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Editorial

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Editor's Choice for the Best Papers Published in *ES&T Letters* in 2018

Papers published in *Environmental Science & Technology Letters* (*ES&T Letters*) need to have environmental relevance, be innovative, require urgent publication, and be reported in fewer than about 3000 word equivalents. It is safe to say that all of the studies published in *ES&T Letters* are therefore both remarkable and succinct. Each year the editors reflect on the different qualities of the papers published in the previous calendar year and select those which stand out from the others in terms of scientific rigor, topical importance, impact, and appeal. Getting to the final list of the best papers then becomes quite challenging! Fortunately, we do not have to choose which one of our final selected papers is the winner in the group or identify papers within specific categories. We only have to agree that the selected papers deserve to be acknowledged as being the very best papers published that year.

Five papers received the recognition of being the best papers published in *ES&T Letters* in 2018. Congratulations to all of these authors for their excellent work! We provide short summaries of each of these papers below (in alphabetical order by first author).

Concentrations of particulate matter of <2.5 μm (PM 2.5) have significantly negative impacts on cardiovascular function and, as a result, human longevity. However, while many studies linking these parameters have done so primarily in localized areas of atmospheric pollution, this assessment was undertaken on a global scale by Joshua S. Apte, Michael Brauer, Aaron J. Cohen, Majid Ezzati, and C. Arden Pope, III, in their study "Ambient PM2.5 Reduces Global and Regional Life Expectancy". Using data from the Global Burden of Disease project and actuarial standard life-table methods, they estimated global and national decrements in life expectancy attributable to ambient PM2.5 for 185 countries. Their results showed that average global life expectancy at birth was diminished by approximately 1 year in general and by nearly 2 years in people from Asia and Africa. Individuals with diseases associated with cardiovascular function also had exacerbated impacts of PM 2.5 in susceptible populations. These data will be valuable in assessing impacts of air pollution on human populations for multiple global health organizations.

Uranium might not be the first contaminant that comes to mind when thinking about groundwater pollution, but Rachel M. Coyte, Ratan C. Jain, Sudhir K. Srivastava, Kailash C. Sharma, Abedalrazq Khalil, Lin Ma, and Avner Vengosh demonstrate that it is worthy of attention in their study "Large-Scale Uranium Contamination of Groundwater Resources in India". This team from India, Singapore, and the United States conducted a survey of hundreds of wells across 16 states in India. Measurements in the two states showed uranium concentrations above the World Health Organization guideline of 30 μg/L (33% in Rajashtan and 5% in Gujarat). Combined with previous reports, the paper shows that uranium may be present at excessive levels in certain areas of both northwestern and southern India. An important finding is that while the main source of uranium derives from the underlying geology, nitrate pollution and aquifer drawdown may exacerbate the problem. Water treatment technologies and water management practices will have to be developed to meet this emerging issue.

Monitoring of contamination in biota often requires lethal sampling of the organism to measure end points of health or exposure. If the species of interest is endangered or threatened, sampling can be problematic. In addition, most studies of this nature measure only the contaminant, and few are able to assess the effects of the contaminant in a "real-time" exposure scenario. In their study "Metabolome Profiling of Fish Muscle Tissue Exposed to Benzo[*a*]pyrene Using in Vivo Solid-Phase Microextraction", Anna Roszkowska, Miao Yu, Vincent Bessonneau, Leslie Bragg, Mark Servos, and Janusz Pawliszyn remedied many of these issues by coupling a novel solid phase microextraction procedure with a metabolomics approach on a classic polyaromatic hydrocarbon contaminant (benzo[*a*]-pyrene) to measure the effects of the contaminant on the exposome of the organism without lethal sampling. Use of this technique in the field may allow investigators to identify novel biomarkers of the effect in populations of aquatic species susceptible to lethal sampling such as low-abundance populations.

The spread of antibiotic resistance genes (ARGs) continues to be a global concern, with routes of exposure that include both air and water. In the study "Seasonal Disparities in Airborne Bacteria and Associated Antibiotic Resistance Genes in $PM_{2.5}$ between Urban and Rural Sites", by Jiawen Xie, Ling Jin, Xiaosan Luo, Zhen Zhao, and Xiangdong Li, the association of ARGs with airborne fine particles (PM2.5) was extensively examined in the city of Nanjing in China over a period of one year and compared to that of a rural site. While the abundance seasonally varied for the rural site, there was a more consistent number of ARGs in industrial and urban sites. On the basis of an exposure assessment, the exposure to ARGs in the air was concluded to be of particular concern compared to those in drinking water, because most water consumed in China is boiled and thus likely of less concern than inhalation exposures.

Research on the complex chemistry, morphology, and gas-to-particle partitioning of secondary organic aerosols (SOA) continues to be at the forefront of atmospheric chemistry research. Zhang et al. (Yue Zhang, Yuzhi Chen, Andrew T. Lambe, Nicole E. Olson, Ziying Lei, Rebecca L. Craig, Zhenfa Zhang, Avram Gold, Timothy B. Onasch, John T. Jayne, Douglas R. Worsnop, Cassandra J. Gaston, Joel A. Thornton, William Vizuete, Andrew P. Ault, and Jason D. Surratt) studied SOA formation in the laboratory, as reported in their paper on "Effect of the Aerosol-Phase State on Secondary Organic Aerosol Formation from the Reactive Uptake of Isoprene-Derived Epoxydiols (IEPOX)". They examined the reactive uptake of *trans*-β-isoprene epoxydiol (*trans*-β-IEPOX) on

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acidic sulfate particles that were coated with SOA (derived from α-pinene ozonolysis). Both the relative humidity and the coating thickness of SOA affected the reactive uptake kinetics of IEPOX on the particles. The morphology of the particles, examined using scanning electron microscopy and atomic force microscopy as a function of relative humidity and SOA coating thickness, indicated a core−shell particle morphology. Modeling this experimental effect with field data from the 2013 Southern Oxidant and Aerosol Study campaign suggested that SOA coatings on acidic sulfate particles play a significant role in the production of IEPOX-derived SOA.

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