The R&T Connection Newsletter

A Publication for the Research and Technology Directorate

Summer 2011

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R&T Connection

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 Mia Scharper at mia.d.scharper.ctr@mail.mil or 410.436.2262.

Message from the Director

The ECBC leadership team met recently to discuss and prioritize the Center's four strategic goals. It took a matter of seconds for us to vote. We were unanimous in our belief that taking care of our people was our absolute priority. I want to assure you that the R&T directorate office has placed its people first. We are very appreciative of all that you're doing to advance our national security mission.

Here, by the way, are all four of the Center's strategic goals:

- Grow and develop the workforce to ensure the continued health of the organization.
- Create success for the warfighter and CBRNE clients by delivering consistent customer service.
- Evolve biological defense capabilities to better serve the nation's needs against an expanding biological threat.
- Grow chemical defense capabilities to better serve the nation's needs against an expanding chemical threat.

Again, thank you for your hard work, your dedication and your engagement. Your contributions help protect our soldiers and defend our homeland.

R&T Climate Survey

Thank you to all who participated in the R&T climate survey I sent to government staff in June. The goal of the survey was to take a pulse check of the directorate, to identify what's working well and what could use some attention.

I was pleased to learn that 66 people responded to the survey; that's approximately one-quarter of our staff, an excellent response rate. While most responses were favorable, the open field question at the end of the survey did reveal some areas that we will examine further, for example, perception of senior management engagement, the need to cascade information from top management down, and the physical working environment.

In the coming weeks, I will discuss the trends I saw with my leadership team and share the road ahead with everyone.

Again, thank you for your time and consideration.

Dr. Joseph L. Corriveau

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ECBC Chief Scientist Presents the History of Bioterrorism to a Rapt Audience

Did you know that bioterrorism is as old as the human race? Or that the 17th century children's rhyme "Ring Around the Rosy" memorializes the deadly pneumonic plaque?

Speaking to a rapt audience of more than 40 people, Harry Salem, Ph.D., presented a brief history of bioterrorism as part of a monthly Science Café sponsored by the Northeastern Maryland Technology Council (NMTC) on June 14.

Harry Salem, Ph.D., ECBC chief scientist for life sciences, presents "A Brief History of Bioterrorism" to a rapt audience.

Salem, chief scientist for life sciences at the U.S. Army Edgewood Chemical Biological Center (ECBC), provided an overview of bioterrorism from biblical times on, reviewing deadly agents such as anthrax, plague and smallpox. He discussed the irony of two men associated with the start of chemical-biological warfare – Fritz Haber and Frederick Banting – who also received the Nobel Prize for their humanitarian endeavors.

"The NMTC Science Cafés were honored to have Dr. Salem speak this month," said John Casner, NMTC executive director. "Dr. Salem drew the largest audience ever to our Café – over 40 people with standing room only. He riveted our attention on the reality of bioterrorism, from biblical times to its possible future specter."

"Dr. Salem's talk was very interesting and enlightening. He's a tremendously accomplished scientist," said Nina Lamba, Ph.D., president and chief scientist of CCL Biomedical, Inc., and chair of the NMTC's Science Café committee. "I didn't realize all the history of biowarfare, and I enjoyed his presentation very much."

Salem's research interests and experience include inhalation and general pharmacology and toxicology, and in-vitro and molecular toxicology. He is a visiting professor at Rutgers University and an active member of many professional societies. He is also a Fellow of the Academy of Toxicological Sciences. Salem has been a consultant to the Federal Bureau of Investigation, and to the Attorney General Janet Reno on matters of toxicology, and has testified before Congress on this subject. He has published 13 books including three volumes of the International Encyclopedia of Pharmacology and Therapeutics, as well as over 100 papers in scientific journals. He received a B.A. from the University of Western Ontario, a B.S. in Pharmacy from the University of Michigan, and an M.S. and Ph.D. in Pharmacology from the University of Toronto.

NMTC is Maryland's fast growing technology association with over 140 members and supporters providing member access to technology, industry, academic and government leaders in Pennsylvania, Delaware, Northeastern Maryland, the Greater Baltimore area and beyond.

"The Science Cafés are geared towards non-scientist adults, and attract everyone from high school students to professional retired scientists," Lamba said. "Everyone gets something out of it. For students, it's great to see an extension of their classroom learning. It's also an opportunity for them to understand more about career paths. The future workforce will be tackling challenges that may encompass chemistry, biology, electronics and mechanics. You need depth and breadth. Our Cafés bring those experts together."

"NMTC Science Cafes are a fun way for the general public to take in a short presentation on how science and technology affect our lives," said Casner.

For more information, visit http://www.nmtc.org/.

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ECBC Toxicologists Earn International Team Achievement Award

Three U.S. Army Edgewood Chemical Biological Center (ECBC) Research and Technology (R&T) directorate toxicologists were recognized April 21 at the Scientific Achievement Awards ceremony at the Pentagon Hall of Heroes.

Ron Checkai, Ph.D., Environmental Toxicology branch chief; Roman Kuperman, Ph.D.; and Mike Simini, Ph.D., received The Technical Cooperation Program (TTCP) Team Achievement Award for their work on Key Technology Area 4-32 "Development of Environmental Tolerance Values for Defense Sites Contaminated with Energetic Materials" led by Kuperman from 2004 to 2010.

Ron Checkai, Ph.D., Environmental Toxicology branch chief, receives his TTCP Team Achievement Award at the Hall of Heroes in The Pentagon on April 21. Presenting the awards are, left, Mr. Zachary J. Lemnios, Assistant Secretary of Defense for Research & Engineering, and, right, David A. Honey, Ph.D., Director of Research, Office of Assistant Secretary of Defense for Research & Engineering.

Checkai, Kuperman and Simini were recognized by The Honorable Zachary Lemnios, Assistant Secretary of Defense for Research and Engineering, Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, as well as David Honey, Ph.D., U.S. TTCP principal; and James Short, U.S. TTCP deputy.

"Having the science and technology [S&T] behind the warfighter is very important," said Lemnios at the ceremony. "The folks that we are here to honor today have achieved great things for the warfighter and for TTCP. In addition to honoring them for their contributions to the warfighter, I want to thank them for being such great ambassadors to our partner nations."

Also receiving the award were three collaborating scientists from the U.S. Army Public Health Command, U.S. Air Force Research Laboratory and U.S. Army Corps of Engineers Engineering Research and Development Center.

TTCP is an international organization that collaborates in defense scientific and technical information exchange; program harmonization and alignment; and shared research activities for the five nations, Australia, Canada, New Zealand, United Kingdom and the United States. The Scientific Achievement Awards program was established to honor the outstanding achievements of TTCP scientists and engineers. The awards are made based on excellence, relevance and productivity, and all activities must meet an exceptional level of quality of science, defense impact and collaboration.

According to the certificate presented to each ECBC recipient, the TTCP Achievement Award was bestowed specifically for significant contributions to collaborative research to advance the knowledge and understanding of ecotoxicology of energetic materials and to improve the ecological risk assessment of testing and training ranges at defense installations in TTCP nations.

"It is an honor to accept the TTCP award. It encompasses all the work our branch has done with explosives in the past 10 years," said Simini. "I thank Roman Kuperman and Ron Checkai and the rest of our team. I especially thank [ECBC Technical Director] Joe Wienand and [R&T Director] Joe Corriveau for attending the ceremony and supporting us."

"I am especially proud of Ron, Roman and Mike," said Corriveau. "Their efforts during the last several years have brought honor not only to ECBC but also to our nation. The results of their work will ultimately lead to cost savings and healthier ecology on defense installations around the world."

"We developed environmental tolerance values and bioaccumulation data for explosives, propellants, and related energetic materials for site managers to use to assess the exposure risks at each site, and to manage these facilities as sustainable resources," said Kuperman. "We made the data internationally available to TTCP nations with our book *Ecotoxicology of Explosives*. Sharing this scientific expertise has already led to many successful collaborative studies."

"The ecotoxicolgy of explosives is an area of expanding concern to the U.S. military and its allies. Through this collaborative research program, we have established critical information necessary for the continuing operation and sustainability of military testing and training ranges," said Checkai. "I wish to thank all my colleagues involved in this program, the Strategic Environmental Research and Development Program for funding major portions of the research, TTCP principals, and our ECBC directors for their continuing encouragement and support."

Ecotoxicology of Explosives was published in 2009 by CRC Press, the principal science and technology book division of the Taylor & Francis Group, an Informa Company.

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A Novel Idea: New Sorbents to Increase Mask Efficiency and Capabilities

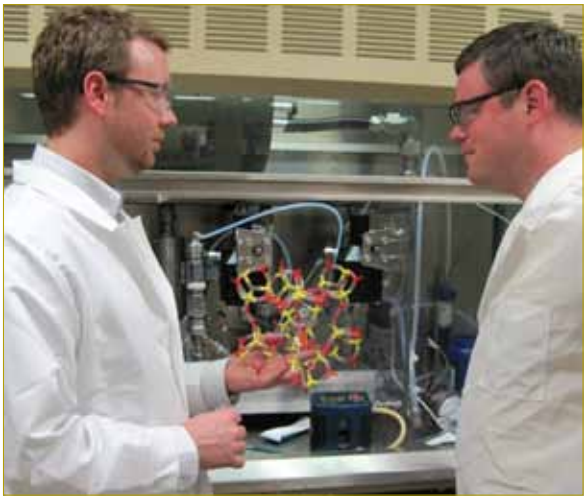
What does nanotechnology – which focuses on matter at the molecular scale – have to do with the bulky masks and filters our warfighters wear for protection against highly toxic compounds?

U.S. Army Edgewood Chemical Biological Center (ECBC) Principal Investigator Greg Peterson, along with Rick Cox, Ph.D., chief of the Chemical, Biological and Radiological (CBR) Filtration Branch, has been leading efforts at ECBC to use state-of-the-art nanotechnology and materials science to improve mask filtration. The goal is to increase filter and mask efficiency, broaden filter capabilities to meet emerging threats and reduce the burden to the warfighter.

ECBC is working to develop novel, advanced sorbents to replace the current activated carbon used in filters. Carbon has been used in the military for nearly a century to purify air; it is effective against highly toxic compounds such as nerve and blister agents, but less so against highly volatile toxic industrial chemicals (TICs). In addition, activated carbon is relatively inert and must be treated with metal impregnants for maximum performance; carbon can accept only so many impregnants before the pores are clogged and the filter becomes ineffective. The nanotechnology effort involves removing the activated carbon and instead synthesizing highly reactive substrates, thus reducing the volume required to remove TICs.

Warfighters have commented that traditional masks are uncomfortable to wear – they retain heat, they fog up, they impede breathing. The new materials will help reduce breathing resistance and filter volume, ultimately advancing both safety and comfort for warfighters.

In addition to offering improved and broader protection against priority chemicals, the new materials "will provide improved physical characteristics, such as being inherently reactive, offering greater stability and capacity, and being non-flammable," Peterson said.



Greg Peterson, left, and Rick Cox discuss metal-organic frameworks (MOFs) in front of the ammonia breakthrough system. The CBR Filtration Branch is currently working on maturing and eventually transitioning MOFs for use as highly effective layers for ammonia (and other TICs) removal in military and industrial filters.

"It's a paradigm shift from a filter capturing something to a filter that's reactive and not just captures but also destroys a toxic compound," said Cox.

The scientists stated that the new materials allow for developing different configurations, rather than being confined to the traditional round filter canister. "Now we can make filters that conform to the head or are molded in a comfortable design," said Peterson. "Newer filters are lighter and more streamlined." In fact, some new materials were recently incorporated into two novel filter designs in the Future CB Ensemble / Ground Soldier System Technology Demonstration, a program in which personnel from ECBC and the U.S. Army Natick Soldier Research, Development and Engineering Center jointly developed novel filter concepts for the future force.

Funded by the Defense Threat Reduction Agency Joint Science and Technology Office for Chemical and Biological Defense, ECBC is working with various partners, such as the U.S. Naval Research Laboratory, Georgia Institute of Technology, and University of California at Los Angeles, to develop the novel materials. These materials include functionalized carbon nanotubes, metal-organic frameworks, polyoxometalates, carbon-silica composites, organosilicates, and microporous polymers.

"Researchers at the head of their fields are developing these new sorbents," said Peterson. "We provide the research goals and testing; they build the materials. Our goal is to find the material that gives the warfighter the best protection against the most chemicals."

Peterson described one of ECBC's sorbent efforts in an article he cowrote with Joseph Rossin of Guild Associates, Inc. The article, "Replacing a Legacy: A Novel Sorbent for Future Systems," was accepted for publication by the quarterly *Chem-Bio Defense Magazine*.

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Plant Your Own Flower Week May Become a Perennial Event

Staff from the U.S. Army Edgewood Chemical Biological Center Research and Technology Directorate (R&T) found a fun way to "go green," save money and put a smile on visitors' faces. What's the secret? We created "Plant Your Own Flower" week in May, and our staff brought in spring blooms to express their personalities and spruce up our flower beds.

Nearly 30 R&T staff participated in Plant Your Own Flower Week, according to Facilities Coordinator Juanita Hubbard, pictured here with calla lilies.

Nearly 30 R&T people participated in Plant Your Own Flower Week, according to Facilities Coordinator Juanita Hubbard, who helped develop the event. People from the Bernard P. McNamara Life Sciences Laboratory pitched in to weed, water, spread mulch, apply deer repellent, and plant a range of colorful blossoms, from calla lilies to impatiens to delphiniums to salvia. Those who don't have a green thumb or weren't able to make a special trip to a nursery contributed a few dollars to the cause.

Hubbard, who spends most of her time submitting service orders, maintaining common areas, escorting visitors, and troubleshooting, enjoyed the time outdoors. "In addition to enhancing the landscaping, the project enhanced the spirit of the employees in McNamara," she said. "It promoted unity because we were working together for a common cause."

"I think that this project gives us (the building occupants) a sense of ownership and pride in our building," said Biological Research Laboratory Technician Leslie Williams. "It also gives us a break from our desks to go out and enjoy the sunshine."

"I brought in purple wave petunias. I don't have much of a green thumb, but I love beautiful landscaping. The more participants there are, the more beautiful the landscaping will be," said R&T Committee Coordinator Melanie Pender. "Every morning I smile to myself when I see my purple petunias. I appreciate all the hard work that Juanita Hubbard has put into beautifying the entrance to our building, and I hope more building occupants will bring in flowers. If this becomes an annual event, I'll gladly participate each year."

"Flower week was a very therapeutic experience because it allowed me to commune with the Earth by tending to what God gave us to enjoy," said R&T Project Support Assistant Peggy Furlong. "Our day-to-day routine can be tedious, but now I can come to work and can see the creativity that went into the beautification effort. It shows the pride for this building and for those who work in it. There are a lot of green thumbs!"

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Division Chief Bids Farewell After 26 Years of Federal Service

After 26 years and four months, Wade Kuhlmann, Ph.D., bid farewell to federal service in a retirement ceremony on June 30 attended by dozens of ECBC staff and family members.

Kuhlmann, who served most recently as chief of ECBC's Chemical and Biological Protection and Decontamination division, was recognized with many honors during the ceremony, including certificates from Gov. Martin O'Malley, Rep. Dutch Ruppersberger, Sen. Ben Cardin and Sen. Barbara Mikulski, as well as a Commander's Award for Civilian Service and a U.S. flag flown over the U.S. Capitol in April.

Joseph L. Corriveau, Ph.D., Research and Technology director, presents Wade Kuhlmann, Ph.D., with a Commander's Award for Civilian Service.

Joseph Wienand, ECBC technical director, stated, "On the occasion of your retirement, I wish to extend to you my personal thanks and the appreciation of the United States Army for the many years of service which you have given to our country. I share your pride in the contributions that you have made to the Army, and I trust that you will maintain an active interest."

Joseph L. Corriveau, Ph.D., Research and Technology director, also expressed his appreciation for Kuhlmann's dedicated service, stating that he was forever part of the ECBC family.

During his ECBC service, Kuhlmann was involved in several international efforts, including serving as the U.S. representative to The Technical Cooperation Program Technology Panel 11 for respiratory protection, U.S. representative to the NATO Team of Experts to revise the NATO Respirator Triptych, and U.S. representative to the NATO working group to update the NATO Long Term Scientific Study.

"I'm very proud to have contributed to ECBC and to our country and to have worked with so many fine people all these years," Kuhlmann said. "We make a real difference to the guys at the front line. It's been a great ride."

Kuhlmann has plans to return to ECBC part-time starting later this summer as a re-employed annuitant to supervise the completion of the expansion of the Advanced Chemistry Laboratory.

ST Reelected to College Board of Trustees

James J. Valdes, Ph.D., U.S. Army Edgewood Chemical Biological Center (ECBC) senior technologist for biotechnology, has been reelected as vice chair of the Harford Community College Board of Trustees. Valdes, who was elected vice chair last year, joined the Board in 2007.

At ECBC, Valdes serves as the senior biological scientist and advisor to the U.S. Army Research, Development and Engineering Command Group, and he is senior research fellow at the National Defense University's Center for Technology and National Security Policy. Valdes holds a B.S. from Loyola University of Chicago, an M.S. from Trinity University, and a Ph.D. in Neuroscience/Chemistry of Behavior from Texas Christian University. He was a postdoctoral fellow in neurotoxicity at The Johns Hopkins University School of Public Health.

Valdes is an adjunct professor at the University of Texas at San Antonio and an adjunct professor in the Department of Bioengineering at the University of Maryland. He is the author of more than 120 scientific journal articles and 55 technical reports; he has given more than 300 presentations to international scientific professional groups. In 2003 and 2009, Dr. Valdes received the Presidential Rank Award presented by the Secretary of the Army and the Vice Chief of Army Staff on behalf of the President.

Source: http://www.harford.edu/news/press/BoardchairrelectedPR11rev.pdf

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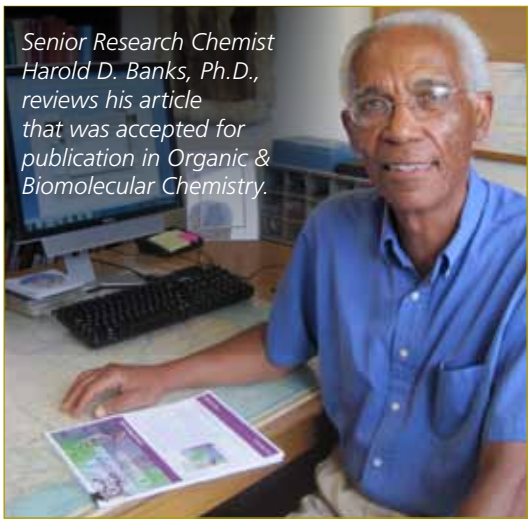
Nanotechnology Article to Be Published in International Journal

An article written by Harold D. Banks, Ph.D., senior research chemist at the U.S. Army Edgewood Chemical Biological Center (ECBC), was accepted for publication by *Organic & Biomolecular Chemistry*, an international journal published in the U.K. by the Royal Society of Chemistry.



Senior Research Chemist Harold D. Banks, Ph.D., reviews his article that was accepted for publication in Organic & Biomolecular Chemistry.

The article, "Substituent Effects on the Rate of Formation of Azomethine Ylides," studies the effects of chemical groups attached to an aziridine on the rate of formation of azomethine ylides (AMY). AMYs are species having partial positive charge on the ring nitrogen and negative charge dispersed over the carbon atoms immediately attached.

AMYs react readily with double and triple bonds, notably with graphene, an exciting nanomaterial that has recently become available in Nobel Prize-winning work. Banks' paper describes a sophisticated computational search and discovery of an extremely reactive aziridine that is predicted to react at room temperature, thus making it useful for the study of biological and sensitive chemical systems.

When this reaction occurs with nanomaterials so as to introduce the necessarily sensitive groups required for detection, it may lead to new approaches for detection of biological and chemical threat agents, ultimately lightening the load for warfighters.

"All this has to do with nanotechnology, which has to do with reducing large things to about one-thousandth their original size," said Banks. "Nanotechnology will eventually allow us to miniaturize our detection devices to minimize the burden on our soldiers. This paper describes how we can attach detection materials, electronic devices, and filtration devices (there are several potential spinoffs) to nanoparticles."

Banks, a 25-year ECBC employee, specializes in computational chemistry, which involves the use of equations to predict such characteristics as reactions, stability and dimensions of molecules. "Computational chemists use computers to predict chemistry," Banks said, "with the goal of making things safer for laboratory scientists."

Students Are Getting Ready to Go Back to School… And ECBC is kicking off its Back-to-School Drive!

There are many ways to invest in the next generation. One initiative that the ECBC's Community and Educational Outreach Program offers is its annual Back-to-School Drive.

In support of the soldiers and their families within the 20th Support Command and the 22nd Chemical Battalion, we have launched our fourth annual Back-to-School Drive. We will be collecting donations from 15 July 2011 until 12 August 2011 to provide children in need supplies essential for their academic performance.

Sometimes the only difference between an A+ student and a failing student is having basic supplies to do homework and participate in class. With your help children in local military families will start the school year feeling good about themselves and ready to learn. Education is the key to success, and you can help children in need succeed with your generous donations.

Please look for drop-off boxes at the entrances of buildings E3150, E3160, E3549, E3330/3331, E3400, E3831, E4475, E5100, E5234, E5560, and E5951.

Please consider taking advantage of current back-to-school sales and supporting our military community!

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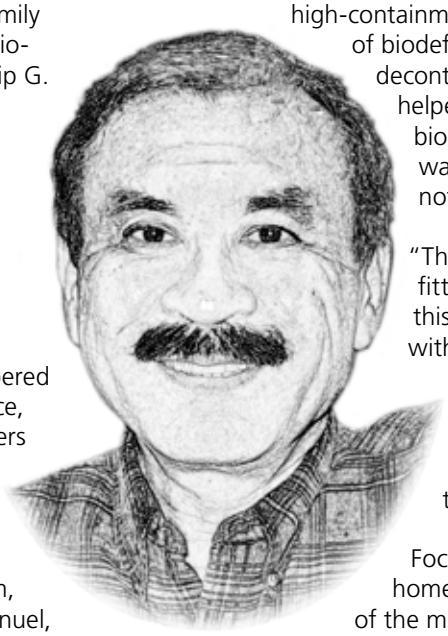
ECBC Dedicates BSL-3 Lab to Late Scientist

U.S. Army Edgewood Chemical Biological Center (ECBC) senior leaders gathered with a couple dozen family members on May 16 to dedicate the Center's Bio-Safety Level 3 (BSL-3) laboratory to the late Philip G. Koga, Ph.D.

Koga, a molecular biologist and biodefense expert, joined ECBC as a senior team leader for the BioSciences Division in 2001 and was promoted to associate director for special programs in 2005. He died May 5, 2010, from pancreatic cancer.

At the dedication ceremony, Koga was remembered by several ECBC leaders for his exemplary service, integrity and commitment to excellence. Speakers at the ceremony included Joseph Wienand, technical director; Joseph Corriveau, Ph.D., director of the Research and Technology Directorate; Suzanne Milchling, director of the Directorate of Program Integration; Harry Salem, Ph.D., chief scientist for life sciences; Peter Emanuel, Ph.D., chief of the BioSciences Division; and Vipin Rastogi, Ph.D., research biologist.



"Dr. Koga's strong visionary leadership in establishing a high-containment BSL-3 laboratory and broadening of biodefense research to biochemistry, bio-decontamination and pathogen research truly helped shape the division into a first-rate biodefense research operation supporting the warfighter and homeland security," Corriveau noted during the ceremony.

"The dedication of the BSL-3 laboratory is a fitting tribute to Phil's name," said Salem. "For this laboratory to function efficiently and safely, with extremely deadly organisms, the scientists must work meticulously, paying careful attention to detail without the slightest deviation from protocol. And that's how Phil was, always paying attention to details to protect the safety of the workforce."

Focused on protecting the warfighter and homeland, scientists conduct research on some of the most dangerous biological agents such as anthrax in the BSL-3 lab.

Suzanne Milchling, ECBC director of Program Integration, presents a commemorative shadowbox to the family of Dr. Philip G. Koga.

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Recent Patents and Years of Service Awards

Recent Staff Patents

Patent no. 7,790,452, Artificial Chimeras Engineered to Simulate Multiple Biological Threat Agents, Dr. Jose-Luis Sagripanti

Patent no. 7,838,227, Simultaneous Detection of Biological Agents by Solid-State Hybridization and Naked Eye Visualization, Dr. Jose-Luis Sagripanti

Patent no. 7,851,207, Multiplex Field Device to Detect and Identify a Variety of Microbial Agents Simultaneously, Dr. Jose-Luis Sagripanti

Patent no. 7,910,365, Artificial Chimeras Engineered to Simulate Multiple Biological Threat Agents, Dr. Jose-Luis Sagripanti

Patent no. 7,910,537, Decontamination of Chemical Warfare Agents Using Benign Household Chemicals, Dr. George W. Wagner

Patent no. 7,934,497, Modular Helmet-Mask Assembly, Corey M. Grove (first named inventor)

Patent no. 7,943,148, Amino Acid Sites in Flavivirus E Proteins Useful for Development of Diagnostics and Vaccines, Dr. Jose-Luis Sagripanti

Length of Service Certificates

5 Years:
Kathy L. Crouse
Shaun M. DeBow
Theresa A. LaLain
Dennis B. Miller
Fiona E. Narayanan

10 Years:
Earl Austin
George Hondrogiannis
Jana Kesavan

15 Years:
Peter A. Emanuel
Alan C. Samuels

20 Years:
Ronald Checkai
Janet Jensen
David A. McCaskey
Ruth W. Moretz

25 Years:
Harold Banks
Daniel Barker
Martha Bishop
William M. Lagna
Dorothea Paterno
Melanie G. Pender
Douglas R. Sommerville

30 Years:
James H. Buchanan
Vincent Carcirieri
Regina L. Evans
Paul D. Gardner
Dorothea A. Paterno
Daniel Weber

35 Years:
Kenneth Cameron
Linda Gail Janes
Sandra J. Johnson
Eugene Song

Congratulations and warm thanks to those R&T employees who have served with ECBC for five years and beyond. We are grateful that you have contributed your knowledge and expertise to our organization, our country and our warfighters.

- Dr. Joseph L. Corriveau, R&T Director

UPCOMING S&T CONFERENCES/MEETINGS

R&T staff get around! This list is just a sampling of the many conferences and workshops we will be supporting in the coming months.

- IEEE International Geoscience and Remote Sensing Symposium (IGARSS), August 1-5, 2011, Sendai, Japan link
- International Conference and Exhibition on Virology, September 5-7, 2011, Baltimore, MD link
- CBRNe Convergence Conference, November 1 – 3, 2011, Istanbul, Turkey link
- Society of Environmental Toxicology and Chemistry 32nd Annual Meeting, November 13 - 17, 2011, Boston, MA link
- CBD S&T Conference, November 14-18, 2011, Las Vegas, NV link
- Partners in Environmental Technology Technical Symposium & Workshop, November 29 - December 1, 2011, Washington, DC link
- Biotechnology 2011, November 29-December 1, 2011, Philadelphia, PA link