The R&T Connection
A Publication of the U.S. Army Edgewood Chemical Biological Center
Research & Technology Directorate

2017 Winter in Review

A Walk in Their Shoes
ECBC employees gain hands-on experience through DTRA sponsored-program

Also inside:

BG Maria Gervais Guest Speaker at APG Women’s History Month Celebration
Newest Generation of Big Mac glovebox is Bigger and Better
Collaboration and Coffee Kicks off ECBC’s 100th Anniversary
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Cover page picture: ECBC scientists and other participants ready to spring into action in a simulated nuclear explosion exercise for DTRA-sponsored program.

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Have an item for the R&T Connection? Whether it’s a technical accomplishment, an upcoming speech, an employee award or any other news story, please share it with R&T Communications Officer Kelly Outram at Kelly.A.Outram.ctr@mail.mil or 410.436.2262.

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2017 Winter in Review

ECBC Team,

On March 15, Brigadier General Maria Gervais, Deputy Commanding General, Combined Arms Center - Training., U.S. Army Combined Arms Center and Fort Leavenworth, gave the keynote address at the Annual Women’s History Month Day of Observance at the Aberdeen Proving Ground, which I had the opportunity to host on behalf of our ECBC Director, Dr. Joseph Corriveau.

The theme of the event was “Women Blazing the Trail,” and following the event, BG Gervais hosted a luncheon with some members of the ECBC workforce, where she shared personal stories about her lessons learned and triumphs during her career. One of her personal values deeply resonated with me, which was “Mission First, People Always.” A phrase so simple, yet so powerful, is something I strive to achieve and demonstrate every day as Director of Research and Technology. Over the course of my career, I learned if you take care of the people, the mission will take care of itself.

ECBC’s mission to protect the world from the brutal effects of weapons of mass destruction is vital to ensure national safety and international peace. However, the mission cannot be achieved without the hard work and dedication each of you contribute. How you feel, and most importantly, how your leaders and supervisors make you feel, is critical to your success and ultimately the safety and security of our nation. No matter what the mission or the task might be, we, as leaders, must make decisions to inspire and prepare our workforce, because without you we can’t succeed.

This issue of the R&T Connection focuses on the people who are working on critical projects to support our Armed Forces. For example, on page 10 “A Walk in their Shoes” discusses the DTRA-led ‘Scientist in the Foxhole’ Program where ECBC scientists live a week in the life of servicemen and women to learn more about their needs and conditions. On page 14, read about how Dr. Steve Harvey (Winner of the 2017 Matta Award), Mr. Greg Peterson and Mr. Doug Sommerville’s commitment to the U.S. Army and passion for science led to them being nominated for the prestigious Joseph E. Matta Award for Excellence in Research. Finally, on page 8 learn about the patents, highlights, and technical reports published during the first quarter of this calendar year.

I am proud of the work our scientists, technicians and engineers achieve every day to evolve science and keep our nation safe. Our mission all starts with you bringing your best self to the job. Our nation depends on it.

Respectfully,

Eric L. Moore, Ph.D.
# ECBC CENTENNIAL CELEBRATION

## CALENDAR OF EVENTS

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“Growing up, I could never imagine being pegged to a certain career field and not able to pursue my dreams just because I’m a woman,” said Brig. Gen. Maria Gervais, deputy commanding general of the U.S. Army Combined Arms Center, speaking at the 27th annual Team APG celebration of women’s history month. “I owe that to the women who blazed the trail before us, persevering and enduring to make us equal.”

The event was held at the Mallette Training Facility on March 15 and it was also part of the Edgewood Chemical Biological Center’s (ECBC) 100th anniversary celebration. It was attended by employees and service members from ECBC and other Aberdeen Proving Ground commands.

It also included an actress performing as U.S. Navy computer science pioneer Adm. Grace Murray Hopper to share her life story.

Gervais also praised the U.S. Army as a progressive force for advancing opportunities for women. She said this includes hiring women to fly newly manufactured airplanes to Army installations within the continental United States during World War II, opening all non-combat and non-hazardous military occupational specialties to women in 1972, and graduating the first co-educational class from the U.S. Military Academy in 1976. Women continue to make historic firsts in the Army, such as the first two women to graduate from the Army’s Ranger School in 2015 and the first woman to be assigned to an Army special operations unit in December.

Reflecting on her life path, she said she was the seventh of nine children and enrolled in ROTC at Landers College in her home state of South Carolina because her collegiate basketball career had been cut short by a knee injury. “When I told my father I had enrolled in the Army he was proud, but my mother cried,” she recalled. “I only found out years later she cried because she was proud, too. She later told me she knew I could become anything I want because I was in the Army.”

She concluded by telling the members of the audience, “We must continue to strive and to fight against discrimination and stereotyping so future generations of women are treated fairly. And, when you have an opportunity, step forward and take it.”
Her next stop was an Edgewood Chemical Biological Center leadership luncheon held in the ECBC headquarters building. She told the attendees, mid-career employees from across the Center, as a career-long chemical officer and former commandant of the U.S. Army Chemical, Biological, Radiological and Nuclear School, she has a special place in her heart for ECBC because she deeply appreciates ECBC’s mission of protecting the force from chemical and biological threats.

“ECBC is a hidden gem of talent and capability; you are the quiet professionals who make it all work,” she added. She also gave the group leadership advice. “The path to leadership is really about your attitude and how you approach things. Always treat others with dignity and respect. Always ask yourself, ‘What can I do for my unit?’ and opportunities will present themselves.”

Her final stop was a tour of ECBC’s Advanced CBRNE Training Facility where a team of trainers instructs members of the armed forces, special customers, and interagency partners how to respond to chemical and biological threats encountered in the field. Gervais said she admired the realism of the threat scenarios the team is able to create. “I wish I had this more advanced CBRNE training with all these training aids when I was a young officer,” she said. “This advanced training serves as excellent reinforcement for our CBRNE fundamentals, and provides a platform for increased repetitions in a safe environment which allows for continuous feedback resulting in improved learning, decision making, and proficiency.”

Gervais is no stranger to APG. She was the commander of the U.S. Army Environmental Center from 2008 to 2010, before it moved to San Antonio, Texas. She said when she arrived at APG the night before and looked at it again, “I thought to myself, ‘If these old buildings could talk, the things they would have to say.’” As of 2017, would be 100 years of stories, many of them about women’s advancement.
A unique and one-of-a-kind glove box facility, dubbed the Big Mac II, has been crafted and created at the Edgewood Chemical Biological Center (ECBC) to be used for the testing and safe-handling of extremely hazardous chemicals. Its expanded internal 1,000 liter exposure chamber allows for full immersion aerosol testing under a range of environmental conditions and dominates in size compared to its first generation counterpart, the Big Mac I. It fills a much needed requirement to test larger footprint items such as detectors.
The development and fabrication of the Big Mac II was funded by both the Product Director Cross Commodity Advanced Threats and Test Infrastructure (PDCAT-TI) and the Defense Threat Reduction Agency (DTRA). The ECBC Toxicology and Obscurants Division of Research and Technology Directorate has partnered with ECBC’s Engineering Directorate on the operation and use of the facility located in the McNamara Life Sciences Building.

“The goal for the McNamara glove box facilities is to provide the necessary toxicological and performance data to help maintain the Warfighter in a readiness state. Whatever may be encountered on the battlefield, the Soldiers need to know the nature of the hazard they face and the means necessary to protect themselves,” said John Carpin, Ph.D., of the ECBC Operational Toxicology Branch.

The newest generation includes environmental controls with the capability to change the temperature over a range of -20 to 50 degrees Celsius and humidity conditions from 5 to 95 percent within the internal test chamber. The environmental conditioning system, which is a separate unit designed and fabricated by ECBC staff, was integrated with the Big Mac II after its installation.

This bigger and better glove box facility, as described by David McCaskey of the ECBC Operational Toxicology Branch, required plywood mockup fixtures to be built and transported through the building to ensure the actual glove box components could be transported into the lab for assembly.

“One new thing for us was the primary zone, one of the three sections of the Glove Box. It is so large a fire retardant room had to be built within the lab first so this section could be welded, ground, and polished right on-site,” said McCaskey. Operation of such a large piece of equipment is challenging in and of itself. Due to its height and length, four people are needed when conducting tests in the Big Mac II.

The Big Mac II is a culmination of 19 years of work and experience; the first glove box became operational in 2001. “We have been on a learning curve in the creation of these facilities and our goal has always been to work in as safe a manner as possible, and now we have the capability of doing full immersion aerosol testing in the Big Mac II,” said Carpin.

With the necessary approvals in place, the Big Mac II is currently going “hot” and the toxicology team is gearing up to officially start agent exposure testing in spring 2017.
**R&T Tech Reports**

- **CR-160** - Absorption Obscurants in the Ultraviolet (UV) Spectral Region, Robert Carestia, Jeff Hale, Sharhabael Alyones, Michael Granado, Charles Bruce
- **TR-1439** - Development and Optimization of a Bacillus anthracis Singleplex Immunoassay on a Multiplexing Platform, Bruce T. Voelker, Bryan A. Rivers, Janet L. Betters
- **TR-1435** - Evaluation of Commercial-off-the-Shelf Materials for the Preservation of Gram-Positive Vegetative Cells, Daniel Angelini, Jacquelyn Harris, Lisa Smith, Vipin Rastogi, Kristy Williams, Laura Burton, Pooya Rastogi
- **TR-1429** - Contact Transfer of VX from Contaminated Grass onto Army Combat Uniform, Mark V. Haley, Ronald T. Checkai, Michael Simini, Richard J. Lawrence, Michael W. Busch
- **TR-1432** - Failure Analysis of the Carl Gustav 4698 Screening Smoke Cartridge, Joseph A. Domanico
- **TR-1430** - Pyrotechnically Generated and Disseminated Aerosol for Bioagent Defeat, Aimee L. Polk, Michael F. Kauzlarich, Nino L. Bonavito, Lisa S. Smith, Vipin K. Rastogi
- **TR-1431** - Effect of Strontium Nitrate on Extremely Slow Strobe Compositions, Aimee L. Polk, Michael F. Kauzlarich
- **TR-1371** - Unmanned Aerial Vehicle Non-Line-of-Sight Chemical Detection Final Report, Mark A. Colgan
- **TR-1420** - Methodology Development of Background Aerosols for Chemical Detector Testing, Jana Kesavan, Jerold Bottiger
- **TR-1427** - Comparative Human Health and Environmental Toxicology Review of Seven Candidate Obscurant Smokes for Replacement of M83 Grenade. Authors: Michael Simini, Ronald T. Checkai, Nancy A. Chester, Robert Kristovich, Mark V. Haley
- **TR-1433** - Pinene Adsorption and Breakthrough Studies with Tube-Scale Breather Flow. Authors: John J. Mahle, Gregory W. Peterson, James J. Buchanan, Matthew Browe, Eric Bruni, Bryan Schindler
- **TR-1437** - Median Lethal Doses Associated with Intravenous Exposure to the Optically Pure Enantiomers of VX in Guinea Pigs. Authors: Linnzi K. Wright, Jeffry S. Forster, Ruth W. Moretz, Bernardita I. Gaviola, Julie A. Renner, Robert L. Kristovich

**News Shorts**

- Dr. Eric Moore, ECBC Director of Research and Technology Chaired a Chemical, Biological, and Radiological (CBR) Memorandum of Understanding (MOU) Assess Working Group (AWG) Meeting
- Members of The CBR Filteration Branch Briefed The Joint Science and Technology Office (JSTO) Chemical Biological Technology (CBT) Division on The Ongoing Multifunctional Materials for Force Protection Program
- ECBC Scientists Participated in American Society for Microbiology (ASM) Biothreats: Research, Response and Policy Meeting
- ECBC’s Dr. Robert Kristovich Recently Hosted The Annual Meeting of the Civilian Coordination Consortium
- ECBC Scientist, Jeffrey McGuire, Serves as Mentor For Stevenson University Masters Candidate
- Dr. Brent Mantooth, Dr. Mark Varady, Dr. Brian Bennett, Mr. Russell Bartholomew and Mr. Jon Hogan, Attended and Participated at the Test and Evaluation Capabilities and Methodologies Integrated Process Team (TECMIPT) Meeting
- Dr. Robert Kristovich and Dr. Kyle Glover, Discussed Alternative Methods to Animal Research at the National Institute of Health
- ECBC’s Dr. Vipin Rastogi, to Share Ebola Research Discoveries at Singapore Symposium
- ECBC’s Dr. Peter Emanuel and Dr. Amy Flinch from Army Research Laboratory (ARL) Plan on Collaborations with UK Synthetic Biologists
- Dr. Augustus W. Fountain III, Attended the NATO Science and Technology Board (STB) Plans and Programs Workshop
- ECBC BioSensors Branch Met with Program Managers for the Department of Homeland Security (DHS) Science and Technology Directorate (S&T)
- ECBC Meets with Field Identification of Biological Warfare Agents (FIBWA) Program Lead Training Coordinator For Discussions on Instituting the Program Abroad
- Dr. Jason Guicheteau Gave an Invited Lecture to Cadets From the Chemistry, Biology, and Physics Departments at the Virginia Military Institute (VMI)
- ECBC’s Dr. Nicole Rosenzweig Attended the Integrated Wearable Solutions for Dismounted Warfighters Wearable Workshop
- Mr. David Caretti and Mr. Douglas Wilke of the ECBC Respiratory Protection Branch Were Awarded the U.S. Army Achievement Medal for Civilian Service For Support to the Joint Project Manager for Protection During the Contamination Mitigation Demonstration Planning and Execution
- Three BioChemistry Scientists, Dr. Matthew Lux, Ms. Vanessa Funk, and Dr. Jorge Maciel, Attended a Three-Day Technical Planning Meeting at Air Force Research Labs
- ECBC’s Mr. Raphael Moon and Mr. Kevin Hung Conducted Acceptance Evaluation of the Standoff Covert/Eyesafe Explosives Detection System (SCEEDS)
- BioTesting Branch Microbiologist James Sorenson, Along With Members of West Desert Test Center’s Special Programs Division, Conducted an Advanced Chemical Biological Techniques, Tactics and Procedures (TTP) Development Course for the 773rd Civil Support Team (CST) Weapons of Mass Destruction (WMD)
A human brain microphysiological system derived from induced pluripotent stem cells to study neurological diseases and toxicity
Source: Alternatives to Animal Experimentation (ALTEX)
DOI: 10.14573/altex.1609122
Publication Date: 24 November 2016
FULL TEXT: http://www.altex.ch/resources/Pamies2_of1_corr.pdf

Poly(3,4-ethylenedioxythiophene) (PEDOT) infused TiO2 nanofibers: the role of hole transport layer in photocatalytic degradation of phenazopyridine as a pharmaceutical contaminant
Jared B. DeCoste ECBC, Jian Liu, Danielle L. McCarthy, Linyue Tong, Michael J. Cowan, John M. Kinsley, Laura Sonnenberg, Kenneth H. Skorenko, Steven M. Boyer, William E. Bernier and Wayne E. Jones, Jr
Source: RSC Advances
DOI: 10.1039/C6RA22797J
Publication Date: 01 Dec 2015
FULL TEXT: http://pubs.rsc.org/en/content/articlelanding/2016/ra/c6ra22797j#!divAbstract

Anticonvulsant efficacy of antihistamine cyproheptadine in rats exposed to the chemical warfare nerve agent soman
Jennifer L. Winkler, Jacob W. Skovira, Robert K. Kan
Source: Neuro Toxicology
DOI: 10.1016/j.neuro.2016.12.004
Publication Date: 14 Dec 2016
FULL TEXT: http://dx.doi.org/10.1016/j.neuro.2016.12.004

In Situ Probes of Capture and Decomposition of Chemical Warfare Agent Simulants by Zr-based Metal Organic Frameworks
Anna M. Plonka, Qi Wang, Wesley O. Gordon, Alex Balboa (ECBC), Diego Troya, Weiwei Guo, Conor H Sharp, Sanjaya D. Senanayake, John R. Morris, Craig L Hill, and Anatoly I Frenkel
Source: Journal of American Chemical Society, DOI: 10.1021/jacs.6b11373
Publication Date: 30 Dec 2016
FULL TEXT: http://pubs.acs.org/doi/pdf/10.1021/jacs.6b11373

Secretome analysis of diarrhea-inducing strains of Escherichia coli
Raja Sekhar Nirujogi, Babylakshmi Muthusamy, Min-Sik Kim, Gajanan J. Sathe, P.T.V. Lakshmi, Olga N. Kovbasnjuk, T.S. Keshava Prasad, Mary Wade (ECBC), and Rabin E. Jabbour (ECBC)
Source: Proteomics Journal
DOI: 10.1002/pmc.201600299
Publication Date: 9 January 2017

Facile Synthesis and Direct Activation of Zirconium Based Metal-Organic Frameworks from Acetone
Ann M. Plonka, Stephanie E. Marzen, and Jared B. DeCoste (ECBC)
Source: Industrial and Engineering Chemistry Research/ ACS Publications
DOI: 10.1021/acs.iecr.6b04361
Publication Date: 20 January 2017
FULL TEXT: http://pubs.acs.org/doi/abs/10.1021/acs.iecr.6b04361?journalCode=iecred

Ferrihydrite deposited on cotton textiles as protection media against chemical warfare agent surrogate (2-choroethyl ethyl sulfide)
Rajiv Wallace, Dimitrios A. Giannakoudakis, Marc Florent, Christopher Karwacki (ECBC) and Teresa J Bandosz
Source: Journal of Materials Chemistry A
DOI: 10.1039/C6TA09548H
Publication Date: 01 Feb 2017
FULL TEXT: http://pubs.rsc.org/en/content/articlelanding/2017/ta/c6ta09548h#!divAbstract

Effects of organophosphates on the regulation of mesenchymal stem cell proliferation and differentiation: MSCs and organophosphates
Amber M. Prugh (ECBC), Stephanie D. Cole, Trevor Giaros (ECBC), and Daniel J. Angelini (ECBC)
Source: Chemico-Biological Interactions
DOI: 10.1016/j.cbi.2017.01.020
Publication Date: 4 February 2017
FULL TEXT: http://dx.doi.org/10.1016/j.cbi.2017.01.020

Filtration of Chlorine and Hydrogen Chloride Gas by Engineered UiO-66-NH2 Metal-Organic Framework
Matthew A. Browe (ECBC), Amedeo Napolitano, Jared B. DeCoste (ECBC), and Gregory W. Peterson (ECBC)
Source: Journal of Hazardous Materials
DOI: 10.1016/j.jhazmat.2017.02.026
Publication Date: 14 February 2017

Patents

Patent #9,500,568 - Inflatable Inlet for Aerosol Sampling, Daniel G. Wise

Patent #9,500,591- Plastic Particle Detector for Detection of Biological Aerosol and Other Fluorescent Materials, Aime P. Goad, David W. Sickenberger, Fiona E. Narayanan, Richard J. Kreis, Lester D. Strauch III, Dr. Gary K. Kilper, Dr. Jerry B. Cabalo, Harold S. Wylie, Anna Wong

Patent #9,617,526- OPAA FLF – A Mutant Enzyme with Increased Catalytic Efficiency on VX, Dr. Steve Harvey and Dr. Mark Guelta
Scientists and engineers from the U.S. Army Edgewood Chemical Biological Center (ECBC) an opportunity to step out of the laboratory, and into the shoes of an American warfighter through the “Scientists in the Foxhole” program. Created by the Defense Threat Reduction Agency (DTRA) J9CB-OE Joint Science and Technology Office (JSTO) in 2015, it is designed to put selected scientists working across DTRA’s countering weapons of mass destruction (CWMD) enterprise into relevant environments to experience current baseline of operational capabilities and conditions.

JSTO works with the services – Navy, Army, Air Force and Marines – to create an immersive, multi-day program; in 2016, 10 ECBC employees participated. The goal of “Scientists in the Foxhole” is to foster innovation and forward thinking and to stimulate research efforts to benefit the warfighter within the next 5 to 15 years. Each of these programs are unique to the service, and give scientists and engineers the chance to live a week in the life of Sailor, Soldier, and Marine. Ultimately with an end state of understanding how their work in the laboratory translates onto the field.

“A Scientists at Sea”
Amanda Schenning, a chemist with the ECBC Decontamination Sciences Branch, participated in “Scientists at Sea,” which was joint hosted by the U.S. Navy and Marine Corp at Camp Pendleton, Calif. Schenning, along with ECBC scientists, Roderick Fry, Christine Pan, Carilyn Torruellas-Pagan, Ph.D., and Nicole Vincelli were members of a 10-person team from across the CWMD community, who were selected to gain first-hand knowledge of the activities and needs of Sailors and Marines in support of both protective and humanitarian aid missions.

Schenning has a dual role at ECBC where she assists in the development and evaluation of new decontaminant formulations or processes and scanning electron microscopy support, which is used to aid in studying the decontamination of military relevant materials, such as paint, steel, rubber, etc.

“I haven’t had any hands on experience quite like this, so the opportunity was really something I was looking for,” said Schenning. “This program has been beneficial, because it puts a face to the name of the people who are risking their lives and depending on us to come up with the best thing to help them.”

The team observed evaluation exercises of the Navy/Marine Corp. Forward Deployed Preventive Medicine Unit (FDPMU), and toured three ships, USS Boxer, USNS Bob Hope and USNS Mercy. The FDPMU is a mobile, modular unit with 13-16 highly trained personnel who perform field laboratory analyses of chemical, biological, radiological, nuclear (CBRN), and infectious disease agents. The USS Boxer and USNS Mercy are fully equipped hospital ships with currently fielded chemical and biological defensive capabilities. This event enabled researchers to communicate directly with members of the FDPMU and the CBRN response teams. “The message I got from them was for lighter, smaller, and portable equipment. For example, they would prefer a disposable test strip with capability to be carried in a pocket to a sample source, rather than carry a sample back to the FDPMU site for processing on a more sophisticated piece of equipment,” said Schenning.

The ECBC scientists were also able to observe the personnel decontamination procedures aboard the ships and gained knowledge related to the capabilities, limitations, and possible improvements made to fielded equipment. “Being a part of this program gave me an
incredible amount of self-awareness when comparing all the conveniences I have in the lab, to the men and women performing the mission with minimal supplies and options,” said Schenning. “I didn’t have the big picture for the people who are actually out there doing the job before attending the event so I was able to gain a lot of insight to bring back with me to ECBC.”

“Scientists in the Sand”

Greg Peterson, a chemical engineer with the ECBC Chemical Biological Radiological Filtration Branch, participated in the “Scientists in the Sand” event, sponsored by the U.S. Marine Corp at Fort Gillem, Ga. Peterson said he was able to gain a better understanding of how personal protection equipment (PPE) was used by attending situational training exercise lanes with the U.S. Marine Corps Chemical Biological Incident Response Force Decontamination, Search and Extraction, and Identification and Detection Platoon units.

“I work with filters, masks and PPE, but seeing decontamination, detection and other areas gave me a better outlook,” said Peterson. “My first project when I joined ECBC was working on a program evaluating military and commercial off the shelf filters at high flow rates for CBIRF. Although I didn’t understand the implications at the time, now it is apparent why this was necessary.”

The team followed the Marines as they conducted training in: rescue operations, deploying decontamination stations and equipment, combing areas for evidence and marking radioactive hazards. Participants were also able to tour a mobile lab used for analysis. The event allowed for scientists to participate in an actual simulated nuclear explosion exercise by donning full PPE and following the bomb disposal unit as they cleared a building and disarmed several devices.

“This event gave me a real sense of appreciation of what the Warfighter goes through and the difficulty of performing with full PPE on, but most importantly it showcased their professionalism and effectiveness,” said Peterson.

Currently, ECBC is proposing several efforts to JSTO to solve and enhance the ability and reduce the burden of Marines. Based on first-hand experience, feedback and a follow up briefing to the CBIRF commander with JSTO, Peterson brought back with him a focus to increase comfort in next generation systems. “The Marines had on higher tier protective equipment and used self-contained breathing apparatuses, which are incredibly burdensome, most especially in Georgia during the summer. This gave me some perspective on making better equipment to complete their mission,” said Peterson.

“Scientists on the Flight Line”

ECBC scientists Dan Angelini, Ph.D., from the BioDefense Branch, Dave Caretti, of the Respiratory Protection Branch, and Julie Renner, of the Molecular Toxicology Branch, attended the U.S. Air Force-sponsored, “Scientist on the Flight Line” in 2016. During the training, warfighters demonstrated chemical detectors and how equipment is operated through battlefield scenarios. Scientists donned mission-oriented protective posture gear and experienced the added weight and restricted field of view. Angelini said he felt this experience with Scientist on the Flight Line inspired him to work harder for his customers, the warfighters.

“It drives me to make sure we do things right, because there are real people at the end of all of this who have to deal with the information and equipment we give them,” said Angelini.

What to Expect in 2017

The continued success of the DTRA JSTO program is helping scientists to gain a different perspective and obtain refreshed and refocused ideas in innovation and development of solutions for the warfighter. The series continues with “Scientist on the Flight Line,” with the U.S. Air Force’s Air Combat Command 823 Red Horse squadron at Tyndall Air Force Base in Panama City, Fla followed by “Scientists in the Sand” in Perry, Ga.

In addition to Sea, Sand and Flight Line, there is also “Scientists in the Silos” to support the U.S. Army. In the future, DTRA JSTO hopes to introduce the Coast Guard into the program. Also, there may be a reverse program, called “Boots in the Laboratory,” bringing Warfighters into labs to see how scientists and engineers support them every day. Other opportunities are currently in the planning process and an invitation flyer will be sent to the chemical biological defense program science and technology enterprise.”
The first Lightning Lecture for the new year kicked off with a full house and hot topics by Matthew Lux, Ph.D., and Michael Feasel. Lux discussed his intriguing work in synthetic biology, this year’s Grand Challenge topic and much buzzed about research based on Department of Defense interest. He presented his study, from the Applied Research and Experimentation Partner program, on cell free and paper based synthetic biology. His goal is to develop synthetic biology genetic tools, particularly looking at nontraditional organisms, work on cell free application and research cell based applications in the environment. Lux has also leveraged work with the volatile organic compound kit by changing the ticket, to a wax based paper with cell free systems embedded.

Feasel captured the audience on his attention grabbing work about pharmacology of opioid analgesics, which has stemmed from numerous other follow-on studies and is also his Ph.D. dissertation topic. His study involves the identification of metabolites in carfentanil, an ultra-potent synthetic opioid. There is no other such previous research conducted and little is known about the deadly substance. Carfentanil is 10,000 times more potent than morphine and 1,000 times more potent than prescription drug fentanyl. The success of the Lightning Lecture series has been able to show the wealth of knowledge and talent ECBC has to offer. The next lecture is planned for May with two new speakers to offer a quick bolt of knowledge for colleagues to enjoy. ❧
Fully Covered

ECBC respiratory protection experts partner with NSRDEC to provide additional protection for warfighters

The U.S. Army Edgewood Chemical Biological Center (ECBC) has partnered with the U.S. Army Natick Soldier Research, Development and Engineering Center (NSRDEC), Battelle Memorial Institute, and Priority Designs, to develop an improved neck-up personal protective equipment (PPE) concept. The new concept will improve the historically challenging interface where a warfighter’s protective mask and hood meet, in order to provide greater protection from exposure to chemical and biological warfare agents. The development of this concept supports NSRDC’s Integrated Protective Fabric System program, and is sponsored by the Defense Threat Reduction Agency. The new design offers significant protection capability for the improvement of aerosol protection when paired with the hood.

ECBC, NSRDEC, Priority Design and Battelle, developed a second skin sits over the top of the M50 mask respirator. The prototype offers many enhancements such as an added ridge and interface for the hood. In addition to the second skin, the team has developed several prototypes for an upgraded hood can work in tangent with the M50 second skin. The second skin needs to be properly integrated with hoods, which are a key part of a warfighter’s PPE. Hoods are designed to provide chemical agent liquid splash and aerosol protection over the Warfighters head and upper shoulders. When worn with the protective suit, the hood offers complete coverage from exposure. The team down-selected the hood prototypes to three, through their own human factors analyses and discussions with warfighters.

The prototype hoods and second skin recently completed aerosol system testing at Research Triangle Park, N.C. “What we are seeing through all of the rigorous testing is a noteworthy proof of concept aerosol protection improvement with a projected equivalent time to don the gear compared with the current mask and hood,” said Dan Barker, ECBC project lead for second skin.

This project is currently in the research stage, and has been in development for only 18 months. “Collaborative research efforts between laboratories are key as PPE item research and development occurs across disparate labs.”

A mock-up of a proposed second skin concept to work with the current generation gas mask.

M50: current generation gas mask

‘Second Skin’ prototype
I was really honored to be considered in the company of fellow nominees Greg Peterson and Douglas Sommerville, who both have tremendous accomplishments. That alone would have been more than enough for me. Someone went to a lot of trouble to put those nominations together and I really appreciate it.

When do you consider yourself a success?

Some days you’re the windshield, some days you’re the bug - I definitely experience both! A lot of efforts in the lab don’t go the way you plan, but I’ve been fortunate to have met a lot of smart, capable people both at ECBC and at other institutions.

We’ve worked together on a number of projects and some of them bore fruit. Then if you can put your results together in a reasonably coherent story you probably have a shot at publishing or patenting it, which is pretty rewarding.

What work have you that done has generated the most interest and inspiration for you in your career?

In the 1990s, we were working on the Alternative Technologies Program trying to develop alternatives to incineration for disposing of the chemical weapons stockpile. It was an amazing experience, working directly with the engineers designing the plant, meeting with the citizens groups at public meetings and
reporting to a committee of the National Research Council. More recently we’ve been working, with some success, to develop enzymatic antidotes to nerve agent poisoning. Either of those projects might typically be once-in-a-lifetime opportunities, but I already got to live it twice.

What work have you done has generated the most interest and motivation for you in your career?

My work in developing human toxicity estimates for both chemical warfare agents and toxic industrial chemicals have generated the most outside interest and personal motivation. I have enjoyed delving into the history-reviewing the historical data, evaluating how previous estimates were developed, interesting stories behind the numbers, etc. Also, there has been several related topics that have generated interest: the overall suitability of the toxic load model for modeling inhalation exposures and how to translate human toxicity estimates from a healthy subpopulation to general population basis (and vice-versa).

I can answer this a couple of ways. First and foremost, I like science. I like figuring out how materials work. I like finding new uses for materials in places other people haven’t looked. And I simply like making new materials. I am also very cognizant of the role our organization plays in supporting the warfighter, and the fact they are putting their lives on the line inspires me to try and get them the best material and equipment possible.

I am also fortunate to conduct research spanning from fundamental to very applied, such as testing and evaluation. And I emphasize the team aspect of that statement - a lot of people are responsible for these successes. The nature of the work our Branch does, has allowed me to get a good understanding on what it takes not only to invent a new technology, but to transition it from JSTO to JPEO, and eventually the field. The variety of this work means that it keeps me interested. I’m very seldom bored at work. When I get bored with the fundamental research, I can go tackle an applied problem, like designing a new filter.

What is your overall goal as you continue to move forward in your career?

Right now I am focused on getting my Ph.D in Materials Science at the University of Delaware, but doing so to enhance the work I do at ECBC and bring us new capabilities and partnerships. Eventually, I hope to use this to get to the next level. For me, that level, and a career goal, is an ST or leadership position. But really, I am happy doing research in the lab while also directly supporting the warfighter.
ECBC’s sixth Coffee with Colleagues poster session was held on Jan. 11 at the Chemical Demilitarization Training Facility at the Edgewood Area of Aberdeen Proving Ground, MD. Approximately 350 people attended, including the ECBC civilian workforce, contractors and partners. The showcase, normally held annually in December, was delayed until January to lead off the festivities for this year’s 100th anniversary celebration of ECBC.

“This is the initial event of the 100th anniversary and I can’t think of any better way to start it than with this competition,” said Peter Emanuel, Ph.D., senior technologist for Bioengineering at ECBC and founder of Coffee With Colleagues. “We’ve gone from being an arsenal to a research and development center and this event is the best example we have to demonstrate how we’ve evolved as an organization.”

The event provides various teams within ECBC an opportunity to show their work on major projects from the previous year. Attendees filtered through the aisles viewing the 140 posters on display, some brought in actual technologies to display, interacting with the team members who stood by their projects. A separate, secure room contained posters from classified and sensitive projects.

“I’m delighted when we’re able to hold events like this,” said ECBC Director Joseph Corriveau, Ph.D. “It brings out not only the best of ECBC but shows the great work we do to others across the center as well as other stakeholders. It’s an opportunity for people to get out of their labs and shops, meet people from across the center and collaborate. It’s like a celebration.”

Winners were selected in seven categories: Chemistry, Biology, Physical Sciences, Design, Operations, Classified and People’s Choice.

“I looked at all the wonderful posters and I was thinking, ‘I’m glad I’m not a judge,’” said ECBC Research and Technology Director Eric Moore, Ph.D., before announcing winners in the Biology and Physical Sciences categories. “There’s so much excellent work on display.”

Bob Kristovich, Ph.D., chief of the Molecular Toxicology Branch at ECBC, who managed the classified entries in the showcase, concurred. “We had a very robust session this year and the judges emphasized the extremely hard time they had making a decision this year,” among the 19 entries, he said.

Initially, Coffee with Colleagues began as an event for one division within ECBC, then grew to two divisions, but at the last showcase in December 2015, the program was expanded to include the entire center. “It’s gotten better and better as we expanded beyond biosciences to research and technology to the entire center,” said Augustus Fountain, Ph.D., senior technologist for chemistry. An early supporter of Coffee With Colleagues, Fountain lauded the expanded awards program. “This event shows the intellectual capital of our entire organization. You can see why we’re proud to be a part of ECBC.”

ECBC Engineering Director Michael Abaie thanked Emanuel and his team for putting the program together and led the audience in a round of applause for them as well as for the individual contributors who produced the posters. “It’s an incredible amount of work,” he said, before announcing the winner in the Design category.

“I’m totally overwhelmed by this,” said Mary Peck in accepting her Edgy award for the winning Design poster. Peck, a specialist in the Packaging Branch of the Engineering Directorate, thanked not only her colleagues who worked on the project featured in her poster but also her colleagues throughout the organization. “Thanks to all of you who took time to explain your posters to me,” she said. “I’m very appreciative of the work you do.”

Tim Blades, director of operations for the Directorate of Program Integration and head of the CBARR business unit accepted the Edgy for the Operations category in the winning team’s absence. Blades also presented the People’s Choice Award, which was voted on by attendees who filled out ballots at the event.

As people were congratulating the winners after the awards ceremony, Corriveau reflected on the overall meaning of the program and his organization. “This is one of the first major events this year for the 100th anniversary of ECBC, but I look at it as the kickoff to the next 100 years” he said. “Just think, 100 years ago, we were concerned with how to protect soldiers in the trenches. Here we are, 100 years later, and we’re working on innovative technological solutions for the warfighter, to meet the national security needs of our citizens and our great Nation.”

The winners from the 2017 ECBC Coffee with Colleagues event