

# Superfund Research Program e-Posted Notes

SRP Annual Meeting Special Edition

## E-POSTED NOTES SPECIAL EDITION: 2018 SRP ANNUAL MEETING

### SRP Annual Meeting a Success

The NIEHS Superfund Research Program (SRP) 2018 Annual Meeting Nov. 28-30 in Sacramento brought together more than 400 SRP researchers, administrators, trainees, and partners from across the nation to share findings and discuss their experiences.

This special edition e-Posted Notes newsletter provides a recap of sessions, photos, and other moments throughout the week in Sacramento. Thanks to everyone involved in the SRP Annual Meeting, and a special thanks to the organizers from the University of California, Davis, for making it such a success!

For a broad overview of the meeting, visit the [NIEHS Environmental Factor](#).

## CELEBRATING 30 YEARS OF THE SRP

### Welcoming Grantees

Talks and events emphasized innovative projects in SRP that promote environmental health, particularly research driven by early stage investigators and trainees. The meeting was hosted by SRP centers at the University of California (UC) Davis, UC Berkeley, and UC San Diego.

The meeting kicked off with UC Davis Center Director **Bruce Hammock** who thanked everyone for attending and introduced **Paul Dodd**, the UC Davis Associate Vice Chancellor for Interdisciplinary Research and Strategic Initiatives.



Meeting attendees listen intently to the opening speakers.

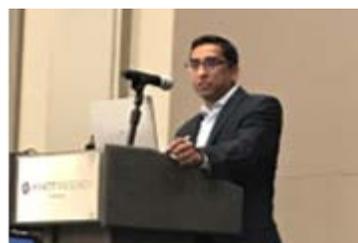
During opening remarks, SRP Director **William Suk** expressed his eagerness to hear about all the incredible successes of SRP trainees throughout the program.

## KEYNOTE SPEAKERS DESCRIBE IMPORTANT RESEARCH ADVANCES

### Mohit Jain: Mapping Human Chemical Diversity and the Environmental Landscape of Disease

**Mohit Jain**, an assistant professor at UC San Diego, described his work integrating large-scale data sets to map the chemical landscape of human disease. He combines cutting edge mass spectrometry techniques to assess exposures with population-scale human biosampling data. By mapping the exposome, or the

totality of human exposures, Jain aims to better understand the role of toxicants on different diseases, including cardiovascular disease.



Jain is using high-throughput mass spectrometry to measure exposure-related small molecules in human blood.

### Rebecca Neumann: The Unique Vulnerability of Shallow Lakes to Arsenic Contamination

University of Washington SRP Center researcher **Rebecca Neumann** explained how lake properties impact the amount of arsenic that transfers from sediments into the aquatic food web. Her team discovered high concentrations of arsenic in the water and plankton of well-mixed shallow lakes. The water in shallow lakes warms more uniformly than deep lakes, enabling these lakes to remain well-mixed with only brief periods of stratification. According to the UW SRP research, this mixing increases the opportunity for arsenic in the sediments to move up into the overlying water and enter the aquatic food web.



Neumann, right, answers a question about her research from EPA representative Larry Zaragoza, left.

## MAIN MEETING SESSIONS: SCIENTIFIC INNOVATIONS

### Session 1: Highlighting Results from KC Donnelly Awardees

In the first scientific session, previous KC Donnelly Award winners described their experiences and results from collaborative externships.

- **Victoria Parker**, a graduate student at the University of Iowa, is exploring how polychlorinated biphenyls (PCBs) inhibit important enzymes that work with the hormone estrogen in the body.
- Columbia University graduate student **Ann Bozack** expanded her work using statistical approaches to characterize multiple environmental exposures and assess DNA methylation in exposed individuals.
- **Rosemarie de la Rosa**, a UC Berkeley graduate student, is developing ways to understand the effects of potentially harmful chemical mixtures on a molecular pathway involved in stress response.
- University of Washington postdoc **Pamela Barrett** is determining seasonal trends in arsenic concentration and speciation as well as the biological uptake of arsenic in lakes with legacy pollution in sediments.



Parker, right, with moderator Isaac Pessah, left. Parker's externship at the University of Kentucky expanded the scope of her current work to explore important differences between human and rodent cell models.

### Session 2: Mechanisms of Toxicity

The second session highlighted work by SRP-funded scientists who are exploring how environmental contaminants play a role in specific processes in the body, which can lead to adverse effects.

- Michigan State University (MSU) postdoc **Maggie Williams** is working to understand how dioxins can alter the gut microbiome. She is also exploring how activated carbon has the potential to sequester dioxins and reduce impacts on the microbial community in the gut.
- **Eric Uwimana**, a University of Iowa graduate student, demonstrated how PCBs can affect calcium signaling in human cells, which may be associated with liver diseases such as non-alcoholic fatty liver disease.



Williams is collaborating with other MSU SRP projects to understand how activated carbon reduces the bioavailability of dioxins in the body.

### Session 3: Connecting Exposures to Health Outcomes

In session 3, SRP-funded researchers described how their research has provided new information about how exposures to environmental contaminants can affect health.

- Using a mouse model, MSU graduate student **Kelly Fader** found that dioxin impacts circadian-controlled metabolism, which may be associated with development of metabolic disorders.
- **Amber Cathey**, a graduate student at the University of Michigan, explained how exposure to polycyclic aromatic hydrocarbons (PAHs) may disrupt hormones during pregnancy, and that women may be more vulnerable to these effects early in pregnancy.
- Northeastern graduate student **Nancy Cardona** described her work to increase environmental health knowledge and enhance decision-making in underserved communities in Puerto Rico.
- **Oluwadamilare Adebambo**, a postdoc at the University of North Carolina at Chapel Hill, is exploring how cadmium in the human placenta may lead to mitochondrial dysfunction, which is associated with preeclampsia during pregnancy.



Adebambo described how she looked specifically at mitochondrial DNA abundance, which is an indicator of dysfunctional or damaged mitochondria.

### Session 4: Innovations in Contaminant Measurement and Remediation

The fourth session featured ways SRP-funded researchers are working to better characterize contaminants and associated impacts. Presenters also described innovative remediation technologies.

- **Gregory LeFevre**, a professor at the University of Iowa, described how some transformation products from emerging contaminants may have greater ecological or health impacts than the original compound. He is using high-resolution mass spectrometry techniques to discover new transformation products with human health implications.
- University of Washington, Tacoma, professor **Edward Kolodziej** is characterizing urban stormwater impacts on water quality to better understand ecosystem health. He has developed chemical signatures linked to various contaminant sources and estimated the contributions of these sources to highway runoff and

urban receiving waters.

- **Chuqing Zhou**, a graduate student at UC Davis, is developing a microfluidic print-to-analyze system, which provides a method for automated biological sample preparation. The method is low-cost, easy-to-use, and allows scientists to easily share protocols and reproduce results.

- University of Kentucky professor **Dibakar**

**Bhattacharyya** is developing responsive membranes to remove contaminants such as PCBs from water. He explained how they developed both a lab- and full-scale membrane platform to reduce the toxicity of chemicals.

- **James Ranville**, a Colorado School of Mines professor, described a project where he and his team examined the recovery of a mining-impacted stream following treatment. They found that stream quality has improved and although species abundance has also improved, these measures have not yet returned to that of upstream reference sites.



Bhattacharyya got out into the audience to discuss development of innovative membrane technologies.

## Session 5: Environmental Impacts of Natural Disasters

In session 5, SRP-funded researchers explained how they are studying the impacts of disasters, including characterizing mixtures to identify hazards.

- Texas A&M University professor **Ivan Rusyn** is applying new approaches to group complex substances and mixtures according to similarities in their chemical composition or biological activity in cell models. Using these new methods, he aims to categorize real-life environmental mixtures to help characterize and manage both existing hazardous waste sites and new contamination events resulting from weather-related emergencies.

- **Michael Welton**, a research fellow at Northeastern University, is working with the Puerto Rico Testsite for Exploring Contamination Threats (PROTECT) SRP Center to identify potential sources of hurricane-related exposures and explore climate change, maternal stress, and access to care, potable water, and nutrition as major challenges to maternal and child health following Hurricanes Irma and Maria.

- **Zunwei Chen**, a graduate student at Texas A&M University, demonstrated the potential applicability of a cell-based screening approach to test and group complex environmental mixtures and provide faster response to environmental emergency events.

- UC Riverside graduate student **Allison Taylor** is making connections between the age of contaminants such as PCBs and bioavailability, the ability of organisms to take up the contaminants. She discussed the implications of age and bioavailability in assessing risk and cleaning up the contaminants.



Chen described his method using 42 chemicals and 16 mixtures to test the applicability of a toxicity screening method.

## Session 6: Trace Element Speciation, Bioavailability, and Toxicity

Session 6 highlighted SRP-funded researchers who are working to understand how people are exposed to environmental contaminants and why some people are more susceptible than others.

- Through his work with a cohort in Chile, UC Berkeley

professor **Craig Steinmaus** is investigating long-term effects of arsenic contamination and identifying those at greatest risk.



Welch is examining the links between drinking water arsenic and vaccine antibody concentrations in children in Bangladesh.

- **Barrett Welch**, a graduate student at Oregon State University, provided evidence showing how early-life arsenic exposure is associated with decreased likelihood of clinically protective levels of serum antibody to common vaccines in children.
- Based on her recent findings, Duke University professor **Heileen Hsu-Kim** suggested that mercury uptake into passive samplers and the composition of microbial communities in sediments could be a way to estimate net methylmercury production in the environment.
- **Ana Navas Acien**, director of the Columbia University SRP Center, described work by their Research Translation Core to promote private well-testing for arsenic, including through health portal messaging.

## Session 7: PFAS Detection, Treatment, and Impacts

Session 7 featured innovative ways that SRP grantees and partners are detecting polyfluoroalkyl substances (PFASs) and developing methods to clean it up in the environment. Presenters also discussed research on the health effects of PFASs.

- **John McKernan** of the U.S. Environmental Protection Agency (EPA) discussed his laboratory study exploring ways to cleanup PFASs using stabilizing agents to immobilize PFASs in soils from two Superfund sites.
- **Jennifer Guelfo**, a former postdoc at Brown University and 2017 KC Donnelly Award Winner, explained how she evaluated the occurrence of PFASs in water, sediment, and shellfish in Narragansett Bay.
- University of Rhode Island postdoc **Jitka Becanova** is testing a nanographite-based hydrogel as a construction material for a PFAS passive sampler in the aquatic environment.
- **Joseph Braun**, a professor at Brown University, is identifying metabolic pathways associated with childhood exposure to perfluorooctanoic acid.



Becanova, a KC Donnelly award winner, traveled to Brown University to learn skills and cutting-edge techniques related to advanced nanomaterials.

## HIGHLIGHTING AND REWARDING TRAINEE SUCCESSES

### Wetterhahn Award: Stephanie Kim

The SRP selected **Stephanie Kim** from Boston University for the 2018 Wetterhahn Memorial Award. Kim is pursuing her doctoral degree under the mentorship of **Jennifer Schlezinger**. Kim was recognized for her research to explore the effects of exposure to contaminants on cells and molecular pathways that could lead to metabolic disorders such as obesity and diabetes. Read more about Kim and her research in the [NIEHS Environmental Factor](#).

### KC Donnelly Award Talks

Scientific sessions featured nine talks given by [KC Donnelly Externship Award](#) Winners, including all seven of the [2017 Winners](#), who described their experiences and results from an SRP-funded externship at another SRP Center or at a federal or state agency. The trainees described interesting and innovative research they performed as a result of the KC Donnelly Award.

## Graduate Student Poster Winners

The graduate student poster competition provided an opportunity for SRP graduate students to explain their research and showcase innovative findings. Congratulations to the six students who received awards in the annual poster competition!

In the environmental sciences and engineering category, the winners were:

- **Sara Gushgari**, University of California, Berkeley: "Syntrophic Interactions Ameliorate Arsenic Inhibitions on the TCE-Dechlorinating *Dehalococcoides mccartyi*"
- **Amber Kramer**, Oregon State University: "Polycyclic Aromatic Hydrocarbon (PAH) Oxidation During Formation of Secondary Organic Aerosol (SOA) Particles: Implications for Human Exposure to Fine Particulate Matter (PM<sub>2.5</sub>)"
- **Jean Van Buren**, University of California, Berkeley: "Ring-Cleavage Products from Advanced Oxidation of Alkylbenzenes"



Suk, center, pictured with trainee poster winners, from left, Shankar, Van Buren, Gushgari, Kramer, and Rice. Not pictured: Barney.

In the health sciences category, the winners were:

- **Jazmyne Barney**, University of Kentucky: "Diet-Induced Steatohepatitis Alters Liver and Gut Microbiota Catalyzed Green Tea Metabolism in Mice"
- **Prarthana Shankar**, Oregon State University: "Combination of Developmental Toxicity and Transcriptomic Analyses in Zebrafish to Classify Polycyclic Aromatic Hydrocarbons (PAHs)"
- **Brittany Rice**, University of Kentucky: "Protective Effects of Maternal Exercise on Male Offspring Born to Mothers Exposed to Polychlorinated Biphenyl 126 (PCB126)"

## Training Needs in Big Data

During the meeting, trainees had an opportunity to provide input on improving training in data science by posting sticky notes on the data science poster. Many useful insights were collected during this exercise, including suggestions to offer more workshops and classes and matching trainees with knowledgeable mentors to offer guidance.



An SRP trainee adds suggestions to the poster about data science training needs.

## HIGHLIGHTING RESEARCH TRANSLATION AND COMMUNITY ENGAGEMENT

### Landmark Successes of the SRP

As part of the Research Translation Core (RTC) and Community Engagement Core (CEC) satellite meeting, attendees heard about the successes of SRP Centers that have been funded for many years.

- UC San Diego SRP Center Director **Robert Tukey** spoke about the increase in liver disease associated with exposure to toxins, such as the

antimicrobial triclosan, which is found in consumer products like toothpaste. He shared how research from their Center has helped shed light on the mechanisms of liver toxicity and helped encourage companies to remove triclosan from consumer products.

- **Kent Udell**, formerly with the UC Berkeley SRP Center, described his research to remediate groundwater contaminated with volatile organic compounds and other hazardous substances using an innovative steam injection method. He explained how use of this technology is faster, cheaper, and more effective than existing treatment methods.
- Northeastern University RTC leader **Phil Brown** talked about their efforts in Puerto Rico in response to the Zika outbreak and in the aftermath of Hurricane Maria. He emphasized the importance of building environmental health infrastructure, which has allowed the team to leverage existing resources to obtain additional funding.



During the panel discussion, participants highlighted the importance of fundamental research, and how it lays a scientific foundation for research translation and broader impacts on public health. They also discussed the importance of making research actionable and promoting community engagement through building environmental health literacy, promoting behavioral changes, and informing policy.

### Working Across Sectors

Participants had the opportunity to hear diverse perspectives outside of the SRP during a session featuring representatives from industry, government, science communication organizations, and community groups.

- **John Freeman** of CSO Intrinsyx shared the industry perspective and discussed the use of endophyte assisted phytoremediation using hybrid poplar trees.
- Government partner **Ben Gerhardstein** from the Agency for Toxic Substances and Disease Registry (ATSDR) explained how a collaboration between SRP and ATSDR can benefit communities by streamlining communication, presenting a unified message, combining expertise, and broadening the audience to hear and address community concerns.
- **Destiny Davis** of ScienceSays described the need for scientific communication to encourage dialogue, put data in context, and provide an open space for asking questions.
- Community partner **Adriana Renteria** from the Community Water Center stressed the importance of representing community needs and building trust in research. She also described her organization's efforts to develop a publicly available GIS tool to identify water vulnerable areas.



During a breakout session, participants discussed approaches to engaging with community partners. From left to right: Clare Pace, UC Berkeley; Ted Emmett, University of Pennsylvania; Phil Brown, Northeastern University; Carmen Velez Vega, University of Puerto Rico; Ilya Zaslavsky, UC San Diego; Andrew Geller, U.S. EPA

During break-out sessions, participants discussed how to actively and effectively engage people with scientific communication, how to engage communities and address their concerns through research, and ways to leverage shared interests and goals with partner agencies like ATSDR and industry.

## Engaging with Tribal Partners

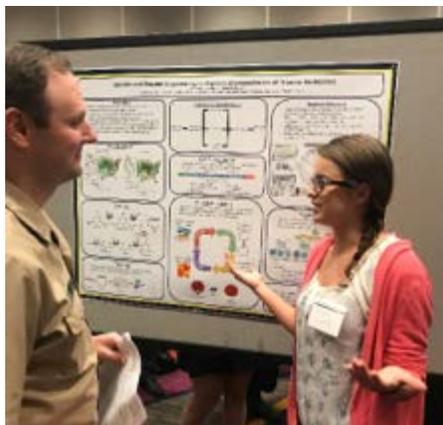
Attendees also heard about community engaged research approaches for working with tribes and impacted tribal lands.

- **Melissa Gonzales**, RTC leader at the University of New Mexico, described how they are using traditional art and symbolism to communicate how exposure to uranium damages DNA and why the nutrient zinc may help protect cells and restore their healthy function. A community partner working with the Center, **Sarah Henio-Adeky**, explained the importance and challenges of translating scientific concepts into the Diné language.
- UC Davis CEC leader **Beth Rose Middleton** shared the perspective of their community partners in the Yurok Tribe. She emphasized the importance of accepting tribal knowledge and empowering impacted communities to participate in decision-making as part of developing meaningful partnerships.
- **Kathleen Vandiver**, CEC leader at the Massachusetts Institute of Technology, described a pilot citizen science study in partnership with the Passamaquoddy Tribe in Maine. The project, which involves well water sampling for arsenic and other metals, is helping to enhance environmental health science education and build the capacity of their tribal partners to conduct research.
- Director of the NIH Tribal Health Research Office, **David Wilson**, spoke about NIH efforts to engage and ensure input from tribal leaders across the nation, as well as to expand training opportunities for American Indian and Alaska Native Communities.

## Moving Technologies to the Real World

SRP partners from the EPA joined an early-bird panel discussion on tips and resources for getting the most out of field-testing new technologies that detect contamination and reduce it.

**Dan Powell** and **John McKernan** of the EPA described EPA's interest in addressing drinking water and soil contamination. They described past programs and a future vision for moving technologies from the lab to the field and finally to commercial use. They also emphasized the importance of collaboration and leveraging existing infrastructure and resources.



McKernan, left, hears about work by UC Davis graduate student Morgan Connolly at the poster session.

## TRAINING FUTURE SCIENTIFIC LEADERS

### Trainee Satellite Meeting

A special trainee program featured sessions on non-academic careers and academic survival skills. It also introduced trainees to diverse professional career tracks and provided networking opportunities with SRP trainee alumni. **Tyrone Hayes** from UC Berkeley gave the keynote address about the impact of chemical contaminants on environmental and public health with a particular focus on environmental justice concerns and the role that exposures play in health

disparities.

During the session on non-academic careers, panelists discussed successes in diverse career areas and shared tips for job searching and networking. In a session dedicated to big data,

**Nirav Merchant**, Director of the University of Arizona Data Science Institute and CyVerse, described how to unleash the inner data scientist and how to scale science using community cyberinfrastructure.

SRP trainee alumni participated in round table discussions for professional networking and career options. A special thank you to the SRP alumni and partners who provided thoughtful insights into different career trajectories.



Trainees also participated in the technology fair and other meeting activities. Shown here, Christine Ghetu, a trainee from the Oregon State University SRP Center, described the team's wearable silicone bracelets that measure exposure to thousands of chemicals.

## TIME FOR SCIENTIFIC AND PROGRAMMATIC DISCUSSION

### Poster Sessions Facilitate Collaboration

During two poster sessions, more than 95 SRP graduate students, postdoctoral researchers, and principal investigators presented innovative SRP-funded research. As part of the student poster competition, trainees shared their research and its significance for SRP stakeholders and the public.

These sessions provided an opportunity for researchers and trainees to learn about others who are doing related work and facilitated collaborations. Visit the [SRP Annual Meeting Full Program](#) for a list and abstracts for each poster.

### Technology Demonstrations Offer Hands-on Exchanges

The meeting also featured a technology fair with demonstrations of SRP-funded products. During the first session, passive sampling devices and material technologies from SRP Centers across the country were on display.



A trainee from the Texas A&M University SRP Center, presented her research to Kelly Pennell of the University of Kentucky SRP Center.

- Brown University: "Graphene-enabled toxicant barrier technologies for personal protection"
- Oregon State University: "Silicone wristbands and passive sampling devices for personal monitoring and assessing bioavailability"
- University of Iowa: "Passive air samplers for PCBs"
- University of Kentucky: "Water remediation through responsive membranes"
- University of Rhode Island: "PFAS passive sampling devices"

The second session featured clean-up and detection technologies developed by SRP small business grantees.

- Entanglement Technologies, Inc: "AROMA-VOC real-time chemical vapor analyzer"
- GlycoSurf, LLC: "Novel rhamnolipid surfactants for remediation of metal contaminated waste streams"
- Microvi Biotechnologies Inc: "Biocatalytic degradation of 1,2,3-trichloropropane for achieving extremely low regulatory limits"
- OndaVia, Inc: "Raman spectroscopy for environmental monitoring"
- Picoyune: "Plasmonic mercury analyzers for field monitoring of vapor, liquid, and solid samples"

SRP grantees held breakout meetings during lunch throughout the week to catch up with colleagues. For SRP Center Administrators, a satellite meeting enabled them to get to know one another and NIEHS staff, and to learn about new NIEHS guidelines.



At the Small Business Innovative Research Demonstration Tables, SRP Health Scientist Administrator Michelle Heacock, Ph.D., left, discussed a mercury analyzer developed by Picoyune.



A breakout meeting for SRP Center Administrators enabled them to get to know one another and NIEHS staff and to learn about new NIEHS guidelines.