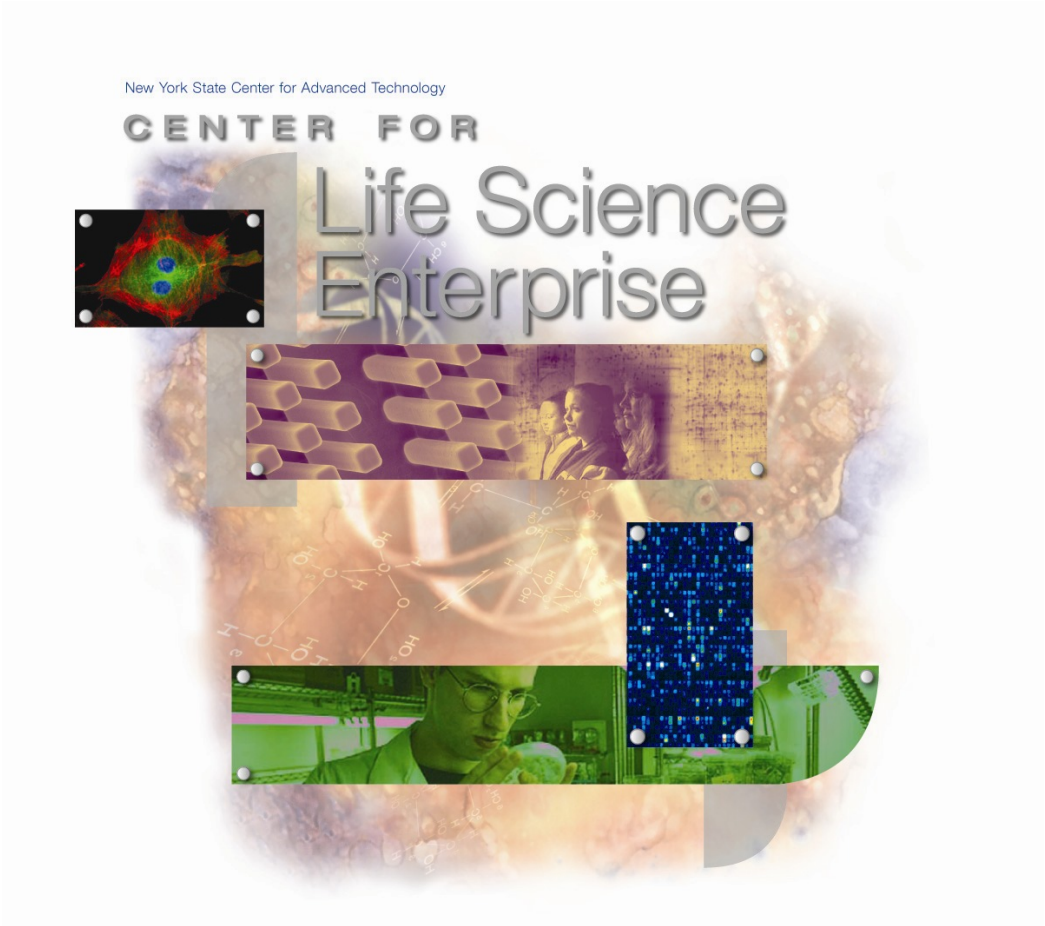
Cornell University

The 2nd Annual Public Engagement and Science Communication Symposium



Tuesday, May 13, 2008
9:00am – 1:30pm

G10 Biotech

Sponsored by the Cornell Center for Life Science Enterprise,
A NYSTAR Center for Advanced Technology,
in collaboration with University Communications,
the Office of the Vice Provost of Research, and the
Department of Communications, Cornell University

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AGENDA:

9:00am

Welcome by Vice Provost for Life Sciences *Stephen Kresovich*

*Special Powerpoint Presentation by *Roald Hoffmann* and *Redshift Productions*
"The Chemical Imagination at Work in Very Tight Places"

***Panel Discussion** on Science Communication and Public Engagement, featuring:

Roald Hoffmann, Chemist, Nobel Prize winner and Poet at Cornell University

Jeff Nesbit, Director of Legislative and Public Affairs at the National Science Foundation and

Gaspar Taroncher-Oldenburg, Executive Editor of SciBX, Nature Publishing Group.

Moderated by *Bruce Lewenstein*, Professor of Science Communication in the Departments of Communication and of Science & Technology Studies, Cornell University

10:00am - 12:00pm

Faculty Research Poster Showcase and Displays:

*Finally understand over 20 Center for Life Science Enterprise faculty funded research projects competing for the First place $10,000.00 award and $1,000.00 2nd prize travel award, for clearly communicating the intent and outcome of their research to a broad audience, and judged by community and business leaders.

*Find out about Cornell University Centers and Services, available to businesses and entrepreneurs.

12:00pm – 1:00pm

Luncheon Keynote Address “Communicating Science Broadly” with special introduction by *Thomas Bruce*, Vice President, University Communications

Jeff Nesbit, a senior communications strategist with 25 years of experience working with the national media, the Food and Drug Administration, politicians and private industry, will address the audience on the National Science Foundation's communication activities with the public and various scientific, engineering and education organizations.

1:30 pm

Winners announced

WELCOME ADDRESS:

Stephen Kresovich

Professor, Plant Breeding and Genetics
Vice Provost for Life Sciences, Cornell University

Stephen Kresovich is a Professor in the Departments of Plant Breeding and Genetics and Plant Biology. During his tenure at Cornell, Dr. Kresovich has served as the Director of the Institute for Genomic Diversity, the Director of the Institute for Biotechnology and Life Sciences Technologies, and the Associate Vice Provost for Life Sciences. In 2005, Dr. Kresovich became the Vice Provost for Life Sciences. In this position, he provides leadership for the university-wide Life Sciences Initiative (the University's largest academic effort), including strategic planning, fundraising, hiring of faculty, planning for science facilities construction, developing shared core facilities, and supporting research and educational activities based on Cornell's comprehensive investments in the life sciences.

Dr. Kresovich received his A.B. in biology from Washington and Jefferson College, M.S. in agronomy at Texas A&M University, and Ph.D. in crop physiology and genetics from The Ohio State University in 1982. Following graduation, he conducted research in crop breeding and biotechnology at Battelle Memorial Institute and Texas A&M University. Prior to joining the Cornell faculty in 1998, he served for eleven years as Laboratory Director at two U.S. National Genetic Resources Program genebanks in New York (1987-93) then in Georgia (1993-98). Dr. Kresovich's research focuses on conservation genetics and improvement of crop plants including maize, sorghum, and pearl millet.

Dr. Kresovich is a Fellow of the American Association for the Advancement of Science and the Crop Science Society of America. Since 1997, he has served as the U.S. Agency for International Developments Scientific Liaison Officer for Genetic Resources Conservation for the U.N.-supported International Agricultural Research Centers. In 2001, Dr. Kresovich was appointed to the Executive Committee of the New York State Biodiversity Research Institute.

PANEL MODERATOR:

Bruce Lewenstein

Professor of Science Communication, Departments of Communication and of Science & Technology Studies, Cornell University

Bruce Lewenstein (Ph.D., history and sociology of science, 1987, University of Pennsylvania) is Professor of Science Communication in the Departments of Communication and of Science & Technology Studies at Cornell University, Ithaca, New York, USA. He works primarily on the history of public communication of science, with excursions into other areas of science communication (such as emerging issues in open-access publishing). He has also been very active in international activities that contribute to education and research on public communication of science and technology, especially in the developing world.

He is a co-author of *The Establishment of American Science: 150 Years of the AAAS* (Rutgers Univ. Press, 1999, with Sally Gregory Kohlstedt and Michael M. Sokal), editor of *When Science Meets the Public* (Washington, DC: AAAS, 1992), and co-editor of *Creating Connections: Museums and the Public Understanding of Research* (Altamira Press, 2004, with David Chittenden and Graham Farmelo). From 1998 to 2003, he was editor of the journal *Public Understanding of Science*. He is a Fellow of the American Association for the Advancement of Science.

PANEL MEMBERS:

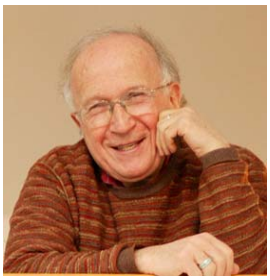


Photo by Maciej Zienkewicz

Roald Hoffmann

Frank HT Rhodes Prof in Humane Letters and Professor Emeritus, Chemistry and Chemical Biology, Cornell University

Roald Hoffmann was born in 1937 in Zloczow, Poland. Having survived the war, he came to the U. S. in 1949, and studied chemistry at Columbia and Harvard Universities (Ph.D. 1962). Since 1965 he is at Cornell University, now as the Frank H. T. Rhodes Professor of Humane Letters. He has received many of the honors of his profession, including the 1981 Nobel Prize in Chemistry (shared with Kenichi Fukui).

"Applied theoretical chemistry" is the way Roald Hoffmann likes to characterize the particular blend of computations stimulated by experiment and the construction of generalized models, of frameworks for understanding, that is his contribution to chemistry. The pedagogical perspective is very strong in his work.

Notable at the same time is his reaching out to the general public; he participated, for example, in the production of a television course in introductory chemistry titled "The World of Chemistry," shown widely since 1990. And, as a writer, Hoffmann has carved out a land between science, poetry, and philosophy, through many essays and three books, Chemistry Imagined with artist Vivian Torrence, The Same and Not the Same and Old Wine (translated into six languages), New Flasks: Reflections on Science and Jewish Tradition, with Shira Leibowitz Schmidt.

Hoffmann is also an accomplished poet and playwright. He began writing poetry in the mid-1970s, eventually publishing the first of a number of collections, The Metamict State, in 1987, followed three years later by Gaps and Verges, then Memory Effects (1999), Soliton (2002), and most recently, in Spanish, Catalista. He has also co-written a play with fellow chemist Carl Djerassi, entitled Oxygen, which has been performed worldwide, translated into ten languages. A second play by Roald Hoffmann, Should've, had its initial workshop production in Edmonton, Canada in 2006.

Unadvertised, a monthly cabaret Roald runs at the Cornelia Street Café in Greenwich Village, "Entertaining Science," has become the hot cheap ticket in NYC.

PANEL MEMBERS (CON'T):

Gaspar Taroncher-Oldenburg, Ph. D.

Executive Editor of SciBX: Science Business eXchange, Nature Publishing Group

Gaspar is Executive Editor of *SciBX*, a weekly publication resulting from a publishing collaboration between *BioCentury Publications, Inc.* and *Nature Publishing Group*. *SciBX* is a platform for efficiently identifying and evaluating new developments in science and technology that have commercial and investment potential within the biotechnology and pharmaceutical arenas, by bringing together the business intelligence of *BioCentury* and the scientific acumen of *Nature*.

Gaspar has been analyzing, evaluating and writing about biotechnology as a scientific editor with *Nature Biotechnology* since 2002. He holds a Ph.D. from MIT and the Woods Hole Oceanographic Institution and a first degree in biology from the Universidad Autónoma in Madrid, Spain. Prior to joining *Nature Biotechnology*, Gaspar conducted research and taught at Princeton University, MIT and Tufts University. He has further been involved in global educational projects such as the inception, in affiliation with the MIT Technology and Development Program, of what is now the Malaysia University of Science and Technology in Kuala Lumpur, Malaysia. Gaspar is currently also a member of the Future Trends Forum, sponsored by the Bankinter Foundation for Innovation, Spain, a meeting place for opinion leaders in all areas of knowledge (philosophy, science, culture, communication, and technology) to discuss issues of global reach and their implications for society.

KEYNOTE INTRODUCTION:

Thomas. W. Bruce
Vice President for University Communications, Cornell University

Thomas W. Bruce serves as Vice President for University Communications at Cornell University. His primary responsibilities on behalf of the university include leading the development of its communications and marketing strategy and practices, serving as the university's spokesperson to all media and the public, directing all aspects of its communication activities including the design and maintenance of the website, news service, publication services and photography, as well as overseeing the information and visitor services.

Bruce's 25 years in the nation's capital encompass policy-making on Capitol Hill, foreign policy, diplomacy and international consulting, as well as a stint as the anchor of a national public affairs cable television show. He brings to Cornell a wide array of experience in creating and managing large-scale advocacy campaigns in the areas of international and domestic business, politics and public policy.

Bruce has channeled his interest in community service by serving on a number of boards, including 15 years as chairman of the board of directors of Sasha Bruce Youthworks, the largest private agency in the District of Columbia working with runaway children.

Born in Midland, Texas, Thomas grew up in Paris. He was educated at the University of Paris and Georgetown University in Washington, D.C., where he earned his bachelors degree from the School of Foreign Service in 1979. His fields of study were international relations, Arabic and Middle East studies. Thomas is married to film producer and former National Geographic Television executive Constance L. Bruce and is the father of Louise and Charlotte Bruce.

LUNCHEON KEYNOTE SPEAKER:

Jeff Nesbit
Director of Legislative and Public Affairs, National Science Foundation

Mr. Jeff Nesbit, a senior communications strategist with 25 years of experience working in the national media, Congress, the Food and Drug Administration, the White House and Private Industry, was appointed director of the Office of Legislative and Public Affairs at the National Science Foundation (NSF).

Nesbit oversees the agency's communication activities with the public, Congress, the news media, states and governors and various scientific, engineering and education organizations. He began his duties at NSF on June 12, 2006.

Nesbit has managed a successful strategic communications consulting business for more than a decade. His clients and projects have included dozens of national nonprofit, trade associations, media companies, Fortune 500 companies, major health foundations, public relations agencies and advocacy organizations such as the Discovery Health Channel, the American Heart Association, the Robert Wood Johnson Foundation, the American Red Cross, Porter-Novelli, CTIA-the Wireless Association, the Koop-Kessler Committee on Tobacco Policy and Public Health, Burson-Marsteller, the Kaiser Family Foundation and a number of major pharmaceutical companies.

Prior to forming his own communications consulting business in 1992, Nesbit was the Director of Communications to former Vice President Dan Quayle at the White House; Associate Commissioner for Public Affairs at the FDA for David Kessler, M.D.; a U.S. Senate press secretary and a national journalist with media organizations such as Knight-Ridder Newspapers. In addition, Nesbit is the author of 17 novels for children and adults.

POSTER ABSTRACTS:

#1

A RFID-based sensor for field-based detection

Carl Batt

Food Science, College of Agriculture and Life Sciences

Detection of potential threats in the environment is best accomplished using distributed remote sensors. Ideally a detector should be small, unobtrusive and self-contained able to send an alert to a more centralized data collection component. Distributed sensors in can yield more information and an informed description of the nature of the potential threat. We are developing sensors that communicate wirelessly and a design that permits the creation of distributed microscopic sensors. The platform is robust and capable of detecting a wide array of agents including those of both chemical and biological origins. The base technology involves interdigitated electrodes which are coated with aptamers that have been developed to specifically bind a given target. Our current system has been tested using two model analytes, the immunoglobulin IgE and staphylococcal entertotoxin. The binding events are monitored remotely using a wireless transmitter that permits us to measure these events at hundreds of meters.

#2

Novel Genetically Engineered Bacteria for Biological Control of Fire Blight

Finalist

Steven V. Beer, Marshall L. Hayes and Jean M. Bonasera

Plant Pathology and Plant-Microbe Biology, College of Agriculture and Life Sciences

Most apple and pear growers farm in great fear of the bacterial disease Fire Blight. This disease can wipe out an orchard in one growing season if the right environmental conditions prevail. Presently, the most effective option for disease control is widespread application of antibiotics. Our research seeks an alternative to antibiotic use. One possibility is to apply a biological control agent, such as a bacterium that does not cause disease itself but prevents other bacteria from causing disease. This biocontrol bacterium can also be engineered with a specific gene that stimulates the natural defenses of the treated plant. Our genetic engineering strategy is novel in that it involves gene manipulation that confers only beneficial effects to the engineered strain. The same strategy can be adapted to engineering plants that would be resistant not only to Fire Blight but to other dreaded plant diseases as well.

#3

Protein microarrays for identification of new potential diagnostic markers and vaccine candidates for *Mycobacterium avium* subsp. *paratuberculosis* infection

Yung-Fu Chang[1], Jenn-wei Chen[1], Subhash Chandra[1], Maria AS Moreira[1], and Yu-Wei Chiang[2]

[1]Department of Population and Diagnostic Sciences, College of Veterinary Medicine, Cornell University and [2]Fort Dodge Animal Health, Inc

Mycobacterium avium subsp. *paratuberculosis* is a bacterium that infects cattle, goats and sheep. Effective strategies for diagnosis and prevention by vaccination would be very beneficial for the control of disease. However, protective proteins and diagnostic antigens are needed for diagnosis and for vaccine preparation against this disease. Despite the availability of genome (DNA) sequences of this bacterium, the production and purification of the useful proteins from this bacterium remain a bottleneck. To address this need, we applied a high-throughput technique to allow hundreds of genes to be batch-processed by using ordinary laboratory procedures without robotics. The expressed proteins are printed directly onto nitrocellulose membrane. The protein membranes are very useful for us to identify the potential diagnosis antigens and/or protein vaccine candidates. These diagnosis and vaccine candidates will help us to develop the diagnosis kits and to produce useful vaccines to protect animals against natural infection by this bacterium.

#4

New Methods for the Synthesis of Biodegradable Polyesters

Finalist

Geoffrey Coates

Chemistry and Chemical Biology, College of Arts and Sciences

Society depends on polymeric materials now more than at any other time in history. Although synthetic polymers are indispensable in a diverse array of applications, ranging from commodity packaging and structural materials to technologically complex biomedical and electronic devices, their synthesis and proper disposal pose important environmental challenges. In this poster presentation, a new route for the synthesis of biodegradable polymers from renewable resources will be presented.

#5

Discover the Microbes Within: Students Partnering with Research Scientists

Jeffrey Doyle and **Laurel Southard**

The Cornell Institute for Biology Teachers, and Seth Bordenstein, *Marine Biological Laboratory*

CIBT, in partnership with Dr. Seth Bordenstein of the Marine Biology Laboratory, has offered high school students the opportunity to participate in Dr. Bordenstein's research.

The bacterium, Wolbachia spp, infects insect reproductive cells and causes a variety of problems for the insect, including male death and transfer of its genetic material from insect to insect.

Dr. Bordenstein's group are attempting to determine how widespread the infection is and how many orders of insects are currently infected.

Students collect insects from their area and learn to classify them using traditional body descriptions. DNA is then extracted from the insects. The presence or absence of Wolbachia DNA is then determined by PCR and gel electrophoresis. The students have determined that approximately 20% of the insects they test are positive for Wolbachia. The Wolbachia DNA from the PCR reactions is then sequenced to determine what species of Wolbachia the insect is carrying.

#6

3-D breast cancer models for pathologically relevant drug testing

Claudia Fischbach-Teschl

Biomedical Engineering

Conventional 2-D cell culture is typically used for preclinical testing of anti-cancer drugs; however, this approach only marginally reflects the microenvironmental conditions present in tumors in vivo. The purpose of this project was to develop novel breast cancer models for pathologically relevant testing of anti-cancer drugs. Alginate-based artificial extracellular matrices of varying stiffness and 3-D co-culture approaches with adipose progenitor cells have been designed to recreate typical cell-microenvironment interactions of normal and cancerous breast tissue, respectively. Our data indicate that 3-D culture dramatically reduces the responsiveness of breast cancer cells to anti-cancer drugs and that adipose progenitor cell behavior is significantly altered by physicochemical cues inherent to breast cancer. Current studies are evaluating whether increased stiffness in the mammary tumor microenvironment indirectly modulates breast cancer malignancy and drug responsiveness by altering adipose tissue-derived cell behavior. These experiments will further enhance the developed technology and enable its future use for relevant and high throughput testing of anti-cancer drugs.

#7

Genetically Modified Grapevines for Virus Resistance

Marc Fuchs, Jonathan Oliver

Plant Pathology, Geneva, College of Agriculture and Life Sciences

Grapevine is one of the most important fruit crops worldwide. Numerous pathogens, including *Grapevine fanleaf virus*, can have a detrimental impact on grape production. This virus reduces vigor, causes yield losses, alters fruit quality and shortens the productive life span of vineyards. It is transmitted from the roots of one vine to another by a soil-inhabiting nematode. Since no grape is known to be resistant to this virus, our latest understanding of the RNA-silencing pathway (a potent defense mechanism against viruses in plants) is used to develop genetically modified grapevine rootstocks with virus resistance. Since grapevines are commonly grown as scions grafted onto rootstocks to improve tolerance to abiotic stresses and protect vines from soil pests and nematodes, genetically modified rootstocks are anticipated to protect scion varieties from the virus while allowing for the continued use of existing varieties that are familiar to growers and consumers.

#8

Making Manure an Environmental and Economic Asset

Gary Harman, Terry Spittler and Robert Patrick

Horticultural Sciences, New York State Agricultural Experiment Station (NYSAES), Geneva, College of Agriculture and Life Sciences

Manure is a problem. This smelly, polluting material is disposed of by landspreading but avoiding pollution of waterways is a difficult and expensive issue for farmers. Together with industrial matching partner Terrenew, LLC, we have developed a way to turn manure into an environmental and economic asset. Terrenew produces dry manure that is odor and pathogen free. OilMaster 7x, one of several products made principally of manure, is a loose bagged material designed to absorb oil and other spills. It also can be formulated into pads for removal of oil spills from water or solid surfaces, and the same pads are excellent for plant propagation. Dairy manure slurries can be used to produce energy (biogas), but biogas contains large amounts of hydrogen sulfide, a toxic and corrosive contaminant. We can remove hydrogen sulfide to provide a complete closed loop system that will provide clean biogas and products for environmental remediation.

#9

Development of Oil Scrubbers to Moderate Styrene Supply to Biofilters

Finalist

Anthony Hay

Microbiology, College of Agriculture and Life Sciences

Industries are being pressed by regulatory agencies to limit the environmental release of and worker exposure to hazardous air pollutants (HAPs). Currently, the most widely used control technology for HAPs is thermal oxidation, which is cost-prohibitive for mid-size manufacturers and is not eco-friendly because it requires burning pollutants in a natural-gas-fed flame. Our approach employs biofilters that use microorganisms to destroy hazardous air pollutants. While this is a proven method and a promising alternative to thermal oxidation, the microbes responsible for degrading the styrene function best when they face constant styrene concentrations. We are developing an oil scrubber to couple with the biofilter that can absorb peak styrene emissions, then release them to the microbes when factory styrene levels decrease. The goal is to effectively moderate fluctuations in styrene delivery so that the microbes in the biofilters have more constant conditions and degrade more styrene, thereby providing cleaner air.

#10

What Do Cocaine Inhibition of Brain Proteins and Plaque Formation in Alzheimer's Disease Have in Common?

George Hess, Susan Coombs and Moataz Gadalla*

Molecular Biology and Genetics, College of Arts and Sciences
**Currently in the M.D./Ph.D. program at The John Hopkins School of Medicine*

Cocaine inhibits the rapid passage of signals between brain cells by binding tightly and specifically to a protein. We discovered that a specific cocaine site also occurs on molecules that aggregate to form plaques in the brains of patients with Alzheimer's Disease.

From a library containing millions of molecules (aptamers) composed of four nucleic acids randomly arranged we isolated a few aptamers that alleviated cocaine inhibition of the brain protein. Each aptamer contained a stretch with a similar sequence of nucleic acids. Meanwhile, another laboratory described aptamers that bind to the aggregating material implicated in Alzheimer's Disease. Serendipitously, Moataz Gadalla, an undergraduate at Cornell, noticed that both sets of aptamers contained the same sequence.

Do the aptamers, and some small organic molecules that also compete with cocaine for the site on the brain protein, also affect the plaque formation characteristic of Alzheimer's Disease? This is what we are trying to determine.

#11

Biodegradable Sprayable Fibers for Bioremediation and Pest Management

Michael P. Hoffmann and **Anil N. Netravali,**

Entomology, College of Agriculture and Life Sciences
Fiber Science and Apparel Design, College of Human Ecology

Our overarching goal is to develop soy-based fibers capable of being sprayed *in situ* to expedite bioremediation by reducing erosion, improving seedling establishment, enhancing soil properties, and protecting emerging vegetation from pests. Our specific objectives are to create prototypic soy-resin fibers; improve their mechanical properties; test their durability and degradability; and conduct trials to evaluate prototype fibers for preventing soil erosion and promoting seedling establishment.

Thus far, soy-derived fibers have been created and various cross-linking agents, thickening agents, and micro-fibrillated cellulose have been incorporated to increase fiber strength and durability. To guide the process of formulating sufficiently durable fibers, the physical and mechanical properties of the fibers have been characterized for strength and longevity. Field trials are underway to determine fiber efficacy in preventing soil erosion and enhancing seedling establishment. In the future, selective herbicides or other desirable amendments will be added to facilitate seedling establishment.

#12

Second Place Winner

Multiplexed Pathogen Detection Via a Portable Fixcytometer

Finalist

Nokyoung Park, Jong Bum Lee, Mark Hartman, and **Dan Luo**

Biological and Environmental Engineering, College of Agriculture and Life Sciences

Current pathogen detection methods in an agricultural or food setting are laboratory-based and time consuming – each pathogen requires its own separate assay. Inspired by the principle of Universal Product Code (UPC barcode) found on the packaging of most commercial goods, we have developed a branched-DNA based, nanobarcode system that is able to detect at least 8 different pathogens simultaneously with only two colors. Our detection was achieved through the rationing of color intensities rather than colors, but our Scanner was laboratory-based microscopes and flowcytomers, which are not portable, severely limiting the broad implementation of the DNA nanobarcode system in the field. We have since constructed a portable detector, Fixcytometer, which is powered by batteries and using a digital camera. This detector detects our DNA nanobarcodes without a need for large pieces of equipment, making it usable at the point of interest including dairy farms, food processors, and battle fields.

#13

First Place Winner

Development of biocontrol products from vermicomposted dairy manure

Finalist

Allison L. H. Jack, Tom Herlihy, **Eric B. Nelson**

Plant Pathology and Plant Microbe Biology, College of Agriculture and Life Sciences

In vermicomposting, earthworms convert organic wastes into valuable soil amendments used in agricultural disease control. Use of composts as pesticide alternatives is limited by how little we understand the mechanism of action. Our research has revealed that microbes in vermicomposted cow manure protect seeds from a highly infectious plant pathogen. However, discovering precisely which microbes are involved in protection is difficult considering there are over one trillion bacteria per gram of compost. We have narrowed our search by discovering that only microbes colonizing the seed surface within 24 hours of sowing are responsible. We know that the pathogen finds the host using chemical homing signals released from the seed. We have learned that seed colonizing microbes from vermicompost disrupt this homing signal and we are currently working to find the exact nature of this disruption. This knowledge will help us work backwards to determine how vermicomposts protect plants from disease.

#14

Symmetrical Lipids for Controlled Drug Delivery

Sara Yazdi[1], **David Putnam**[1,2]

College of Engineering, [1]School of Chemical and Biomolecular Engineering, [2]Department of Biomedical Engineering

Controlled drug delivery devices allow regulation of how fast or slow medicine is released into the body. Polymers are commonly used to govern the rate of drug release, but the release rate is difficult to control because the size of the polymers is hard to control. However, it is easy to control the size of lipids. Our hypothesis is that the rate of drug release can be better controlled from lipid-based devices owing to tighter control over their size. To test our hypothesis we synthesized a library of lipids with a range of sizes, fabricated implantable devices, and quantified the rates of drug release. Our results support our hypothesis and show that the rate of release is a controlled by lipid size.

#15

Genome Comparison of Transient Versus Chronic *E.coli* Strains

Tristan Lefébure[1], **Kenneth W. Simpson[2]**, **Ynte H. Schukken[1]**, and **Michael J. Stanhope[1]**.

[1]Population Medicine and Diagnostic Sciences and [2]Clinical Sciences, College of Veterinary Medicine

Mastitis in dairy cows is a disease of the mammary gland and affects the welfare of the cow and the quality and safety of the milk supply to consumers. Among the organisms causing mastitis, *Escherichia coli* (*E. coli*) is a dominant causes of intra-mammary infections. Typically, this form of mastitis causes a severe transient infection, however recent studies indicate an emergence of more chronic infections. We have developed a collection of *E. coli* isolates that can be divided into two distinct groups: (1) those displaying transient infection and (2) those associated with chronic infected mammary glands. We used the latest developments in genome sequencing and bioinformatics to determine the complete genome sequence of isolates arising from each of these categories and assessed genes that are unique or missing in comparison to other available genome sequences of *E. coli*. Initial results show important differences between these groups of isolates. Our results provide opportunities for development of tools for prevention and therapy of this debilitating cattle disease.

#16

Bioprocess-on-a-Chip: Making Biotechnology Products Cheaper and Better

B.J. Kim[1], T. Zhao[1], P. Miller[1], L. Young[2], P. Zhou[2], and **M.L. Shuler[1]**

[1]Biomedical Engineering, College of Engineering, Cornell University, [2]Rheonix, Corp.

Biotechnology has provided therapeutic proteins that have saved or improved the lives of countless patients. However, the cost effective production of these proteins is still problematic. The utility of these proteins relies on folding into the correct three dimensional shape with specific sugars added to predetermined locations on the proteins. Proteins lacking the correct sugar additions may not be effective.

By combining microfabrication with animal cell culture we have developed inexpensive systems that can test simultaneously many candidate production conditions. Our proposed system consists of a microbioreactor and a separator/purifier chip, which will allow us to measure the amount of protein produced and its sugar content . The proposed system can optimize culture conditions inexpensively to maximize the amount of high quality protein made. This system will allow biotechnology companies to make highly effective therapeutics at a price that society can better afford.

#17

Multi-Layer Porous Membranes for Sensing and Filtration

Totka Ouzounova, **Christopher Umbach** and David Bogdan

Materials Science &Engineering, College of Engineering,
Chemistry and Chemical Biology, College of Arts and Sciences

Porous materials are used in filters for trapping micro-organisms in the narrow channels formed by the pores. Porous materials shaped into sheets are known as membranes. 'Asymmetric' or 'multi-layer' membranes use a thick (typically 100 micron) large-pore layer for mechanical support of a small-pore surface layer (<1 micron) so that the pressure differentials used to drive fluids through the membranes do not damage the small-pore layer. We have used a mixture of silver and gold from which most of the silver is removed to create porous gold and have been able to produce a unique multi-layer porous gold membrane with potential for rapid detection of bacteria such as E. coli, which threatens water and food supplies. We describe our progress in controlling the structure of the pores so that they are appropriate for both entrapping bacteria and detecting them by electrical or optical techniques.

#18

Understanding Tumor Formation using Computer Models

Jeffrey D. Varner

Chemical and Biomolecular Engineering, College of Engineering

Cells in our bodies, like your desktop PC, work most of the time however sometimes they crash for strange reasons. When your PC crashes you reboot it, when a cell crashes it initiates a self-destruction program. When the self-destruction program fails to kill the crashed cells you have cancer. The long-term objective of the Varner laboratory is to understand how and why breast and prostate cells crash using computer models. In this study, we show that our computer models are capable of describing the early stage tumor formation and correctly predicting where likely malfunctions could occur in the cellular programs. We propose that this is a critical first-step in understanding the likely sites where cells could break and will help in developing new treatments for breast and prostate cancer that maximize efficacy and minimize side effects.

ADDITIONAL POSTERS (NOT IN COMPETITION):

Looking for New Antifungal Compounds: Exploring the Potential of Sea Fan Corals

Nancy L. Douglas[1], **C. Drew Harvell[1]**, and Stephen Lowes[2]

[1]Ecology and Evolutionary Biology, College of Agriculture and Life Sciences, Cornell University and [2]Advion BioSciences

The fungus *Aspergillus* is responsible for contamination of agricultural crops, life-threatening infections in humans, and potentially devastating infections in sea fan corals. We set out to collect and characterize molecules that sea fans release to protect themselves from infections. Our objectives were to better understand coral immunity and to isolate novel compounds that could be developed into pharmaceuticals to help fight fungal infections. We successfully isolated several antifungal proteins and smaller molecules using the size and charge characteristics of these molecules. The sea fan molecules were compared to databases of known compounds to identify similarities and novel features. This information is being used to find the genes that produce these proteins, which will allow further characterization of how they participate in immunity. These studies have contributed to new laboratory tools and instrument applications that will be applied to future projects in the Harvell lab and business ventures at Advion BioSciences.

Making Glycosylated Antibodies in Bacteria and On Phage

Tom Mansell, **Matthew DeLisa**

Chemical and Biomolecular Engineering, College of Engineering

Many of the most advanced therapeutic drugs on the market today are complex therapeutic proteins. Some examples include insulin (Eli Lilly), Epogen (Amgen), Avastin (Genentech). The complexity of these drugs, most notably due to protein glycosylation, requires the use of cultures of mammalian cells, which present many problems for efficient scale-up of production. Glycosylation, the attachment of sugar groups to proteins, is an important factor in drug efficacy, targeting, and immune response in the human patient. By using protein engineering strategies to develop powerful high-throughput selection techniques, we hope to engineer glycosylation mechanisms into E. coli, a simple prokaryotic expression host, in order to produce more "human-like" therapeutic proteins, reducing cost while increasing production scalability and drug efficacy.

The Development of a Surface Display System to Assay for Engineered Modifications to the N-linked Protein Glycosylation Machinery of Bacteria

Cassandra Guarino[†], Kristin Chan[‡], and **Matt DeLisa**[£]

[†]Graduate Student, Comparative Biomedical Sciences, College of Veterinary Medicine, [‡]Undergraduate Student, [£]Assistant Professor Chemical and Biomolecular Engineering, College of Engineering

N-linked protein glycosylation is an essential modification for a variety of proteins, including many human therapeutic proteins. Large-scale production of glycosylated proteins requires the use of live animals or mammalian cell cultures, and this is expensive. Alternatively, bacteria can be used to produce proteins in exceedingly large quantities and at a fraction of the time and cost of mammalian cells, but bacteria have long been considered incompetent for glycosylation. Recently, however, the pathogenic bacterium *Campylobacter jejuni* was found to possess an N-linked glycosylation system. The functional transfer of this system to non-pathogenic *Escherichia coli* has opened the field of bacterial glycoprotein engineering. The focus of our research is the development of a genetic assay for bacterial protein glycosylation that can be used as a selection tool for engineering modifications to the bacterial glycosylation machinery. Such modifications should permit "humanizing" of the bacterial glycosylation machinery for biosynthesis of authentic glycoproteins.

Quantitative detection of enzymes involved in bioremediation of groundwater contaminants

Jeffrey J. Werner*, A. Celeste Ptak[†], Brian G. Rahm*, Sheng Zhang[†], and **Ruth E. Richardson**[*]

**School of Civil and Environmental Engineering, College of Engineering †Proteomics and Mass Spectrometry Facility, Biotechnology Building*

Thousands of sites around the world are contaminated with the chlorinated solvents PCE and TCE. Most of the contamination is below ground and threatens drinking water resources. Plumes of chlorinated solvents are often deep underground, and extend below residential and commercial properties, making excavation of the contaminated land unfeasible. Bioremediation – the use of microbes to degrade/detoxify the contaminants in place – is an attractive alternative. However, it is difficult to track the specific activities of desirable microbes in these remote and complex environments. Because bioremediation activity is directly tied to enzymatic proteins, it would be desirable to have methods for specific and quantitative detection of desired enzymes in these environments. In work funded by the Innovations grant we first determined which microbial enzymes are utilized during the detoxification of PCE and TCE and have developed a tandem mass spectrometry-based techniques to quantify these enzymes in complex environments.

Novel Drug Delivery Systems Via Nanotechnology

Jishnu Naskar[1], Katherine M. Tyner[1], Alexander Nikitin[2], Mark S. Roberson[2], **Yi Wang[3], Emmanuel P. Giannelis[4]**

[1]Department of Chemistry and Chemical Biology, [2]Department of Biomedical Sciences, [3]Department of Biomedical Engineering and Weill Medical College, [4]Department of Materials Science and Engineering

For early detection of disease such as cancer, imaging technologies combining contrast agents with targeting and therapy are highly desirable. The long term goal of this program is to develop nanotechnology tools for diagnostic and therapeutic applications in cancer. Our specific research goals are to synthesize and evaluate a new family of nanoparticles as new MRI contrast agents and for hyperthermic therapy.

ABOUT THE POSTER JUDGES:

Greg Acland is Professor of Medical Genetics at the Baker Institute for Animal Health, College of Veterinary Medicine. He is also Adjunct Professor of Ophthalmology in the School of Veterinary Medicine and Director, Retinal Disease Studies Facility at the University of Pennsylvania, New Bolton Center. In collaboration with the Fred Hutchinson Cancer Research Center, he established the Canine Reference Family DNA Distribution Center, a collaborative arrangement between Cornell and Ralston Purina to make available to canine genetics researchers a panel of DNA samples forming the canine map.

Steven Mark Anderson, Tompkins Cortland Community College A.S. Biotech to graduate spring '08, will be transferring to SUNY College of Enivironmental Science & Forestry for a B.S. in Conservation Biology, and currently works for Novosteriilis in Lansing, NY.

Kristin N Andrascik, Tompkins Cortland Community College A.S. Biotech to graduate spring '08, will be transferring to Binghamton University for a B.S. in Biochemistry, and currently works for Cell Preservation Solutions Inc in Owego, NY.

Gabriel D Borden, Tompkins Cortland Community College student, with a B.S. in physics, is retraining for a biotechnology related career.

BJ Bormann is Senior Vice President, Business Development & Licensing at Boehringer Ingelheim (BI). BJ comes to Boehringer Ingelheim from Pfizer where she spent the past 11 years in roles of increasing responsibility. In her most recent role as a vice president in Pfizer's global R&D organization and the head of worldwide strategic alliances, she was responsible for the strategic and tactical execution of technology collaborations and acquisitions for R&D. She also handled candidate licensing deals in pre-clinical, Phase I and Phase II, and out-licensing. She was a member of Pfizer's global R&D senior leadership team and a director on the Board of The Pfizer Incubator. In addition BJ was the leader of several strategic cross-divisional teams such as biologics, diagnostics and Asian alliance strategies.

BJ attended Fairfield University where she received her Bachelor of Science degree in biology and chemistry. She received her Ph.D. in biomedical science from the University of Connecticut Health center where she worked as a graduate student in the Department of Pathology. Upon receiving her Ph.D., BJ worked in the Department of Pathology at Yale University School of Medicine as a Post Doctorate Research Fellow. In this role, she enjoyed increasing roles responsibility with positions as associate research scientist and research affiliate.

After a productive career in academia, BJ joined Boehringer Ingelheim Pharmaceuticals, Inc. (BIPI) where she spent seven years in R&D as a senior and principal scientist. While at BIPI, she worked on several programs including ICAM/LFA and DPP IV. BJ was a steering committee member for the antisense therapy investment with ISIS Pharmaceuticals. She was also a member of the cell adhesion interdisciplinary research team and member of the international experts group for oncology.

BJ lives in Old Lyme, CT with her husband Scott and her two teenage daughters Ashton and Colbey.

Dawn M. Bricen, Director of Public Relations, Franziska Racker Centers, Inc.
Dawn Bricen joined Franziska Racker Centers, an organization providing services to people with special needs, in August of 2006. As their Director of Public Relations, she manages the agency's marketing initiatives including their advertising, events, speaking engagements, publications and website. Prior to the Centers, she worked as the Director of Marketing and Publications for a nonprofit agency in Pennsylvania that provided retirement living and child care to a three county area. She is a trained in the graphic arts and holds a Bachelor's degree in art education from Penn State University.

Casey J Davis, Tompkins Cortland Community College A.S. Biotech to graduate spring '08, will be transferring to Upstate Medical College on full scholarship for a B.S. in Medical Biotechnology.

Will Edgecomb, Dryden High School student, plans to study psychobiology with a concentration in evolutionary studies at Binghamton University next year. Besides discussing the latest in evolutionary psychology, Will also enjoys watching fringe movies and playing Monopoly.

Clayton J Farrell, Tompkins Cortland Community College Liberal Arts Math & Science major to graduate fall '08, is undecided on his future university program (although he has already been accepted to three schools).

Ian Forsythe, Dryden High School student, will be attending Cornell University in the fall of 2008. At Cornell, he plans to study bioengineering. Interested in the genre of science fiction, he hopes to apply his knowledge to some of the more abstract fields within bioengineering, primarily genetic manipulation for medical applications.

Lee Henderson Chairman & CEO, is the founder of Vybion, a contract biopharmaceutical development company. Prior to Vybion, he was the Director of Molecular Virology at the Guthrie Research Foundation, a member of the Faculty of Tulane Medical School, and a fellow at the University of Texas Health Science Center in Dallas. He has also served as a director and medical advisor to public and private companies and on the NIH AIDS Drug Development Advisory Board. Dr. Henderson also serves on the Cornell University College of Agriculture and Life Sciences Advisory Council.

Mary Kay Hickey has been teaching chemistry and AP biology at Dryden High School for more than twenty years. She considers herself fortunate to be able to take advantage of the many opportunities that Cornell offers for professional development. In her spare time, she enjoys playing with grandchildren, being outdoors, gardening, walking and reading.

Thomas Kurz, Co-Founder and President of Commercial Operations, Advion BioSciences, Inc.
Founded in 1993, Advion is an established leader in bioanalytical science and regulatory compliance for drug development and an innovator of products for the life science industry. Advion is a leading global supplier of microfluidic technology supporting the analytical chemistry and positron emission tomography imaging markets. Advion operates a premier bioanalytical contract research organization, providing the pharmaceutical and biotech industry with bioanalytical services using liquid chromatography/mass spectrometry (LC/MS) and immunoassay techniques. Headquarted in Ithaca, New York, Advion employs over 180 scientific professionals and operates four facilities in the United States and has sales offices in North America, Europe, and Japan. For more information about Advion, visit www.advion.com.

Barbara Mink, Artistic Director, Light in Winter
Barbara Mink is the Founder and Artistic Director of Light in Winter, an annual festival of music, art and science (www.lightinwinter.com) . She has taught oral and written communication for MBAs and Executive Coaching for EMBAs at Cornell University's Johnson Graduate School of Management since 1986. She is also a guest lecturer on American-style presentations at ESCP-EAP in Paris, France. Mink was News Director of WHCU radio in Ithaca for eight years, and received the 1982 Associated Press Award for a program on ethics in journalism. In 1989 Mink was elected to the Tompkins County Legislature, and served as Chair of the Board for five years, stepping down in 2002. She is also an active painter (www.barbaramink.com)and is a member of State of the Art Gallery and the Greater Ithaca art trail.

Katrina Morse, Assistant Director, Family Reading Partnership
Katrina is trained as an art educator and is a writer and illustrator. Her work at the Family Reading Partnership includes supporting the many FRP programs that give books to families in our community and the creation of banners, calendars, brochures and articles that promote reading aloud to children and connect families with the joy of books.

Richard Newman Welch Allyn Vice President for Advanced Technology, retired in January 2008 after 40 years with the company. His career included development of new ideas and technologies that advanced Welch Allyn products and services in the global healthcare community. At the company he had responsibilities for in-licensing, sponsored research, developing strategic alliances, and providing technical evaluations of patents and their acquisitions. He holds a B.S. from Cornell University and an M.S. from Syracuse University.
Welch Allyn recently formed a new technology incubator company housed at Syracuse University and named in honor of his amazing career. The goal of the Richard W. Newman Innovation Center is to accelerate the product development process from ideation to conceptualization of new technologies and inventions designed specifically for the health care industry. This will allow Welch Allyn to fill its product pipeline faster with new technology to address future customer needs and with increased efficiency and focus. In addition, there will be greater ability to collaborate with university researchers throughout the world and leverage the many resources and advantages that an innovation incubator is afforded.

Alexander Parren Johnson III, Tompkins Cortland Community College A.S. Biotech to graduate summer '08, will be transferring to a business school, and is currently a member of the management team for a local start-up brewery.

Kate Perkins, Dryden High School student, will enter Cornell as a freshman this fall. She plans to pursue an undergraduate degree in psychology, and then continue on to law school. In high school, Kate has played the saxophone and the clarinet, and she has been a member of the science olympiad team, the varsity swim team, and the mock trial team.

Mickey Knorr, Tompkins Cortland Community College A.S. Liberal Arts Math & Science and Business Administration to graduate spring '08 with Highest Honors, will be transferring to Ithaca College for Economics (unless Cornell accepts him; Dartmouth did).

Rakibou Ouro-Djobo, Tompkins Cortland Community College A.S. Biotech to graduate fall '08, will be transferring to the University at Buffalo for Biochemistry.

Tim Renteria, Dryden High School student, enjoys various aspects of non-labor intensive activities that do not test his athletic abilities. He is interested in science-related subjects and plans to further his studies at SUNY Albany next year. He likes long walks on the beach; unfortunately there are none around here.

Helen Talty, Vice President, Tompkins Trust Company

Helen has 13 years of banking experience. She spent the first part of her career at a large regional bank primarily focused on retail banking. She later concentrated on commercial banking as a Senior Business Banker for 2 ½ years, working with small business and entrepreneurs on their commercial lending and deposit needs. For the past year, Helen has been the Manager of Community Banking at the Tompkins Trust Company. In this role, she oversees 13 retail branch offices and 70 employees.

Helen has been active in several local organizations. She is a member of Ithaca Sunrise Rotary, Ithaca Downtown Businesswomen, Finance Committee of St. Catherine's Greek Orthodox Church and Allocation Committee of the United Way of Tompkins County. She is the former treasurer of the Kitchen Theatre (1997-2000), mentor of the 3 Pillars Foundation (2001-2006) and a 1998 Leadership Tompkins graduate.

Cathy Valentino, Union Negotiator

Cathy Valentino was voted one of Cayuga Radio Group's Twenty Outstanding Women You Should Know in 2007, and received the Community Builder award from Better Housing of Tompkins County in 2004. Valentino served for three terms as Supervisor of the Town of Ithaca, and was treasurer of the Bolton Point Water System for twelve years.

Dr. Arthur Vercillo, Vice President/Chief Medical Officer, Excellus BlueCross BlueShield

Dr. Arthur Vercillo is currently Vice President and Chief Medical Officer for Excellus BlueCross BlueShield. He is a board certified general surgeon who was trained at Syracuse University, SUNY Upstate Medical University, University of Connecticut and Harvard University. He is an associate professor of general surgery and otolaryngology at SUNY Upstate and is the past president of the Onondaga County Medical Society. Dr. Vercillo has authored numerous articles in the medical literature.

Mike Washburn is Executive Chef at Wegmans in Ithaca.

DISPLAYS AND SERVICES:

Cornell Business & Technology Park, www.cornellbtp.com

Cornell Business & Technology Park is the premier location providing flexible space for office and research firms, large or small.

Situated in a park like setting, accommodating from 200 to 20,000 SF, Cornell Business & Technology Park offers flexibility and services to help your business grow.

Conveniently located adjacent to Ithaca Tompkins Regional Airport, Federal Express, post office, hotel and offering free parking, this is the premier location for your business.

Cornell Center for Materials Research (CCMR) www.ccmr.cornell.edu

The Cornell Center for Materials Research (CCMR) is a part of the NSF's Materials Research Science and Engineering Centers program. The mission of the CCMR is to advance, explore and exploit the science and engineering of advanced materials. The CCMR is committed to ensuring that technical innovations move efficiently from the research bench to the private sector and to developing productive industrial partnerships. The CCMR Industrial Partnerships Program, which is funded by New York State, received the mandate to promote cooperation between the CCMR and industry, foster technology transfer and promote economic development. Companies, from multinationals to local small businesses and start ups, can access programs specifically designed by the CCMR to address their research, development and manufacturing needs in the area of Material Sciences.

Cornell University Library

One of the leading academic research libraries in the United States, the Cornell University Library is a highly valued partner in teaching, research, and learning at the university, offering cutting-edge services and a full spectrum of library resources, from rare books and manuscripts to a rapidly expanding network of digital resources. Through such initiatives as the life sciences portal, the installation of a pioneering high-end mobile and flexible computer laboratory designed specifically for collaborative use, and innovative scholarly publishing support, the Library is an integral component of the many educational programs and research projects under way at Cornell. To help researchers who receive funding from the National Institutes of Health (NIH) comply with the new mandate to put copies of peer-reviewed publications in an online repository, where they will eventually be made open to the public, the Library offers a Web site at http://www.library.cornell.edu/scholarlycomm/nihmandate.html and an e-mail hotline at nihmandate@cornell.edu.

Entrepreneurship@Cornell www.eship.cornell.edu

Entrepreneurship@Cornell works with campus schools, colleges, and organizations to help create and promote entrepreneurial culture at Cornell.

Vision: *To find and foster the entrepreneurial spirit in every Cornell participant - in every college, every field, and every stage of life.*

Entrepreneurship@Cornell is governed by the deans of the nine participating Cornell schools and colleges, supported by a large, committed alumni advisory council, and powered by a diverse group of enthusiastic faculty from across the campus.

For further information on Entrepreneurship@Cornell and to learn about its many activities please visit our website.

Life Sciences Core Laboratories Center (CLC)
http://cores.lifesciences.cornell.edu/brcinfo/index.php
The Cornell University Life Sciences Core Laboratories Center (CLC) provides an array of genomics, proteomics, imaging and informatics shared research resources and services to the university community and to outside investigators. The CLC offers resources for DNA sequencing and genotyping, DNA microarrays, epigenomics, proteomics and mass spectrometry, protein production and characterization, microscopy and imaging, animal transgenics, bioinformatics, bio-IT, and advanced technology assessment. The CLC includes fee-for-service research, technology testing and development, and educational components. The resources and services of the CLC are open to all investigators at Cornell University and to researchers from outside academic institutions and commercial enterprises. With a concentration of advanced instrumentation and expertise in their applications, the CLC is a key resource for life sciences research.

Nanobiotechnology Center (NBTC) www.nbtc.cornell.edu

Nanobiotechnology brings together engineers, physical scientists, and biologists to explore life sciences at the nanoscale. The tools and techniques of nanofabrication are interfaced with biological systems, to generate new insight into how these systems function. Addressing such biological systems on the cellular and molecular scale opens a new world of scientific exploration and novel device construction. Research at the Nanobiotechnology Center is characterized by its highly interdisciplinary nature, featuring collaboration among faculty representing twenty-two departments from six institutions around the country. The NBTC shared research facilities are available to all users from academia, industry and other research communities. Nanofabrication, chemical processing and biological processing are integrated in a facility that promotes the exchange of ideas across traditional disciplinary boundaries. Our education program works with all age groups to foster a lifelong interest in science with particular emphasis on processes and structures at the nanoscale. We work with school systems, education groups and our local Sciencenter to develop activities, exhibitions and materials that promote the public understanding of science.

Sloan Program www.human.cornell.edu/che/PAM/SLOAN/

The Sloan Program in Health Administration prepares future leaders and entrepreneurs in the health sector with the knowledge and skills in management, healthcare organization, policy and public health to lead health-related organizations. Graduates work in settings ranging from health systems and consulting to insurance and pharmaceuticals. Established in 1955, the Sloan Program is the nation's first two-year graduate program in health management and is named after the late Alfred P. Sloan, Jr., the innovative CEO of General Motors, who provided the original funding and selected Cornell to develop a program to promote application of modern management practices to healthcare.

VIVO http://vivo.cornell.edu

VIVO, the Virtual Life Sciences Library, helps researchers discover common interests and make connections by transcending Cornell's campus, college and department structure to offer an integrated view of the life sciences at Cornell. VIVO includes content related to any aspect of the life sciences at Cornell, and provides:

- A means for students to discover fields of study, research projects, advisors, and opportunities
- A resource for researchers looking for activities or collaborators
- A source for industrial partners and donors seeking points of contact

A resource for administrators or journalists seeking information and expert commentary

ABOUT THE CENTER FOR LIFE SCIENCE ENTERPRISE:

The Center for Life Science Enterprise at Cornell University emphasizes technology, people, and research involved in the life sciences. The Center marries the diversity, discovery, and knowledge base of Cornell with the jobs, innovation, and impact of New York State businesses. The result is a diverse portfolio of projects and expertise that positively impacts human and animal health, agriculture, and the environment, and leads to economic growth and job creation in New York.

The Center for Life Science Enterprise works mainly with small to mid-sized companies, with an emphasis on startup or emerging companies. The Center also works with Cornell's Corporate Relations Office to address the needs of larger companies.

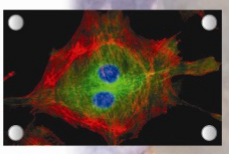
In addition to funding collaborative research, the Center for Life Science Enterprise offers a variety of services for industrial researchers and entrepreneurs. The Life Sciences Core Facilities provide access to specialized technologies and instrumentation that many small to medium sized companies are unable to afford. To enhance the available skill set among the current workforce, the Center welcomes scientists at NYS companies to visit and learn the state of the art in scientific techniques such as automated DNA sequencing and many others.

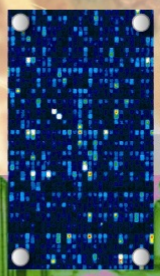
The Center for Life Science Enterprise assists in all aspects of entrepreneurial activities, from the creation and growth of a start-up business, to business planning in general, to assistance with finding the resources to meet companies' individualized needs. Some of the services provided include connecting companies with Cornell researchers to assist with sponsored research projects; helping to understand and find alternative sources of funding; locating support services for businesses; workforce development; and introductions, referrals and networking opportunities. Moreover, the Center facilitates access to a talented pool of experienced undergraduate, graduate and post doctoral students at Cornell University through internships, research project collaborations and career fairs.

More information on the Cornell Center for Life Science Enterprise can be found at the website http://www.biotech.cornell.edu.

New York State Center for Advanced Technology

CENTER FOR Life Science Enterprise





www.biotech.cornell.edu

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