



Contributed by Tyler Frankel

Spring Newsletter

April 2022



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Announcements

**April 10-12th: 2022
CPRC/HDC Annual
Spring Meeting**



Photo: A smiling snowy owl in Cambridge, MD. Photo taken by Rebecca Lazarus

Mission Statement

Serving the Chesapeake-Potomac Region (Maryland, DC, Virginia, and West Virginia), our chapter of SETAC North America (SNA) provides a professional forum for individuals from private industry, academia, and government agencies who are engaged in the study, analysis and solutions for environmental problems, management, and regulation of natural resources, and/or research and development. We facilitate networking and educational opportunities for scientific professionals, mentoring and career guidance for students, and environmental education and outreach for the public.



Keep in touch with CPRC SETAC



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2022 – 2024	Andrew East, U.S. Army Public Health Center	andrew.g.east.civ@mail.mil
2020 – 2022	Tyler Frankel, University of Mary Washington	tfrankel@umw.edu
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Assistant Editors	Michael Quinn, Andrew East, Nathalie Lombard	

President's Podium



It is my great pleasure to welcome everyone to the Year of the Tiger, known for courage and generosity with a drive to help others. I sincerely thank all our members and sponsors for their great support during this challenging time! We could not have done these successful events (e.g., Spring Meeting, Short Courses, Fall Dinner, and Happy Hours) without your contribution and participation in past year (2021). While safety and health are our top priorities, I am very optimistic and hopeful that in 2022 we can start planning more in-person events where people are able to safely gather indoors on a more regular basis.

At the beginning of year 2022, we are fortunate to have three new members to join our team. They are Debra Joseph as new Vice President, Andrew East as new Board member, sector government, and Thomas Bean as new Secretary. They will officially start after this year's spring meeting in April and serve a three-year term. We are also excited to have CPRC Inclusive Diversity Committee in 2021 as part of our Membership Committee, with Jennifer Flippin (jennifer_flippin@nps.gov) as CPRC Inclusive Diversity Representative, and Nathan Sell (treasurer.cprc.setac@gmail.com) as Membership Committee Chair. With the unmatched expertise and fresh perspectives that they bring to our team, we look forward to creating a more inclusive and diverse environment, and strengthening our service for the members from private industry, academia, and government agencies in CPRC region (Maryland, DC, Virginia, and West Virginia).

Most importantly, after being delayed for two years due to the COVID pandemic, we work with the Hudson Delaware Chapter together to have the Joint CPRC-HDC SETAC 2022 Spring Meeting on April 10th-12th, 2022 (Learn more about this meeting [here](#)). We received many high-quality abstracts from both chapters, and we are happy to see that CPRC student members participate actively in the meeting to share their results and thoughts with broad audience across both chapters. On a personal level, I am very excited about this in-person opportunity to meet my peers and friends who I have not seen in person since I joined CPRC SETAC in 2020. I also would like to remind you that next SETAC North America meeting (43rd) is planned as hybrid on Nov. 13th, 2022 at Pittsburgh, PA.

If you want to know more about and connect with our officers and boards of director, their contact information can be found [here](#). If you have any suggestions or ideas, or are interested in contributing to CPRC SETAC in any forms (e.g., donation, volunteers, etc.), feel free to contact us at president.cprc.setac@gmail.com or directly speak with any of our officers and boards of director. We always welcome volunteers in any of our committee: Events Planning, Communications, Memberships, and Inclusive Diversity, with more details available [here](#). We are also planning to have more networking events in this year, stay tuned by checking our website at <https://cprcsetac.wordpress.com/>.

I look forward seeing you all in more engaged platforms this year! Stay safe, healthy, and connected!

Guangbin Li, Ph. D

CPRC President 2022-2023

New Member Spotlight

DEBRA JOSEPH, Vice President



I believe strongly in environmental science communication between professionals, students, business people, and the general public. My goal for CPRC is to support and further these efforts. My educational background includes a focus on biological impacts of anthropogenic contaminants. I hold a master's degree in Conservation Biology from SUNY-Environmental Science and Forestry. I also obtained two bachelor's degrees, one in Environmental Science and Studies at Towson University and the other in History from Tulane University. As a graduate researcher at SUNY-Environmental Science and Forestry, I studied the presence and movement of environmental estrogens in central New

York state at Onondaga Lake and its associated wetlands, and as an undergraduate researcher at Towson University in Maryland, I assessed the differential survival of tadpoles raised in clean and stormwater retention pond systems. I found my way to environmental science while investigating the effects of environmental hazards and disasters on at-risk communities for the Annie E Casey Foundation.

In addition to my ecotoxicology background, throughout my career I have focused on ensuring high-quality data collection and management, implementing demanding quality control practices and procedures, and raising community awareness and facilitating information exchange of scientific matters. My career has included field positions, lab work and desktop analysis, along with positions where I organized and provided significant logistical support for meetings, fundraisers, and alumni networking. I have worked for the state of Maryland to track, prevent, and treat forests for pathogens and invasive species, worked with watermen to track daily catch, even worked for the US Census. Prior to my position as VP, I worked as the Newsletter Editor for CPRC in 2013 - 2015. I was also a board member for Maryland's chapter for ACS. In my free time, I enjoy hiking and baking.

THOMAS BEAN, Secretary

Global Regulatory Ecotoxicologist with FMC at the Stine Research Center



I first joined SETAC a decade ago while studying for my PhD in Environmental Science at the University of York, UK. I moved to the United States in 2015 for an Avian Toxicology post-doc in a position jointly held between the University of Maryland, College Park and the US Geological Survey Patuxent Wildlife Research Center (currently known as USGS Eastern Ecological Science Center at the Patuxent Research Refuge). Under the supervision of Dr Barnett Rattner, Prof. William Bowerman, Dr Natalie Karouna-Renier and Dr Paula Henry, I worked on, and lead, several avian related environmental contaminants projects involving a variety of lab and field work. During my post-doc, I was a member of CPRC. I attended, and presented, my research at

the CPRC annual meetings in Charlottesville in 2016 and Annapolis in 2017.

In March 2018, I left Maryland (and CPRC) to take a position as Avian Reproduction Study Director at a Contract Research Organization, Smithers, at their avian toxicology laboratory in Snow Camp, North Carolina. In November 2020 I moved on to my current position as a Global Regulatory Ecotoxicologist with FMC at the Stine Research Center in Newark, Delaware. At FMC, my role involves monitoring regulatory ecotoxicology studies conducted following protocols developed to adhere to OECD and/or OCSP guidelines as well as performing ecological risk assessments for the global registration and renewal of both new and previously registered plant protection products.

As a member of SETAC, I have presented at multiple European and North American annual meetings, co-chaired wildlife toxicology sessions at SETAC North America meetings and published multiple papers in Environmental Toxicology and Chemistry (ET&C). I am currently serving a second 3-year term on the editorial board of ET&C. I am currently the vice-chair of the SETAC Wildlife Toxicology Interest Group (WTIG) (in-coming chair for 2023) and am a co-chair for the “Effects” workgroup for the SETAC wildlife risk assessment workshop (involved as co-chair 2020- present). I am excited to be able to rejoin CPRC SETAC and look forward to meeting you all at meetings and social events.

In my spare time, I enjoy spending time with family, running and racing from 5k to half-marathon, dog walking, bird watching, boating, kayaking and coaching my son's soccer team.

ANDREW EAST, Board Member (Government sector)

Biologist, Health Effects Research Division at the U.S. Army Public Health Center



Andrew East is a biologist with the Health Effects Research Division at the U.S. Army Public Health Center. His work focuses on asking ecological risk and toxicology questions of defense-relevant compounds and products (e.g. PFAS, AFFF, energetics) and development of computational and conceptual methods to improve alternatives assessment and regulatory-relevant toxicology data.

Prior to joining the Health Effects Research team as a Biologist, he spent five years at the Towson University Environmental Science Program as a senior research associate, Master's student, and lab manager. His Master's thesis focused on the prediction of population level effects of fungicide exposure in aquatic systems based on individual level toxicity data. Prior to working at Towson, he spent four years as a roving fish and wildlife field biologist on a variety of research and monitoring projects. Andrew's B.S. is in Fish and Wildlife Ecology and Management from Northland College, and his M.S. is in Environmental Science from Towson University.

Participating in SETAC meetings (North America and with the Chesapeake-Potomac Regional Chapter (CPRC)) since 2014 has become a reliable annual impulse of scientific and career rejuvenation. Beyond presentations and networking, in 2018 he chaired a session at the Young Environmental Science (YES) conference and in 2021 participated in the CPRC Communications Committee. For the North America meeting in 2022, submitted with a full multi-stakeholder contingent, he hopes to co-chair a session on PFAS alternative products. His goals as a government representative on the CPRC Board of Directors are focused on engaging hands-on with the multi-disciplinary and multi-stakeholder mission of SETAC.

2022 CPRC/HDC Annual Spring Meeting

2022 CPRC/HDC Annual Spring Meeting



Save the dates: April 10-12, 2022



JOINT MID-ATLANTIC SPRING MEETING

**Chesapeake-Potomac and Hudson-Delaware
Regional Chapters**

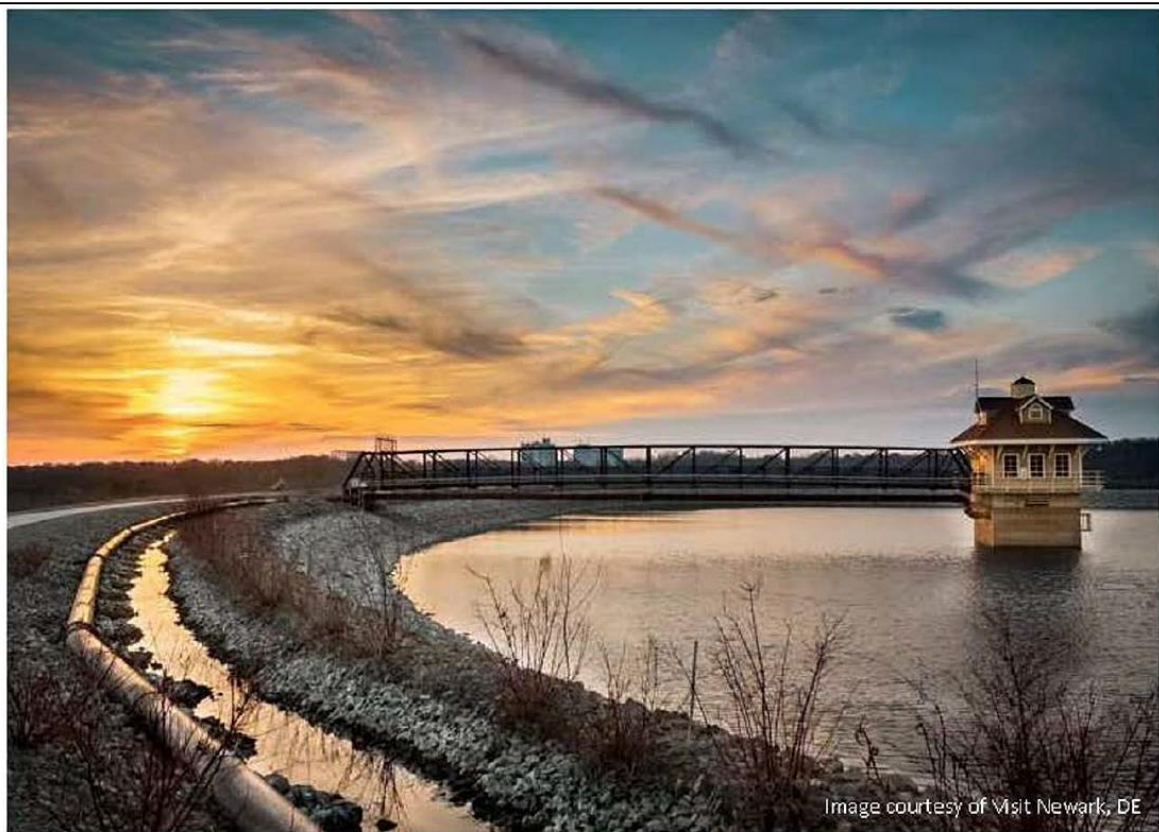


Image courtesy of Visit Newark, DE

**Newark, Delaware
Stine Research Center (FMC) 1090 Elkton Rd 19711**

Visit our website ([here](#)) to sign up for email updates about events, travel award opportunities for student attendants, and other CPRC SETAC sponsored activity.

CPRC SETAC Board Member Spotlight

MICHAEL J. QUINN, Ph.D.

**Chief, Health Effects Research Division
U.S. Army Public Health Center**



Areas of Interest: endocrine disruption, reproductive and developmental toxicology, compounds of military interest, PFAS, sensitive life-stages

Hi! My name is Mike Quinn, and I am one of the government representatives for CPRC, lead for the Communication Committee, and am an assistant editor for this newsletter. We are starting this Board Member Spotlight to introduce members of the Board to the larger CPRC team so we can get to know our relatively small community better and help put faces to some of the names you've seen in our publications and social media posts.

I am originally from Staten Island, New York and got my B.S. from Fairleigh Dickinson University in Madison, New Jersey when I thought my career path would lead me to a job in marine biology. After a brief stint working for the National Marine Fisheries Service, my life would take an unexpected turn into the world of toxicology when I took an internship at USGS Patuxent Wildlife Research Center in Laurel, MD. My intention for this 'temporary' position was to gain some experience in science between a completed contract where I was working in the Bering Sea and my next marine-related job. At the time, I had very little interest in birds and in chemistry, but my initial work at PWRC was participating in a study that investigated the reproductive effects of polychlorinated biphenyls in American kestrels. I had never considered toxicology as a career path, but I was almost immediately captivated by this field of study, so much so that I decided to make my work with these birds and class of chemicals a master's thesis at Shippensburg University, focusing on the effects of endocrine disruption on the development of plumage. By the end of that degree, I was hooked on environmental toxicology and decided to pursue a doctoral degree at the University of Maryland at College Park. Sticking with endocrine disruption (and birds – who knew?!), I decided to study the effects of estrogenic and androgenic chemicals on the development and function of the immune system in Japanese quail.

My career path took another unexpected turn after graduation from UMD when I started working for the U.S. Army's Center for Health Promotion and Preventive Medicine. I had aspirations of teaching

and doing research at an academic institution and didn't see much potential for environmentally focused work at a military organization. While at CHPPM, I got involved with many ecotoxicity studies that centered on the effects of military-specific chemicals (explosives, rocket propellants, etc.) on wildlife, and gained a lot of experience working with a wide variety of species that included western fence lizards, red-backed salamanders, bobwhite quail, micro-pigs, and finches to name a few. After a few organizational changes, CHPPM became the Army Public Health Command, and now Army Public Health Center. With the initial name change, the focus on our research shifted almost entirely to the human spectrum of environmental toxicology, protecting civilians and soldiers from chemicals that enter the food web and drinking water. Embracing the One-Health approach, I still get to scratch my 'eco-itch,' and even have a biomagnification study with per- and polyfluorinated substances that are used in aqueous film-forming foams in fire suppressants starting this year with toads.

To fulfil my love of teaching and mentorship, I have taught at a variety of schools in Maryland since 2003, teaching introductory courses in Biology and Environmental Science and classes on endocrine disruption and toxicology. My first graduate student, Allison Narizzano, completed her Ph.D. in 2020 from the Department of Epidemiology and Public Health at the University of Maryland School of Medicine in Baltimore, and I will join a dissertation committee this year for Andrew East (also a government representative for CPRC and a member of the Communications Committee) at the Department of Environmental Science and Technology at the University of Maryland. If you are, or know someone who is, an early career toxicologist, and want to gain experience in the field of toxicology at the U.S. Army Public Health Center, please don't hesitate to reach out to me. Graduate students also are welcome to gain experience at our Center with summer internships through the Oak Ridge Institute for Science and Education.

CPRC SETAC events in the past year



As the New Year 2022 began, the Event Planning Committee (EPC) of CPRC organized a happy hour in January to reconnect and exchange with SETAC's students and professionals in the Chesapeake Potomac Region.

With the emergence and widespread of the covid variant omicron, EPC opted for the virtual format and used CPRC's Zoom account to host the event.

Topics of discussion included CPRC's email delivery and would love YOUR feedback at vice.president.cprc.setac@gmail.com:

Are you receiving CPRC's email lately?

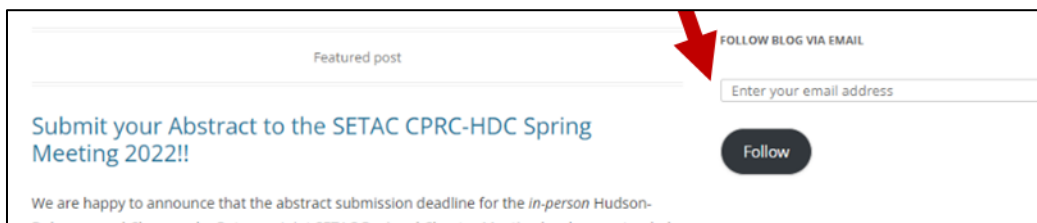
If none received recently, have you checked your spam folder?

Do you prefer fewer emails containing multiple information, or one email per topic?



CPRC is planning more in-person events as the temperature gets warmer. To stay updated with CPRC social activities:

1. Send a request to be added on the mail list to: cprc.setac@gmail.com
2. Follow blog post by email by entering your email address at <https://cprcsetac.wordpress.com/about-us/>



3. Follow us on social media [Twitter](#), [Facebook](#), [LinkedIn](#) and [Instagram](#)

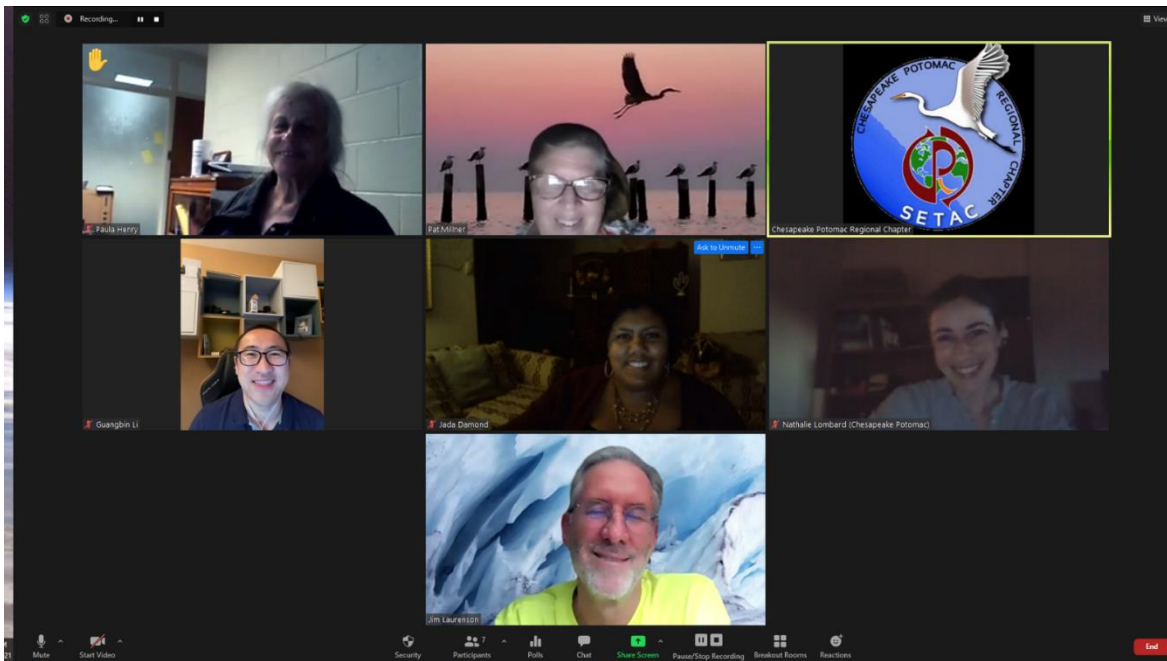
CPRC SETAC Events in the past year



The poster features a purple background with a blue circular graphic at the bottom. In the top right corner is the Chesapeake Potomac Regional SETAC logo, which includes a white swan and a globe. The text on the poster reads: '2021 CPRC-SETAC FALL DINNER', 'Adventures in the Realm of Fresh Produce Food Safety: Farm-to-Table Microbiology and Technology', 'Speaker: Dr. Patricia D Millner', 'Research Microbiologist, USDA-ARS-Beltsville Agricultural Research Center, Environmental Microbial and Food Safety Laboratory, Beltsville, MD', and 'OCT 14 • 5:00 PM TO 7:00 PM'. A circular portrait of Dr. Patricia D. Millner is positioned on the right side of the poster.

The CPRC Events Planning Committee prepared the 2021 Fall Dinner event with the goal to **reconnect and share** life with joyful moments centered around food during this challenging time. Unfortunately, we had to do the Autumn Dinner virtually due to the safety concerns and restrictions due to the on-going COVID pandemic. However, with already plenty of virtual platform experience we gathered from the Spring Meeting, the planning and organization of the Fall Dinner event went smoothly.

This year, the committee invited Dr. Patricia D. Millner to give a presentation titled “*Adventures in the Realm of Fresh Produce Food Safety: Farm-to-Table Microbiology and Technology.*” Dr. Millner is a research microbiologist at USDA-ARS-Beltsville Agricultural Research Center, Environmental Microbial and Food Safety Laboratory in Beltsville, Maryland. Dr. Millner used innovative approaches to solve problems on a broad range of environmental, crop production, and product processing issues. Her seminal study on bioaerosols, and their dispersal from compost sites, has been used extensively by state and local governing authorities in the USA and international consulting and regulatory authorities to establish regulations and permit standards for compost sites. Dr. Millner’s research advances have resulted in improved technologies to reduce food safety risks from pathogen cross-contamination. She has provided consultations on treatment and pathogen destruction technologies for numerous state and federal agencies including U.S. EPA and U.S. Department of Interior.



In her presentation, Dr. Millner provided examples of investigations, their results, and how these results and new technologies are affecting current practices at each of the key supply chain stages to implement improved fresh produce food safety practices from farm-to-table. She also discussed the survival of pathogens in manure-amended soil and associated impact factors under different spatiotemporal, agricultural, and weather conditions. As this topic is new to most members in our chapter, the presentation offered an opportunity to broaden our horizons and ask many great questions. We also received great suggestions and ideas from members after the event and will continue to improve for the next time whether it will be a virtual or hybrid event.

We look forward to seeing you again at the 2022 Fall Dinner event!

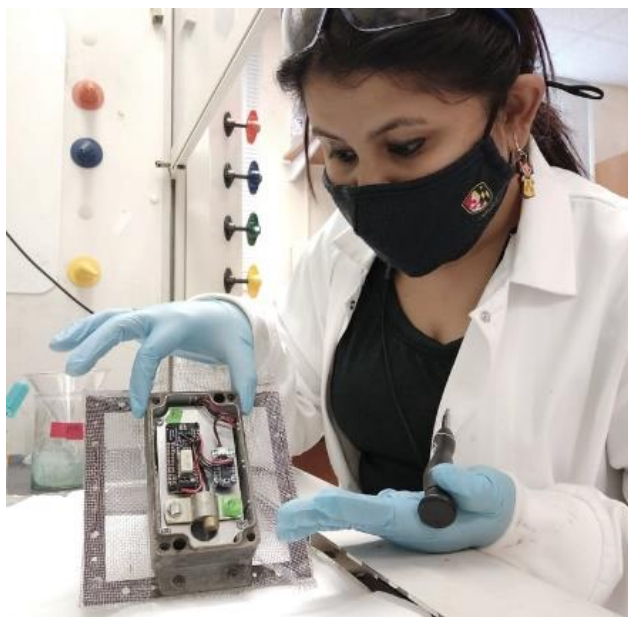
Student Research Highlight

Optimization of Passive Sampling for surface-water and sediment porewater measurements

OINDRILA GHOSH

University of Maryland, Baltimore County

About the author: Oindrila is a Ph.D. candidate at the University of Maryland Baltimore County. Oindrila has a Bachelor of Science degree in Chemistry from the University of Delhi, India and a Master of Science degree in Environmental Sciences from Nalanda University, India. Oindrila is passionate about understanding the science of fate and transport, monitoring and remediation of organic contaminants in environmental media through research and outreach. She is particularly interested in research using mass transfer modelling to optimize passive sampling of hydrophobic organic chemicals that exist in the dissolved phase of various environmental media like surface water or sediment porewater.



GENERAL RESEARCH AREA

The general research focus of our group is the fate, effects, and remediation of toxic hydrophobic organic contaminants (HOCs) in the environment like polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), pesticides, dioxins, and certain heavy metals like mercury and Arsenic. We explore the fundamental process mechanisms that control the fate of these contaminants in sediments and aquatic environments by using multidisciplinary tools to investigate their exposure and bioavailability to the organisms. Passive Sampling (PS) is one such tool that has been used in recent years for monitoring freely dissolved concentration of these organic contaminants in the environment. In that context my research area involves enhancement and optimization of these PS applications by using mass transfer modeling techniques.

BACKGROUND

HOCs have stable chemical structures which make them difficult to break down and so they persist in the environment. The commercial manufacture of polychlorinated biphenyls for example were

banned in the USA in 1979 but PCBs still persist in the environment and have cycled through air water and soil to travel far from where they were originally released. In passive sampling the hydrophobic nature of these contaminants and consequently their tendency to prefer sorbing into the matrix of a polymer like polyethylene (PE) than staying dissolved in water, is utilized.¹

Chemical monitoring of these contaminants involves deploying the passive samplers over a period of days, weeks, or months. They accumulate the contaminants in their matrix and are analyzed in the lab to provide a time-integrated measurement of the freely dissolved concentrations of HOCs. This measurement is quite useful because it gives an estimate of the bioavailable concentration of these HOCs, and the time-integrated measurement reflects the mean exposure concentration to the ecosystem receptors^{2,3}. In the real environment, events like stormflow, industrial runoff, and tides lead to the temporal variation in water concentrations of these HOCs. The effect of such events on the time weighted average water concentration is important for ecological exposure assessment.

RESEARCH QUESTIONS

The true nature of the time-integrative property of equilibrium passive samplers under fluctuating ambient concentration is not well understood. Additionally potential of passive samplers to accumulate contaminants over short operating periods to estimate event-specific contaminant loads has not been extensively studied. The specific questions that my research tries to answer are:

1. How does the time integrated measurement of PCB concentrations in overlying water change with: (a) timing of pulsed fluctuation in ambient water, (b) hydrophobicity of the PCB analytes and (c) thickness of polyethylene (PE) passive samplers?
2. What might be some of the design modifications of the passive sampling devices, including sampler thickness, material, and physical vibration on sampling platform, to accurately capture the time-integrated measurement of episodic events in overlying water over a period of 1 day?

¹ Burgess, R. M., Lohmann, R., Schubauer-Berigan, J. P., Reitsma, P., Perron, M. M., Lefkovitz, L., & Cantwell, M. G. (2015). Application of passive sampling for measuring dissolved concentrations of organic contaminants in the water column at three marine superfund sites. *Environmental Toxicology and Chemistry*, 34(8), 1720-1733.

² Schwarzenbach, R. P., Gschwend, P. M., & Imboden, D. M. (2005). *Environmental organic chemistry*. John Wiley & Sons.

³ Ghosh, U., Kane Driscoll, S., Burgess, R. M., Jonker, M. T., Reible, D., Gobas, F., ... & Beegan, C. (2014). Passive sampling methods for contaminated sediments: Practical guidance for selection, calibration, and implementation. *Integrated environmental assessment and management*, 10(2), 210-223.

3. Can we optimize sampling methods for sediment porewater measurements, by introducing vibration on the passive sampling platform with the vision of faster achievement of equilibrium by expediting mass transfer?

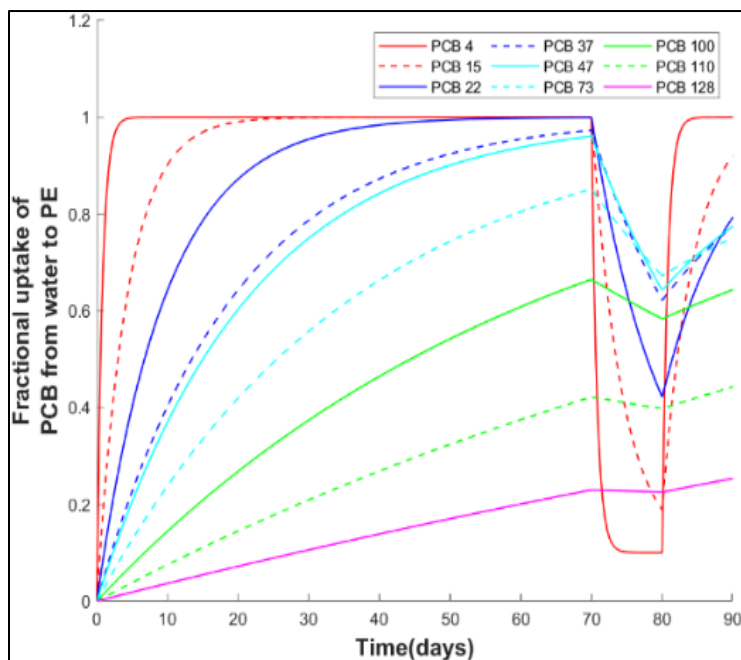


Fig 1: Fractional uptake of target PCB analytes into PE of thickness 25 μ m when the pulse in the ambient concentration lasts from day 70 to day 80.

METHODS

Numerical model set-up: The first step of addressing the above research questions was to develop the theoretical and modeling framework of exchange kinetics in passive samplers under the influence of ambient concentration fluctuation. For this, the uptake of PCB target analytes (#4, #15, #22, #37, #47, #73, #100, #110, #128) were simulated using numerical solutions of a) Fick's diffusion model and b) first order model for a modeled pulse of 10X dilution that lasts for 10 days (Fig 1). The time-period of integration was calculated for each analyte as the time required to recover from a 10-day long pulse. The % accuracy was measured by

comparing the PS-based concentration with the actual water concentration. This revealed the sensitivity of the analyte-PE thickness pair to ambient fluctuation in predicting the time-averaged concentration. I am currently using the modeling framework developed above to explore the feasibility of designing a polymer that can perform short-term measurements. Since the water boundary layer and the membrane thickness are major rate-limiting zones for mass transfer in passive samplers, I will explore the opportunity of manipulating these through the design of the sampler and achieve faster equilibration.

Model Validation: An artificial flow chamber (**Fig 2**) that can accommodate a range of water velocities was built in the lab. I plan to use this flow chamber to experimentally validate my findings from the modeling experiments to test the ability of high flow velocity to expedite mass transfer in passive samplers. To explore if physical vibration can help faster approach to equilibrium, a scaled-up version of an early vibrating sampler prototype from previous research was built from scratch in the lab (**Fig 3b**). Another prototype was built by Geosyntec Consultants and deployed in a marine sediment (10-15 ft water depth) in a harbor for about 14 days (Fig 3a). I am currently comparing these

two prototypes by conducting experiments to optimize and test them for robustness in field applications and better performance for sampling more hydrophobic PCBs and Dioxins.

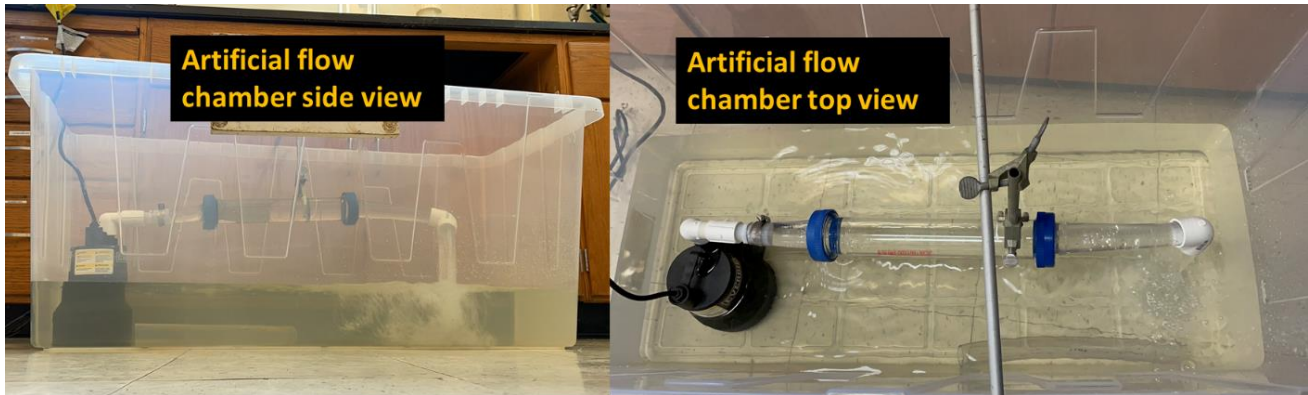


Fig 2: Artificial flow chamber to demonstrate the effect of flow velocity on mass transfer kinetics in passive samplers.

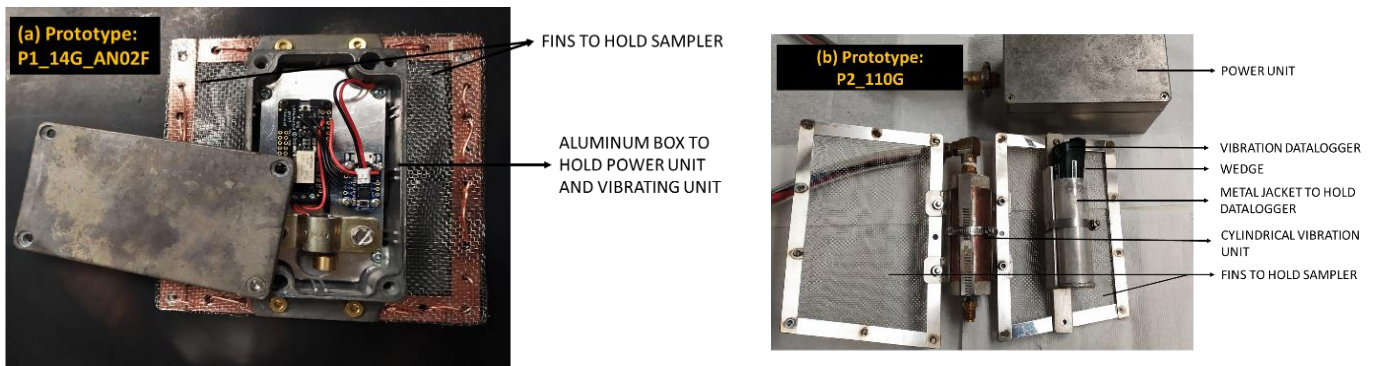


Fig 3: Vibrating platforms for passive samplers: (a) prototype P2_14G_AN02F built by Geosyntec Consultants and modified at UMBC and (b) prototype P2_110G built at UMBC, to demonstrate the effect of physical vibration on mass transfer kinetics in passive samplers.

RESEARCH IMPLICATIONS

This research will develop the mathematical framework to describe mass transfer in time-integrated passive sampling and apply the model to optimize long- and short-term deployments in the field for pore-water and surface water measurements.

CURRENT STANDING IN PHD RESEARCH TIMELINE

I am currently working on developing a manuscript for my first journal submission that establishes the modeling framework to address my first research question. I plan to defend my PhD thesis proposal in the last week of April this year as I keep working on the experiments mentioned above.

Inclusive Diversity in Data Visualization

NATHALIE LOMBARD AND OINDRILA GHOSH
University of Maryland, Baltimore County

One of the many tasks of scientists is to effectively communicate their research through platform presentations, posters, and scientific articles. Well-designed graphs and figures are crucial to illustrate data and convey a message in a simple and comprehensible manner to the scientific community and wider public. Creating these figures needs scientific knowledge and empathy towards all members of this community. Recently we attended a webinar by Nature Careers on “[How to use art and design in Science](#)” where we learnt about the importance of using an inclusive color palette for data visualization. In this article we summarize what we learnt and a few resources that can help build inclusive scientific graphics.

Current estimates indicate that 1 man in 12 and 1 woman in 200 have Color Vision Deficiency (CVD), most commonly in the red-green perception. As described by the [National Eye Institute](#), there are three main types of CVD

- Red-green color blindness: cannot easily differentiate between red and green (most common)
- Blue-yellow color blindness: cannot easily differentiate between blue and green, and between yellow and red (less common)
- Complete color blindness: cannot see colors at all (uncommon)

The webinar introduced us to the tools and strategies to design figures and cover arts in scientific papers and presentations. One of the speakers, Fabio Crameri, centered his talk on color choice for data visualization. The author explained how the use of standard rainbow color map (jet) can visually distort scientific data and should be replaced with more scientifically derived maps with even color gradients (batlow)¹. He also highlighted the importance of choosing the right color palette for the whole scientific community, color vision deficient scientists included, to correctly perceive and comprehend the data. Fig1 illustrates the three color maps (a) grayscale, (b) rainbow (a.k.a jet) and (c) batlow that are mostly used to represent scientific data. The corresponding incremental lightness difference which is a measure of the perceptual color difference along the color map shows that a batlow map is perceptually uniform and jet map is not.

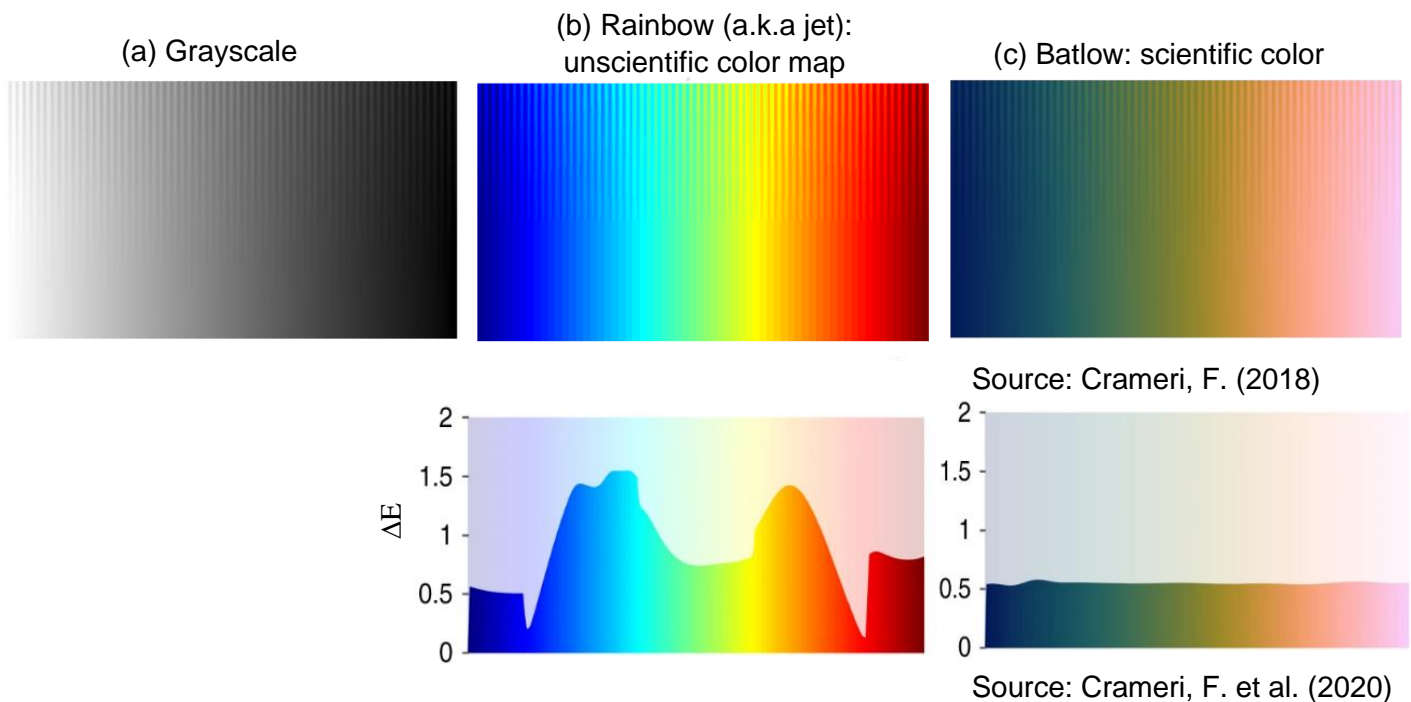


Fig 1: The perceptual color difference along a color map is represented by the incremental lightness difference, ΔE . ΔE is equal all along the color map (a flat graph) for a perceptually uniform scientific color map like batlow. Unscientific, perceptually non-uniform color maps like rainbow, cause visual distortion that is hard to interpret.

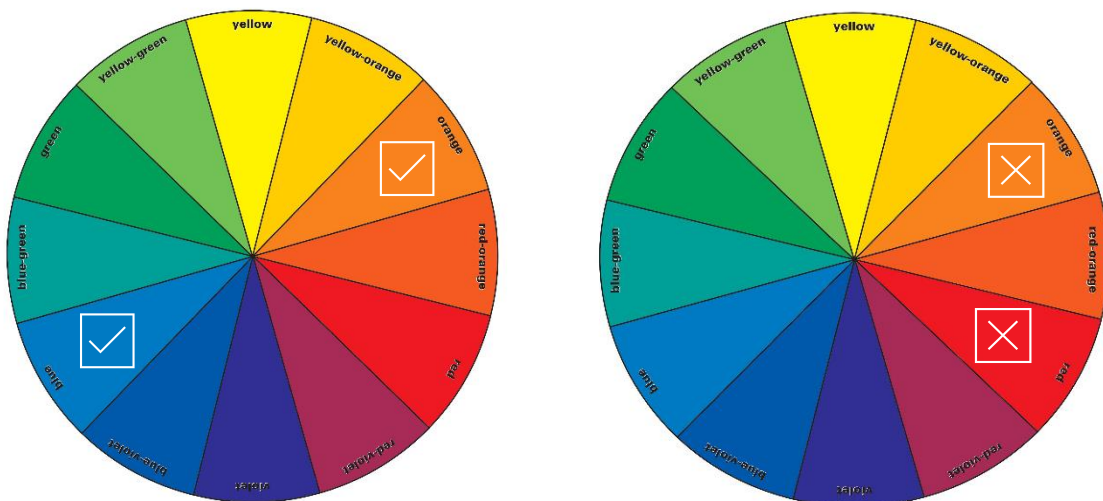


Fig 2: Choosing opposite colors from the color wheel creates the best visual contrast in scientific graphics that can be easily interpreted by a color vision deficient audience.

HOW TO DESIGN CVD INCLUSIVE GRAPHICS AND ART?

Crameri et al. (2020) provided links and references to freely available scientifically derived color maps and toolkits¹. Other tips can be found in the weblinks provided in resources section.

Below are listed main tips provided by simplified science publishing:

1. Choose opposite colors from the color wheel (Fig2)
2. Use color saturation and lightness to create contrast (15-30% difference in saturation, i.e. shade, between colors used)
3. Use the tool "[Viz Palette](#)" to test for color accessibility or switch your design to a grayscale view to verify the contrast between color used.

Red and green are unfortunately often used in ecotoxicology for color coding harmful and safe dose levels. Simplified Science Publishing indicates that "red and green can be used together as long as you apply different saturation and lightness to increase the contrast." Can we try and adapt the color code for toxicological data representation to be more CVD inclusive?

REACT TO THIS ARTICLE

Share your comments, feedback, questions, and tips using CPRC social media [Twitter](#), [Facebook](#), [LinkedIn](#) and [Instagram](#) or at socialmedia.cprc.setac@gmail.com

OTHER RESOURCES

<https://s-ink.org/>

<https://www.simplifiedsciencepublishing.com/resources/best-color-palettes-for-scientific-figures-and-data-visualizations>

<https://projects.susielu.com/viz-palette>

REFERENCES

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2. Crameri, F. (2018), Scientific colour maps, Zenodo, doi:10.5281/zenodo.1243862

Career Corner

Toxicologist/Biologist GS 11-12 at U.S. Army Public Health Center, Directorate of Toxicology, Toxicity Evaluation Division

Responsibilities include:

- Designs/plans/conducts toxicology in vivo and in vitro studies/experiments as the Primary Investigator to determine effects of various chemicals/materials of military interest.
- Translates results into qualitative and quantitative terms.
- Establishes and maintains Good Laboratory Practices (GLPs) procedures used for all studies conducted.
- Procedures include protocol development/review and writing the final technical report and/or manuscripts.
- Interacts with various toxicology personnel (e.g., animal care staff, technicians, pathologist, etc.) during conduct of studies.
- Performs consultations/advisements on toxicology related issues.
- Researches toxicological issues of importance to the military and conducts comprehensive literature reviews on specific content/issues.
- Authors toxicity information to develop toxicity clearance documents to protect military personnel from potential adverse effects from environmental and occupational exposures.
- Reviews interagency documents for accuracy and soundness of interpretations of data and development of safe benchmarks for exposure.
- Interacts in a consultative manner with various levels of Army-wide contacts, Department of Defense elements, and/or toxicologists and environmental health professionals in various Federal and state regulatory organizations along with members of the general scientific community.
- Attends scientific meetings and seminars and presents results obtained from studies before various scientific groups when requested.

If interested, please send CV to Arthur Oneill at Arthur.j.oneill.civ@mail.mil ; 410-436-5080.

Please visit the CPRC SETAC website to keep updated with latest job postings:

<https://cprcsetac.wordpress.com/job-opportunities/>

Winter Fun



Northern Shoveler at Blackwater NWR. Photo taken by Rebecca Lazarus

Winter Fun



Dr. Upal Ghosh and his research group skiing on the slopes of Blue Mountain, PA

(Picture credits: Yu Ting)

CPRC SETAC Membership



SETAC: The Society of Environmental Toxicology and Chemistry is an independent, nonprofit professional society that provides a forum for individuals and institutions engaged in the study of environmental issues, management and conservation of natural resources, environmental education, and environmental research and development.



CPRC: The Chesapeake and Potomac Regional Chapter of SETAC is a non-profit organization started in the year 1983. CPRC's mission is to promote the exchange of information among environmental scientists in the Mid-Atlantic States.

Note: you do not have to be a SETAC member to be a member of CPRC.

There are three ways to join/renew:

- 1) Preferred Method: SETAC North America (SNA) ([LINK](#)). SNA will send us your contact information so we can add you to our chapter mailing list. You do not have to be an SNA member to use this option.
- 2) PayPal CPRC ([LINK](#)): Credit cards accepted, no PayPal account needed. Enter appropriate fee amount (\$5 student, \$15 professional). Please note that it is easier for us to track your membership when you join via the SNA site (option 1 above).
- 3) Snail Mail: Check and money orders accepted. Please include your name, affiliation and address with your payment.

SETAC-CPRC P.O. Box 2728

Brooklyn, MD 21225

Attn: Nathan Sell, Treasurer

Membership renewals occur every December. If you have any difficulty with your membership application or payment, please contact Nathan Sell (treasurer.cprc.setac@gmail.com).

CPRC SETAC Sponsorship Opportunities

STEP THREE: PAYMENT INFORMATION

Please submit a completed copy of this form and a check (payable to "CPRC SETAC") to the following address:

CPRC SETAC Treasurer
 PO Box 2728
 Brooklyn, MD 21225
 Attn: Meredith Bohannon

If you have any difficulty with your sponsorship payment, or have any questions, please contact CPRC Treasurer Meredith Bohannon (treasurer.cprc.setac@gmail.com) or (cprc.setac@gmail.com).

CPRC SETAC Sponsorship Form

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Benefit	Primary Producer (\$250/year) ^A	Secondary Producer (\$500/year) ^A	Keystone Sponsor (\$1000+/year) ^A
Complimentary Spring Meeting Registration(s) ^B		1	2
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Logo appears in CPRC newsletter and meeting documents. Logo and link posted on CPRC website ^C	2 years ^C	3 years ^C	5 years ^C
Advertising in newsletter	Half Page	Full Page	Full Page
Advertising in Spring Meeting Program		Half Page	Full Page

^A Sponsorship Tier is determined by the total amount given on an annual basis from **STEP TWO**.

^B Complimentary Spring Meeting Registrations are granted on an annual basis according to the sponsorship tier with the recommendation that they are to be used within a year.

^C Length of time during which the logo appears in the newsletter, meeting documents, and website is a benefit only and does NOT represent a commitment to provide sponsorship money on an annual basis.

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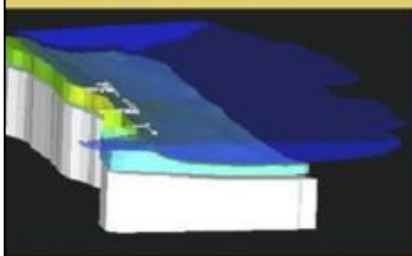
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Contact: Stuart Z. Cohen, Ph.D., CGWP
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