and former dean of science and engineering at the University of Edinburgh, Hill was awarded an honorary Doctor of Science degree by Chancellor Marye Anne Fox at the 2003 spring commencement.

Hill was visiting professor in the Statistics Department from 1979 to 1998, presented the C. Clark Cockerham lecture in 1997, and continues to collaborate with Dr. Bruce Weir of the Bioinformatics Research Center (BRC), Dr. Trudy Mackay of the Department of Genetics, and Dr. Eugene Eisen of the Department of Animal Science. Dr. Zhao-Bang Zeng, professor of

statistics and genetics, was a former graduate student under Hill.

Hill formulated statistical theories central to explaining how multiple genes affect complex traits such as weight, longevity and yield. His theories permit estimating the numbers of genes and their effects from observed trait changes in offspring, predicting the amount of change to be expected from various selective breeding strategies, and describing the effects of new mutations on selection response. Hill also contributed significantly to the fields of population genetics and genetic mapping, which have application in the search for human disease genes.

The day before commencement, a day-long BRC symposium honoring Hill brought together about 100 internationally recognized scientists in statistics and genetics from NC State and other institutions.



Dr. William Hill, shown with Chancellor Marye Anne Fox, received an honorary degree at NC State's May 2003 commencement.

PHOTO BY ROGER WINSTEAD

VIGRE, *continued from page 9*

years 2001 and 2002 saw significant increases in minority recruitment, and in May 2003, master's degrees were awarded to Candace Porter, Kiya Hamilton, and Tina Dube, all recruited in minority outreach efforts funded by VIGRE.

The NSF sees the department's VIGRE program as a success, too. The program passed its three-year performance review in 2001, earning it a second round of funding. NSF has asked Pantula to give presentations about the department's VIGRE program and help with VIGRE site visits.

Where does VIGRE go next? The department's program has become a model for similar projects at NC State and elsewhere. In February, VIGRE post-doctoral fellow Dr. Kim Weems, Hunt and Swallow won a \$250,000 NSF joint grant to help establish a research-in-education program at Spelman College.

The department expects to add

biomathematics and bioinformatics as areas of VIGRE research next year, and it hopes to offer a summer research institute in biostatistics in cooperation with Duke University Medical Center.

strength of its VIGRE program will help it win a continuing grant for the period beginning in fall 2004.

"The VIGRE program really endorses what the department does well," said Hughes-Oliver. "VIGRE

“VIGRE is a way to meet the NSF goals of educating U.S. nationals and take bold steps in mathematical sciences—and we’re doing it.”

— Dr. Jacqueline Hughes-Oliver

VIGRE also promotes off-campus partnerships, such as the SAS Institute Computational Statistics Fellowship.

The department hopes that the

is a way to meet the NSF goals of educating U.S. nationals and take bold steps in mathematical sciences—and we're doing it."

—By Pat Westphal

Faculty Notables

Alton Banks (Chemistry)—
2003 Alumni Distinguished
Undergraduate Professor

Brent Gunnoe (Chemistry)—
2003 National Science Founda-
tion Career Development Award

The **Physics Department**—
2003 Univesity Award for
Teaching and Learning Excellence

Jackie Krim (Physics)—
Distinguished Lecturer by
Sigma Xi

David E. Aspnes (Physics)—
Fellow of the American
Association for the
Advancement of Science.

Jim York, (Physics)—
recipient of the 2003
Dannie Heineman Prize for
Mathematical Physics

David A. Dickey (Statistics)—
ISIHighlyCited.com's list of the
most highly cited researchers in
the mathematics category for
economics/business and
mathematics

Butch Tsiatis (Statistics)—
ISIHighlyCited.com's list of the
most highly cited researchers in
the mathematics category

Cavell Brownie (Statistics)—
Fellow of the American Statistical
Association

Marie Davidian (Statistics)—
Alumni Distinguished Graduate
Professor

Bill Swallow (Statistics)—
Board of Governor's Award for
Excellence in Teaching

World's first electric guitar invented at NC State?

Music lovers, take note. A physicist at NC State developed the world's first fully electric guitar years before one was patented by Gibson Corporation.

At the 1940 NC State Engineering Fair, physicist Sidney Wilson of Yanceyville, NC, created a sensation with his invention of a fully electric guitar. The instrument was also the first to have single-string pick-up.

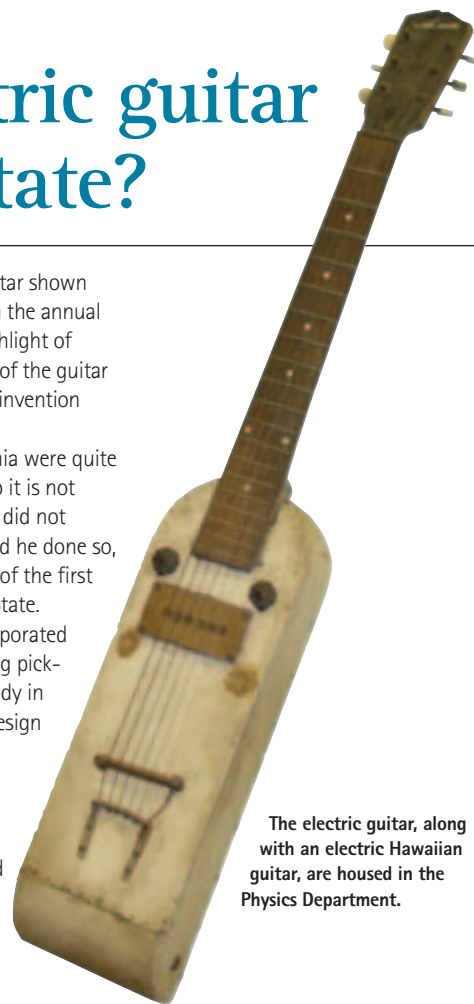
Gibson Corporation had introduced a converted acoustic guitar—the ES-150—in 1937 that used a single bar to pick up the signal from all strings. The instrument achieved some popularity, but was plagued by unequal loudness across the six strings.

Wilson reasoned that individual pick-ups could remedy the unequal loudness problem, and that the acoustical body was not necessary for a fully electric instrument.

He developed the guitar shown at right and entered it in the annual engineering fair. The highlight of the fair was the playing of the guitar by Mickey May, and the invention won the fair's first prize.

Patents from academia were quite unusual in the 1940s, so it is not unexpected that Wilson did not patent his invention. Had he done so, it would have been one of the first patents granted to NC State.

In 1949 Gibson incorporated both the individual string pick-up and the cut-away body in its model ES-175. The design was attributed to Ted McCarthy of Gibson Corporation, but the features were first conceived and implemented by NC State physicists.



The electric guitar, along with an electric Hawaiian guitar, are housed in the Physics Department.

Disappearing neutrinos support the case for neutrino mass

Physics researchers at NC State are part of a large international team that made news recently when they found seemingly inescapable proof that neutrinos have mass. Results from six months of experiments at KamLAND, an underground neutrino detector in central Japan, show that anti-neutrinos emanating from nearby nuclear reactors are "disappearing," indicating that they have mass and can oscillate or change from one type to another.

"This is the first wholly-terrestrial demonstration that neutrinos have

mass, and therefore do not move at the speed of light," said Dr. Chris Gould, professor and Physics Department head. "Neutrinos change form as they travel along, and they definitely are the lightest particles (with non-zero mass) so far discovered in the universe."

As anti-neutrinos are the anti-matter counterpart to neutrinos, these results provide independent confirmation of earlier studies involving solar neutrinos and show that the standard model of particle physics, which has successfully

explained fundamental physics since the 1970s, is in need of updating. The results also point the way to the first direct measurements of the total radioactivity of the earth.

The research was conducted by an international team of scientists from 13 universities and three government research laboratories.

Participants from NC State included faculty members Chris Gould, Diane Markoff and Albert Young, graduate student Jason Messimore, and undergraduate student Mic Iwashima.

WebAssign: Physics project evolves into innovative teaching tool

Before the first day of fall semester classes at NC State, more than 100 students had already turned in their first homework assignments. The students were able to access their assignments through WebAssign, a unique online service that enables students to complete their homework and have it automatically graded online.

Starting as a project in NC State's Physics Education Group in 1997, WebAssign is now used by more than 17,000 students in almost 400 classes at NC State, and by more than 90,000 students at more than 300 colleges and universities.

The most advanced system of its kind on the Internet, WebAssign is revolutionizing the way math and science courses are taught and the way students learn.

From an educator's perspective, the software enables teachers to distribute, collect, grade and record assignments quickly, accurately and automatically over the Internet.

From a student's perspective, WebAssign allows them to master subject material. The software is basically a textbook or quiz that "talks back." Teachers can pull from existing textbook questions or write their own. Students answer online, can check answers at any time, and have the opportunity to rework problems until they get them right.

The software also offers a unique feature—it randomizes numbers, offering each student unique questions to solve. This feature makes it virtually impossible to copy another's work, and very difficult to do assignments right before class.

"WebAssign unlocks the door to a new way of teaching—to a classroom without walls where time isn't a boundary and record-keeping is no longer a burden," said John Risley, WebAssign director and NC State physics professor. "WebAssign

harnesses the power of the Internet and puts it to work for teachers, giving them the freedom to get back to teaching."

WebAssign has the flexibility to handle any kind of coursework. Questions can be numerical and algebraic as well as multiple choice, true/false, matching, fill in the blank,

academies, University of Notre Dame, Wake Forest University, University of Wisconsin and University of Washington.

WebAssign also boasts a growing high school market, with 12,000 students.

"WebAssign has taken quality education to the next level by making

"WebAssign has taken quality education to the next level by making homework assignments and tests more effective teaching tools."

— Dr. John Risley

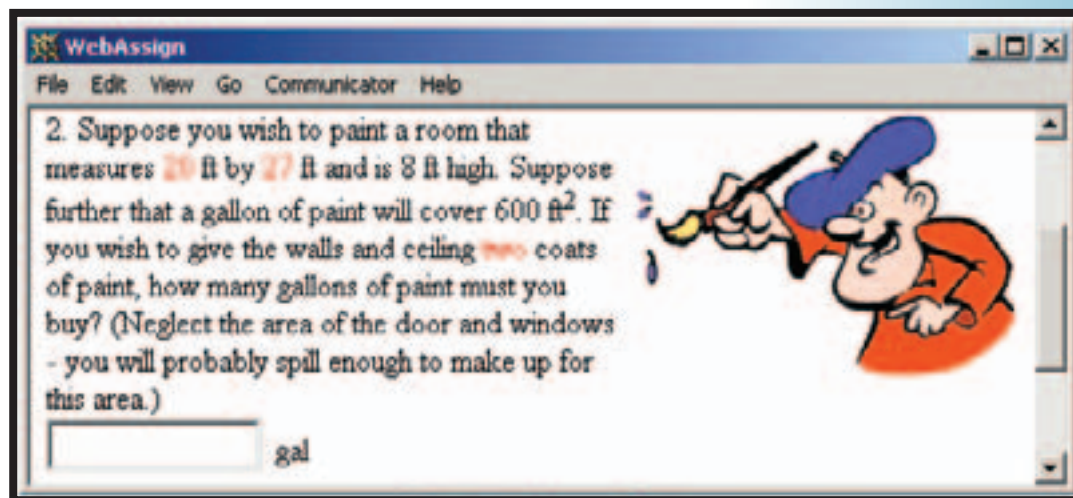
short answer, essay or poll. Complex questions using all types of answers can be created. Variables, words and phrases, graphics, and sound and video files can all be randomized.

WebAssign has quickly attained national prominence. It's used at institutions such as University of North Carolina at Chapel Hill, North Carolina A&T State University, East Carolina University, University of Virginia, all United States military

homework assignments and tests more effective teaching tools," Risley said. "Students are more accountable for their homework and faculty can better manage time spent in the classroom. We're very excited to see this program expand."

Instructors interested in more information on WebAssign should contact info@webassign.net, 800/955-8275, or visit <http://webassign.net>.

This is a sample high-school level exercise from WebAssign.



College recognizes scholarship recipients, donors

About 175 scholarship recipients and donors joined Chancellor Marye Anne Fox and PAMS faculty and staff for the fourth Realizing Possibilities Dinner.

The event provides a unique opportunity for recipients and donors to meet, allowing them to share experiences and learn more about each other.

"This dinner allows me to make a meaningful connection to the wonderful young people I've helped," said Susan Cormier, who supports the Lauren Bonatz Memorial Fund, which provides a scholarship for a geology student in memory of Cormier's daughter.

"There are so many bright kids out there who are going to make a brighter future for us all. Some of them just need a little boost to do their best, and

relieved my family of a greater financial burden but have allowed me to focus more on my studies, instead of a part-time job," said Sarah Reising, a physics major and recipient of the Thomas A.

how one of the students said that saying "thank you" doesn't seem like "enough."

"Even though these students shared their experiences with us in their own

"There are so many bright kids out there who are going to make a brighter future for us all. Some of them just need a little boost to do their best."

— Susan Cormier

Hill Scholarship and the Nancy Chung Physics Scholarship.

"I hope that some day, I'll be able to contribute to the College in a way that will help students like me, as a way of returning the favor of my donors' generosity."

The event included the presentation of awards of appreciation to three high school teachers who had significant influence on a college student's academic career.

John Primm, a history teacher at Northeast Guilford High School in McLeansville, was recognized for debating material in class, which geology student Holly Woodward credited for helping her develop critical thinking skills that enabled her to be successful in the sciences.

Statistics student Susan Hunter recognized Michael Downey, her math teacher at Enloe High School in Raleigh, for his holistic view of his students.

Chemistry student Hugh Crews honored David Corsetti, a physics teacher at Broughton High School in Raleigh, for serving as an important role model outside of the classroom.

"As a teacher, this portion of the program warms my heart," Cormier said. "I think it's great that these kids can look back and reflect on how they got to where they are, and recognize the impact of their teachers."

In her comments, Fox reflected on

touching and sincere way, I think that they'll all agree with me when I say that there are no words that can adequately express how grateful we all are," Fox said. "How can you possibly thank anyone enough for funding your education? For laying the foundation for your career? For giving you a kick-start on your life?"

"I don't know that it's possible," she said. "But every year, the College of Physical and Mathematical Sciences tries by bringing you all together to celebrate your generosity of spirit."



Heather Cherry greets her scholarship donor, Hubert Park, at the 2003 Realizing Possibilities Dinner. Park sponsors the Mary Alice and Hubert V. Park Scholarship, which supports students in mathematics.

this event reminds us that it's worthwhile to continue supporting them."

Several students made brief presentations about what their scholarships mean to them and how much the support is appreciated. They explained how scholarships make them feel appreciated as students, and motivated to continue striving for academic success. They also acknowledged how such support enables them to focus on their studies.

"My scholarships have not only

You've got mail!

Alumni have had positive feedback about *PAMS Focus*, the College's periodic e-mail news bulletin.

PAMS Focus is distributed every several weeks to alumni and friends, keeping them up-to-date on the latest news. Items are short and include Web links for those who want additional details.

PAMS Focus doesn't include graphics that can clog up one's e-mail box.

To receive *PAMS Focus*, send an e-mail to pamsalumni@lists.ncsu.edu.

Gift provides rare out-of-state scholarship

For Jake Belin, experiencing a new region of the country and a different, unfamiliar environment in general was as important to his college experience as top-notch teachers and courses. And while being from Port St. Joe, Florida, didn't quite make Belin a foreign student at NC State, he was far enough from home on Florida's Gulf Coast to gain an appreciation for things different, even including the need for a heavy winter coat.

To help other students reap the benefits of attending a great university miles from their hometowns and high schools, Belin has established the Jacob and Betty Belin Endowed Scholarship in the College of Physical and Mathematical Sciences for students from Florida. The merit scholarship will provide one or more students each year with full out-of-state tuition, and is designated for mathematics, physics, statistics or chemistry majors.

"Diversity of student background is vital to providing a university environment rich in differing ideas, personal experiences and points of view," Dean Dan Solomon said. "Yet while attracting out-of-state students is important, scholarships for such students are rare. The Belin Scholarship will help us better compete for those out-of-state students who can enrich the educational experience for all of our students."

Belin, whose own degree was in applied mathematics, parlayed his studies and extracurricular activities into a

successful career in the petroleum industry.

While at NC State, Belin was inducted into Pi Mu Epsilon, the honorary math fraternity, as a freshman, and Phi Kappa Phi as a senior. After graduating in 1970 with highest honors, he did graduate work at Georgia Tech's Graduate School of Industrial Management. He later joined Charter Oil Company, which was then the parent company of Kern Oil & Refining Company. Belin became president of Kern Oil while only in his 30s. Industry analysts consider Kern one of the top small, independent petroleum refining companies in the country.

Belin also has been an advocate for small business in California and has served as president of the Western Independent Refiners Association.

Belin received the 1993 Distinguished Alumnus Award from the College, in recognition of his academic success, entrepreneurial spirit, business savvy, visionary management style and commitment to young people.

"One of my passions is youth," Belin said. "Through this scholarship, Betty and I hope to open the doors of opportunity for students who wish to learn and grow at a great university in a great city and state."

Belin lives with his wife, Betty, in Rancho Palos Verdes, California.

They have one son, Phillip, who recently earned a law degree from Southern Methodist University.



Jake Belin and his wife, Betty, enjoyed the fall colors on campus during a recent visit. The Jake and Betty Belin Endowed Scholarship supports out-of-state students.

Howard Schaeffer remembered

Dr. Howard J. Schaeffer, a former member of the PAMS Foundation Board of Directors and a driving force in the development of The Science House, passed away last spring at the age of 75.

A native of Rochester, NY, he was a pioneer in the field of medicinal chemistry. Dr. Schaeffer's most famous discovery while working for Burroughs Wellcome was Zovirax (acyclovir), the first selective drug for the treatment of herpes infection.

Schaeffer was the recipient of a number of awards including the Ebert

Prize, The Bristol Award in Chemotherapy, The Discoverers Award from the Pharmaceutical Manufacturers Association, The Esselan Award for Chemistry in the Public Interest, and he received an honorary Doctor of Science degree from the University of Arizona.

Burroughs Wellcome recognized Dr. Schaeffer's many contributions by endowing a Distinguished Professorship in Chemistry at NC State in his name.

One NC State program partially funded by the Burroughs Wellcome

Fund and supported by Dr. Schaeffer is The Science House, a nationally recognized outreach model for enhancing science and mathematics education by partnering with K-12 teachers and schools. By fostering greater interest in the sciences, The Science House also helps to ensure a diverse pool of scientists and engineers for the future.

The Schaeffer family requested that memorial contributions be made to The Science House. For information on how to make a gift, see the inside back cover.

Science House expands outreach with satellite offices

With the help of a grant from the US Department of Education, The Science House has opened two more satellite offices, and is preparing for a third.

"Having satellite offices in strategic locations across the state enables

House's special brand of educational programs. The goal of the satellite offices is to help create a community of teachers and schools who use technology to improve the teaching of science and mathematics.

This summer, each site will hold

High School in north Fayetteville. The Fayetteville office serves the science and math teachers of Cumberland and surrounding counties.

A third satellite is planned for Jacksonville and a search for a coordinator to staff it is underway.

The new satellites will build upon the successes from two previously existing offices.

The Northeastern Satellite Science House, located in Edenton extends The Science House's services into counties east of I-95 and to the north of the Albemarle Sound. The office is housed at the Albemarle Learning Center, a local nonprofit dedicated to promoting local people and places as educational resources. In addition to lab and classroom space, this office has access to canoes, a nature trail and a mill pond, resources that facilitate environment-related activities for students and teachers.

The Western Regional Satellite Office is located in The Education Center in Lenoir and serves schools in Caldwell and surrounding counties. This office has 10 Macintosh laptop computers outfitted with a Vernier Universal Lab Interface and probes, which are taken into local schools. Since this service began in 1997, 37 teachers and more than 2,500 students from six high schools have participated.

For more information about The Science House, visit www.science-house.org.

PHOTO BY GINA BARRIER



The Western Regional Satellite Office held an EnviroTech summer camp for high school students, who traveled across the Blue Ridge Mountains to monitor air, soil, and water quality. Here, campers enjoy the view from the top of Grandfather Mountain while waiting for their equipment to process air samples.

us to serve rural school systems which are short of qualified science teachers and new teaching technologies." said Dr. David Haase, director of The Science House. "By working with these rural schools and teachers we are helping produce the technological workforce and good schools needed for economic development in these needy areas."

Each satellite is operated by a coordinator who is skilled in The Science

teacher-training workshops supported by Progress Energy.

One of the new satellites is housed at The Health Adventure, a regional science museum in downtown Asheville. The Asheville office serves math and science teachers in Buncombe County and Asheville City Schools as well as surrounding areas.

Another new satellite is hosted by Cumberland County Public Schools and is located at Reid Ross Classical

Challenge grant supports Science House

An anonymous donor has announced a challenge grant of \$250,000 for The Science House endowment.

"The Science House is a mature program that has established itself as a national model for K-12 science and mathematics outreach," said Anita Stallings, executive director of the PAMS Foundation. "It currently

has no permanent endowed support, and we hope that this challenge grant will encourage others to step forward to support this worthwhile program."

Not only will the anonymous donor match contributions one-to-one to the general Science House Endowment, but the donor will support endowments in other donors'

names. For example, if "Jane Smith" establishes an endowment in her name to support The Science House, the anonymous donor would designate a match into the Jane Smith endowment. This enables Jane Smith to double the value of her gift.

For information about making a contribution, see "How to Make a Gift" on the inside back cover.



How to make a gift

Many alumni remember how difficult it was to manage the expense of higher education and want to find a way to help today's students achieve their dreams.

The PAMS Foundation provides many ways to support students, faculty and programs of the College. Whether you want to contribute to an existing scholarship, support a departmental enhancement fund, make a memorial gift, or consider more significant support, our staff is available to help you explore the options.

To support existing funds

To contribute to a scholarship, fellowship or other fund, simply mail a check to the NC State Physical & Mathematical Sciences Foundation, Campus Box 8201, Raleigh, NC, 27695. Make checks payable to PAMS Foundation and write the name of the fund on the "notes" or "for" line.

And if your employer provides matches for charitable donations, please send a completed matching gift form with your contribution.

There are many funds not mentioned in this issue of *Scope*, and several have specific designated uses. If you would like information on our various funds to help you decide the best fit for your support, please give us a call at 919-515-3462.

To explore other options

If you have questions about gift planning, we can help you identify tax benefits, choose between permanent endowment vs. one-time support, and explore estate planning or life-income options.

There are many ways to match your interests with specific College needs, and several possibilities for making your vision a reality. Whether using cash, appreciated assets, real estate or a bequest, we can help you find the best way to make the most of your gift.

Contact us today at 919-515-3462 or by e-mail at pamsalumni@lists.ncsu.edu.

Etch your name into NC State history

Many alumni have reserved laser-etched bricks in the "Walk of Discovery." To coincide with the construction of the new Undergraduate Science Teaching Laboratory (USTL) building, the Walk of Discovery will include bricks engraved with the names of alumni, faculty, staff, students and friends. Proceeds from the

sale of the bricks will support scholarships within the College.

Brochures about the walkway were mailed to all PAMS alumni and friends in November 2002. We have completed the order for the initial laying of the bricks. However, we will continue taking orders and periodically add additional etched bricks to

the walk when we have accumulated enough for an order.

If you did not receive a brochure and you want to install a brick on the Walk of Discovery, contact the PAMS Development Office at 919-515-3462 and we will fax the order form to you. We can accept orders by fax with credit card information.

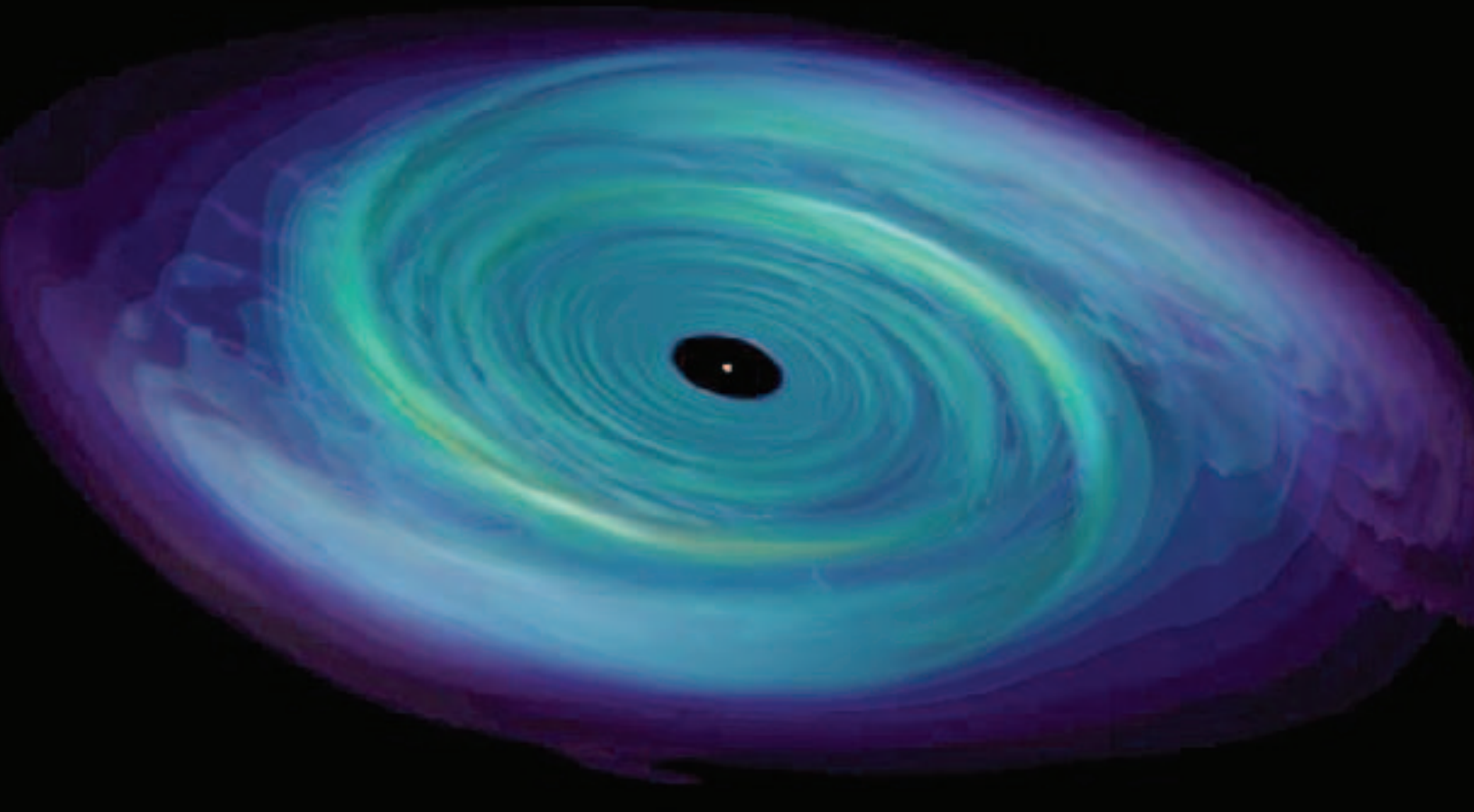
Send us your news! We want to hear from alumni, students, faculty and staff members, and other supporters of the College. Awards, accomplishments, career changes—Let us hear from you!

_____ NAME	_____ EMPLOYER
_____ DEGREE/YEAR AWARDED	_____ E-MAIL
_____ ADDRESS	
_____ HOME PHONE	_____ WORK PHONE
_____ HERE'S MY NEWS (PLEASE PRINT)	

Clip and mail to: NC State College of Physical and Mathematical Sciences, Box 8201, Raleigh NC 27695-8201
Or send an e-mail to: pamsalumni@lists.ncsu.edu.

NC State image “Discovered”

An image created by physics student Michael Owen was used in the January 2003 *Discover* magazine to illustrate one of 2002's top 100 science stories. Under the direction of Dr. John Blondin, Owen created a 3-D simulation of an accretion disk—cosmic material swirling into a black hole or other compact central object. The image also was selected for NASA's Astronomy Picture of the Day, a rare honor for a non-photographic image. For more about the image, visit the NASA Picture of the Day Web site at: <http://antwrp.gsfc.nasa.gov/apod/ap020927.html>.



scope

The College of Physical and Mathematical Sciences is made up of internationally recognized departments:

Physics
Mathematics
Chemistry
Molecular & Structural Biochemistry
Statistics
Marine, Earth & Atmospheric Sciences

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