



## VGN Provides Opportunity for Graduate Students to Visit NIH

by Pamela J. Lescault, M.Sc., Graduate Student, Microbiology & Molecular Genetics

The Vermont Genetics Network provided several graduate students the opportunity to visit the National Institutes of Health (NIH) in late August 2008. The Professional Development Program, under the direction of Dr. Janet Murray, generously afforded us the opportunity to explore the campus and learn about the numerous opportunities at the NIH in Bethesda, Maryland. This important opportunity arose from requests from graduate students and post-docs during several Professional Development workshops that were offered by the VGN in the recent past, and was open to all VGN members, past and present. The timing of our NIH visit was aligned very nicely with participation in the 2nd Biennial NIH National IDEA Symposium of Biomedical Research Excellence (NISBRE), which was also being held in Washington, D.C. at that same time.

There was a buzz of excitement as our group passed through the tight security at the front entrance to the NIH campus where we met Dr. Padma Maruvada, the Health Scientist Administrator for the Division of Research Infrastructure, who played a large role in the organization of our special tour. Jennifer Gorman, the Director of the NIH Visitor Center, along with Fettina Bryant, the NIH Ambassador Guide, walked us throughout the campus informing us of the numerous opportunities and the research (both internal and external) that goes on at this prestigious institution.

We learned that the NIH consists of 27 institutes (cancer, eye, heart, etc.) and has more than 28,000 employees. The Clinical Research Center is a hospital that treats patients and researches high risk/high impact disease-related challenges. Prospective patients can research their disease and then enroll in a public web-based environment in order to be considered for acceptance into a peer-reviewed protocol. Then, if chosen for the protocol (based on specific criteria), the patient will be fully funded for all medical exams, tests, treatments, etc. (not to mention family housing in a beautiful stone-walled refuge, called "The Children's Inn"). It is no surprise to learn that the family members of patients refer to the NIH as the "National Institutes of HOPE".

Here we are at the National Library of Medicine.



We learned that although scientists at the NIH do not have to compete for grants, the atmosphere is still very

competitive. We began our tour at the NIH Security Gateway Center.

"You don't rest on your laurels here!" said Jennifer Gorman, as she expressed the work ethic exhibited in and around the corners of the NIH.

We were very fortunate to be able to meet with Paul Meltzer, M.D. Ph.D., Branch Chief, Head, Molecular Genetics Section, Genetics Branch, National Cancer Institute and Sarah Anzick, Ph.D., Genetics Branch, National Cancer Institute. These researchers presented some of their research to us, answered our questions about being a researcher at NIH, and let us tour some of their lab space. This was definitely one of the high points of our visit.

Our group was also very enthusiastic on our way to the National Library of Medicine (NLM), especially because we all use PubMed on a daily basis. While at the NLM we learned about the history of its existence. One interesting fact took place while JFK was president. During this era, the library was purposely designed to have an inward-pointing roof dome so that if the area were to be attacked by a nuclear bomb, the data would be saved!!

Next, we witnessed what seemed to be a "futuristic" level of security (the retinal scan) protecting the enormous amount of data that is stored at the NLM.

Our VGN group was also welcomed in to tour the current exhibit at the time, "Against the Odds: Making a Difference in Global Health" and learned much about brilliant societal changes that have been made in the name of Global Health over the past few decades, including future plans for improvement.

At the end of our tour, we explored the Hall of Nobel Laureates and reminisced about our favorite studies. Then we were guided into an adjacent classroom and invited to a 'question & answer' session with Betsy Wade Ph.D. and Lori Conlan Ph.D. from The Office of Intramural Training and Education. They answered many questions related to postdoctoral opportunities at the NIH and the type of training and education provided by their office for successful career development. Thank you VGN, your programs are so important and well appreciated by your members.



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## From the Director

*Judith Van Houten,  
PhD*



The Vermont Genetics Network has begun its fourth year of INBRE funding after a very successful third year. I am very pleased with all of the accomplishments and all of the hard work of our staff and faculty members.

The **7th Annual VGN Retreat** was held on August 13. Dr. Thomas Tritton, President of the Chemical Heritage Foundation was the keynote speaker and made a presentation titled, "The Joy of Science: Research & the Undergraduate Experience." The BPI Presidents were invited to this presentation and enjoyed a luncheon with Dr. Tritton to further discuss building cultures of research at their respective colleges. Three VGN funded researchers gave presentations about their research while other researchers had the opportunity to present their research in a poster session. Mike Meunier, UVM Assistant Controller, and Nathan Besio, VGN Business Manager hosted a Business Managers meeting for our BPI's.

Dr. Janet Murray, VGN Outreach Coordinator, organized a **trip to NIH (National Institutes of Health) for VGN graduate students** in late August. They took a tour of the facility, met with NIH researchers, visited the National Library of Medicine, and ended their visit with a question and answer period with researchers from the Office of Intramural Training and Education. After their day at NIH they were able to participate in the NISBRE (National IDeA Symposium of Biomedical Research) meeting that was being held at the same time. The trip was very successful and I'd like to thank Dr. Murray for organizing such a successful and well-received trip.

The **UVM/VGN Proteomics Facility hosted its second annual open house** on Tuesday, August 26th. The open house was organized by Dr. Bin Deng, VGN Proteomics Facility Manager. The open house was a success and continues to be an effective way to introduce researchers to the services available from the facility. The Proteomics Facility has three mass spectrometers now and has assisted in a total of 94 projects. They will begin to charge for services in January 2009 and can be reached for a consultation through the following

link: <http://vgn.uvm.edu/proteomics/>.

VGN would like to congratulate Tim Hunter, Manager of the UVM/VGN Microarray Facility, on the success of the recent **NERLSCD (Northeast Regional Life Sciences Core Directors)** meeting. The conference was held October 22-24, in Burlington, Vermont. It was a networking meeting for core directors and managers throughout the northeast and provided an opportunity to meet colleagues, share technical advice, and to discuss the challenges and outcomes of implementing shared research and resources and technologies. Over 40 posters were presented describing the activities and services that their cores provided. One of the highlights of the meeting was the UVM core facility tours that were offered to all attendees. These tours were very well received by all.

Our next **Request for Applications for VGN Funding** is currently available on the VGN website: <http://vgn.uvm.edu/funding>. Applications will be accepted for faculty project grants, faculty pilot project grants, undergraduate summer research, graduate student assistantships and use of UVM/VGN Microarray and Proteomics facilities grants.

Thank you to all who filled out the VGN Longitudinal Survey. The statistics that we were able to produce will be crucial when we apply to NIH for funding for INBRE Phase II. Work has already begun as we prepare for the renewal and the support of all VGN current and former faculty, staff, and students is greatly appreciated.

I wish you all another successful and productive year and thank you for making VGN a success.

*Save the Date!*

**8th Annual  
Career Day**

**April 15, 2009  
4:30 - 7:30 pm**

**Double Tree Hotel  
South Burlington, VT**

## Vermont Genetics Network 7th Annual Retreat August 13, 2008

The Vermont Genetics Network (VGN) hosted its 7th Annual Retreat on Wednesday, August 13, 2008 at the DoubleTree Hotel in South Burlington. The day began with a Continental Breakfast/Networking Session and guests had the opportunity to sign up or update their status on our Vermont Science, Engineering and Environment Network (vSEEN) website. Bryan Fleming, VGN IT Specialist, had laptop computers set up to demonstrate how to navigate the website. Dr. Judith Van Houten, VGN Director, opened the program by welcoming all of the guests. Next, three presentations by VGN funded faculty were given. The following faculty members from VGN's partner colleges spoke about their VGN funded research:



Malcom Lippert, PhD  
Saint Michael's College

*"Genetic Requirements of  
Transcription-Associated  
Mutation in Yeast"*



Elizabeth Wuorinen, PhD  
Norwich University

*"Exercise-Induced Energy  
Expenditure and the Effects  
on Appetite"*



Roger Sandwick, PhD  
Middlebury College

*"The Wonderful World of  
Protein Glycation"*

During the presentations, the Baccalaureate Partner Institutions (BPI) Coordinators held a workshop to further discuss the culture of research at their institutions. The meeting was attended by the BPI Coordinators from Castleton State College, Johnson State College, and Norwich University.

After a short break, Dr. Judith Van Houten introduced the guest speaker, Dr. Thomas R. Tritton, President and CEO, Chemical

Heritage Foundation. He spoke on "The Joy of Science: Research and The Undergraduate Experience". The Baccalaureate Partner Institutions (BPI) College Presidents were invited to his presentation as well. The presentation was very well received by all.

During lunch, Dr. Tritton and Dr. Van Houten met with the BPI College Presidents from Johnson State College, Middlebury College, Norwich University and Saint Michael's College. They expanded upon the talk that Dr. Tritton had given on "Research and the Undergraduate Experience." A valuable exchange of information took place and the attendees were provided with suggestions and ideas to assist them at their own institution.

Following the wonderful buffet lunch, Nathan Besio, VGN Business Manager, held a business managers meeting for representatives from each of the BPI Institutions. Nathan and Mike Meunier, Assistant Controller-Grants & Contracts Accounting at UVM, gave presentations and had a Q & A Session.

While the business managers meeting was being conducted, other attendees networked and visited the posters that were presented by the BPI faculty members and UVM graduate students that had received VGN funding last year.



Dr. Thomas Tritton, Guest Speaker

*The following VGN  
funding opportunities  
are now available:*

PROJECT GRANTS

PILOT PROJECT GRANTS

UVM GRADUATE STUDENT ASSISTANTSHIPS

UNDERGRADUATE STUDENT SUMMER RESEARCH

USE OF UVM/VGN MICROARRAY &  
PROTEOMICS FACILITIES FOR FACULTY AT UVM

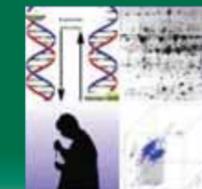
*For more details and to apply please visit our website:*

<http://vgn.uvm.edu/funding>



# Northeast Regional Life Sciences Core Directors Meeting

OCTOBER 22-24, 2008 • UNIVERSITY OF VERMONT, BURLINGTON, VT

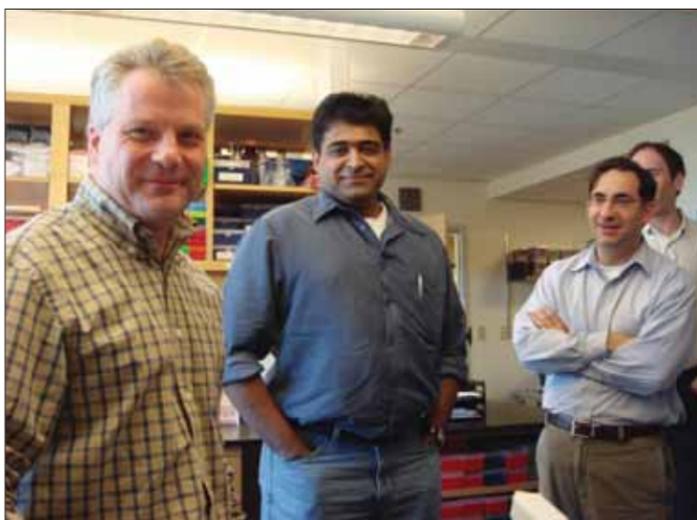


The third annual Northeast Regional Life Sciences Core Directors (NERLSCD) meeting was held October 22-24th at the Sheraton Hotel and Conference Center which provided an opportunity for core facility directors and managers to meet colleagues, to share technical



Phyllis Spatrack, UMMS, Valerie Scott, Jackson Labs, Susanna Perkins, UMMS, enjoying conversation at the opening reception.

advice, and to discuss the challenges and results of implementing shared research resources and technologies. This gathering attracted 149 attendees from 19 states and one Canadian province representing over 60 institutions. Also in attendance were representatives from the National Center for Research Resources including the deputy director, Louise Ramm. The three day meeting consisted of presentations on topics relevant to all cores directors and managers, as well as technology focused breakout sessions. The meeting was sponsored by multiple institutions in the region with a tremendous amount of logistical support provided by the Vermont Genetics Network and the Vermont



Scott Tighe, Senior Research Technician in the Microarray facility, provides a tour for NERLSCD participants from SUNY Albany.

Cancer Center.

The meeting opened with organized tours through eight core facilities on the University of Vermont campus followed by an evening opening reception that allowed attendees to meet and discuss core technical and operational issues in an informal setting. The tours afforded an opportunity for core directors to showcase their technologies and discuss how they support research investigators and explore what opportunities may exist for regional sharing of resources. The UVM core facilities that opened their doors and welcomed core directors and managers throughout the northeast were VGN Proteomics Mass Spectrometer and Microarray facilities, VCC DNA Analysis facility, Microscopy Imaging Center, COBRE Neuroscience Imaging and Cell and Molecular Biology facilities, X-Ray Crystallography Center, and the UVM Transgenic Mouse Facility.

The meeting officially began with welcoming remarks from Tim Hunter, chair of the NERLSCD organization committee and facility manager of the VGN Microarray and VCC DNA Analysis Facilities, followed by remarks from Dr. Frances Carr, Vice President for Research and Graduate Studies who discussed the critical role core facilities play in expediting research and charged the participants to develop a working document on best practices for shared resource facilities. This first day began with a series of presentations on core technology



Bryan Fleming, VGN Bioinformatics Staff, assists Chris Lytle, Core Director from Dartmouth, to populate the VGN searchable core database.

development, operation, and obstacles relevant to all core facilities. Dr. Judith Van Houten, Director of the Vermont Genetics Network, started the morning session as the keynote speaker and presented a talk on "Building Technology Infrastructure and Sustaining it into the Future". Dr. Van Houten stressed the importance of careful planning when building new technology infrastructure and shared her approach of ascertaining the need, finding a talented workforce, developing a plan for delivering the service, building a user base, collaborating with administrators, and partnering with other institutions in the region to avoid redundancy. This was a great segue way for a panel discussion that followed with core directors and focused on regional initiatives that

are targeted at developing tools to improve core communication and cooperation between core facilities to enhance the science capabilities at their research institutes. Initiatives discussed were the utility of the Vermont Genetics Network's searchable core database, the formation of a Network of IDeA funded core laboratories (NICL), the New England Regional Translational Research Network, and the Northeast Network Initiative. Matt Stine presented an insightful talk on the information technology solutions developed and implemented at

St. Jude Children's Research Hospital. Systems discussed were a Sciences Resource Management System (SRM) which is a comprehensive workflow and data management package, and TrakIT that serves as a publication tracking system. Steve Bobin, Dartmouth College Core Director, followed with a presentation on Circular A-21 compliance guidelines for chargeback development and stressed the importance of an accurate assessment of aggregate costs of a core service.

A core facility poster session followed the morning talks that promoted and fostered core director networking by providing a chance



Janet Murray, VGN Outreach Coordinator, discusses her poster with Sheryl White.

for them to present posters describing the activities and services their individual cores offer and to view what core services are available at neighboring institutions.

Eleven technology breakout sessions, each led by a panel of experts in which topics of interest were discussed in a roundtable setting, included: DNA sequencing, flow cytometry, microarray, proteomics, transgenics, stem cells, protein characterization and expression, real-time PCR, optical imaging, genotyping, and bioinformatics. University of Vermont breakout session organizers were Dr. Jeffrey Spees for stem cells, Dr. Mercedes Rincon for transgenics, and expert panelists included Mary Lou Shane for real-time PCR and Dr. Jim Vincent for the Bioinformatics panel. The goal of these sessions was to be informal and promote directors to share core successes or failures, protocols, or discuss emerging technologies in the field.

The meeting concluded with closing remarks by George Grills, Director of Core Operations at Cornell University, and discussed the importance of these meeting formats to increase regional awareness and promote sharing. Feedback generated through a post meeting survey



Networking with Colleagues.

has been positive and indicates that participants were appreciative for such a valuable networking opportunity. To learn more about the meeting, please visit: [www.uvm.edu/~vgn/NERLSCD/](http://www.uvm.edu/~vgn/NERLSCD/).

*A Special Thanks to the NERLSCD Organizing Committee:*

Tim Hunter  
UNIVERSITY OF VERMONT

Pamela Scott Adams  
THE TRUDEAU INSTITUTE

Stephen Bobin  
DARTMOUTH MEDICAL SCHOOL

Michelle Detwiler  
ROSWELL PARK CANCER INSTITUTE

George Grills  
CORNELL UNIVERSITY

Robert Keefe  
WADSWORTH CENTER  
NEW YORK STATE DEPARTMENT OF HEALTH

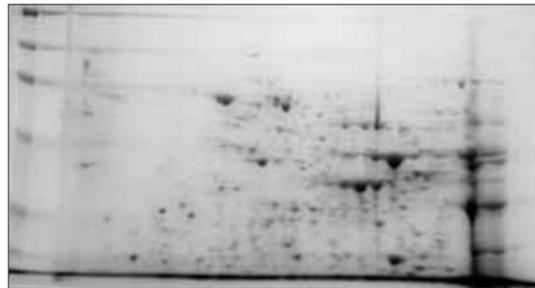
Katia Sol-Church  
CENTER FOR PEDIATRIC RESEARCH  
NEMOURS CHILDREN'S CLINIC-DELAWARE

Theodore Thannhauser  
U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE

## VGN Outreach Update by Janet Murray, PhD, VGN Outreach Coordinator

### Proteomics

The Fall of 2008 had the outreach team focused on the development of the upcoming proteomics module to be beta tested at UVM in Spring 2009 and ready for outreach delivery in the Fall of 2009.



2D gel of total yeast protein extract.

We are planning a comparative proteomics module using yeast as our experimental organism. Total protein will be isolated from a treated

and untreated culture. 2D-electro-phoresis will be used to separate the proteins and differential spots will be picked and identified using mass spectrophotometry performed by Bin Deng, the proteomics facility manager.

We are proud to announce that we have added a new member to the outreach team to help with proteomics. Bryan Ballif current co-director of the Proteomics Facility has joined us and his expertise has been invaluable. He has been involved in the development of the module and will be working with the rest of the outreach team in the delivery the module. Welcome Aboard Bryan!!



Bryan Ballif, our new proteomics outreach team member.

### Bioinformatics



Outreach members Janet Murray and Pat Reed with Mark Lubkowitz and 19 Saint Michael's College students who participated in the Fall 2008 VGN Bioinformatics module.

The Fall of 2008 had the outreach team visiting Saint Michael's College for delivery of the bioinformatics module. Nineteen students participated in Mark Lubkowitz' Molecular Biology course which included the bioinformatics module as part of the courses laboratory section.

As part of the module each student presented a poster on the final day. Each student discussed unique genetic diseases with outreach members, other students and faculty from the college who were invited to the event.

We really enjoy seeing the students' efforts and the excitement they have when presenting their posters. It is very satisfying for the students to put together all the tools they have learned for a final project.

This is the third outreach site we have visited with our module. In the 2007-2008 academic year, we delivered the module to Green Mountain College and Norwich University. Both of these colleges have integrated all or portions of the information from the module into new courses. We feel that the information that is contained in the module is useful to all science students and can be incorporated in many different ways into a multitude of science curricula.

## Proteomics Facility News

### Heart Failure Study

Heart failure is a symptomatic syndrome that affects nearly 5 million Americans and costs the U.S. health care system 27.8 billion dollars in treatment per year. The appearance of symptoms that negatively affect daily living are highly correlated to a remodeling process within the heart. This cardiac remodeling process involves both whole-heart morphological changes, and molecular alterations of the contractile proteins that are responsible for heart contraction. The cardiology research laboratories of Peter VanBuren and Martin LeWinter recently observed that the phosphorylation of a thin filament contractile protein is a key mechanism in the depression of contractile function during heart failure. However, the thin filament is composed of multiple proteins – actin, troponins I, T, C, and tropomyosin – and the site of phosphorylation was not identified in their study.

Michael Previs, a Ph.D. candidate in the Cell and Molecular Biology Program, has been working with Dwight E. Matthews and Jim O. Vigoreaux to develop a strategy to identify the site(s) of thin filament phosphorylation and quantify the degree of the post-translational modification in biopsies taken from healthy and failing human hearts. In their recent publication (Previs, M. J.; VanBuren, P.; Begin, K. J.; Vigoreaux, J. O.; LeWinter, M. M.; Matthews, D. E., Quantification of protein phosphorylation by liquid chromatography-mass spectrometry. *Anal Chem* 2008, 80, (15), 5864-72), they developed and presented a general proteomic method to identify site-specific phosphorylation and quantify the degree of phosphorylation of using liquid chromatography-mass spectrometry. Their method relies on tryptic digestion of protein samples to peptides and peptide labeling with stable isotopes for quantification. They demonstrated the accuracy and precision

of their method using troponin I samples of known degrees of phosphorylation. They also highlighted their ability to overcome several technical limitations that are present in the current literature concerning the quantification of phosphorylation.

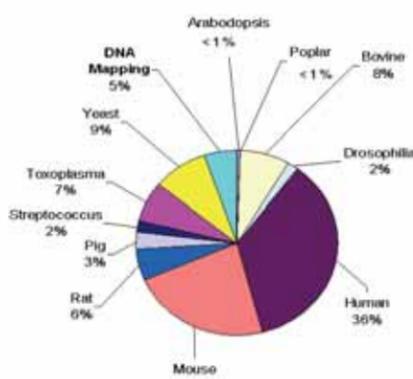
Mike Previs is currently applying this proteomic technique to investigate and quantify phosphorylation status of thin filament proteins isolated directly from the human heart biopsies taken at FAHC as the second part of his Ph.D. thesis. His current results are exciting, yet somewhat unexpected, and suggest that the phosphorylation of a specific serine residue on the C-terminus of tropomyosin is in fact the regulatory effector responsible for the reduction in contractile function. These findings in human heart are novel and currently being prepared for publication. The result of this study should provide an exciting avenue for future research concerning the mechanism of contractile dysfunction observed during heart failure.



(L to R)  
Dr. Jim  
Vigoreaux,  
Michael  
Previs, Dr.  
Dwight  
Matthews.

## Updates from the Microarray Core Facility by Scott Tighe and Tim Hunter

Use of the Microarray Core Facility continues to grow and since the first samples received in May 2003, the facility has run 1360 genechips for 41 principle investigators from nine institutes for both



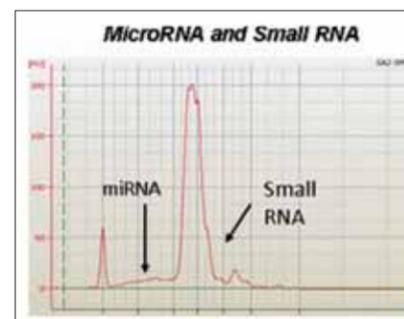
Pie chart showing types of GeneChips used since the beginning of the facility in May 2003.

global gene expression profiling and DNA mapping studies for single nucleotide polymorphisms [SNP], chromosomal copy number variation, and loss of heterozygosity [LOH].

Over the past several months, the facility has implemented several beneficial changes to GeneChip prices, methods, and types of GeneChips available through the facility. As of October 1st

the University has secured a Tier 4 pricing structure from Affymetrix which puts UVM at the highest discount available in the US for Affymetrix products. This translates to an approximate \$50 per GeneChip cost reduction. This, combined with the addition of the new Gene array 1.0 ST for human, mouse, and rat, now allows GeneChips to be purchased for a reasonable \$175 each from the previous \$300 U133a 2.0 GeneChip. Investigators who require the study of alternative splice variants in gene expression for human, mouse, and rat can utilize the Exon 1.0 ST arrays. These arrays contain the highest possible probe content of any gene expression array and interrogate nearly 1 million exon clusters representing 150,000 transcript variants. The resulting data for both Exon and Gene arrays may either be self-analyzed using the newly acquired Biotiques X-ray analysis software package or by the bioinformatics core.

New methods to prepare GeneChip hybridization targets from RNA include the newly adopted NuGEN Ovation system. This method is advantageous as it requires less starting RNA from the previous 2 ug to 50ng for standard gene expression analysis as well as enhanced



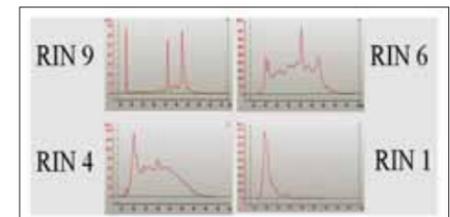
Profile of MicroRNA analyzed using the Agilent Bioanalyzer 2100.

sensitivity and signal to noise ratio. Although the new target synthesis method has been used on special LCM and FACS projects over the past 4 years, it is now fully implemented for routine analysis since September 2008. In addition to providing RNA assessment of total and mRNA, the facility is now offering the ability to analyze the quality

of small RNA's including microRNA using the Agilent Bioanalyzer 2100 as well as high sensitivity nucleic acid quantification with a new Qubit spectrofluorometer for lower recovery targets. Current research in the facility is focused on new synthesis strategies to enable gene expression profiling from partially degraded RNA applicable to 3' expression arrays, Gene arrays, and Exon arrays. This continues to be increasingly important as the need for analysis

of slightly degraded samples from fluorescently activated cell sorting [FACS], laser capture micro-dissection [LCM], formalin fixed paraffin embedded [FFPE], and unique non-replaceable tissues is required from investigators.

This study involves using a known reference RNA at four different degradation levels as determined by the Agilent Bioanalyzer's RNA Integrity Number (RIN) and subjecting them to five unique synthesis protocols. Each product will be hybridized to three types of Affymetrix GeneChips including standard 3' Expression arrays, Gene array 1.0 ST, and Exon 1.0 ST. Data from the study will be analyzed by the bioinformatics core and successful methods will be adopted and implemented in the facility as deemed appropriate. The results of the study will be presented as part of the VCC DNA Analysis User Educational Seminar series.



RNA quality scans of Human Brain Reference RNA used in degradation study

# VGN Members Attend NIH NCRR 2nd Biennial National IDeA Symposium of Biomedical Research Excellence (NISBRE)

by Janet Murray, PhD, VGN Outreach Coordinator

The National IDeA symposium (NISBRE) was held in August of 2008. This symposium was attended by COBRE and INBRE funded students and scientists from across the United States and Puerto Rico. UVM had a large presence at this meeting with attendees from our three COBRE funded grants (Vermont Lung Center COBRE, Neuroscience COBRE and the Vermont Center for Immunology and Infectious Diseases COBRE) and the INBRE program (Vermont Genetics Network). UVM's own Dr. Charles Irvin from the Vermont Lung Center was the program chair for this symposium.



*Dimitry Kremensov was awarded a Student Travel Award at the 2008 National IDeA Symposium.*

Many VGN members attended and participated in the national meeting, including the VGN program director Dr. Judith Van Houten. VGN sponsored the attendance of eight currently and previously funded graduate students, six of whom presented a poster on their research. Graduate student Dimitry Kremensov was recognized at the meeting. He competed for and was awarded a student travel award.

Posters were also presented by the Microarray core (Tim Hunter, Scott Tighe), the Proteomics core (Bin Deng) and the Outreach core (Janet Murray).

Tim Hunter and Jim Vincent were

members of a panel for a Core Service Breakout Session. This session was very well received with Barbara M. Alving, NCRR Director, in attendance as well as many other NCRR officials. The discussion focused on sharing resources and developing infrastructure. The panel session has resulted in much excitement and further discussion being planned at other national meetings including a satellite meeting of the Network of IDeA Core Laboratories (NICL) at the ABRF (Association of Biomedical Resource Facilities) meeting in Memphis TN which will be held in February, 2009.

INBRE funded states have developed some unique facilities that could be shared among institutions to avoid duplicating effort. Bioinformatics cores have been developed in all the INBRE states. Each of these cores have experts focusing on unique aspects of bioinformatics and these tools and services may be shareable between cores as well.

The symposium was a great forum to see the types of research and infrastructure development happening in the 23 IDeA states and was a wonderful opportunity for those of us at UVM to feel very proud about what we have done at UVM, throughout Vermont and regionally.



RETURN SERVICE REQUESTED

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Burlington, Vermont 05405-0086

Vermont Genetics Network



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