Collaboration with Industry is Beneficial to Both Faculty and Students
By Lorin Henrich

Lannigan and Luna Technologies, a company specializing in fiber optic technology, are working together to develop a commercially available biosensor for use in medical diagnostics and environmental sensing. As a basic science researcher, Dr. Lannigan is interested in "proving that a concept has commercial potential." She prefers to focus on the basic science behind the product, while the company is responsible for "preparing [the product] for the consumer."

Research faculty can form collaborations with industry in several ways. Larger companies, such as Rohm and Haas, can provide direct funding through "external funding" programs. In this type of funding program, a contract is drafted between the company and the researcher. In order to receive continual funding from the company, the researcher must meet milestones stated in the contract. Researchers and companies can also receive joint federal funding through STTR/SBIR (Small Business Technology Transfer)/SBIR (Small Business Innovative Research) programs.

Dr. Lannigan feels that it is beneficial for graduate students to become involved in collaborations with companies. She feels that working with a company exposes students to today's competitive marketplace and shows them the need to be productive. Similar to a biotechnology company, "the lab is a small business," she says. "Our business is to produce papers; that's our product. I have to get the grants to produce those papers, and we have to run as efficiently as we can." In addition, by working with industry, students must learn to communicate not only with biologists, but also with engineers and marketing experts. Students, involved in industry, become a part of a "diverse group," Dr. Lannigan says, "they learn to evaluate things not in their discipline."

The BTP offers students a 1-4 month internship with a biotechnology company. This program gives students a chance to gain industrial experience, establish contacts with a company, and decide if they want to pursue a career in industry. Dr. Lannigan feels that both the student and their academic laboratories can benefit from these internships. The students benefit by gaining experience and establishing personal connections with companies, which may lead to future employment. These connections may also result in future collaborations, reagents, and technology for the academic research laboratory.
Externship Experiences

Genentech
By Mike Smith

My internship took place at Genentech (South San Francisco, California) under Dr. Mary Gerritsen’s lab, part of their basic science Cardiovascular Department. Genentech is a large biotech company that currently has nine FDA approved products on the market. Genentech’s success includes such milestones as the cloning of human insulin in 1978, the cloning of human growth hormone in 1979, licensing the first recombinant DNA drug (human insulin), and has been named one of Fortune Magazine’s “100 Best Companies to Work For.” Dr. Gerritsen’s lab discovered that hydrostatic pressure induces a proliferative response in cultured endothelial cells in vitro. I spent the summer extending this research to cyclic hydrostatic pressure stimulation. GeneChip analysis was done prior to my arrival and VEGF-C was found to be induced 7-fold in these cells; I spent the summer confirming these results at both the mRNA and protein level and determining if blocking VEGF-C abrogated the proliferative response. VEGF-C is a signaling molecule that is believed to be important in lymphangiogenesis. This project required me to utilize cell culture, mRNA isolation, protein isolation, Western blot, and Taqman probe and primer design. I was also exposed to an active angiogenesis lab, the fast pace often found in industry, and the beautiful scenery of the central California coast.

Institute for Genomic Research
By Mike Smoot

My internship was at the Institute for Genomic Research (TIGR). I worked with the “Closure” team that maintains the software used to assemble short sequences of DNA into genomes, manage the assemblies and find gaps in the assemblies where either the data or algorithms break down so that the gaps can be closed, thus creating complete genomes.

My project was to develop a tool for visualizing the output of the MUMmer tool. MUMmer quickly and efficiently aligns two very long sequences. Traditional algorithms like BLAST and FASTA are much slower than MUMmer and thus not useful for these situations. However, MUMmer only produces lengthy text output describing the alignments. To see the results of MUMmer, a user must read the textual output, determine the subsequences to be examined and then look at the individual sequence databases, usually just FASTA formatted text files.

I developed a Java application that provides a visual representation of how the two sequences align with one another. The tool, DisplayMUMs, takes the two sequences being aligned and the output generated by MUMmer as input.

It provides several different representations of the alignment as well as an interface that provides a simple way for users to customize their views. All views allow users to click on the alignments to view the actual base level alignment for detailed analysis.

DisplayMUMs was first used on TIGR’s recent project to sequence Bacillus anthracis for the FBI. It was used to compare the genome that TIGR had previously produced to the genome produced from DNA from one of the anthrax victims.

Human Genome Sciences, Inc.
By Eric Park

I conducted my internship at Human Genome Sciences, Inc. (HGSI) based in Rockville, Maryland. HGSI is a biotechnology company which pioneered the use of genomics in the discovery and development of pharmaceutical therapeutics. The current focus of HGSI is in the development of their proprietary, peptides, proteins, and antibodies along with collaborations in developing gene therapy products and small molecule drugs. I worked in the Preclinical Development department at HGSI with a group evaluating some of the Company’s cancer drug candidates. I was in charge of starting up a project to investigate the transport characteristics of their drugs in tumors and to evaluate their effect on stimulating the host immune system. I was responsible for installing and calibrating much of the equipment needed for this project as well as implementing an experimental protocol for the intratival experiments.

It was very intriguing to see the amount of interplay between the scientific search divisions, and the businesses and legal groups within HGSI. Raising capital through various business partnerships, reaching research milestones, and protecting intellectual property were all working in concert to expand research initiatives. One of the highlights of my internship was a luncheon with the CEO of HGSI. He talked about how HGSI was able to transition itself from just sequencing portions of the genome into developing drugs to target those genes through collaborations and partnerships with other biotech and pharmaceutical companies. My experience at HGSI allowed me to hone my research skills while at the same time observing the business dynamics of a growing biotechnology company.

Welcome to Leslie Fox!

The BTP would like to extend a warm welcome to Leslie Fox, our new Program Administrator. Previous to joining the Biotechnology Training Program, Leslie was the Information & Referral Specialist for the United Way T3A. She provided a link, for people in need, to health and human service agencies. In addition to many other administrative duties, Leslie will be coordinating the BTP newsletter and helping to organize applications, mailings, and this year’s spring symposium. Leslie spends most of her free time keeping up with her 11-year-old son A.J., who is an active boy scouts! She is also at work on a children’s picture book. Welcome Leslie!
Focus On B1IG
By Michael Torok

There are many economical contexts that embody biotechnology, including government, academia, and industry. The University of Virginia Biotechnology Program and the Industrial Interest Group (B1IG) aims to create scientist-managers and to connect executives and lawyers with academia. B1IG is working closely with leaders in the Biotechnology Training Program, the Darden School of Business, the McIntyre School of Commerce, the collective Graduate Biosciences, and the University of Virginia Law School. There is one goal: to create a cooperative professional forum for pursuit of interdisciplinary education and career building opportunities.

Officers and Founders: Michael Torok, Anastasia Mitchell, and Mike Kagey are taking B1IG to the next level. B1IG is pursuing operational funding from the GBS, private firms, and the Biotechnology Training Program.

In the past B1IG has brought to Jordan Hall "Entrepreneurship 101." This event featured the Entrepreneur's Club of the University of Virginia Darden School of Business and concentrated on "talking ideas to enterprise." The event was a huge success; there was fantastic turnout, feedback, and an overall increase in involvement. In addition, the University of Virginia Entrepreneur's Network and the Charlottesville Venture Network have invited B1IG officers to various functions.

Such associations are playing a large role in the direction of B1IG. For instance, B1IG is beginning to create a spin-off umbrella company that harnesses the concepts of B1IG members and aggressively pushes that intellectual property to the market place. Such progress is accelerated by the connections gained through the organization.

This is only the start for B1IG and the future is bright. B1IG officers welcome those who wish to follow up on IP, learn the ropes of biotech start-ups or simply desire to learn more science and business.

2002 Spring Events:

Blue Ridge Governor's School
On February 7th, Karen Wormly brought 92 tenth-grade students from the Virginia Governor's School for a biotechnology presentation. They heard presentations on biomedical ethics by Dr. Joel Hockansmith, Associate Professor of Biochemistry & Molecular Genetics, and on electron microscopy by Jan Redick of the Central Electron Microscope Facility. Later, they divided into small groups of 7-8 students each and visited individual labs, where they were able to observe and perhaps try some laboratory techniques.

Annual Ski Trip
February 16th is the tentative date for our ski excursion, if the weather permits. We will be going to Wintergreen resort. It is about 45 minutes from Charlottesville. The plan is to meet at Scott Stadium parking lot at 7:45 AM on the 16th and car pool from there. It would be nice to get to Wintergreen before 9am to avoid the long rental lines. We will ski till 4:30 PM! When we get back, we can take a quick rest before heading over to Prof. Laune's home on St. Claire Avenue around 6:30 p.m. He has kindly invited us all for dinner and maybe some games!

Biotec "After Hours"
Anyone and everyone in Central Virginia interested in biotechnology and pharmaceutical development is invited to a Biotec After Hours. This includes people at all levels of industry, the university, and the merely curious. Come to this networking/social opportunity and meet other people in the region who share your interest or career goals in biotechnology and pharmaceutical development. Hear about future plans for the Central Virginia biotechnology community. Join us Wednesday, February 27, 2002, from 5:30 to 7:00 PM at The Station Restaurant, 420 West Main Street, Charlottesville, Virginia. There will be a cash bar, light appetizers provided courtesy of our food sponsor—The Station Restaurant. Admission is $5.00 for everyone. Register online at: www.vptc.org/biotech-afterhours.htm.

Brought to you by: Virginia Piedmont Technology Council, Virginia Biotechnology Association, Thomas Jefferson Partnership for Economic Development

Minority Day
As a precursor to the Biotechnology Training Program Symposium, the Biotechnology Program (BTP) will be hosting 11 minority science majors from two of Virginia's Historically Black Colleges and Universities. The selected students from Hampton University and Virginia Union University will spend Wednesday, April 10th shadowing current BTP trainees in classes, seminars and laboratories. The students' day will conclude with an opportunity to dine and discuss the many aspects of graduate school with BTP trainees and professors. The next day the students from Hampton University and Virginia Union University will attend the BTP Symposium "Connecting Cell Behavior to Manufactured Therapeutics." We are extremely pleased with the opportunities presented by the collaboration between the UVa BTP and these two universities.

Biotec Symposium
The Biotechnology Training Program is excited to announce that it will hold the 2002 Spring Biotechnology Training Program Symposium. This year's symposium is entitled "Connecting Cell Behaviors to Manufactured Therapeutics." The symposium will be comprised of four sessions with two nationally recognized speakers each session.

University of Virginia Biotechnology Training Program Symposium: Connecting Cell Behaviors to Manufactured Therapeutics
April 11, 2002, Omni Hotel Ballroom

Session I: Matrix Biology/Polymereic Scaffolding Applications
George Martin, Fibrogen
Kam Leong, John Hopkins University

Session II: Developing Drugable Targets Based on Microarray Technology and Gene Circuit Analysis
John Fowler, Large Scale Biology Company
Eric Neumann, Beyond Genomics

Session III: Manufacturing New Classes of Therapeutic Compounds
Bhar Okita, Genzyme
Ram Sasaikharan, MIT

Session IV: Drug Delivery
David Needham, Duke University
Craig Wright, Boeavex

Cocktail Reception: Industry-Stuent Networking Session

Biotechnology Trainees’ Recent Conference Presentations

“Identification of the Kinase Responsible for Estradiol-Induced Phosphorylation of the Estrogen Receptor Alpha”
Lorin Heinrich and Deborah Lannigan

“Experimental and Theoretical Investigations of Shear Rate and Apparent Viscosity of Blood Flow in Venules”
Biomedical Engineering Society Conference 2001
Durham, North Carolina, October 5, 2001

“Inhibition of Amino Acid Transport Prevents Trophoblast Cell Outgrowth in Mouse Blastocysts”
Patrick McPhail Martin, Jennifer Sloan, Seta Mager, and Ann E. Sutherland.
American Society for Cell Biology 2001 Annual Meeting
Washington, D.C., December 11, 2001

The Faculty & Their Research

Gary Ballan (OBMBG) Biochemistry of connective tissue macromolecules.
Travis Blalock (EE) CMOS digital and analog signal processor design.
David Brautigan (MAMEG) Protein [phosphatases...change to phosphatases] and cell signaling circuits.
Giorgio Carta (CE) Adsorption and ion exchange, chromatography, biocatalysis.
Douglas DeSimone (CB) Cell adhesion molecules in development.
Brian Duling (MPBBE) 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 Engelhard (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 metalloproteinases.
John Gainer (CE) Biochemical engineering, biomedical applications, environmentally benign solvents.
Steven Gonas (OBMBG) Proteins and cytokines in cellular growth regulation.
Stephanie Gueruin (SE) Information system development in the human genome era.
Bill Guillford (BE) Vascular and molecular engineering.
John Herr (CB) Differentiation antigens expressed during mammalian spermatogenesis.
Andrew Hillier (CB) Interfacial engineering, materials chemistry, electrochemistry, scanning probe microscopy.
Rick Horowitz (CB) Cell adhesion in development and pathology.
Donald Hunt (CP) Protein sequencing by mass spectroscopy.
Iza Hussain (P) Functional roles of low density lipoprotein receptor-related protein (LRP) and protein kinase C in astrocytic tumor invasive growth.
Donald Kirwan (CE) Mass transfer and separation, crystallization, biochemical engineering.
James Landers (C) Biological, bioanalytical and clinical chemistry.
Gordon Laurence (CB) Molecular control of epithelial differentiation.
Michael Lawrence (BE) Biochemical, cellular, and mechanical factors regulating leukocyte adhesion.
Klaus Ley (BEBMPB) 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 kinetics in cell adhesion.
William Pearson (BMG) Protein evolution; transcription.
Thomas Skalak (BE) Cardiovascular mechanics, microcirculation.
Ann Sutherland (CB) Cell matrix interactions in mouse development.
Ronald Taylor (BMG) Clearance of pathogens.
Judith White (CB&M) Molecular mechanisms of viral and cellular adhesion/fusion proteins; molecular mechanisms of sperm-egg binding and fusion; ADAMs in fertilization and development.
Michael Worthington (E) Post-transcriptional regulation of gene expression; Development of RNA-based therapeutics.

Training Departments

Biology
Biomedical Engineering
BMG
Biochemistry & Molecular Engineers
Chemistry
Cell Biology
Electrical Engineering
Microbiology
Medicine

MANE
Molecular Aerospace & Nuclear Engineering
MAB
Molecular Biology & Biophysical Sciences
MBG
Molecular Physiology & Biophysical Sciences
C
Orthopaedics
CB
Pathology
CE
Systems Engineering
EE
U
MED
*Program Director

Obituary:

Dr. Robert M. Schwartz
By Dr. Jerry Coughler, Industry Director, Biochemistry and Medical Applications, CIT.

The BTP mourns the recent death of Robert M. Schwartz, Board of Corporate Advisors member. Bob was a brilliant man whose 15 years at CIT began with work on growing the biotechnology industry in Virginia and seeding research efforts at Virginia's universities. As Executive Director of Research and Development and University Relations, Bob was responsible for CIT's interactions with research universities and oversight of CIT's Technology Awards programs. Bob played an important role in supporting the policy initiatives of the Secretary of Technology and in that capacity he worked with the Virginia's Research & Technology Advisory Commission, an organization that advises the Governor on research and technology strategies for the Commonwealth.

Recently, he developed the peer-review guidelines for Virginia's Commonwealth Technology Research Fund, created in 2000 to attract increased public and private sector funding for Virginia's public institutions of higher education. Bob was an early advocate for the biotechnology industry in Virginia and the Virginia Biotechnology Association recognized his role with its first Lifetime Achievement Award. He was also a founding member of the BTP Board of Corporate Advisors.

Biotech at Virginia
The Newsletter of the University of Virginia Biotechnology Training Program

Biotechnology Training Program Application Deadline: April 24
Website: http://www.bw.virginia.edu/depar/oom/program/bo/biotech/index.html
Phone: (434) 924-1778

Gordon Luce, Program Director gwl@virginia.edu

Jan Holden, Company Contact and Executive Coordinator JHolden@virginia.edu

Lori Hennings, Newsletter Editor lh@virginia.edu

Leslie Fox, Program Coordinator lfox@virginia.edu