ERHE Emitter

Department of Environmental & Radiological Health Sciences

College of Veterinary Medicine and Biomedical Sciences
Summer 2011 Volume 7, No. 1

New Equipment Brings New Capabilities to CEM Analytical Laboratory

Dr. Ronald Tjalkens wants his research to have a substantial impact on the treatment of Parkinson's disease. Dr. Elizabeth Ryan is interested in investigating powdered green tea as complementary therapy in the treatment of cancer, but wants to verify the purity of her green tea powders. Dr. William Hanneman is conducting a lab exercise that teaches students about gun residue. All three have diverse goals but share a common resource – the Center for Environmental Medicine's Analytical Laboratory at Colorado State University.

"We are now home to one of the premier analytical laboratories in the region," said Dr. Hanneman, Director of the Center for Environmental Medicine. "We have a track record in pesticides, and now we can look at pharmaceutical agents and at metals. We've added new technologies and now have additional capabilities."

New equipment in the two sections of the laboratory – inorganic analysis and organic analysis – is enabling detection of substances of interest at lower and lower levels (parts per trillion), increasing the range of detectable organics and inorganics from environmental and biological sources, and advancing the ability to provide custom method development to fit specific testing needs.

"Between the inorganics and organics laboratories, we can analyze just about anything," said Bryan Brattin, a research associate and manager of the Inorganic Laboratory. "We have new equipment, including an optical emission spectrometer, which is an important tool for fast and accurate elemental analysis of metals and can help us see elements at even lower levels. It's another great instrument we have in our tool chest. Basically, if I can hold it in my hand, I can dissolve it in water, and we can test it."

Bryan Brattin, manager for the Center for Environmental Medicine Inorganic Lab, works with an Inductively Coupled Plasma Mass Spectrometer.

An array of analytical equipment, from gas and liquid chromatographers to an inductively coupled plasma mass spectrometer, includes tried-and-true workhorses of the laboratory and newer pieces of equipment that help Brattin and Dr. Greg Dooley, Director of the Analytical Laboratory, provide state-of-the-art analytical services to their clients.

"For Dr. Ryan, we have conducted pesticide analysis on tea and rice bran, looking for pesticide residues before these products are used in feeding programs as part of her cancer research," said Dr. Dooley. "We

continued on Page 3

In This Edition:

Colorado State University

WELCOME

Dear Friends,

On March 11, 2011, Japan suffered the effects of a 9.0-magnitude undersea earthquake that hit approximately 45 miles east of the Oshika Peninsula of Tohōku. It's estimated that more than 18,000 people died and tens of thousands remain missing, with most of those presumed dead.

The Great East Japan Earthquake triggered an automatic shutdown of four of Japan's nuclear facilities, including Fukushima I. Following shutdown, diesel backup power systems were responsible for cooling decay heat. But the earthquake also triggered extremely destructive tsunami waves that, at the Fukushima I plant, overtopped seawalls and destroyed diesel backup power systems. Without the backup power systems, the situation was critical.

In the days that followed, more than 200,000 people were evacuated as workers struggled to bring the problematic reactors under control and limit radioactive contamination. As of this writing, the full extent of contamination is under investigation though radioactive iodine, cesium, and strontium have been detected in the soil in some places around Fukushima; radioactive iodine has been detected in multiple locations, including Chiba and Tokyo; and certain fisheries have been shut down after discovering species of fish that contained radioactive cesium above legal limits. The short-term and long-term consequences, known and unknown, will shape the future of Japan for some time to come.

For three years, the Department of Environmental and Radiological Health Sciences has had a memorandum of understanding with Japan's National Institute of Radiological Sciences and Gifu University. Many of our Japanese colleagues were directly or indirectly affected by the earthquake and resulting tsunami. We will be working with our colleagues in many facets in the aftermath of this tragedy. Our faculty members are world-renowned in the field of radiation biology and the flow of contaminants in the environment, and this expertise will help the Japanese people in their recovery and create new knowledge that will benefit the rest of the world in the event of an intentional or unintentional release of radioactive materials.

Our work with NIRS and Gifu takes on even more urgency in the light of helping Japan move forward. We recently were awarded a grant and named a NIRS International Open Laboratory to increase research and training collaborations between our two countries. We expect to return to Japan this summer not only to kick off the IOL but also to begin sampling (soil, water, and tissue), in geographical areas of concern. In another grant related to radiation exposure, awarded by the United States Department of Agriculture last fall, Drs. Alexander Brandl and Thomas Johnson are investigating numerous aspects of radioactive contamination in livestock, including dosimetry, appropriate emergency response, and recovery. Their work will establish baseline knowledge that will help agricultural interests best protect human populations and livestock, ensure food safety, and promote food security.

You'll read about the NIRS and USDA grant in this edition of *Emitter*, as well as many other articles about the amazing people in our Department (including our students and alumni), the success we are having on multiple research fronts, and other news of interest. I welcome your questions and comments on the magazine and its contents, as well as suggestions for articles in future editions. Please drop us a line, or give us a call with your input.

Best regards,

Jac A. Nickoloff, PhD
Professor and Head
Department of Environmental and Radiological Health Sciences

Table of Contents

The ERHS Emitter *is published two times annually by Colorado State's Department of Environmental and Radiological Health Sciences and produced by Communications and Creative Services. We welcome your questions, comments, and story suggestions. You can e-mail your comments to Carol Borchert,* ERHS Emitter *editor, at* ***carol.borchert@colostate.edu****. You also can visit us on the Web at* ***www.cvmbs.colostate.edu/erhs****.*

New Equipment Brings New Capabilities to CEM Analytical Laboratory

continued from Page 1

have established a method to detect 300 pesticides from a variety of matrices in a single 20-minute run, thanks to our new LC-MS/MS system."

Dr. Greg Dooley

In the new optical emission spectrometer, samples are heated to 10,000 degrees C using inductively coupled plasma. The light emitted by the metal atoms is then passed through a spectrometer, which splits the light up with a prism. The pattern of bands cast by the spectrometer is used to identify each individual element. For Dr. Tjalkens, Brattin is determining levels of manganese in tissue samples from a mouse brain. As part of his research in Parkinson's disease, Dr. Tjalkens is interested in the similarities between Parkinson's disease and manganism, particularly as a model for Parkinson's research and drug discovery.

Brattin said the Inorganic Laboratory tests three primary sample types: water, tissues, and sediments/solids. These samples come from lakes and streams, living organisms, natural ecosystems, and manmade systems (for example, sewage treatment plants). Laboratory clients include University researchers and collaborators, government entities, and the private sector. The facility also benefits students taking courses in such fields as toxicology, nutrition, and exercise science.

"Teaching is an important part of what we do. We not only have a mission to provide the highest-quality testing to our internal and external clients but also to teach the next generation of toxicologists and students in other majors who need skills in instrumentation."
– Dr. Greg Dooley

In Colorado, unique testing situations include old mines where liquid mercury was used to extract gold; oil shale formations that prevent the permeation of water resulting in pools that dry and leave behind toxic levels of selenium; uranium mining; contamination of wild rivers and streams; agricultural runoff; animal waste products; and other contaminations associated with mining and agricultural industries in the state.

In addition to a full menu of testing for inorganic and organic samples, Dr. Dooley and Brattin provide more specialized analyses with custom method development where analytical methods and validation services are designed to meet a client's specific needs. This process can be time-consuming, but the laboratories work closely with clients to be sure the test provides precise answers to the questions the client is asking.

Dr. Dooley and Brattin also work closely with students in the College of Veterinary Medicine and Biomedical Sciences, as well as in the College of Engineering and College of Applied Human Sciences, helping to train them on instrumentation and how to conduct testing for research and class projects. Dr. Dooley and Brattin also teach EH 547, Equipment and Instrumentation, where students learn how to prepare samples and use the analytical equipment with practical experiments relating to food, beverage, and environmental analyses. Class projects have included looking at pesticides in produce, capsaicin in chili peppers, and pharmaceuticals in the environment.

"Teaching is an important part of what we do," said Dr. Dooley. "We not only have a mission to provide the highest-quality testing to our internal and external clients but also to teach the next generation of toxicologists and students in other majors who need skills in instrumentation."

To learn about the Inorganic Laboratory and Organic Laboratory, visit www.cvmbs.colostate.edu and click on the Department of Environmental and Radiological Health Sciences, Center for Environmental Medicine.

ERHS Research Group Joins NIRS in International Open Laboratory Program

The Radiological Health Sciences core research group in the Department of Environmental and Radiological Health Sciences has recently been approved as a research unit associated with the National Institute of Radiological Sciences in Chiba, Japan. The ERHS team submitted a proposal to the NIRS International Open Laboratory program and was one of four research proposals selected from a worldwide pool of applicants for the three-year, $350,000 research and training program.

"Three years ago, NIRS began its International Open Laboratory program to link up with key institutions around the world," said Dr. Jac Nickoloff, Head of the Department of Environmental and Radiological Health Sciences. "Since that time, Colorado State University's partnership with NIRS has grown, and as NIRS entered the second term of IOL proposals, the time was right for us to take the next step. The IOL is a natural expansion of research and training initiatives that have been very successful, benefiting both institutions."

Dr. Nickoloff will serve as a Distinguished Foreign Scientist with the Particle Therapy Molecular Target Research Unit. He will serve with Dr. Penelope A. Jeggo, Professor, University of Sussex, United Kingdom. Dr. Akira Fujimori, with NIRS, is the research unit head.

Dr. Nickoloff said that in addition to continuing to build a strong relationship with NIRS, the IOL also will help the radiological health sciences research team leverage a P01 Program Project grant from the National Institutes of Health's National Cancer Institute.

"Our partnership with NIRS gives us access to a unique facility that we simply don't have in the United States – a high-energy facility with clinical-quality carbon ion beams – that is used to treat patients as well as conduct research," said Dr. Nickoloff. "For biological research, this partnership brings in new people and fresh ideas, while giving us access to equipment that enables us to expand our research program in radiological health sciences and cancer."

A kickoff symposium at NIRS, Chiba, originally scheduled in June but now delayed until fall because of the recent tragedy in Japan, will bring the four units together for two days of meetings and lectures. During the first day's closed meetings, each unit will present the purpose, schedule, materials, methods, and expected outcomes of their individual projects. The second day will be open to a general audience and include a lecture from each Distinguished Foreign Scientist. With satisfactory progress, grants to each of the units will continue for three years.

Environmental Health Scholars Start Early on Research Path

For undergraduate students in the College of Veterinary Medicine and Biomedical Sciences, one of the great selling points of pursuing their degree here is the opportunity to work in leading-edge research laboratories where faculty members are creating new knowledge and advancing biomedical sciences. The Department of Environmental and Radiological Health Sciences offers its environmental health majors a golden ticket to such research work through the Environmental Health Research Scholars Program.

Now in its sixth year, the program continues to attract undergraduate students with a strong desire to not only learn in the classroom, but to apply what they learn in a laboratory setting. Students are chosen for the program based on their academic performance and personal essays indicating an interest in research. Participants in the program receive a $1,500 scholarship, are assigned a faculty mentor, and work in their mentor's research laboratory.

Vi Nguyen, Amy Nees, and Cecelia Davies

"At the beginning of the year, students rotate through a variety of laboratories and then select the laboratory in which they want to work," said Dr. David Gilkey, an Associate Professor in ERHS, who is the faculty coordinator of the Environmental Health Research Scholars Program. "In addition to their laboratory work, students meet throughout the semester for special seminar sessions. In December, the students present their fall projects to fellow students and faculty mentors."

This year, ERHS conferred three Environmental Health Research Scholars awards to undergraduate students Amy Nees, Vi Nguyen, and Cecelia Davies.

Nees is working with Dr. John Rosecrance, an Associate Professor in ERHS, and Anuja Patil, a graduate student, in ergonomic research aimed at evaluating the presence of carpal tunnel syndrome in dairy parlor workers.

Nguyen is working with Dr. Thomas Johnson, an Assistant Professor in ERHS, evaluating the effectiveness of coffee filters to remove contaminants in water and improve the overall quality. She is using gas chromatograph mass spectroscopy to evaluate contaminant levels before and after filtration.

Davies is working with Dr. Ronald Tjalkens, an Associate Professor in ERHS, in his neuroscience laboratory investigating causes and treatments for Parkinson's disease. She is learning about modern cell biology techniques used in the lab for experiments aimed at evaluating cellular responses to agents.

USDA NIFA Grant Focuses on Livestock Exposed to Radioactive Agents

Drs. Thomas Johnson and Alexander Brandl, both with the Department of Environmental and Radiological Health Sciences, recently were awarded a research grant to investigate response and recovery from the catastrophic exposure of agricultural animals to radioactive contamination.

The approximately $200,000 grant is from the United States Department of Agriculture's National Institute for Food and Agriculture. The grant was awarded last fall, and Dr. Johnson noted the timeliness of the research given the sequence of events in Japan this March (earthquake and tsunami) that led to radioactive releases from the Fukushima Daiichi nuclear power plant.

"There are simply a lot of gaps in our knowledge about how best to handle the exposure of livestock to radioactive contamination," said Dr. Johnson, an Assistant Professor in ERHS. "This grant will help us identify those critical research and extension service gaps and begin to develop a program proactively. The current situation in Japan reinforces the importance of this research."

The program's objective is to identify and address the most critical research and extension gaps relating to the response to and recovery from the catastrophic exposure of agricultural animals to radioactive contamination including those from a nuclear power plant accident; a "dirty" bomb (a radiological weapon that combines radioactive material with conventional explosives to spread radioactive dust, smoke, or other material); or the detonation of a nuclear bomb.

The investigations should yield best practices to minimize potentially catastrophic damage to agriculture and the environment; ensure safety and security of the food supply; and better protect animal and public health in the event of an accidental or intentional radiological release. The grant also will help to establish a collaborative effort that will assemble existing information for dissemination using existing local, regional, national, and international capabilities and capacities.

To date, Drs. Johnson and Brandl have collected information on the handling of radioactively contaminated livestock after a radiological or nuclear emergency. The difficult process of determining the livestock that would be suitable for decontamination has been completed, and decision nodes identified that can be used in the aftermath of a radiological or nuclear event. Additionally, they have produced a guideline for handling and processing options of salvageable livestock. They also have written a paper for publication that will assist in future emergency handling, including data gathering in the aftermath of a radiological or nuclear event.

"Our current focus is on methodologies to assess dose in affected livestock," said Dr. Brandl, an Assistant Professor in ERHS. "Our follow-up work will concentrate on calculating external contamination doses to animals, and then addressing livestock internal dosimetry questions. From there, we'll investigate the internal contamination of livestock grazing on contaminated land."

Honors Students Explore Wider World of Environmental Health

When Ryan Autenrieth entered the Honors Program at Colorado State University in 2006, he was interested in going above and beyond the normal curriculum. Little did he know the direction his honors program would take him, from learning about meditation and the challenges members of the GLBT community face, to teaching emergency first aid in Nicaragua and helping to rebuild a hurricane-damaged home in New Orleans.

The goal of the Honors Program at CSU is to provide an enriched educational program of study for academically talented and motivated students. Honors students benefit from small, discussion-based seminars taught by some of the University's finest faculty members, Honors coursework in their majors, personalized academic advising, and opportunities for leadership, research, and community service.

"During my freshman year, it was great to get to meet and know the Honors faculty," said Autenrieth, who is now a senior majoring in environmental health. "They were very helpful, helping to point me in the right direction, and making the transition to college a little easier and more personal."

Autenrieth chose the Track 1 University Honors Scholar program, one of two curricular options. The University Honors Scholar program is designed for outstanding students who wish to fulfill a majority of their general education requirements through innovative interdisciplinary seminars. Some that Autenrieth found challenging were creativity in movement, peacemaking, and violence and aggression. Honors students fulfill history and writing requirements, for example, by taking broad-based seminars rather than stand-alone composition or history courses.

In addition, many academic departments allow students to participate in the Honors Program through the Discipline Honors Scholar program. This option, offered by the Department of Environmental and Radiological Health Sciences, is well suited for outstanding students who have completed many general education requirements (through AP and IB coursework) and wish to focus on upper division Honors experiences in their majors.

Autenrieth customized his program even further. His community service included working in restorative justice with youth who had committed petty offenses (helping them rectify their wrongs in a community setting); working with Dr. David Gilkey to bring water-quality education to a local elementary school; studying abroad in Costa Rica; participating in the Nicaragua Cook Stove project; interning for the U.S. Public Health Service; and, for his capstone project, developing and delivering an emergency first-aid course in Nicaragua.

First-aid training in Nicaragua

Autenrieth, who is a certified emergency medical technician, loved the challenge of teaching in Spanish, and enjoyed the connections he was able to make by teaching basic first aid using tools on hand. Showing people how to save a life, particularly in remote parts of Nicaragua, was empowering.

"I had great support in Nicaragua, particularly from Rodney McDonald, who lives and works in the local community," said Autenrieth. "We hit seven locations in 2½ weeks, but had requests for a lot more. Basically, we used a pile of clothes to show how to control bleeding, make slings, and apply pressure, and how to treat burns and cuts. People were able to feel confident and ready to handle a potentially dangerous injury. The fun part was ending each session with a mock accident, when the participants got to practice what they learned."

The Honors Program at Colorado State University is more than 50 years old, and it still remains committed to the ideals envisioned by its founder, Professor Willard Eddy. Today, there are more than 1,140 students participating in Honors, 19 of whom are in ERHS (a large number for a relatively small undergraduate program), and approximately 340 new students enroll each year.

Autenrieth would like to continue to build on his experiences at Colorado State University, perhaps expanding his first-aid project or furthering his education in graduate school. Beyond that, he is considering a career with the Public Health Service, but his mind is open.

"I have a passion for medicine, teaching, and public service," said Autenrieth. "I'd like more life experience to expand on what I've done, and then I'll see what the future holds."

Adjusting a hazmat suit in Alaska

2010-2011 ERHS Honors Students

Ryan Autenrieth
Rachel Burmeister
Zachary Capshaw
Deanna Chavez
Caitlin Condon
Lindsay Davis
Ellie Elgar
Margaret Escobar
Andrew Garrett
Jessica Gillis
Heather Healy
Stacy Marshall
Dayton McMillan
Trevor Mueller
Christopher Neal
Deidra Newbrough
Erik Page
Janelle Ramirez
Eugene Saghi

Nicaragua Cook Stove Project Receives NIH R03 Grant

Blood samples taken from participants in the Nicaragua Cook Stove project can now be analyzed, thanks to a recent grant from the National Institutes of Health. The R03 (Small Grant Program) was awarded to Dr. Jennifer Peel and her research team, including undergraduate students who have worked on the project for the last three years, to look for analytes that may be markers of general systemic inflammation.

The Nicaragua Cook Stove project started in 2008 as a project focused on applied research experience for students; first to assess the health risks of cooking indoors over open fires, and then to see how making a switch to cleaner-burning biomass cook stoves with chimneys could mitigate those risks. The 127 families participating in the project live in the barrio of El Fortin outside of Granada. Researchers were particularly interested in studying women and children, who may be at a higher risk for exposures because of the amount of time they spend indoors.

"During the study, we used a finger prick to collect blood drops that were then dried on filter paper," said Dr. Peel. "We wanted to analyze the blood spots for markers of inflammation that could link inhaled pollution to cardiovascular endpoints, looking at how pollution can affect heart disease. We also wanted to compare samples from before and after the stoves were installed."

In many areas of the world, noted Dr. Peel, it is impossible to draw and store blood because of concerns over using needles, lack of processing equipment, and restricted refrigeration. The blood spot sampling method may allow investigators to collect and store samples without having to worry about degradation.

"We got the samples, but had no money to analyze," said Dr. Peel. "Support from the NIH will now allow us to not only look at the samples for our research in Nicaragua but also to determine if this is a viable method of collection and storage for relevant analytical testing."

The Colorado State University team has been collaborating with the nonprofit groups Trees, Water & People, in Fort Collins, Colo., and Proleña, in Managua, Nicaragua, and with a local women's group working to be sure the cook stoves were functioning properly and being used. With half the world's population still cooking on makeshift coal and biomass stoves, the World Health Organization estimates that pollution from indoor cook stoves kills more than 1.65 million people each year, with millions more suffering from respiratory and other ailments.

The Nicaragua Cook Stove project is wrapping up this year, though data analysis will continue, and the cook stove team is addressing concerns over cook stove use and community sustainability.

"When we went back down in 2009, we realized not everyone was using the new stoves, or were using them just for certain items – an advantage of the new stove is that multiple pots can be in use on the flat griddle surface; however, it's faster to boil water over an open fire, for example," said Dr. Peel. "So, with about half of the people still using their open fires, we can't assume that if we install a new stove we will see the health markers improving."

Dr. Peel said that, perhaps most importantly, the cook stove project has created awareness and empowerment in the El Fortin community and, even if people won't make a change for themselves, "they will do it for their children."

ERHS NEWS OF NOTE

DOE Renews Bedford Grant

The Office of Science (Biological and Environmental Research), U.S. Department of Energy, has approved a renewal application for "Genetic Factors Affecting Susceptibility to Low Dose and Dose Rate Irradiation." Dr. Joel Bedford, a Professor in the Department of Environmental and Radiological Health Sciences, is the principal investigator on the project. The grant was renewed for two years for the amount of $692,845.

Uranium One Makes Gift to Health Physics Training Program

ERHS has established an endowed scholarship fund aimed at training students in the unique combination of environmental health and health physics. The fund is the result of a $75,000 gift from Uranium One.

The Department offers a five-year, Track III BS/MS program combining a bachelor's degree in environmental health with a master's degree in health physics. Students who complete the program are specially trained to understand the science of radiation safety with an environmental background.

"Nationwide and globally, there is a great need for students trained in health physics, and the support of companies like Uranium One are essential to getting the students the support they need to complete these degrees," said Dr. Thomas Johnson, an Assistant Professor in ERHS, and head of the Health Physics Program. "We are very grateful for their support."

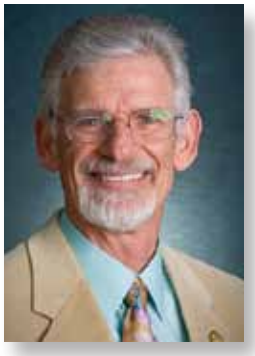
To qualify for a scholarship, students must take 60 credits within the subject matter. The endowment will allow funding of one to three scholarships annually. Scholarship recipients will be selected by a committee of professors within the Department, based on credit hours, competency, commitment, and intention to complete the combined Track III degree program.

Dr. John Volckens' Students Receive CDC/EPA Grant and Fellowship

Dr. Kirsten Koehler, a postdoctoral fellow in the laboratory of Dr. John Volckens, an Associate Professor in ERHS, was awarded a K01 by the Centers for Disease Control, National Institute for Occupational Safety and Health, to develop new statistical methods to support the emerging field of spatio-temporal exposure assessment.

Brie Hawley, a PhD student, was awarded the EPA STAR graduate fellowship to study the toxicity of biodiesel combustion emissions.

Dr. David Gilkey Receives Mortar Board Advising Award



Dr. David Gilkey, an Associate Professor in the Department of Environmental and Radiological Health Sciences, received an Excellence in Advising Award from the Mortar Board National Senior College Honor Society at the organization's annual conference in July 2010.

The Excellence in Advising Award is presented to advisers who provide exceptional support to help their local student Mortar Board chapter (Tau Iota Omega) achieve goals, serving as a role model and demonstrating constant leadership, professionalism, and spirit of service.

In their nomination application, students described Dr. Gilkey as "a man of honor, stability, and creativity. Through thick and thin, he has led the chapter with a calm and professional demeanor. When newly initiated members in 2009 felt lost and officers were unsure of their responsibilities, David immediately provided support and guidance, suggesting projects, reminding officers of national deadlines, and participating in every meeting and activity. Whether it is helping to buy cupcakes for a chapter fundraiser or coming up with ways to increase chapter visibility, David is always available with a solution and a smile."

AIHA Student Local Section of the Year for 2010

The American Industrial Hygiene Association 2010 Student Local Section of the Year Award went to both Colorado State University – Rocky Mountain Student Section – and Murray State University, for their outstanding programs, activities, and contributions toward industrial hygiene excellence for the academic year of 2009-2010.

The award is given to student sections based on numerous criteria, including the type and quality of section meetings, quality and scope of applied research activities, community and campus activities, membership, student newsletter, and more. The $1,000 award was given by AIHA during the annual Volunteer Recognition Reception at AIHce last spring. The winning student sections also were featured in AIHA's magazine, *The Synergist*.

AEHAP Launches EHAC Graduates Association Program

The Association of Environmental Health Academic Programs has now launched the EHAC Graduates Association, an online resource for graduates of environmental health degree programs accredited by the National Environmental Health Science and Protection Accreditation Council. The EGA provides

members with access to an extensive environmental health job bank and online discussion board

To become a member of the EHAC Graduates Association, create a user account at: http://www.aehap.org/graduates. Once you create a username and password and it is approved by AEHAP, you'll be able to access the job bank and discussion boards.

Dr. Jennifer Peel Co-authors Commentary Featured in *Environmental Health Perspectives*

In a commentary featured in *Environmental Health Perspectives* (118(12) Dec. 2010), Dr. Jennifer Peel, an Assistant Professor in the Department of Environmental and Radiological Health Sciences, and co-author Dr. Kirk Smith with the University of California, Berkeley, analyze the gaps in research regarding the relationship between estimated inhaled dose of combustion particles and cardiovascular disease mortality.

Inconsistencies reveal a gap in the evidence base along the dose-response curve between environmental tobacco smoke exposure and active smoking, and conclude that epidemiologic studies are urgently needed to quantify the cardiovascular risks of particulate matter exposures from indoor biomass burning in developing countries, which lie in the dose gap of current evidence.

Dr. Kenneth Blehm Selected as Fellow of AIHA

Dr. Kenneth Blehm, a Professor in the Department of Environmental and Radiological Health Sciences and Associate Dean for Undergraduate Education, has been selected as a Fellow of the American Industrial Hygiene Association. He was honored during the association's annual conference May 14-19 in Portland, Ore.

The AIHA Fellow designation recognizes individuals who have been full members in good standing for a minimum of 15 years and have made recognized contributions to industrial hygiene or related disciplines, either through research, leadership, publications, education, or service to AIHA. Only 5 percent of the AIHA membership can qualify for the Fellow award.

Dr. Blehm currently holds a joint appointment as Associate Dean of Undergraduate Education at the College level, and he supports industrial hygiene teaching and research at the Department level. His research interests are in the areas of noise exposure assessment, noise control, program assessment, and human factors (behavior-based safety and error correction).

Included in his accomplishments are enhancements to the undergraduate environmental health program and internships plus inroads in distance education; control of reverberant noise in public and school facilities through assessment and followed by controls provided by site personnel; and the use of behavior-based safety concepts to address errors leading to near misses or similar outcomes in the workplace.

Dr. Blehm has received the CVMBS Outstanding Academic Advising Award for Undergraduate Education; the Environmental Health Student Association Outstanding Professor Award; and the 2004 Milton M. Miller Award for Outstanding Environmental Health from the Colorado Environmental Health Association, among other awards and honors.

The American Industrial Hygiene Association is one of the largest international associations serving the needs of occupational and environmental health and safety professionals practicing industrial hygiene in industry, government, labor, academic institutions, and independent organizations.

College Remembers Dr. Robert Wrigley, Professor Emeritus

Dr. Robert Wrigley, Professor Emeritus and a faculty member in the Department of Environmental and Radiological Health Sciences for 25 years, passed away on Nov. 12, 2010, in Sydney, Australia. Dr. Wrigley, who left Colorado State University in 2007, was an outstanding veterinary radiologist who had played an integral role in the developmental years of the diagnostic imaging unit at the Veterinary Teaching Hospital.

"Robert was an outstanding veterinary radiologist who was recognized for his exceptional work in developing algorithms for computed radiography and for his leadership in development and teaching diagnostic ultrasound," said Dr. Richard Park, a close colleague of Dr. Wrigley's and Professor in the Department of Environmental and Radiological Health Sciences. "After so many years of dedicated service to CSU, he was eager to return to his much-missed homeland to dedicate himself to the growing imaging units at the veterinary teaching hospitals on the Sydney and Camden campuses, as a Professor of Veterinary Diagnostic Imaging at the University of Sydney."

Dr. Wrigley received his BVSc from the University of Sydney in 1977 and a Diploma of Veterinary Radiology from the Royal College of Veterinary Surgeons, United Kingdom, in 1981. He completed a combined radiology residency/master's degree program in the then-Department of Radiological Health Sciences at Colorado State University in 1982 and became a Diplomate of the American College of Veterinary Radiology that same year. He joined the faculty in the College of Veterinary Medicine and Biomedical Sciences at Colorado State University as an Assistant Professor in 1982.

FACULTY PROFILE

Alexander Brandl

It's an unlikely place to embark on a journey that would eventually lead him to a career as a physicist, but for Dr. Alexander Brandl it all began at the 1992 Olympic Games in Barcelona, Spain. He was not a spectator, perhaps contemplating the study of matter and its motion through space/time. He wasn't a coach or official, musing about concepts of energy and force. Rather, Dr. Brandl was an Olympian, swimming the butterfly for his home country of Austria. And, because of that, he wound up at the University of New Mexico.

"I met the head coach of the swim team from the University of New Mexico, and he asked me what I was doing after the games, and invited me to swim at UNM," said Dr. Brandl. "I was offered a scholarship and the next year started my undergraduate degree."

Dr. Brandl grew up in a small village along the Danube River, where early on he had an interest in languages and then math. After school, he began his mandatory military service, which had "great physical training," and he stayed on for four years, serving and competing in national and international swim meets. He also took a few classes at the University of Vienna, where his interest in math grew. At UNM, his interest in math developed to an interest in physics, which is basically, he notes, applied math.

"I enjoy the way physics works," said Dr. Brandl. "It's a certain way of thinking, like solving riddles and puzzles."

He completed his undergraduate degree, master's degree, and PhD in physics at UNM before returning to Austria in 2000 where he went to work for the then-Austrian Research Centers, in Seibersdorf. He worked in the internal dosimetry group and eventually took over as radiation safety officer. After a restructuring that led to the decentralization of the ARC and creation of different business units, he joined the ARC Nuclear Engineering Seibersdorf group, where he was responsible for radiation safety and on-site legacy management.

After 10 years, Dr. Brandl's American wife, Katherine, wanted to head back to the United States. A position open in the Department of Environmental and Radiological Health Sciences seemed like a perfect fit and, last summer, he moved his family to Fort Collins. Dr.

Dr. Brandl, far left, on Veterans Day

Brandl joined the Department in October and has since had a grant application (with Dr. Thomas Johnson) approved by the United States Department of Agriculture (on radiation exposures in agricultural animals, with one paper already written on their work), is working on another grant for the USDA, teaching, co-coordinating a course with Dr. John Zimbrick, and preparing for fall classes.

"I enjoy the way physics works. It's a certain way of thinking, like solving riddles and puzzles."

– Dr. Alexander Brandl

ALUMNI PROFILE

Bluegrass Music and Radiation Biology Brought Alumnus to CSU

If it weren't for bluegrass music and the banjo, it's entirely possible that Dr. John Fike would never have met Dr. Ed Gillette, never been invited to work and study at Colorado State University, never completed his doctoral program, and never made his way to his current position as Professor-in-Residence at the Brain and Spinal Injury Center, University of California, San Francisco.

"When I was at the University of Wisconsin, I went to a research meeting in St. Louis," said Dr. Fike. "In grad school, I played in a bluegrass band to earn some extra money and, at the meeting, was playing in the lobby of the conference center when Ed Gillette walked by. He stopped to listen, we talked, and I really didn't think too much more about it."

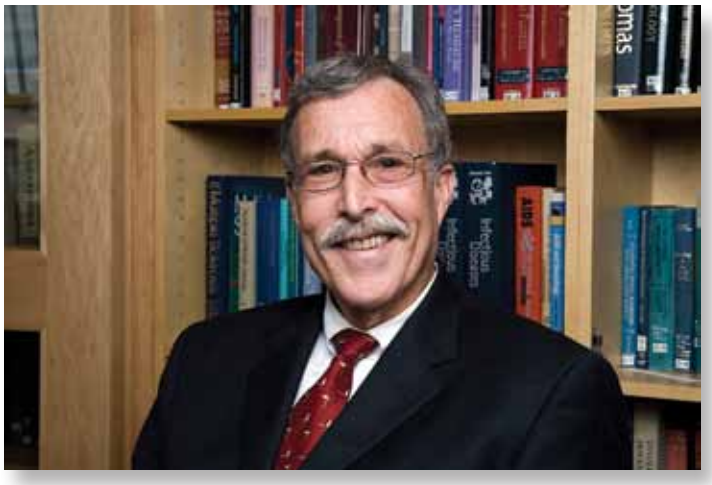
Dr. Fike, who had graduated from the University of California, Irvine, with a master's degree in radiological sciences, was at Wisconsin to work on his PhD in radiation biology. After a year, though, burned out and needing a break, he went to work as a research associate in a Chicago laboratory. He soon decided he needed to go back home to California to regroup. On his way, he stopped in Colorado to visit Ed Gillette, a man who shared Dr. Fike's love of bluegrass music and who was (unknown to Dr. Fike) apparently in need of a banjo player for his group.

"As I get to the end of my career, I think what brings me the most joy is seeing the success of individuals with whom I had the good fortune to work. Everything else tends to fade into the background."

Three weeks later, Dr. Gillette, a Professor in the then-Department of Radiology and Radiation Biology, called with the offer of a job and a place in the PhD program in radiology and radiation biology (and a place in his bluegrass band). For John Fike, that lobby bluegrass performance turned out to be a twist of fate that would shape the rest of his life.

Growing up in California, Dr. Fike had an interest in science and attended California State University where he received his bachelor's degree in biology, but was uncertain of what he wanted to do. When he arrived at Colorado State in 1975, he found an environment that embraced everyone and encouraged independent thinking.

"I don't know if it was by accident or choice, but Ed took in a lot of people who had been kicked around a bit and gave us a lot of free rein," said Dr. Fike. "He taught us how to do normal tissue irradiation and to look at radiation effects. I did my thesis on the effects of radiation on microvasculature (the smallest vessels in the



circulatory system), fully appreciating what an amazing group of people Ed had brought together. He had a tremendous impact in the field, and his students continue to do very well."

After leaving Colorado State University in 1978, Dr. Fike completed two National Institutes of Health postdoctoral fellowships before joining the University of California, San Francisco. His research over the years has focused on radiation and the brain, radiation therapy, normal tissue response, late effects of radiation exposure (such as those in radiation therapy for cancer, especially in children), cognitive impairment, traumatic brain injury, and space irradiation, as well as working to develop computed tomography imaging in the brain. Most recently, he has moved into the field of neurogenesis – the birth of new neurons – and the existence of stem cells in the brain.

"For decades, it was thought that you were born with all the neurons that you would ever have," said Dr. Fike. "Only in the last 10 years have we seen that notion first challenged, and then it proven, that new neurons emerge throughout our lives. We are working to understand the biology of these new neurons, how they form and develop, what prevents or inhibits development, and how radiation therapy and chemotherapy can affect or alter these normal processes."

Dr. Fike also conducts research in his laboratory on low-dose effects of radiation that may be seen in individuals in near proximity to a nuclear accident or detonation. He is particularly interested in combined injury, with radiation and trauma, similar to what was being seen in Japan after the March 11 earthquake and tsunami compromised the nuclear power facility in the Fukushima prefecture.

While his field of study continues to expand, Dr. Fike also is looking forward to his impending retirement. He is spending more time mentoring his students (particularly in the area of improving grant-writing skills), tending his small vineyard (Braying Ass Vineyard), writing novels, and maybe even playing a little more banjo.

"As I get to the end of my career, I think what brings me the most joy is seeing the success of individuals with whom I had the good fortune to work," said Dr. Fike. "Everything else tends to fade into the background."

ALUMNI PROFILE

Phoenix Mourning-Star

From the moment he arrived on the Colorado State University campus in August 2007, Phoenix Mourning-Star had his sights set on the world – a summer internship with the World Health Organization in Geneva, Switzerland; a Rotary Ambassadorial Scholarship in New Zealand; an expedition with BP Petroleum to Antarctica.

Now, back at Colorado State University following his year in New Zealand, Mourning-Star is a National Science Foundation Fellow with the bioenergy research group in the College of Engineering, and hard at work on his doctorate in renewable energies.

"I'm amazed at the opportunities I've been able to take advantage of here at Colorado State University," said Mourning-Star. "I've also had so much support from everyone in the Department of Environmental and Radiological Health Sciences. I never would have imagined when I came to CSU that I'd be traveling to Switzerland to work for WHO, or to New Zealand as the recipient of a Rotary International Ambassadorial Scholarship."

Mourning-Star completed his undergraduate work in mathematics at Mesa State College in Grand Junction. He went on to complete a master's degree in biostatistics at the University of Vermont, where he became interested in epidemiology. He then moved to Colorado State University, where he completed his master's degree in epidemiology under the direction of Dr. Jennifer Peel, Associate Professor in ERHS. (He defended his thesis in Fall 2010.)

The fact that Mourning-Star is pursuing his doctorate surprises even him. When he arrived back in Colorado following his work with WHO in Geneva, he was short on money and prospects. Just a few weeks before the start of the fall semester, he got an email from the Environmental Protection Agency with a message about a fellowship grant. He had applied to the program the previous year, and had mostly forgotten about the application. Now, here was the opportunity he needed to continue his graduate work.

Through the EPA's STAR (Science to Achieve Results) grant, Mourning-Star investigated the adverse health effects of air pollution sources on infants. In the summer of 2009, he was a fellow at

Johns Hopkins University, where he worked in epidemiology and public health. The Rotary Scholarship took him to New Zealand where he studied individual, environmental, and human rights law.

While in New Zealand, Mourning-Star contacted the U.S. State Department in the capital city of Wellington, and soon had a paid post with the embassy. Among his duties, he worked with the United States Department of Agriculture, wrote speeches for the ambassador, and helped in researching the administration of a $90 million joint agricultural campaign between New Zealand and the United States.

Throughout his Rotary service, Mourning-Star met with numerous Rotary Clubs and other community organizations to share the Rotary Scholar mission and connected Fort Collins middle and high school students with students in New Zealand in discussions about the importance of cross-cultural and international communication on science and the environment.

In addition to his work abroad and studies at home, Mourning-Star works with the United Kingdom group ShelterBox to raise awareness about environmental refugees and displaced people around the world. As a ShelterBox representative, he provides information and requests donations for the distribution of emergency shelter kits in disaster locations around the world.

Mourning-Star, who also is co-founder of the Society of Global Health Researchers in Action, plans to complete his doctorate at Colorado State University and pursue a career that would allow him to use science as a humanitarian and diplomatic tool for peace through environmental health and renewable energy.

Phoenix Mourning-Star worked with U.S. and New Zealand agricultural interests, including the sheep industry, during his Rotary Ambassadorial Scholarship.

NEW FACULTY

ERHS Welcomes Four New Faculty Members

The Department of Environmental and Radiological Health Sciences welcomes Drs. J. Lucas Argueso, James Custis, Alexander Brandl, and Dongqing Zhang to the Colorado State University community.

Dr. J. Lucas Argueso

Dr. Argueso comes to Colorado State University from Duke University Medical Center in Durham, N.C., where he was a research scholar in the Department of Molecular Genetics and Microbiology. Prior to that, he was on the faculty of Campinas State University in Brazil.

He received his bachelor's degree in agronomic engineering and master's degree in genetics and plant breeding from the University of São Paulo. He then completed his PhD in genetics and development at Cornell University in 2004. Dr. Argueso's dissertation was on the roles for the *Saccharamyces cerevisiae* MLH1 mismatch repair gene in genome stability and genetic recombination.

His current research interests include chromosomal rearrangements and phenotypic consequences of altered genome architecture, effects of environmental exposure on gene copy number variation and chromosome structure, molecular mechanisms of DNA double-strand break repair, structural genome variation in natural yeast populations, and genomics of industrial yeast strains and bioethanol fermentation.

Dr. James Custis

Dr. Custis is the newest member of the veterinary radiation oncology team at the Colorado State University Animal Cancer Center. He completed his radiation oncology residency at the ACC and stayed on to accept a faculty position.

He received his bachelor's degree in animal and poultry sciences from the Virginia Polytechnic Institute & State University; and his Doctor of Veterinary Medicine from the Virginia-Maryland Regional College of Veterinary Medicine in Blacksburg, Va. He completed his master's degree in radiation cancer biology and oncology this spring at Colorado State University.

His research interests center upon evaluating the response of spontaneously occurring tumors to ionizing radiation. Use of the latest technology allows for the precise delivery of intensity-modulated radiation therapy and stereotactic radiation therapy plans, novel to veterinary medicine. Both modalities seek to maximize local tumor control, while minimizing the impact upon surrounding normal tissues. His efforts, to date, are focused upon the ongoing clinical study of stereotactic radiation therapy both as a limb-sparing option for canine appendicular osteosarcoma and as a novel treatment for canine nasal tumors.

Dr. Alexander Brandl

Dr. Brandl comes to Colorado State University from Nuclear Engineering Seibersdorf GmBH in Austria. He received his bachelor's degree in physics and mathematics, master's degree in physics, and doctorate in physics all from the University of New Mexico.

Following completion of his PhD, Dr. Brandl returned to Austria in 2000 and went to work for the then-Austrian Research Centers in Seibersdorf. He worked in the internal dosimetry group and eventually took over as radiation safety officer. After a restructuring that led to the decentralization of the ARC and creation of different business units, he joined the Nuclear Engineering Seibersdorf group, where he was responsible for radiation safety and on-site legacy management.

His research interests include computer simulation of radiation field, shielding, and detector efficiencies; radionuclide transport; environmental and workplace monitoring; and internal dosimetry.

Dr. Dongqing (David) Zhang

Dr. Zhang comes to Colorado State University from the Department of Radiation Oncology, James Cancer Hospital, at The Ohio State University. He is the Department's new medical physicist in radiation oncology.

After receiving his bachelor's degree in optics from Shandong University in Jinan, China, Dr. Zhang attended the Institute of High Energy Physics, Chinese Academy of Sciences, in Beijing, where he received his master's degree in nuclear physics. He then came to the United States and The Ohio State University for a master's degree in electrical engineering and a PhD in physics. He completed a medical physics internship, and was a medical physics postdoctoral fellow and resident from 2007 until joining Colorado State University this year.

His clinical experience includes commissioning, quality assurance, and treatment planning in cancer radiation therapy. His research experience includes studies in intensity-modulated radiation therapy, assessment of tumor response, radiobiological modeling, and other areas of medical physics.

Emitter Online to Be Introduced This Fall

Having the magazine online makes it easier to find out more about articles you're interested in, send articles of interest to friends and colleagues, and link directly to websites referenced in the magazine.

Starting this fall, *Emitter* magazine will be moving online as the Department of Environmental and Radiological Health Sciences looks to engage alumni, friends, and donors through an interactive website that invites comments and conversation. Going online also will help the Department reduce the cost of *Emitter* while preserving quality and conserving paper and ink.

Having the magazine online makes it easier to find out more about articles you're interested in, send articles of interest to friends and colleagues, and link directly to websites referenced in the magazine. The online magazine also offers the opportunity to post videos, share blogs, and connect to the College of Veterinary Medicine and Biomedical Sciences' social media pages.

Alumni, friends, and donors with a current email address on file at the University will receive an email notification when *Emitter* is released in the fall. If you currently receive the monthly online *E-Insight Magazine* from the College of Veterinary Medicine and Biomedical Sciences, we have your email address on file. If you don't receive *E-Insight Magazine*, we don't have your email address or it is out of service.

If we have your email address, the fall *Emitter* will come to you. If not, and you would like to receive the notification, please send a message to cvmbs_social_media@mail.colostate.edu, with "Emitter" in the subject line. In order to avoid duplicate emails of the *Emitter* notification to your inbox, please help us by providing the following information in your email message:

First and Last Name
Street Address with City, State, and ZIP Code
Email Address

Please note that you may cancel your email notification at any time.

EH Scholars Enjoy Opportunity to Participate in CURC

Students from the College of Veterinary Medicine and Biomedical Sciences, including the three Environmental Health Honors Scholars, showed their research prowess at the annual Celebrate Undergraduate Research and Creativity Showcase held April 19 in the Lory Student Center at Colorado State University.

CURC provides a venue for integrating experiential learning into the undergraduate curriculum. The goals include providing research opportunities for bright, ambitious Colorado State undergraduates and fostering close connections between faculty members and students. Most projects are faculty-mentored endeavors, meaning students collaborate directly with a faculty member on a research project.

Nearly 230 posters and displays were presented in the Lory Student Center Main Ballroom at this year's CURC. Environmental Health Scholars Cecilia Davies, Amy Nees and Vi Nguyen, all participated in the 2011 CURC event. Nees was awarded College Honors for her presentation on the "Prevalence of Carpal Tunnel Syndrome among Dairy Workers."

Students, mentors and poster topics are:

Cecilia Davies – Mentor Dr. Ronald Tjalkens

Davies worked with Dr. Tjalkens in his neuroscience laboratory investigating causes and treatments for Parkinson's disease. She has learned about modern cell biology techniques used in the lab for experiments aimed at evaluating cellular responses to agents.

Amy Nees – Mentor Dr. John Rosecrance

Nees worked with Dr. Rosecrance and graduate student Anuja Patil in ergonomic research aimed at evaluating the presence of carpal tunnel syndrome among dairy parlor workers. Nees has been involved with fieldwork conducting nerve conditions testing on subjects for data collection and coding, input, and management for the project.

Vi Nguyen – Mentor Dr. Thomas Johnson

Nguyen worked with Dr. Johnson evaluating the effectiveness of coffee filters to remove contaminants in water and improve overall water quality. She used gas chromatograph mass spectroscopy to evaluate contaminant levels before and after filtration.

HEALTH AND MEDICAL PHYSICS CORNER

CRMCHPS and CSU Student Branch Activities

The Central Rocky Mountain Chapter of the Health Physics Society, in cooperation with the CSU Student Branch of HPS, had a busy spring agenda. With the assistance of the Mountain and Plains Education and Research Center, several outstanding speakers were invited to speak at the organization's joint meetings. The first joint meeting of the year was with Dr. Eric Moore, who spoke in February on Department of Energy surveillance programs. In March, Ron Kathren gave a seminar on uranium toxicity for the joint meeting. The annual technical meeting was held on April 7.

Health Physics Students Reach Out to Colorado High Schools

Health physics students from CSU were invited this year to a return engagement at Poudre High School. Chemistry teachers Jeramy Jasmann and Kelly Suto asked the CSU students to teach four chemistry classes, with each class designed to answer specific student questions. All the PHS chemistry students enjoyed the cloud chamber and demonstrations with the smoke detector and Fiestaware.

Chris Lee at Fort Collins High School also invited the health physics students to present to all his chemistry classes. The FCHS students were well prepared for the presentations, and one student in particular seemed to have prior knowledge of the basics of radiation safety. As it turns out, he is the son of a CSU health physics alumnus.

Dena Palser at Lone Star High School, in Otis, Colo., invited the CSU health physics students to present a class on radiation to the entire school. The presentation was set up in the gymnasium, and half the school attended the first hour and the remaining students for an hour plus an additional few minutes to ask questions. Although it is a small school (fewer than 100 students total for all grades), the faculty there was outstanding, and the students clearly understood the concepts presented and were able to predict the outcome of almost every demonstration.

Article Reaches Top 10 in JAALAS Downloads

An article authored by Drs. Matthew Rosenbaum (East Carolina University), and Drs. Susan VandeWoude (CSU) and Tom Johnson (ERHS), is in the top 10 downloaded articles from the *Journal of the American Association for Laboratory Animal Science* in 2010, even though the article was published in 2009. The published study, "Effects of Cage-Change Frequency and Bedding Volume on Mice and Their Microenvironment," investigated how bedding volume and the interval between changes affected microenvironmental conditions, health, and behavior of mice housed in individually ventilated cages.

Smiling for the camera at the CRMCHPS and CSU Student Branch joint meeting

Department of Environmental and Radiological Health Sciences
College of Veterinary Medicine and Biomedical Sciences
1681 Campus Delivery
Fort Collins, Colorado 80523-1681

ERHS Calendar Summer/Fall 2011

Aug. 22
Fall Classes Begin at Colorado State University (www.colostate.edu)

Sept. 27-30
Colorado Environmental Health Association, 2011 Annual Education Conference and Exhibition, Fort Collins, Colo. (www.cehaweb.com)

Sept. 30-Oct. 2
Colorado State University Homecoming and Family Weekend (http://www.homecoming.colostate.edu)

Nov. 5-8
American Industrial Hygiene Association, Professional Conference on Industrial Hygiene, Baltimore, Md. (www.aiha.org)

Nov. 27-Dec. 2
Radiological Society of North America, 97th Scientific Assembly and Annual Meeting, McCormick Place, Chicago (www.rsna.org)

Dec. 16-17
Colorado State University Fall 2011 Commencement (www.commencement.colostate.edu)