

RESEARCH ASSOCIATESHIP PROGRAMS

The Postdoc

Autumn 2009

TABLE OF CONTENTS

NRC Exhibits..... 2

Human Genes Studied to Fight Broad-Spectrum Infections 3

Fenton-Driven Chemical Oxidation of MTBE-Spent GAC.....4

NRC Adviser Profile—Oran..... 5

Health Policy Fellowship Program.....6

NRC Staff Profiles.....7

USAMRIID Profile—Biggins..... 8

Emerging Technology Fall Programs.....9

Multidisciplinary Team Honored with FLC Award.....10

NRC Participating Agencies..... 11

USMA Davies Fellow—Peterson.....12

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES



Dr. Fran Ligler, NRC Adviser at NRL

Dr. Fran Ligler, NRC Adviser

Two Naval Research Laboratory employees, Dr. Fran Ligler and Mr. Chris Dwyer, have been named finalists for the 2009 Service to America Medals. These medals are presented annually by the Partnership for Public Service. The Service to American Medals are presented in eight categories: Call to Service Medal, Career Achievement Medal, Citizen Services Medal, Environment Medal, Homeland Security Medal, Justice and Law Enforcement Medal, National Security and International Affairs Medal, Science and Technology Medal.

Dr. Fran Ligler, Senior Scientist for Biosensors and Biomaterials, and NRC Adviser, was honored for having “Invented and developed various sensor systems that are diagnosing infectious diseases in developing countries, monitoring the air for biothreat agents and supporting clean-up efforts at Superfund sites.” She was selected a finalist for the Career Achievement Medal which recognizes significant accomplishments throughout a lifetime of achievement in public service.

The 30 finalists come from more than 20 federal agencies including the Departments of Commerce, Defense, Health and Human Services, Housing and Urban Development, Interior, Justice, Treasury and Veteran Affairs; the Central Intelligence Agency, Government Accountability Office, Environmental Protection Agency, Federal Deposit Insurance Corporation, General Services Administration, Social Security Administration, U.S. Agency for International Development and NASA. From the 30 finalists, nine medal winners will be chosen, including the Federal Employee of the Year. These winners are announced in September 2009.

Ray Gamble, Ph.D., Director, Research Associateship Programs
Suzanne White, Manager, Newsletter

The NRC Research Associateship Programs *Newsletter* is published quarterly to highlight research and activities of NRC Associates and Advisers who participate in the programs with our many agencies and laboratories. All of our *Newsletters* are posted on our Web site Newsletter Web page in full-color PDFs. In addition, the full-color, high-gloss version is printed by the National Academy Press (NAP); and bulk orders of 10 or more are available from our office for distribution at agencies/laboratories, scientific meetings, NRC meetings, staff visits, and site visits. We accept articles throughout the year-- press releases, profiles, 1 – 2 page articles already written and/or submitted to other publications, images, photos, notices, awards, honors, etc.

Send all inquiries and submissions to Suzanne White
(swhite@nas.edu)

PROGRAM PROMOTION 2009

Associateship Programs Staff members will be available at an Exhibit Booth.

American Institute of Aeronautics & Astronautics	AIAA	01/05/09-01/08/09	Orlando	FL
Joint Mathematics Meetings	JMM	01/05/09-01/08/09	Washington	DC
American Meteorological Society	AMS	01/11/09-01/15/09	Phoenix	AZ
Johns Hopkins University Science & Tech Career Fair	JHU-STCF	02/11/09-02/11/09	Baltimore	MD
Nat'l Soc of Black Physicists/Nat'l Soc of Hispanic Physicists	NSBP/NSHP	02/11/09-02/14/09	Nashville	TN
Nat'l Org of Black Chemists & Chemical Engineers	NOBCCHE	03/13/09-03/18/09	St. Louis	MO
Society of Toxicology	SOT	03/15/09-03/19/09	Baltimore	MD
American Physical Society	APS	03/16/09-03/20/09	Pittsburgh	PA
Experimental Biology	EB	03/19/09-03/21/09	New Orleans	LA
American Chemical Society (Spring)	ACS -- Spring	03/23/09-03/25/09	Salt Lake City	UT
National Society of Black Engineers	NSBE	03/26/09-03/28/09	Las Vegas	NV
American Society for Microbiology	ASM	05/17/09-05/21/09	Philadelphia	PA
American Association of Petroleum Geologists	AAPG	06/07/09-06/10/09	Denver	CO
American Chemical Society (Fall)	ACS -- Fall	08/17/09-08/19/09	Washington	DC
Science & Engineering Alliance/Student Tech Conference	SEA/STC	Oct	local	local
Advancement of Chicanos & Native Americans in Science	SACNAS	10/08/09-10/11/09	Dallas	TX
Society of Mexican American Engineers & Scientists	MAES	Oct	TBD	TBD
Hispanic Assn of Colleges & Universities	HACU	10/31/09-11/02/09	Orlando	FL
Florida Education Fund/McKnight Fellows Meeting	FEF/McKnight	TBD	Tampa	FL
American Indian Science & Engineering Society	AISES	TBD	TBD	TBD
Annual Biomedical Research Conference for Minority Students	ABRCMS	11/04/09-11/07/09	Phoenix	AZ
American Society for Tropical Medicine & Hygiene	ASTMH	11/18/09-11/22/09	Washington	DC
Materials Research Society	MRS	12/01/09-12/03/09	Boston	MA
American Society for Cell Biology	ASCB	12/05/09-12/09/09	San Diego	CA
American Geophysical Union	AGU	12/14/09-12/18/09	San Francisco	CA

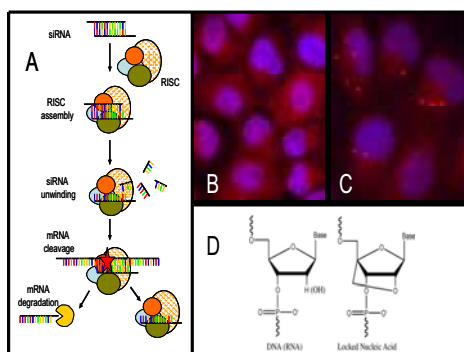
The ability to modulate gene expression, such as techniques used in gene therapy, holds great promise as a way to treat diseases and chronic conditions by manipulating the expression of specific genes. One way is to 'silence' its expression. Over the past decade, siRNA technology (or, short-interfering RNA) has emerged that allows the silencing of specific genes in mammalian cells. Gene silencing within a cell is activated by the presence of a double-stranded siRNA binding to an RNA-Induced Binding Complex of proteins (RISC) within the cell (Figure 1A). Following this binding, one of the two siRNA strands is unwound and cleaved, allowing free complementary messenger RNA (mRNA) to bind to the remaining siRNA strand on the complex. The hybridized strand of mRNA is then targeted for degradation, thus 'silencing' the expression of a gene whose complementary sequence matches the siRNA.

Scientists at the Naval Research Laboratory are working on ways to deliver, image, and manipulate siRNA gene silencing in human cells in order to both detect and improve the host cell response to an infection. **Drs. Kelly Robertson and Chris Bradburne are NRC Associates at the NRL** doing research on this project (originally initiated by Dr. Dzung Thach, former NRC Associate currently at NIH) under the current principal investigator Dr. Eddie Chang. Dr. Bradburne is focused on studying the infection of a human epithelial cell line with *Francisella tularensis* LVS (Figure 1B, C), the non-virulent vaccine strain of a disease with bioterrorism implications. The infection characterization is being done in the lab of Dr. Monique van Hoek at George Mason University, along with her graduate student Annie Verhoeven. Professor van Hoek's laboratory has generated a comprehensive microarray analysis of the host cell genes that are the most highly expressed during the infection. Selectively using these genes as targets, Chris and Kelly hope to be able to silence the expression of each gene using a high-throughput system, and to monitor the outcome of silencing on the infection using flow cytometry. The goal of the research is to find

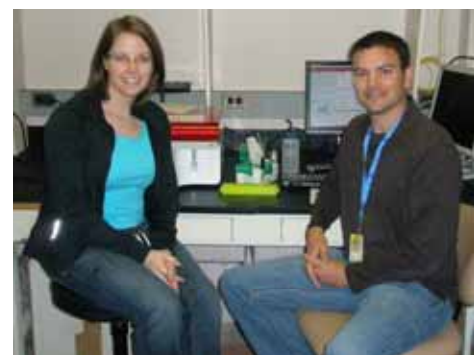
NRC Associates work on methods to manipulate and detect gene expression in human cells to fight broad-spectrum infections.

leads to new targets for the treatment of bacterial infections, targets that do not rely on the bacterium itself.

One of the challenges of gene silencing technology is the delivery, or 'transfection' of the siRNA into the nucleus of the target cell. To address this, Chris and Kelly are using a new, highly efficient methodology called nucleofection, and have optimized this delivery methodology to achieve efficient silencing of target genes. Their work is detailed in a recent paper: Bradburne, Robertson, and Thach, "Assessment of methods and analysis of outcomes for comprehensive optimization of nucleofection" *Genetic Vaccines and Therapy* 2009, 7:6 (11 May 2009).



In order to increase the sensitivity and resolution of the flow-FISH technique, Kelly is utilizing probes containing a nucleic acid analog: locked nucleic acid (LNA). LNA has a higher affinity for nucleic acids than traditional DNA and RNA probes and allows an increase in hybridization temperature (lowering background noise) and a decrease in hybridization time thereby enhancing the specificity of the technique. In LNA nucleotides, the ribose sugar is constrained by a methylene bridge between 2'-oxygen and 4'-carbon resulting in an N-type (3-endo) conformation (Figure 1D). Various flow-FISH conditions using LNA probes have been tested and optimized to give efficient and sensi-



Drs. Kelly Robertson and Chris Bradburne, NRC Associates

Figure 1. A.) Mechanism of siRNA gene silencing in a cell. B.) Control uninfected, and C.) *F. tularensis* LVS-infected, human A-549 epithelial cells. A-549 cells are stained with a nucleic acid stain (DAPI), which stains the nucleus blue, followed by immunostaining with a primary antibody against *F. tularensis* LVS, and then a secondary antibody with a fluorescent red (AlexaFluor) tag. The bacteria in (C.) appear as bright red dots outside of the nucleus in the cytoplasm. D.) Schematic of a nucleic acid backbone (left), and a 'Locked'-Nucleic Acid backbone (right).

Along with silencing the gene expression, new methods are needed to determine how much of any given RNA transcript is present in a cell. Kelly is developing ways to detect and quantify low numbers of mRNA in individual cells using flow cytometry combined with fluorescence in-situ hybridization (FISH). FISH is a powerful technique that allows the in-situ detection of specific nucleic acid sequences while flow cytometry provides the potential for the analysis of low-copy nucleic acid sequences with high accuracy and speed. These combined techniques involve the hybridization of complementary, fluorescently labeled nucleic acid probes to the sequence of interest.

tive detection of specific mRNA species. This work has resulted in a paper: Robertson and Thach. "LNA flow-FISH: A flow cytometry – fluorescence in situ hybridization method to detect messenger RNA using locked nucleic acid probes" *Analytical Biochemistry* 390 (2) 109-114. This represents the first step toward using this technique to monitor the effect of the bacterial infections on cellular mRNA. Currently, the investigators are working to develop a methodology using LNA-flow-FISH to quantify host cell RNA and even viral RNA in a host cell from an infecting virus. Future plans include developing Bayesian network models of bacterial infection for fast development of therapeutics.

Fenton-Driven Regeneration of MTBE-Spent Granular Activated Carbon – Effects of Particle Size and Iron Amendment Procedures

Authors and Affiliations: Scott G. Huling⁽¹⁾, Eunsung Kan⁽²⁾, Caleb Wingo⁽³⁾

Fenton-driven regeneration of spent granular activated carbon (GAC) can be used to regenerate organic contaminant-spent GAC. In this study, the effects of GAC particle size (>2 mm to <0.35 mm) and acid pre-treatment of GAC on Fenton-driven oxidation of methyl *tert*-butyl ether (MTBE)-spent GAC were evaluated. Iron (Fe) was amended to the GAC using two methods: (1) untreated – where GAC was amended with a concentrated solution of ferrous sulfate, and (2) acid pre-treatment – where GAC was amended with acid followed by sequential applications of a dilute ferrous sulfate solution. Subsequently, MTBE was amended to the GAC, followed by oxidative treatments with H₂O₂. H₂O₂ reaction and MTBE oxidation were inversely correlated with GAC particle size and were attributed to shorter intraparticle diffusion transport distances for both H₂O₂ and MTBE. Image analysis of the GAC cross-sections (i.e., prepared thin sections) revealed that the Fe amended to the GAC extended to the center of the GAC particles. Fe accumulated at higher levels on the periphery of the untreated GAC but Fe dispersal was more uniform in the acid pre-treated GAC. In the acid pre-treated GAC, conditions for MTBE oxidation were favorable and greater levels of MTBE oxidation were measured for all particle size fractions tested. Modeling and critical analysis of H₂O₂ diffusive transport and reaction indicated limited H₂O₂ penetration into large GAC particles which contributed to a decline in MTBE removal. Residual MTBE remaining on the GAC limited the quantity of MTBE that could be re-adsorbed, but no reduction in MTBE sorption capacity resulted from oxidative treatments.

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Effects of Temperature and Acidic Pre-Treatment on Fenton-Driven Oxidation of MTBE-Spent Granular Activated Carbon

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The effects of temperature and acidic pre-treatment on Fenton-driven chemical oxidation of methyl *tert*-butyl ether (MTBE)-spent granular activated carbon (GAC) were investigated. Limiting factors in MTBE removal in GAC include the heterogeneous distribution of amended Fe, and slow intraparticle diffusive transport of MTBE and hydrogen peroxide (H₂O₂) into the “reactive zone”. Acid pre-treatment of GAC before Fe amendment altered the surface chemistry of the GAC, lowered the pH point of zero charge, and resulted in greater penetration and more uniform distribution of Fe in GAC. This led to a condition where Fe, MTBE, and H₂O₂ co-existed

over a larger volume of the GAC contributing to greater MTBE oxidation and removal. H₂O₂ reaction and MTBE removal in GAC increased with temperature. Modeling H₂O₂ transport and reaction in GAC indicated that H₂O₂ penetration was inversely proportional with temperature and tortuosity, and occurred over a larger fraction of the total volume of small GAC particles (0.3 mm diameter) relative to large particles (1.2 mm diameter). Acidic pre-treatment of GAC, Fe-amendment, elevated reaction temperature, and use of small GAC particles are operational parameters that improve Fenton-driven oxidation of MTBE in GAC.

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Dr. Elaine Oran, Senior Scientist, and NRC Adviser, for Reactive Flow Physics at the Naval Research Laboratory has been named a fellow of the Society for Industrial and Applied Mathematics (SIAM). Dr. Oran is recognized *"...for contributions to the simulation of reactive flows and other complex processes."*

SIAM is an international community of over 12,000 individual members, including applied and computational mathematicians, computer scientists, and other scientists and engineers. The 2009 fellow is the inaugural class of fellows for SIAM.

As a Senior Scientist at NRL, Dr. Oran's current research includes development of numerical algorithms and the use of these algorithms in computerized models that describe a wide variety of complex fluid systems. These systems are used in research and applications ranging from microfluidics to astrophysics and cosmology. Her current work applies these simulation methods to design micron-sized devices for use in biosensors; design of micro-propulsion systems for use in air vehicles, space and planetary exploration; hazard reduction for the storage and handling of energetic materials including hydrogen fuels; basic physics of combustion processes involving flames; detonations and the transition to denotations; and explosions of supernovae.

Dr. Oran is responsible for programs sponsored by NRL, the Office of Naval Research (ONR), the National Aero-

NRC Adviser Profile-Oran

nautics and Space Administration (NASA), and the Japanese research agency, NEDO. A substantial part of her work is involved with facilitating collaborations among government, academia, and industry. In addition to her work with ONR, Dr. Oran is a consultant to corporations and governmental agencies. Currently, she is at the center of a new collaboration among the U.S. government and a number of universities and private industries to design safe storage for hydrogen fuels. In addition to her professional responsibilities, Dr. Oran has extensively supported the Women in Science and Engineering (WISE) group within NRL.

Dr. Oran has authored and co-authored hundreds of technical papers and articles, as well as the highly regarded textbook, *Numerical Simulation of Reactive Flow*, which is considered to be the most widely used text on the subject.

Dr. Oran received her A.B. degree in physics and chemistry from Bryn Mawr College; her M.Ph. degree in physics; and her Ph.D. degree in solid state physics and statistical mechanics. For her seminal work, Dr. Oran has received a number of distinguished honors and awards:

- ◆ Presidential Rank Award for Distinguished Senior Professional
- ◆ Presidential Rank Award for Meritorious Senior Professional
- ◆ The Zeldovich Gold Medal of the Combustion Institute
- ◆ Fellow of the American Physical Society
- ◆ Fellow of the American Institute of Aeronautics and Astronautics (AIAA)
- ◆ Election to the Hall of Fame of Women in Technology International
- ◆ Achievement Award from the Society of Women Engineers
- ◆ Adjunct and visiting professorships at the University of Michigan and Leeds University (UK)
- ◆ Honorary Professor of Physics, University of Wales
- ◆ Election to the National Academy of Engineering
- ◆ Selection as Editor-in-Chief of the AIAA Journal, the flagship journal of AIAA
- ◆ Distinguished honorary degree, Docteur Honoris Causa, from the Ecole Centrale de Lyon.
- ◆ Delivery of the Louis Clark Vanuxem Public Lecture at Princeton University
- ◆ Achievement Award from the Society of Women Engineers

S.T.E.M.* Talent 2009: A Postdoctoral Conference and Career Fair for Postdocs in the Capital Region Wednesday, July 22, 2009 (8:00 a.m. to 4 p.m.)

The fourth annual Postdoc Conference and Career Fair for career options for scientists and engineers in the greater Washington, D.C., area was held at the Bethesda North Marriott/Montgomery County Maryland Conference Center on Wednesday, July 22, 2009. The conference featured career track panels (entrepreneurial; corporate/industry; non-profit organizations, government agencies, and other), résumé review, and a job fair staffed by representatives of local hiring companies and organizations.

The organizers also offered a preparation for this event on Wednesday afternoon at the Rockville, Maryland, Public Library. It was a two-part workshop to help market oneself to potential employers and create a winning résumé. In the first half of the event, Brianna Blaser, Ph.D., from *ScienceCareers* spoke about Networking and Career Fairs. She covered the basics of good networking and how to employ those tactics in a career fair setting. In the second half of the event, Lori Conlan, Ph.D. from NIH spoke about CVs, résumés, and job searching. Lori covered the differences between résumés and CVs, when to use each, and how to write and edit these documents to attract employers more effectively. She also spoke about strategies that can help locate job opportunities.

Questions? outreach@sciencecareers.org

Visit www.postdocconference.org

10 health professionals selected for competitive Health Policy Fellowship Program

The Institute of Medicine (IOM) and Robert Wood Johnson Foundation (RWJF) selected ten health professionals to spend a year working in congressional offices with key responsibilities for health legislation and programs as RWJF Health Policy Fellows for 2009-2010.

In addition to assisting policymakers with health-related legislative and policy issues, the fellows will engage in discussions and seminars on developing health policy, and participate in leadership development programs. The experience will enrich their understanding of public-policy practices and increase their skills in participating in that process once they return to their home institutions and communities. After their stay in Washington, D.C., fellows may carry out additional activities with their grant funds to continue their development as health policy leaders.

"This is an exciting year for the fellows to be in Washington, D.C.," said Marie Mich-nich, DrPH, director of the RWJF Health Policy Fellows Program at IOM. "Health care and health reform are high on the legislative agenda. The broad range of professional expertise these talented fellows will bring to D.C coupled with their in depth immersion in the political process this year will give the fellows significant opportunities to contribute to shaping today's health care debate."

The 2009-2010 fellows are:

ANDREW BINDMAN, M.D., professor of medicine, health policy, epidemiology, and biostatistics, University of California, San Francisco

GUSTAVO CRUZ, D.M.D., M.P.H., associate professor and director of public health and health promotion, department of epidemiology and health promotion, College of Dentistry, New York University, New York City

SHELDON FIELDS, PH.D., R.N., FNP-BC, associate professor, School of Nursing, University of Rochester Medical Center, Rochester, N.Y.

DAVID KELLER, M.D., clinical associate professor of pediatrics, University of Massachusetts Medical School, Webster, Mass.

JANET LEIGH, B.D.S., D.M.D., chair, department of oral medicine and radiology, and director, LSUHSC HIV Outpatient Dental Clinic, School of Dentistry, Louisiana State University, New Orleans

GREGG MARGOLIS, PH.D., NREMT-P, M.S., associate director, National Registry of Emergency Medical Technicians, Columbus

MARK SCHWARTZ, M.D., associate professor of medicine, School of Medicine, New York University, New York City

BARBARA TOBIAS, M.D., associate professor and director, predoctoral medical education, department of family medicine, College of Medicine, University of Cincinnati, Cincinnati, Ohio

MARGARET WILMOTH, PH.D., R.N., professor, department of adult health nursing, College of Health and Human Services, University of North Carolina, Charlotte

SHALE WONG, M.D., M.S.P.H., associate professor of pediatrics, School of Medicine, University of Colorado, Aurora, Colo.

Established in 1973 at IOM with a grant from RWJF, the fellowship program develops the abilities of outstanding midcareer health professionals in academic and community-based settings by providing them with the ability to work along side those shaping U.S. health care policy. More than 200 fellows from universities, colleges, and community health organizations across the nation have participated in this program.

The fellowship program is funded by the Robert Wood Johnson Foundation with direction and technical assistance provided by the Institute of Medicine of the National Academies. Additional information about the RWJF Health Policy Fellows can be found at www.healthpolicyfellows.org. The fellows represent a wide range of academic and community-based experience.

Established in 1970 under the charter of the National Academy of Sciences, the Institute of Medicine provides independent, objective, evidence-based advice to policymakers, health professionals, the private sector, and the public. The National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council make up the National Academies.

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NRC Staff Profiles

Visa Officer, Peggy Wilson has worked in the National Acad-



Peggy Wilson, NRC Visa Officer

emies Fellowship Program for 21 years, and has managed the Academies' J-1 visa program for the last nine years. She evaluates applicants for NRC Research Associateship awards for eligibility, sponsors J-1 exchange visitor visas, and provides immigration information and guidance to Associates, Laboratory Program

Representatives and Advisers, and NRC staff. She also works with other National Academies units with their visiting researchers. In addition to training in immigration regulations, she holds a B.A. in psychology from the University of Texas at Austin. She has lived and worked in Europe and Asia, and has traveled through 22 countries. An early trip through China, Mongolia and Siberia was interrupted by a flash flood in the Gobi Desert, but two days later Peggy and fellow passengers were rescued by bi-plane on its Monday run to Ulaanbaatar, the capital. Peggy has been fascinated by foreign cultures since the age of four, when her grandfather gave her a small purse from his visit to Guatemala. She is interested in international history and political development, and is dedicated to the benefits of international educational and cultural exchange. Outside the office, Peggy enjoys spending time with friends, cooking, hiking, and singing in a symphonic chorus in Washington.

Dannetta Winstead has been a Senior Accounting/Financial Assistant for the Associate Programs since 1999. In that role, she processes travel authorization for all Research Associates: she ensures that information on travel authorization forms is accurate, complete, and signed by all parties. She also processes travel advance requests and audits travel expense reports, making sure all



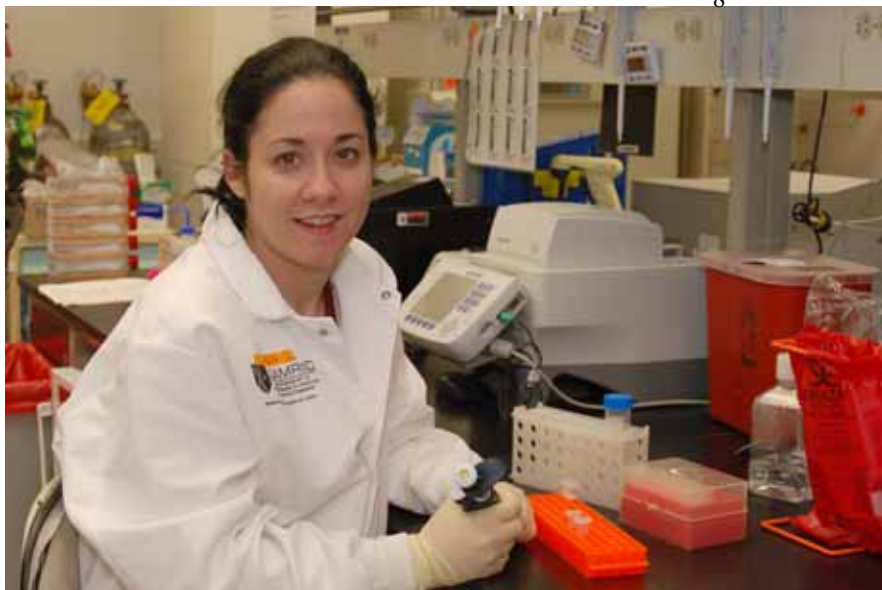
Dannetta Winstead, NRC Sr. Accounting/Financial Assistant

Jason Thornhill is a Senior Program Coordinator for the NRC Research Associateship Program and works with the NRC programs at the following federal laboratories: AFRRRI, AMRMC, CBD, FDA/CDRH, NIH, NIH/NIST, NIOSH, NMRC/NHRC, NOAA and NIOSH/MLP. He has been a Program Coordinator for two years, but worked within the NRC Program for several years previous to his current position. He attended the University of Maryland-College Park, and enjoys playing and watching basketball in his free time.



Jason Thornhill, NRC Sr. Program Coordinator

are completed and signed, and all necessary receipts are attached. She addresses numerous telephone and email inquiries regarding travel and summarizes travel activity in a variety of reports. Career oriented, Dannetta is pursuing a B.S. from University of Maryland University College in Business Law. In her spare time (!), she likes to read, spend time with her family, travel, watch sports, go to movies, and meet new people.



Dr. Julia Biggins, NRC Associate at U.S. Army Medical Research Institute of Infectious Diseases

Dr. Julia Biggins, NRC Associate at the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) in Frederick, Maryland, is working with Dr. Gene Garrard Olinger, Jr. Her research is focused on understanding virulence factors associated with highly pathogenic viral hemorrhagic fever (VHF) viruses, specifically filoviruses such as Ebola and Marburg viruses. VHF viruses are highly contagious and lethal viruses for which an approved protective vaccine, cure, or treatment currently does not exist.

Outbreaks and single cases of filovirus infection continue to occur sporadically in Africa and Southeast Asia. Imported cases have occurred from either travelers from these areas or from imported non-human primates and their infected tissues. Often the fatality of these viruses can exceed 90% in infected individuals. Although previous outbreaks have been geographically restricted, filoviruses pose a serious public health threat as the number of outbreaks has been steadily rising in the past decade.

Development of medical countermeasures is needed to help those in areas affected by natural virus outbreaks. Equally concerning is the possibility that filoviruses could be employed as biological threat agents by terrorist groups or rogue nations against civilians or military forces. Medical counter-

measures must be developed for these individuals as well. Due to the unpredictable and sporadic nature of filovirus outbreaks in human populations, rapid and effective vaccines and antiviral drug treatments would form the foundation for protection from these otherwise unpreventable and untreatable diseases.

Because of the high lethality and lack of approved therapeutic treatments, work on these agents occurs in biosafety level 4 (BSL-4) laboratories. USAMRIID is the only Department of Defense laboratory that has such facilities. In these special laboratories, the virus is contained by specially engineered laboratory facilities and personnel are protected by special encapsulating suits that are provided filtered air through umbilical cord feed hoses (see photo). For greater than 20 years, USAMRIID has been on the cutting edge of science to better understand these viruses and other biological pathogens to develop effective vaccines and therapeutic countermeasures.

Dr. Biggins' research is an essential extension of these on-going efforts. Dr. Biggins accepted an NRC post-doctoral fellowship in March 2007 to elucidate the role of host cell components that are hijacked by the virus during budding from an infected cell. During the past 2 years, she has demonstrated that a significant portion of the virus particle's outer membrane is

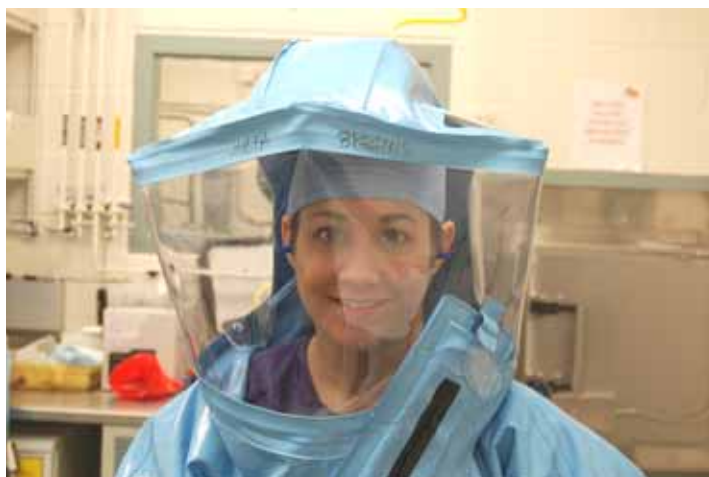
USAMRIID Profile: Biggins

studded with a variety of host membrane proteins. Other enveloped human viruses, such as HIV, have been shown to incorporate host proteins into their viral membranes. Unwittingly, these proteins often modulate virion infectivity by protecting it from the host's immune responses or by making the virus more adherent to uninfected host cells.

Interestingly, Dr. Biggins has been the first to demonstrate that antibody responses directed against host proteins found within the particle membrane can target the virus for destruction. She has demonstrated this through both in vitro experiments and by using a rodent model of disease for Ebola viruses. From these preliminary findings, Dr. Biggins was awarded an USAMRIID-In-House Laboratory Innovative Research grant to continue her research and to begin proteomic analysis of the virus particles generated in various cell types. The long term goal of her basic research is to further understand virus-host cell interactions and develop host-derived targets for therapies and second generation vaccines.

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National Academies Koshland Science Museum explores emerging technology in fall programs

Beginning in September, the Marian Koshland Science Museum is offering a slate of public programs that explores how the next generation of technologies will shape the study of climate change, exploration of the universe, surveillance of infectious diseases, and the creation of art through science. The schedule of events follows:

EMERGING SCIENCE OF CLIMATE CHANGE

Thursday, Sept. 17, 6:30 p.m. - 8 p.m.

Admission: \$7; \$5 for students

Over the last few decades, scientists have been amassing data demonstrating that the Earth's surface temperature is rising at an alarming rate. As the science of climate change advances, researchers are developing increasingly sophisticated technologies to predict how the Earth's climate might evolve in the future. Join JAY GULLEDGE, senior scientist at the Pew Center on Global Climate Change and nonresident senior fellow at the Center for a New American Security; and MICHAEL WINTON, oceanographer at the National Oceanic and Atmospheric Administration's Geophysical Fluid Dynamics Laboratory, as they discuss today's powerful new climate modeling technologies and predictions of climate change over the next two centuries.

FROM THE BIG BANG TO THE JAMES WEBB TELESCOPE

Thursday, Oct. 8, 6:30 p.m. - 8 p.m.

Admission: \$7; \$5 for students

The origin of the universe has been a source of fascination for centuries. In recent years, advanced technologies such as the Hubble Space Telescope and the Cosmic Background Explorer satellite have done much to illuminate how the universe began -- providing proof of the big-bang theory in the process. The planned launch in 2014 of the James Webb Space Telescope, an orbiting infrared observatory, is expected to extend the discoveries and capabilities of the Hubble telescope and provide closer examination of the beginning of time. Join JOHN C. MATHER, senior astrophysicist in the Observational Cosmology Laboratory at NASA's Goddard Space Flight Center and a member of the National Academy of Sciences, as he provides a brief history of the universe and discusses NASA's plans for its newest telescope. The program coincides with World Space Week, being held Oct. 4-10.

INFECTIOUS DISEASE IN THE AGE OF GOOGLE

Thursday, Oct. 22, 6:30 p.m. - 8 p.m.

Admission: \$7; \$5 for students

As the H1N1 influenza virus continues to spread throughout the world, tracking exactly where outbreaks occur will be critical for efforts to contain the pandemic. At this hands-on program, learn how technologies such as the Internet and mobile phones are revolutionizing the way diseases are tracked, contained, and treated. Speakers include AMY L. SONRICKER, project coordinator for the HealthMap project at Children's Hospital of Boston; and PAUL MEYER, co-founder of Voxiva, a company that provides mobile information solutions for disease surveillance, health management, and patient care.

SCIENCE CAFÉ: UNCOVERING THE UNSEEN

Thursday, Nov. 5, 6:30 p.m. - 8 p.m.

Admission: \$10 (includes Happy Hour, ID required); \$5 (discussion only)

From creating a pipe organ out of soda bottles to designing four-dimensional objects, NASA's DAN GOODS is intent on exploring the intersections between art and science. Installations he created as "visual strategist" at NASA's Jet Propulsion Laboratory include "The Hidden Light," about finding planets around other stars, and "The Big Playground," in which a hole drilled into a grain of sand shows the scale of the universe. Currently, Goods is part of a team commissioned to create a data-driven sculpture as the centerpiece artwork for a new extension at the San Jose airport. Join Goods as he shares examples of his work and leads an informal discussion about integrating art and science.

Tickets and additional information for all Koshland events are available through the museum at 202-334-1201 or www.koshland-science-museum.org; advance registration is suggested. Reporters who wish to cover these programs should pre-register.

COST FREE!

Date: Saturday, September 12, 2009

COST FREE!

Location: F Street NW

Time: 11:00 AM to 5:00 PM

Come join the fun and learn about germs and alternative energy at Arts on Foot 2009, the 17th annual celebration of the arts in Downtown's Penn Quarter!

Stop by the Koshland Science Museum's tent for hands-on science activities exploring hydrogen powered fuel cells and infectious diseases.

Arts on Foot will take place in various locations in the downtown Washington area between 4th & 14th Streets, NW and Pennsylvania Avenue and L Street, NW.

Visitors to the Koshland Science Museum's tent will receive free admission to the museum during the Arts on Foot Festival, September 12, 2009. For more information about the festival and a schedule of events, please visit www.artsonfoot.org.

NRL/NRC multidisciplinary team honored with 2009 FLC Award

A research team from NRL has won a 2009 Federal Laboratory Consortium Award for their development and commercialization of a microbial pathogen identification assay. The team's Resequencing Pathogen Microarray (RPM) technology offers potential applications for powerful bio surveillance capability in the control of infectious disease.

This rapid diagnostic tool determines the genetic profiles of bacterial and viral pathogens in clinical samples like blood and nasal swabs. Genetic profiles are then scored for quality and used to identify the pathogens. The pathogen identities are then validated by comparison against online genetic databases of known pathogens.

The NRL-developed RPM technology offers several advances over similar technologies beyond its advantageous use of "raw" un-preprocessed clinical samples – a shorter timeframe (sameday results), simultaneous detection of hundreds of viral and bacterial pathogens in a single sample, including possible co-infecting pathogens, zero false positives, and definitive identification down to strain or serotype levels.

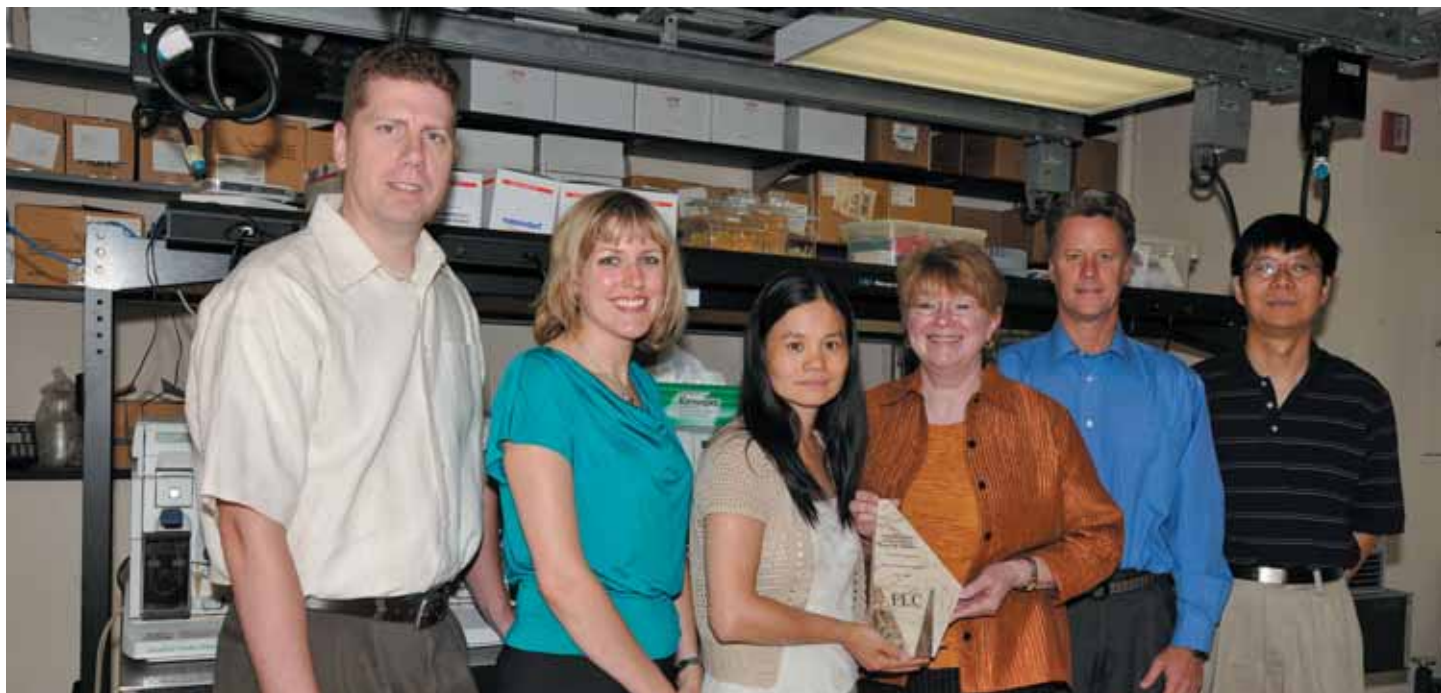
Bacterial/viral strain and serotype identification can be crucial in tracking rapidly mutating microorganisms or the alarming emergence of drug-resistant pathogens. Commercial applications could range from national security efforts like bio threat detection to screening foods for contamination and tracking the spread of avian flu. The transferred NRL technology, which is pending FDA approval for clinical diagnostic use, is expected to play a significant role in disease surveillance in the future. Any

success in identifying infectious disease, whether age-old diseases like tuberculosis or emerging diseases like SARS and swine influenza, will improve public health, lower health care costs, and reduce the social disruption caused by epidemics.

The NRL team is an interdisciplinary group of **NRC Advisers and Associates** that combines their expertise in biology, engineering, and computer science. **The team members being honored are Drs. David Stenger, Baochuan Lin, Anthony Malanoski, and Zheng Wang from NRL's Center for Biomolecular Science and Engineering, along with NRL retiree, Dr. Joel Schnur.**

In a four-month period of time, the NRL team successfully transferred their RPM technology to TessArae LLC of Potomac Falls, VA, a biotechnology firm that develops and markets genomics-based diagnostic products. The NRL researchers provided essential technical support and training to company personnel during and after the transfer process. NRL researchers also participated in the formal negotiations that took place in 2006 between NRL and the company for licensure of ten NRL patent-pending innovations and the concurrent CRADA agreement. Because the CRADA is ongoing, the research team will continue its fast-track development of the technology, thus expanding the RPM technology's commercial applications.

TessArae products already available to customers include diagnostic kits that screen for upper respiratory pathogens like the avian influenza virus, hemorrhagic fever viruses like the Ebola virus, and infectious agents that might be used in bioterrorism. TessArae is currently developing similar RPM assays for food borne pathogens, nosocomial pathogens, and equine and porcine infectious diseases.



Dr. Anthony Malanoski, Ms. Amanda Horansky-McKinney (Technology Transfer Office), Dr. Baochuan Lin, Dr. Rita Manak (Technology Transfer Office), Dr. David Stenger, and Dr. Zheng Wang. The researchers, Drs. Malanoski, Lin, Stenger, and Wang, are all from the Center for Biomolecular Science and Engineering.

Agencies / Laboratories Participating in the NRC Research Associateship Programs

Air Force Research Laboratory (AFRL)

Armed Forces Radiobiology Research Institute (AFRRI)

Chemical and Biological Defense (CBD)

FAA/Civil Aerospace Medical Institute (CAMI)

Federal Highway Administration/Turner-Fairbank Highway Research Center (FHWA)

Institute for Water Resources (IWR)

National Energy Technology Laboratory (NETL)

National Energy Technology Laboratory Methane Hydrates Fellowship Program (NETL/MHFP)

National Institute for Occupational Safety and Health (NIOSH)

National Institute for Occupational Safety and Health Associateship Faculty Fellowship Program (NIOSH/FFP)

National Institute for Occupational Safety and Health Master's Level Program (NIOSH/MLP)

National Institute of Standards and Technology (NIST)

National Institutes of Health (NIH)

National Institutes of Health (National Institute of Biomedical Imaging and Bioengineering) (NIH/NIBIB) /

National Institute of Standards and Technology (NIH [NIBIB]/NIST)

National Oceanic and Atmospheric Administration (NOAA)

Naval Medical Research Center/Naval Health Research Center (NMRC/NHRC)

Naval Postgraduate School (NPS)

Naval Research Laboratory (NRL)

Navy Marine Mammal Program (MMP)

Army Aviation and Missile Research, Development, and Engineering Center (AMRDEC)

US Army Edgewood Chemical Biological Center (ECBC)

US Army Medical Research and Materiel Command (AMRMC)

US Army Natick Soldier Research, Development and Engineering Center (NSRDEC)

US Army Research Laboratory (ARL)

US Army Research Office (ARO)

US Army Research, Development & Engineering Command, Night Vision & Electronic Sensors Directorate (NVESD)

US Army Res., Dev., and Engr Command/Armament Res., Dev., and Engr Center (RDECOM/ARDEC)

US Environmental Protection Agency (EPA)

US Environmental Protection Agency Associateship Faculty Fellowship Program (EPA/FFP)

US Marine Mammal Commission (MMC)

US Military Academy/US Army Research Laboratory (USMA/ARL)

2009 SCHEDULE

February Review

Submission deadline - February 1
 Transcripts and Reference Reports deadline - February 15
 The Board meets March 9—10
 Agencies will be notified within two weeks

May Review

Submission deadline - May 1
 Transcripts and Reference Reports deadline - May 15
 The Board meets on June 19
 Agencies will be notified within two weeks

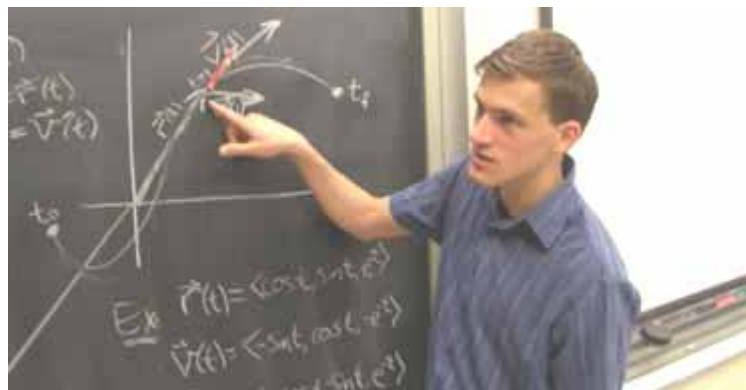
August Review

Submission deadline - August 1
 Transcripts and Reference Reports deadline - August 15
 The Board meets on October 16
 Agencies will be notified within two weeks

November Review

Submission deadline - November 1
 Transcripts and Reference Reports deadline - November 15
 The Board meets on January 8, 2010
 Agencies will be notified within two weeks

USMA/ARL Davies Fellow/NRC Associate, Elisha Peterson and his advisor BG(Ret) Chris Arney presented a paper entitled "Cooperation in Social Networks: Communication, Trust, and Selflessness" at the Army Science Conference in Orlando, FL in December 2008. The paper was selected Best Paper in the Advanced Modeling & Simulation Category and received the conference's Bronze Award (among 845 abstracts submitted). This work featured Peterson's research on the nature of cooperation in pursuit-evasion games and introduced the novel concept of subset team games, the focus of his fellowship research for the past two years. As a teaching post-doc at the United State Military Academy, Peterson has had the opportunity to involve several cadets in his research. The results of work with USMA cadets Andrew Plucker '08 and Lucas Gebhart '09 was highlighted in the paper.



NRC Web Board or Facebook?

You tell us.

Check out our Web Board (www.NRC-RAP.org)

Check out our Facebook (Research Associateship Programs).

And you tell us ...which is more accommodating, more comprehensive, more user friendly, easier. Both are open to the public. Both allow discussion threads on various topics and topics of your choosing. Both allow postings of meetings, career fairs, poster sessions, colloquia, social events, happy hours, awards, science fairs, sports events, community service, etc.

Check out our Web Board and our Facebook, and you tell us.