

Research News

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Two U.Va. Scientists Ranked Among World's Top Young Innovators by MIT's Magazine of Innovation

By Charlotte Crystal

Two interdisciplinary researchers at the University of Virginia — Richard Kent, assistant professor of mechanical and aerospace engineering, and

Shayn Peirce-Cottler, assistant professor in biomedical engineering — have been named to *Technology Review's* 2004 list of the world's 100 Top Young Innovators.

Selected by the editors of *Technology Review*, a magazine published by the Massachusetts Institute of Technology, and an elite panel of judges, the TR100 list comprises 100 individuals under age 35 whose work may have a profound impact on current technology. This year's honorees represent disciplines ranging from biotechnology and medicine to computing and nanotechnology. U.Va. was one of only a handful of institutions with more than one honoree on the list. Others with multiple winners included MIT and Stanford University.

Both U.Va. researchers work at the intersection of engineering and medicine.

Richard Kent holds a joint appointment in engineering and medicine, conducting



Shayn Peirce-Cottler

research with the Department of Mechanical and Aerospace Engineering, and teaching in the Department of Emergency Medicine. His research in the

University's Center for Applied Biomechanics, which conducts a broad array of research related to automobile safety, focuses on developing "smart" seat belts and airbags.

Kent's efforts, built largely on creating new mathematical algorithms, will enable seat belts and airbags rapidly to process data during an impending crash — How fast is the car going? What is the shape of the object being hit? — in combination with data about the driver such as size, weight, bone density, position, age, health. This will help to determine the best response of the safety equipment given the circumstances of a particular driver in a particular crash.

Shayn Peirce-Cottler has developed complex, quantitative, predictive computer models that have the potential to speed up the development of new medical treatments relating to tissue growth and repair. She has

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Richard Kent

Patrick Martin Receives UNCF/Merck Award

Patrick Martin, a postdoctoral fellow in pathology, has received a sought-after UNCF/Merck national award. Martin completed his undergraduate work at Virginia Union University in Richmond. There he was influenced by Dr. William Stetler Stevenson, who was his biology professor. He was also supported in his efforts by Dr. Anthony Madu, director of the MARC (Minority Access to Research Careers) program, funded by the National Institute for General Medical Sciences.

For his graduate program, Martin chose the University of Virginia, and participated in Dr. Moses Woode's Minority Medical Education Program, which is supported by the Robert Wood Johnson Foundation and U.Va.'s School of Medicine. This convinced him that U.Va. would provide a challenging yet supportive atmosphere. He had a particular interest in cell signaling, and this also fit well

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Office of the Vice President for
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UNIVERSITY OF VIRGINIA

An Ounce of Prevention – On an International Scale

An ambitious new collaboration between U.Va.'s School of Nursing, the School of Medicine, the College of Arts & Sciences, and hospitals and clinics in South Africa aims to slow the spread of HIV/AIDS and to help prevent sexual assault. Key U.Va. players include Sarah Farrell, Ph.D., Barbara Parker, Ph.D., and Tina Brashers, M.D., as well as Sarah Anderson, Candace Burton and Lindsay Powell. The team is concerned with reducing the incidence of sexual assault, which is pervasive in southern Africa, and which in turn exacerbates the spread of sexually transmitted diseases. This initiative is a part of the larger U.Va. South African and Virginia Networks and Associations (SAVANA) project which includes faculty and students from not only the School of Nursing, but also the School of Medicine and the College of Arts & Sciences. Sexual Assault Nurse Examiner (SANE) training was the key reason for African faculty to come here last spring and for the SANE nurses training that Sarah Anderson and Candace Burton undertook on site in the Limpopo region.

The aim of the School of Nursing program is to support visits to rural South Africa to learn from their prevention programs, and to host visits from their faculty to learn from ours. Several of these site visits have already taken place, which

have led to mutually beneficial relationships on both sides. “The approaches may be very different but there is much to learn from their perspective,” says Sarah Farrell, who was part of the second visit to Limpopo Province earlier this year. However, the scientific aspects of human and environmental health are also impacted by environmental degradation that leads to climate change and causes a major pollution threat. So the team has included environmental sciences professors Bob Swap and Hank Shugart, as well as Christine Wilder, M.D., from the School of Medicine, who studies pollution and its implication in pulmonary diseases. Nursing students who donate their time through their school’s Nurses Without Borders program have also visited southern Africa to help build capacity among caregivers.

Among the distinguished faculty visiting here from Tshilidzini Hospital in the Limpopo Region, Barnard Mabuda, their director of nursing, has made possible interactions throughout his region, so that visits to provincial health clinics to do in-depth observations were possible. Faculty and students from U.Va.’s departments of anthropology and digital history, and from the Schools of Law, Education, and Commerce and the Darden School have all indicated their

keen interest in further developing collaborative learning opportunities. In the words of Dr. Brashers, “This will benefit both U.Va. participants and those in southern Africa, and ultimately the hope is that there will be a better understanding on both sides of the subtle interplay between environmental degradation and human disease.” ■



Front row, l. to r. Dr. Mashudu Maselesele and Dr. Vhonani Olive Netshandame, visiting scholars from University of Venda; Middle row: Lindsay Donovan, Sarah Farrell, Dr. Tina Brashers, Candace Burton; Back row: Claire Tierney, Bob Swap and Sarah Anderson.

Patrick Martin

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with research programs here. He was interested in studying the formation of brain tumors in human tissues, and glioblastomas are the focus of Dr. Isa Hussaini’s work in pathology research. This proved to be an ideal situation for him. “These fast-growing, highly invasive tumors offer us an excellent opportunity to study cell migration in the brain,” says Martin. Their research is supported by NCI and NINDS.

In addition, Martin was encouraged to apply for a UNCF/Merck



Andrew Shurtleiff

Patrick Martin, UNCF/Merck award winner

Postdoctoral Science Research Fellowship. Only ten are awarded annually, and this may be the last year that they are available. The fellowship offers the benefits of access to a mentor in industry, and attendance at an annual meeting of all awardees at company headquarters in New Jersey. Patrick Martin is equally attracted by a career in academia as he is by industry, and this gives him an opportunity to interact with scientists in both worlds to see the pros and cons of each. Above all, he has had access to enthusiastic mentors throughout his training who have picked up on his drive and determination as well as his natural abilities. ■

Research on Early Urdu Prose

Mehr Farooqi is using support from a new funding program for the Arts, Humanities and Social Sciences from the Office of the Dean of the College of Arts & Sciences to work on the historiography of early Urdu prose. The earliest examples of modern Urdu prose are translations of the Qur'an. There are far more translations of the Qur'an in Urdu than in any other language.

Yet these translations, or tafseers as they are called, have been ignored by the Urdu canon and dismissed by Urdu historiographers as religious texts. The first translation into Urdu can be dated to

around 1770 during the rule of the Mughal Emperor Shah Alam (1759-1806), during which twelve Urdu translations (some partial, others full length) of the Qur'an were carried out, thirty years

before the establishment of Fort William College, an institution established by the British colonialists for the teaching of vernacular languages and generally credited with the development of modern Urdu prose. The objective of Farooqi's research is to examine the literary and historical value of the earliest Urdu religious prose texts as exemplified in the Quranic translations and to substantiate that probably

these works lead the way or provide the model for the Fort William style of Urdu prose.

Urdu is a vernacular language spoken by Indian Muslims and parallels Hindi as the language of everyday life.

Farooqi, who is an assistant professor in the Department of Asian and Middle Eastern Languages and Culture, is working in Allahabad on these early transla-



Mehr Farooqi

tions, comparing them with Persian and English translations for textual explication. She is also working on editing an anthology of *One Hundred*

Years of Urdu Literature (1905 to the present) in English translation for the Oxford University Press, New Delhi.

For more information about funding for research in arts, humanities and social sciences, contact Karen Ryan at klr8p@virginia.edu For students interested in Asian and Middle East Languages and Cultures, visit the department's web site at <http://www.virginia.edu/amelc/> ■

These translations have been ignored by the Urdu canon and dismissed by Urdu historiographers

University Tech Transfer: Getting It Right

This November 15 event, sponsored by Virginia Piedmont Technology Partnership (VPTC), will take place at the Omni Hotel, Charlottesville starting at 11:30 am. Registration is \$35 for non-members. Call 817-6300 or send e-mail to info@vptc.org for more information.

Speakers will include Fred Hutchison, founding partner of Hutchison & Mason PLC (moderator); Mike Martin, executive vice president, Virginia Tech Intellectual Properties; David Day, director of the Office of Technology Licensing, University of Florida; Joseph DeSimone, professor at UNC-Chapel Hill and NC State University, and successful entrepreneur; John Uhrin, partner, Harbert Management Corporation and Robert MacWright, J.D., Ph.D., chief executive officer and Executive Director, U.Va. Patent Foundation.

Topics covered include risks associated with technology commercialization and return on investment to licensors and licensees. All those intending to commercialize a technology should attend. ■

New Cardiovascular Research Award

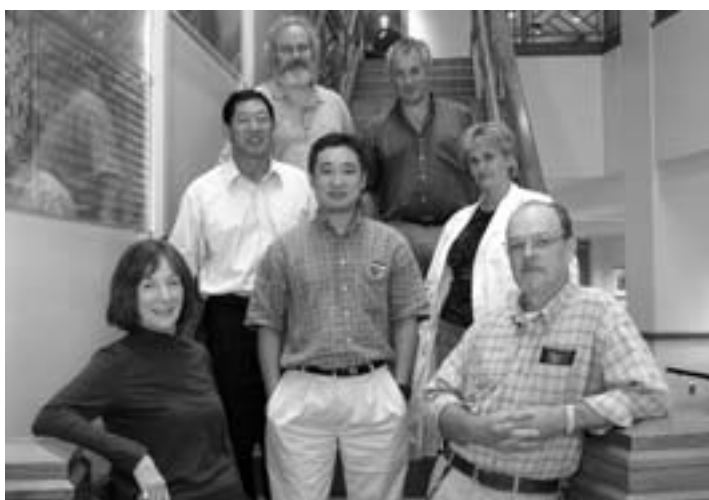
Dr. Klaus Ley, biomedical engineering professor and director of the Cardiovascular Research Center (CVRC), and Brian P. Helmke, assistant professor in BME and member of the CVRC, have received funding for their four-year renewable NHLBI R01 grant entitled, "Micro-Viscometric Studies of the ESL in Microvessels." Helmke and Ley are co-investigators on the project with Dr. Edward R. Damiano of the University of Illinois at Urbana-Champaign. Dr. Damiano was a postdoctoral student in Ley's lab in 1996 and modeled the mechanical properties of the cell layer during his time at U.Va. He also published a first modeling paper while at U.Va.

The research project aims to study the influence of the vascular endothelial surface layer (ESL) on microvascular hemodynamics in venules and arterioles, how ESL is expressed in cultured cells, as well as its role as a barrier to spontaneous rolling of leukocytes from the free stream in venules. Interest in endothelial cells at U.Va. dates back to work carried out in the 1980s in Dr. Brian R. Duling's lab. "We've been working on this for quite a long time, actually. The method was discovered more or less serendipitously by a student trying to get a better measure of wall shear stress, and that led to several papers," says Dr. Ley.

Program Project Award for Dr. Avril Somlyo and Colleagues

The National Institutes of Health have announced a program project award titled “Structural Biology of Cardiovascular Signaling” for which Dr. Avril V. Somlyo, professor of molecular physiology and biological physics, is director and P.I., with funding of \$9M. over five years. Project leaders include Drs. John Bushweller, Urszula Derewenda, Zygmunt Derewenda, Masumi Eto, Barry Gumbiner, Robert Nakamoto, and Zhifeng Shao.

The aim of this interdisciplinary program is to determine the structure-function relationships and mechanisms of proteins in normal cardiovascular signaling and subject to abnormalities that cause disease. Structural approaches include X-ray crystallography, NMR spectroscopy, X-ray microprobe analysis, and electron energy loss analysis as well as light and electron microscopies. The high level of biomedical significance of this is derived from the involvement of the smooth muscle regulatory proteins in asthma and high blood pressure, and from the importance of calcium in the development of ventricular fibrillation, the most common cause of sudden cardiac death.



Andrew Shurtleff

Front row: l to r: Dr. Avril Somlyo, Dr. Masumi Eto and Dr. Zygmunt Derewenda. Middle row: Dr. Robert Nakamoto, Dr. Ula Derewenda; Back row: Dr. Barry Gumbiner, Dr. John Bushweller.

Regrettably, Andrew P. Somlyo, chair of the department of molecular physiology and biological physics and Charles Slaughter Professor, died working on another grant while this grant was under review in January 2004. Andrew P. Somlyo trained in medicine and cardiology at Philadelphia General Hospital, Mt. Sinai Medical Center in New York, Bellevue Hospital, New York and the Department of Medicine at Columbia Presbyterian Medical Center, New York. In 1963 Somlyo joined the faculty of the University of Pennsylvania where he was professor of physiology and pathology and in 1973 organized the Pennsylvania Muscle Institute and served as the director, which under his leadership became internationally known and was the mecca for studies of muscle and non-muscle motility. In 1988, with his move to the University of Virginia, he developed an outstanding Department of Molecular Physiology and Biological

Physics. He was internationally renowned for over forty years for his groundbreaking work on the contractile process in vascular smooth muscle, defining many of the structural components and signaling pathways. Dr. Somlyo pioneered the development and application of X-ray microprobe analysis and electron energy loss analysis to the field of cell physiology, currently tracking calcium and other elements with a spatial resolution of a few nanometers, far below the resolution of optical microscopes. ■

Online Protocol Submission In the Works for the Human Investigation Committee (HIC)

The Institutional Review Board (IRB) that deals with biomedical human research is in Phase I of its efforts to offer online submission. Phase 1, implemented September 1, 2004, allows the investigator to build a protocol and consent form template that is specific to their study. The site can be found at www.irb.virginia.edu. Phase II, which the HIC hopes to implement in the spring of 2005 will involve the actual online submission of protocols and modifications. Future plans include online submission of grants and continuations.

Questions about the new online submission process can be addressed to Jeff Monroe at 243-2853, mjm6ny@virginia.edu or to Susie Hoffman, HIC Director, at srh@virginia.edu.

Young Investigator and Student Awards in Biomedical Engineering

Dr. Shayn Peirce-Cottler, assistant professor in biomedical engineering, recently won the Rita Schaffer Young Investigator Memorial Award from the Biomedical Engineering Society. The Young Investigator Award is offered each year by the BMES to stimulate research careers in biomedical engineering. Dr. Peirce-Cottler will present a 20-minute Rita Schaffer Lecture during the BMES Annual Fall Meeting in Philadelphia, PA. The \$1,000 award, plaque, travel expenses, and meeting registration fee will be presented at the BMES Annual Fall Meeting. The award is in recognition of a high level of originality and ingenuity in a scientific work in biomedical engineering. Dr. Peirce-Cottler’s area of research that won her the award is “Computational Modeling of Complex Biological Systems.” She was also recently featured in MIT’s magazine of innovation (see page 1).

U.Va’s Biomedical Engineering Society Student Chapter has won the national Meritorious Achievement Award of BMES again this year. The award will be presented at the BMES Annual Business Meeting at the Annual Meeting in October. ■

Carilion Biomedical Institute Announces 2004–2005 CBI/UVA Biomedical Translational Research Grant Awards

Carilion Biomedical Institute (CBI) has announced the winners of the 2004–2005 CBI/U.Va. Biomedical Translational Research grants. This program accelerates the transition of University of Virginia biomedical research into commercial products and businesses by providing funding along with CBI assistance. CBI partners with University faculty and researchers during the development and commercialization phases to provide guidance with technology, medical relevance, intellectual property, and commercialization issues. This year's program has identified three U.Va. research projects that apply innovative technologies to address clearly defined medical and healthcare needs. These projects also demonstrate a match between a medical or healthcare need, a technology solution, and the research team's ability to

develop the solution. The winning projects and researchers are:

Jennifer Penberthy, Ph.D., assistant professor, and Boris Kovatchev, Ph.D., associate professor, Department of Psychiatric Medicine; Daniel Cox, Ph.D., professor, Department of Behavioral Medicine & Psychiatry and director, Behavioral Medicine Center; Stephen Burton, Ph.D., president, PhysioAdvantage (Midlothian, VA); and Raina Robeva, Ph.D., associate professor, Department of Mathematical Sciences, Sweet Briar College. The topic is "Psycho-Physiological Procedure for Assessing Attentional Disorders."

Casey Kerrigan, M.D., professor and chair, Patrick Riley, Ph.D., associate professor, and Ugo Della Croce, Ph.D., associate professor, Department of Physical Medicine and Rehabilitation; Paul Allaire, Ph.D., Mac Wade Chair, profes-

sor of engineering, and Jun-Ho Lee, Ph.D., senior scientist, Department of Mechanical and Aerospace Engineering, and Zongli Lin, Ph.D., associate professor of electrical and computer engineering. Their work is on "Dynamic Partial Weight Gait Support: U.Va. GaitTrain."

A third award has been made for a project entitled "Hyperpolarized Xenon Encapsulated Fullerenes: Development of a New Class of MRI Diagnostic Contrast Agents." The research team includes James R. Brookeman, Ph.D., professor of radiology and biomedical engineering, director, U.Va. center for in-vivo hyperpolarized gas MR imaging, Harry C. Dorn, Ph.D., professor of chemistry and director for self-assembled nanoscale devices, Virginia Tech, and James Duchamp Ph.D., Emory & Henry College (see page 6 for more details). ■

CVG/Entrenet 7th Annual Charlottesville Business Forum

"MISSION POSSIBLE - Cracking the Code for Tactical Growth"

Presented by the Batten Institute at the Darden School and the Charlottesville Venture Group, on November 11-12 at the Darden School.

For more information and to register, visit www.cville-venture.org

Recent Conference Sponsored by Faculty Research Support Funds

In May 2004, Mitchell Green, associate professor in the Department of Philosophy, received support from the Faculty Research Support fund to organize and host a conference on Grounds on the topics of Semantics, Pragmatics, and Aesthetics. Six philosophers from institutions within a 200-mile area attended the two-day event, each presenting work in progress. The participants were Fred Adams from the University of Delaware, Dorit



Mitchell Green, associate professor of philosophy and director of graduate admissions, who coordinated this conference.

Bar-On from the University of North Carolina, Wayne Davis from Georgetown University, John Justice from Randolph-Macon Woman's College, Ram Neta from the University of North Carolina, and Cara Spencer from Howard University. Mitchell Green chaired the conference, and faculty and students from U.Va. departments of anthropology, psychology, and philosophy were among the participants. For more information, including copies of papers presented at the conference, please contact Mitchell Green at msg6m@virginia.edu.

New Nanotechnology Research Award

Dr. James R. Brookeman, Professor of Radiology and Biomedical Engineering, and Dr. Harry Dorn, Department of Chemistry at Virginia Tech, received an award to study a new class of MRI diagnostic contrast agents based on nanotechnology. The award was for \$120,000 from the U.Va. internal funding source of CBI-FEST (Carilion Biomedical Institute and the Fund for Excellence in Science and Technology). The Title of the Award is "Hyperpolarized Xenon Encapsulated Fullerenes: Development of a New Class of MRI Diagnostic Contrast Agents." The one-year research program will be conducted jointly at U.Va. and Va. Tech, with the participation of biomedical engineering graduate Jaime Mata.

Magnetic resonance imaging (MRI) contrast agents are used in clinical applications in diverse disease entities such as oncology and stroke. Most conventional MRI contrast agents are based on chelates of gadolinium, which increase the contrast in MR images by selectively decreasing the spin-lattice relaxation time (T1) of specific tissues such as tumors. A recent advance utilizes hyperpolarized gases ^3He and ^{129}Xe that largely alleviate sensitivity considerations, but are limited by short relaxation times in biological fluids. In this proposal a new class of hyperpolarized xenon encapsulated fullerenes ($\text{Xe}@C_{60}$) MRI diagnostic agents is proposed for direct vasculature injection applications.

U.Va. Scientists — Top Innovators

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used the models to explore embryogenesis, the process of embryo formation, to learn about the mechanics that contribute to birth defects. She also has used them to predict blood vessel growth in response to changes in blood pressure and the presence of a growth protein. The research in blood vessel formation — believed to be a first in the emerging field of systems biology — holds promise for future developments in the treatment of chronic heart disease and diabetes through angiogenesis, or the growth of new blood vessels. The results also could be used to develop new treatments for cancer that involve shutting off the blood supply to cancerous tissue.

"In the five years since we began naming our annual selection of the world's top innovators under age 35, inclusion among the TR100 has become one of the most prestigious awards for young innovators around the world," said David Rotman, executive editor of *Technology Review*. "This year's winners are all pioneering fascinating innovations in the fields of biomedicine, computing and nanotechnology, and were chosen after a rigorous selection and judging process. The result is an elite group whose visions and inventions will shape the future of technology."

Kent and Peirce-Cuttler were honored Sept. 29-30 in Boston at Technology Review's Emerging Technologies Conference at MIT. ■

Research News

October 2004 Vol. 6 No. 5

Research News is published by the Office of the Vice President for Research and Graduate Studies.

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