Site Visit: Research Park at North Fork

by Rosalind Mott

ON JANUARY 30TH, THE BTP students and Dr. Laurie ventured north of Charlottesville to the growing University of Virginia Foundation Research Park at North Fork. The group spent the afternoon at the Emerging Technologies Center and had the opportunity to meet and speak with the multiple tenants of the ETC.

The day began with lunch and a general information session on the 562 acre park. Students learned of how North Fork was far into the development stage with six state-of-the-art buildings, but was continuing to grow with plans for office and lab space of nearly 3 million square feet.

Andrea Alms, General Manager of Spinner Technologies, Inc., gave an informative talk on this subsidiary of the UVA Patent Foundation founded in 2000. Students were excited to hear about the many UVA faculty members that were taking advantage of the entrepreneurial opportunities and lab space offered by Spinner. Students also met with Timothy Redden, Senior Director of Corporate and Foundation Relations and member of the BTP Board of Corporate Advisors, before touring the ETC labs.

The first lab of the tour was Adenosine Therapeutics, LLC (ATL). Scientists of ATL kindly showed the tour group around the lab that was busy at work on the development of adenosine-receptor selective drugs. Their pharmaceuticals have far-reaching applications including the prevention of and therapy for heart attack, stroke, asthma, diabetes, spinal-cord injury, and cancer. The company works with multiple labs at UVA to...
Externship Experiences

University of Virginia Patent Foundation

by Shannon Beck

The University of Virginia Patent Foundation was a clear choice for my externship as I am considering a career in the field of intellectual property and technology transfer. The Patent Foundation secures rights for UVA intellectual property, then licenses it to corporations for development into products beneficial to the public.

With its licensing associates, in-house counsel, and director all recipients of advanced degrees in science or engineering, UVA PF is a shining example of what a university technology transfer office should be. During my time there I worked closely with Marie Kereshian, the Patent Foundation’s senior negotiator. For each technology I handled, I researched databases and company websites to identify those for whom it would be a good fit. For example, technologies suited to development in kit form may be attractive to companies already marketing component reagents or devices. Other target companies may have long-standing research and development programs in a related area.

The most important marketing tool is a concisely written summary of the technology, easily understood even by people unfamiliar with the underlying science. It must reveal enough to interest a licensee, and yet protect sensitive information not yet in the public domain. To access additional information, such as patent applications or unpublished manuscripts, a company must enter a confidential disclosure agreement binding it to refrain from commercially using the information without entering a licensing agreement with the Patent Foundation.

In addition to marketing and writing non-confidential summaries, I also investigated the patentability of several technologies and looked into potential infringement of one UVA patent. In all these activities the UVA PF staff provided much support and guidance, making my externship an extremely educational and satisfying experience.

Becton, Dickinson and Company Diagnostic Systems

by Lorin Herrich

My BTP externship was with Becton, Dickinson and Company (BD) Diagnostic Systems in Sparks, MD. BD is a leader in the manufacture and sales of medical supplies, laboratory equipment and clinical diagnostic products. During my internship, I developed multiplex PCR assays for detection of antibiotic resistance genes in both gram positive and gram negative bacteria. These molecular diagnostic assays will be used to for validation and support of the Phoenix System, BD’s new automated microbial identification and antimicrobial susceptibility testing instrument.

This externship was extremely rewarding. BD provided a platform from which I was able to successfully combine skills obtained from my clinical laboratory experience with molecular assay design techniques gained from my graduate studies. I also had the opportunity to work with many wonderful people in a professional, commercial setting.

Welcome to New Recruits by Gordon Laurs

A WARM WELCOME AND congratulations to Rooshin Dalal, Matthew Stark, Michelle Kofron, Jake Fogle, Elizabeth Phan, Qin Su and Shannon Smith on their acceptance into the BTP. Rooshin is an MD/PhD student in Rick Horwitz’s lab (BME/Cell Biology) and hails from Johns Hopkins University (BS and MSc in Bio-medical Engineering). Matthew is a 1997 graduate of the University of Colorado (Biochemistry) and is now a Klaus Ley BME graduate student. Perhaps Matthew is qualified to organize the annual BTP ski trip. Michelle comes to us from Drexel University as a transfer BME grad student with new Othopedics Chair (and new BTP mentor) Cato Laurencin who is also affiliated with BME and Chemical Engineering. Michelle is a 1993 Biology graduate of Bucknell University. Jake received his BS from Penn State in Chemical Engineering in 1999, and is in Erik Fernandez’s lab. Elizabeth is a graduate student of new mentor Ian Sarembock (Cardiology) and is a 2002 BS graduate of the University of Oklahoma in Chemical Engineering. Qin Sun is from Nanjing University where she received her bachelor’s degree in Chemistry in 1999 in Chemistry. She is a grad student in Mario Geysen’s lab here in Chemistry. Shannon Smith graduated in 2001 from the University of Southern Mississippi (BS in Polymer Science) and is housed in Roseanne Ford’s lab in Chemical Engineering.

Student Achievements

CONGRATULATIONS to Michael Smith for winning the ‘Michael J. Peach Honorable Mention Award’ and to Eric Park for winning First Honorable Mention for the Michael J. Peach Award.
In the Spotlight: Martin Schwartz, PhD
by Rosalind Mott

This past year UVA was very fortunate to gain one of the world's leading experts in the field of integrin signaling. Dr. Schwartz began his career in the Chemistry Department at Stanford where his PhD work entailed the study of lipid properties and membrane models. A curiosity of the biological structures associated with lipid membranes drew him to the lab of Richard Hynes at MIT. While at MIT, Dr. Schwartz initiated his work in the field of cell adhesion. As an assistant professor in the department of Physiology and Biophysics at Harvard, he continued studying cell adhesion and advanced the field by identifying the role of integrins in signal transduction. At Scripps, Dr. Schwartz joined the Vascular Biology group and had much success in the research of integrin regulation of Rho family GTPases and the role of integrins in mechanotransduction.

In the UVA Department of Microbiology, his lab continues its important and pervasive work on integrin signaling. The critical role of integrins in many biological processes is reflected in Dr. Schwartz's joint appointments, which include the Cardiovascular Research Center, the Mellon Prostate Cancer Research Institute, and Biomedical Engineering. In addition, Dr. Schwartz is a member of the Cell Migration Consortium. Dr. Schwartz joined UVA so that his lab could foster collaborations with UVA's developmental, cancer, and cardiovascular biologists. His lab's current research includes the study of endothelial cell mechanotransduction, Rho family GTPases, endothelial cell migration, and the role of integrins and adhesion in the cellular response to DNA damage. This group is also focusing on the development of fluorescence-based assays to visualize signaling.

Dr. Schwartz says that the most rewarding part of all this research is "when all of the little pieces fit together." There is no doubt that Dr. Schwartz and his lab will continue their success in identifying the pieces of integrin signaling and fitting them into the complex puzzle of cell regulation.
New Mentors

Cato T. Laurencin, MD, PhD

Cato T. Laurencin, M.D., Ph.D., is the Lillian T. Pratt Distinguished Professor, and Chairman of the Department of Orthopaedic Surgery at the University of Virginia. He has also been designated a University Professor at the University of Virginia, and holds professorships in Biomedical Engineering and Chemical Engineering at the school.

Dr. Laurencin earned his B.S.E. in Chemical Engineering from Princeton University, and his M.D. from Harvard Medical School where he graduated Magna Cum Laude and earned the Robinson Award for Excellence in Surgery. Simultaneously he earned a Ph.D. in Biochemical Engineering/Biotechnology from the Massachusetts Institute of Technology where he was a Hugh Hampton Young Scholar.

After completing his doctoral programs, Dr. Laurencin continued clinical training at the Harvard University Orthopaedic Surgery Program, and ultimately became Chief Resident in Orthopaedic Surgery at the Beth Israel Hospital, Harvard Medical School. Simultaneously, he was an instructor in the Harvard-M.I.T. Division of Health Sciences and Technology, where he directed a biomaterials laboratory at M.I.T. Dr. Laurencin subsequently completed a clinical fellowship in Sports Medicine and Shoulder Surgery at the Hospital for Special Surgery in New York, working with the team physicians for the New York Mets, and St. John’s University in New York.

Board certified in orthopaedic surgery, Dr. Laurencin is a Fellow of the American College of Surgeons and a Fellow of the American Academy of Orthopaedic Surgeons. He has lectured throughout the world in the areas of shoulder surgery and biomaterials science as an American British and Canadian Traveling Fellow, and has been an instructor in shoulder surgery at the American Academy of Orthopaedic Surgery’s Orthopaedic Learning Center.

Dr. Laurencin’s research interests are in the areas of biomaterials, tissue engineering, drug delivery and nanotechnology. Honored at the White House, Dr. Laurencin received the Presidential Faculty Fellowship Award from President William Clinton in recognition of his research work involving biodegradable polymers. Dr. Laurencin is a Fellow of the American Institute for Medical and Biological Engineering, and an International Fellow in Biomaterials Science and Engineering. He most recently received the William Grimes Award for Excellence in Chemical Engineering from the American Institute of Chemical Engineers and the Leadership in Technology Award from the New Millennium Foundation.

Ian J. Sarembock, MD, PhD

Dr. Ian J. Sarembock received his M.D. degree from the University of Cape Town, South Africa in 1975 followed by a residency in Internal Medicine and Cardiovascular Medicine at the University of Cape Town and Groote Schuur Hospital in Cape Town. He received his Ph.D. degree from the University of Cape Town in 1988. He moved to the USA in 1986 and was a research associate in the Cardiovascular Division at Yale University from 1986–1988 where he developed expertise in animal models of vascular injury. He is presently Professor of Medicine at the University of Virginia and a member of the Cardiovascular Research Center. His lab focuses on the role of inflammation in vascular injury and repair with specific interest in the role of early inflammatory events, including adhesion molecules using different animal models, including mice, rabbits and pigs. He is also a member of a PPG, “Glucose, Insulin in Diabetic Vascular Disease”, headed by Dr. Jerry Nadler, investigating the role of lipoxigenases in accelerated atherosclerotic disease in diabetes.

BTP Minority Recruiting

by Gordon Laurie

Following are two opportunities to attract minority students and faculty to the Biotechnology Training Program (BTP). Giving talks at historically African-American universities such as Richmond’s Virginia Union University is one approach. The quality of VUU, and recent BTP graduate Patrick Martin (Anne Sutherland, mentor) speaks to the potential of this form of interaction. Directing VUU’s MARC U*STAR Program is Anthony Madu (Associate Professor of Biology). Please Email Dr. Madu if you wish to give a seminar (amadu@vuu.edu). Some BTP mentors have volunteered. More would be welcome. Secondly, in the planning stage is an exciting new program by Norfolk State University’s Joseph Hall (Associate Professor of Chemistry; jchall@nsu.edu) that will seek to position visiting minority students and faculty in active research labs long enough for a real chunk of science to be accomplished. The progress of this venture will be updated in future BTP newsletters.
The Virginia Union University MARC U*STAR Program

by Anthony Madu

THE MARC U*STAR PROGRAM IS A STUDENT TRAINING program funded by the NIGMS branch of NIH. Its goal is to increase the number of well prepared under-represented minority students who compete successfully for admission into graduate programs leading to the Ph.D. or M.D./Ph.D. degrees in the biomedical sciences, and pursue careers in biomedical research. At VUU, this is achieved through:

1. course improvements,
2. introduction of new lab-intensive courses that emphasize practical experience in molecular biology and biochemistry, and
3. research training during the summer and academic year.

The research training experience culminates in presentations at national scientific meetings, a thesis, and a public defense of the thesis at the MARC U*STAR Biomedical Research Day. Trainees, therefore, graduate with a fairly good experience/expertise in molecular biology and biochemistry. Most matriculate into Ph.D. programs in the disciplines at universities such as UVA, Yale, Cornell, VA Tech, and UNCCH. Others accept employment as research assistants in industry (including Dupont, Merck, and Qiagen) and academia. 

Norfolk State University: Center for Biotechnology and Biomedical Sciences

by Joseph Hall

THE FUTURE OF biotechnology and the biomedical sciences, both the discovery of new knowledge and the application of that knowledge to develop new drugs and drug therapies, will increasingly require the combined efforts and collaboration of experts in many science disciplines. Norfolk State University (NSU), the 5th largest historically black institution of higher learning, believes that our students, who will be future scientists and engineers, need to be exposed to and involved in cross-disciplinary research activities by scientists who teach and train them to go beyond their chosen major field in pursuit of new knowledge and solutions to biomedical problems of interest to the public health service (PHS) mission. Cross-disciplinary and interdisciplinary collaborative research activities will be pursued through the establishment of a Center for Biotechnology and Biomedical Sciences (CBBS). The Center, which will be established on existing strengths of the School of Science and Technology has four major objectives:

1. To hire new highly trained tenure-track faculty members involved in research in biotechnology and the biosciences.
2. To provide opportunities for NSU faculty members and students to exchange scientific ideas with leading scientists at other Universities in the area of biotechnology and biomedical sciences.
3. To establish a state-of-the-art Bio-Analytical Core facility to house research instrumentation for the separation, isolation, and functional analysis of biomolecules.

By accomplishing these objectives, the Center will provide scientific expertise, increased educational opportunities for students, leadership and industry support in the areas of reproductive biology/biochemistry, drug discovery, and proteomic/glycoproteomics.
The Faculty & Their Research

Gary Balian — (BEMG)
Biochemistry of connective tissue macromolecules.

Travis Bialock — (EE) CMOS digital and analog signal processor design.

David Brautigan — (M) Protein phosphates and cell signaling circuits.

Giorgio Carta — (CE) Adsorption and ion exchange, chromatography, biocatalysis.

Zygmunt Derewenda — (MPP) Protein structure and function: macromolecular crystallography; mechanisms of signaling by GTPases; protein-protein interactions.

Douglas DeSimone — (CB) Cell adhesion molecules in development.

Brian Duong — (MPPBEMG) Cell-cell communication in the vessel wall, including chemical, electrical, and mechanical processes that lead to coordination function of endothelial and smooth muscle cells.

Victor Engelhardt — (M) Structure and synthesis of antigens recognized by T lymphocytes, tumor immunology.

Erik Fernandez — (CE) Purification of biological molecules, protein structure, magnetic resonance imaging and spectroscopy.

Roseanne Ford — (CE) Environmental remediation, microbial transport in porous media.

Cassandra Fraser — (C) Polymeric metal complexes: synthesis, properties and uses.

Jay Fox — (M) Basement membrane structure and metalloproteases.

Joni Gainer — (CE) Biochemical engineering, biomedical applications, environmentally benign solvents.

H. Mario Geysen — (C) Combinatoria Chemistry.

Steven Gonias — (P&BEMG) Proteases and cytokines in cellular growth regulation.

Stephanie Guerlain — (SE) Information system development in the human genome era.

Bill Guilford — (BEMG) Vascular and molecular engineering.

Brian Heimke — (BEMG) Endothelial mechanotransduction, cellular biomechanics, nanotechnology tools for cellular bioengineering, cell-cell interactions in microcirculatory blood flow.

John Herr — (CB) Differentiation antigens expressed during mammalian spermatogenesis.

Andrew Hillier — (CE) Interfacial engineering, materials chemistry, electrochemistry, scanning probe microscopy.

Rick Horvitz — (CB) Cell adhesion in development and pathology.

Donald Hunt — (C&P) Protein sequencing by mass spectroscopy.

Isa Hussaini — (P&NS) Functional roles of low density lipoprotein receptor-related protein (LRP) and protein kinase C in astrocytic tumor invasive growth.

Donald Kirvan — (CE) Mass transfer and separation, crystallization, biochemical engineering.

James Landers — (C&P) Biological, biochemical and clinical chemistry.

Gordon Laurie* — (CB) Molecular control of epithelial differentiation.

Cato Laurencin — (O, BEMG, and CE) Biomaterials, tissue engineering, drug delivery and nanotechnology.

Michael Lawrence — (BEMG) Biochemical, cellular, and mechanical factors regulating leukocyte adhesion.

Klaus Ley — (BEMGMP) Molecular mechanisms of leukocyte adhesion and genetic engineering targeting atherosclerosis.

Timothy MacDonald — (C) Biorganic and synthetic organic chemistry.

Pamela Norris — (MANE) Aerogel technology.

J. Thomas Parsons — (M) Protein kinases in cell adhesion.

William Pearson — (BEMG) Protein evolution; transcription.

Ian Sarembock — (InMD) Role of inflammation in vascular injury and repair.

Thomas Skalak — (BEMG) Cardiovascular mechanics, microcirculation.

Ann Sutherland — (CB) Cell matrix interactions in mouse development.

Ronald Taylor — (BEMG) Clearance of pathogens.

Martin Schwartz — (M) Integrin signaling and its relevance to mechanotransduction, cancer and vascular disease.

Judith White — (CB&IM) Molecular mechanisms of viral and cellular adhesion/fusion proteins; molecular mechanisms of sperm-egg binding and fusion; ADAMS in fertilization and development.

Michael Wormalding — (B) Post-transcriptional regulation of gene expression; Development of RNA-based therapeutics.

*Program Director

Training Departments

Biology
BME Biomedical Engineering
BEMG Biochemistry
& Molecular Genetics
Chemistry
CE Chemical Engineering
CB Cell Biology
EE Electrical Engineering
IMAG Internal Medicine
Microbiology
MANE Mechanical Aerospace & Nuclear Engineering
MPPB Molecular Physiology
& Biological Physics
NS Neurosciences
Orthopedics
Pathology
SE Systems Engineering