RISING TO THE CHALLENGE: A CALL TO ACTION

*Rising to the Challenge: The Campaign for Johns Hopkins* will raise unprecedented levels of support to attract, sustain, and empower the students and faculty of Johns Hopkins, who through their work improve the lives of millions around the world. Together with our philanthropic partners we will:

**ADVANCE DISCOVERY AND CREATIVITY** through support of our exceptional faculty. Their innovative work drives the development of new knowledge, new forms of expression, and new ways to save lives and improve health across our core disciplines in science and technology, the humanities and arts, and public health and medicine.

**ENRICH THE STUDENT EXPERIENCE** by investing in scholarships and fellowships, inspirational spaces for collaborative learning and social opportunities, and new programs that will enhance student-faculty interactions, ensure diversity on campus, link learning in the classroom to life after graduation, and strengthen connections between our students and our communities.

**SOLVE GLOBAL PROBLEMS AS ONE UNIVERSITY** by creating new cross-disciplinary solutions in crucial areas such as sustaining global water resources, revitalizing America’s cities, advancing the health of individuals and populations, and understanding how we learn and teach.

With your help, the Bloomberg School will play a key role in the success of the campaign.
DEPARTMENT AT A GLANCE

Chair: Marsha Wills-Karp, PhD

History: Originally founded in 1916 as the departments of Physiological Hygiene and Sanitary Engineering in the world’s first independent graduate school of public health, consistently ranked #1 by U.S. News & World Report.

Size and scope: 70+ full-time faculty and 110+ students. Doctoral programs in Environmental Health Engineering; Occupational and Environmental Health; Respiratory Biology and Lung Disease; and Molecular and Translational Toxicology. Master of Health Science (MHS) in Environmental Health – Academic. Master of Science in Public Health (MSPH) in Occupational and Environmental Hygiene – Professional. Joint Bachelor/Master programs in Health Science (BA/MHS) or Science in Public Health (BA/MSPH).

Centers: Center for Alternatives to Animal Testing; Center in Epigenetics and Public Health; Center for a Livable Future; Center for Urban Environmental Health; Center for Water and Health; Education and Research Center for Occupational Safety and Health; Johns Hopkins Center for Public Health Preparedness.

DEPARTMENTAL PROFILE

Water. Air. Food. Shelter. These four essential requirements for human survival are the pillars of research in Environmental Health Sciences (EHS) at the Johns Hopkins Bloomberg School of Public Health (JHSPH). The substances we breathe, eat, drink, and touch can either sustain life or become deadly vectors for epidemic disease and toxic exposure. EHS faculty and students explore the impact of chemical, biological, and physical agents on human health. They assess environmental risk and devise prevention and intervention strategies that account for the natural, built, and social environments.

Environmental health science is unique among public health disciplines for its sweeping scope of inquiry into the sources of health problems from the molecular to the population levels. EHS has been doing environmental detective work since 1916, when Johns Hopkins University established the world’s first graduate school of public health. In a school that married the best of biomedical inquiry with the population-based approach of public health, the original departments of Sanitary Engineering and Physiological Hygiene focused primarily on solving environmental health problems related to water and air, respectively. Two giants of public health who set the parameters for these disciplines were sanitary engineer Abel Wolman and industrial health expert Anna Baetjer. Wolman’s and Baetjer’s departments were merged in 1976 to form the Department of Environmental Health Sciences.

As a JHSPH faculty member from 1924 until her death in 1984, Anna Baetjer led the development of the School’s research and training programs in lung physiology, environmental toxicology, occupational health, and injury prevention. In the 1940s and 1950s, Baetjer did pioneering work on the epidemiology of lead poisoning and identified chromate dust as a cause of lung cancer. In the second half of her career, she pushed school administrators to pursue federal grants and build faculty expertise to delve into the myriad problems of population-level exposure to environmental health risks. Her persuasive leadership and popularity with generations of JHSPH students were crucial in establishing the School as a leader in environmental public health.

Like Baetjer, Wolman’s charisma and passion for environmental health attracted a flurry of students to the field. As the leading American sanitary engineer of the 20th century, Wolman co-developed one of the most revolutionary public health innovations in history: the first safe, effective chlorination formula to purify water supplies. He doggedly lobbied municipal and national governments from Baltimore to Bangalore to adopt the chlorination process, and provided the technical expertise to establish modern water and sewage systems in 50 countries. He worked tirelessly to convince the World Health Organization, USAID, and a host of other agencies that maintaining the volume and quality of the global water supply was the key to reducing the horrific toll of waterborne and diarrheal diseases, which in 1958 still caused 5 million infant deaths annually worldwide.
RISING TO THE CHALLENGE

FOOD AND WATER: SO ESSENTIAL, SO DEADLY
In the 1980s and 1990s, researchers led by EHS chair John Groopman contributed major new insights on connections between liver cancer and aflatoxins, a common contaminant in the developing world’s food supply. Subsequent studies have revealed that enzyme-inducing compounds found in vegetables such as broccoli, cabbage, brussels sprouts, and cauliflower can actually detoxify the body and prevent tumors from forming on the liver. Enzyme induction has great potential for preventing other forms of cancer, and dietary approaches are far easier and cheaper to implement than drug therapy, especially in the regions of Asia and Africa where liver cancer is the leading cause of cancer deaths.

Wolman’s son, M. Gordon “Reds” Wolman, was another luminary in water resources research and policy who served from 1970 to 1990 as chair of the JHU Department of Geography and Environmental Engineering and as director of the JHSPH Center for Environmental Health Engineering. Wolman was also instrumental in the creation of the Johns Hopkins Center for a Livable Future (CLF) in 1996. The Center was a response to a phenomenon best expressed by James Grant, the late director of UNICEF, who warned of the “vicious spiral” of population growth, poverty, and environmental degradation.

CLF’s mission is to promote research and educate the public about the complex interrelationships among diet, agricultural production, environment, and human health; to advance an ecological perspective in reducing threats to population health; and to promote policies that protect global health, environment, and sustainability for future generations.

Abel and Reds Wolman’s work also inspired the Johns Hopkins Center for Water and Health, which focuses on public health and environmental engineering aspects, as well as the broader university-wide Johns Hopkins Global Water Program. EHS faculty member Kellogg J. Schwab directs both initiatives, aimed at providing the quality and quantity of water required to sustain human health and the environment. Dr. Schwab’s work in environmental microbiology and engineering explores how pathogenic microorganisms travel in water, food, and the environment. In the U.S. alone, more than 20 million cases of acute gastroenteritis annually are linked to noroviruses, the leading cause of nonbacterial gastroenteritis worldwide. In collaboration with the CDC and state health laboratories, Dr. Schwab has investigated numerous waterborne and foodborne outbreaks of viral gastroenteritis, for which he is developing improved environmental detection methods. In Lima, Peru, Dr. Schwab’s team analyzed drinking water samples and found that more than 20 percent of diarrheal illnesses in slum-dwelling children are caused by noroviruses, a discovery that will help Peruvian health officials target public health and sanitation efforts.

THE DEVIL INSIDE: INDOOR POLLUTION AND GLOBAL LUNG DISEASE
The current chair of EHS, Marsha Wills-Karp, is a leader in the study of molecular mechanisms to determine the fundamental genetic and environmental causes of asthma and other allergic diseases. She also chairs the NIAID Allergy, Immunology, and Transplantation Research Committee. Dr. Wills-Karp’s lab was one of the first groups to demonstrate the importance of the Th2 cytokine, IL-13, in the development of allergic asthma. Antibodies against this cytokine are now in clinical trials for the treatment of asthma.

Asthma incidence has more than doubled in the last few decades, suggesting environmental causes. Over 300 million people worldwide suffer from asthma, particularly children. With mass migration from rural to urban dwellings, the burden of asthma is projected to grow substantially. Dr. Wills-Karp’s lab is exploring the health consequences of several recent environmental changes in westernized societies, such as the role of air pollution and diet in the asthma epidemic in the United States. By identifying these factors and the mechanisms by which they induce asthma, EHS researchers can aid in developing prevention and treatment strategies for this debilitating disease.

In Peru, India, Burma, and Uganda, EHS research aims to better understand the biological mechanisms triggered by particulates from biomass burning, and their role in environmental diseases such as asthma and chronic obstructive pulmonary disease (COPD). Currently, there is no effective cure for COPD, which affects 24 million Americans. Globally, approximately 50 percent of all households and 90 percent of rural households use solid fuels as the main
Rather than merely a think tank, the Center for a Livable Future is a do tank that recognizes the ways that food production and consumption determine human health and environmental resource use.”

—Robert S. Lawrence, Director of the Center for a Livable Future

domestic source of energy for cooking and home heating. Compared with 1.1 billion tobacco smokers worldwide, an estimated 3 billion people are exposed to high levels of indoor air pollution from cookstove smoke, which is the largest source of indoor air pollution worldwide, rivals automobile exhaust as a source of greenhouse gas emissions, and leads to an estimated 4 million premature deaths each year.

Shyam S. Biswal’s lab is working to develop new interventions to prevent COPD and other environmental lung diseases by augmenting Nrf2, the genetic transcription factor that confers host defense by upregulating a multitude of genes that protect lung cells. In 2011, JHSPH received funding from the Indo-U.S. Science & Technology Forum to establish the Indo-U.S. Center of Excellence for Environmental Lung Diseases, the first joint center to study environmental lung diseases. The Center’s research will focus on a large cohort of more than 80,000 nonsmokers living in rural India. The Center’s multidisciplinary team will draw experts from the Bloomberg School and the Johns Hopkins School of Medicine, as well as collaborators from the National Institute of Environmental Health Sciences, the Institute of Genomics and Integrative Biology, and the Council of Scientific and Industrial Research in Delhi, India.

Biswal also directs the Johns Hopkins Center for Global Clean Air, which is testing cookstove technologies and associated health effects in sites across South America, sub-Saharan Africa, and Asia. Building upon JHU’s leadership in global environmental health, the Center brings together top public health researchers from diverse areas of expertise in behavioral sciences, risk communication, implementation science, epidemiology, and various disciplines of environmental health such as exposure assessment, toxicology, and climate change to tackle the global challenge of household air pollution. A clean-burning cookstove is now available that is both affordable and will appeal to diverse consumer needs and desires across different cultures and continents. It also includes a power source for USB devices such as LED lights and cellphone chargers, and its cost will be partly offset by selling the carbon credits generated in countries such as China, Mexico, Bangladesh, and Uganda that have adopted national carbon finance programs. Dr. Biswal’s team is poised to help launch one of the most revolutionary public health innovations since the mosquito net.

THE BUILT ENVIRONMENT: PROTECTING WORKERS AND COMMUNITY HEALTH

Peter Lees and Patrick N. Breysse are carrying on Anna Baetjer’s legacy by developing new occupational and environmental exposure assessment methodology and applying it to epidemiologic studies of the relationship between chemical and environmental exposure and disease. Dr. Lees’ research has
evaluated many different chemical substances including mineral fibers, chromium, lead, and PCBs in occupational, residential, and outdoor environments. Since the relationship between exposure and dose is not known for the vast majority of environmental chemicals, exposure assessment research is essential for developing generalized models for environmental epidemiology and risk assessment. Dr. Lees has focused on surface contamination in homes as a source of skin and hand-to-mouth exposure to lead paint dust in inner city Baltimore homes. He developed and applied an accurate method to sample the amount of lead paint dust present on household surfaces in order to estimate the blood lead levels in children.

Dr. Breysse directs the Occupational and Environmental Hygiene Program and co-directs the Center for Childhood Asthma in the Urban Environment. His research on the impact of indoor and outdoor air pollution on respiratory health focuses on risk and exposure assessment, including pollutant source characterization, exposure measurement and interpretation, and development and use of biomarkers to determine relationships among sources, exposures, doses, and disease. Dr. Breysse is collaborating with colleagues in Materials Science and Engineering to develop novel sensor technology using organic semiconductors.

The Education and Research Center for Occupational Safety and Health, directed by Jackie Agnew, houses the department’s training and research programs that focus on protecting health in living and working environments. By learning to identify and control chemical and physical hazards in these environments, physicians, nurses, policymakers, and workers in a range of health fields can make important contributions to preventing illness and injury. For over 35 years, the Occupational and Environmental Medicine training programs have prepared nurses and medical residents for leadership positions in government, labor, military, industry, and clinical settings. Alumni of the professional training programs are working as managers of government public health and environmental agencies, owners of environmental consulting firms, occupational safety consultants, academic faculty, and policy directors for scientific organizations.

OPPORTUNITIES TO SUPPORT ENVIRONMENTAL HEALTH SCIENCES

To ensure its future, EHS must pursue the stability and flexibility that can only come from private funding. A more diversified funding base is critical to our mission of training first-class environmental health scientists and forging ahead in new fields of scientific inquiry. EHS faculty are highly competitive for NIH grants, and the majority of the Department’s current budget comes from the National Institute of Environmental Health Sciences and the National Institute for Occupational Safety and Health. Yet every successful federal grant application demands many hours of writing, assembling supporting documentation, revising proposals, reporting, and ensuring compliance with federal guidelines. Constant pressure to raise their own salary drains away faculty time and energy that could be devoted to students or just pursuing a novel idea with creative potential. Dollar for dollar, private funding has a much greater impact, since it carries far fewer restrictions and conserves so much faculty effort. It also allows the faculty to “think outside the box” and be more creative than do very restrictive NIH grants that traditionally like to play it safe. With private support, faculty can address environmental issues such as hydro-fracking that are currently not funded by NIH.

Building endowments to support students and faculty is essential for
providing consistent income to address the Department’s greatest needs. The chairs of five out of the School’s 10 departments, including EHS, do not hold endowed professorships, so that the cost of the chair’s salary and benefits diverts significant departmental resources that could support other critical activities. Endowed professorships are also highly attractive incentives for recruiting faculty to anchor existing programs or nucleate new ones. Emerging Scholar endowed professorships could enable junior faculty to “jump off the treadmill” by providing three years of early career support for intensive research to generate preliminary data for subsequent grant applications. Such protected time would help the School more easily recruit junior investigators in new fields.

More reliable core support for both faculty and students is critical for maintaining the quality of the EHS teaching program, which in turn benefits the entire school. EHS is dedicated to high-quality teaching, and offers courses that ground all JHSPH students in the methods that are essential for effecting population-level changes to protect health. A faculty recruitment and retention fund will aid in attracting and retaining the most talented scholars, who are constantly courted by other institutions. When an outstanding laboratory loses grant support, the time and resources already invested in assembling equipment and training staff are rendered useless. Innovation funding would sustain continued productivity for promising investigators while they prepare and submit a revised application.

Each academic year, about eight new doctoral students and 20 master’s students enroll in EHS degree programs. Since NIH training grants exclude doctoral candidates during their first two years and provide little to no support for master’s students, approximately 28 of these students need funding every year. Without a sufficient number of scholarships, the burden of debt that will face our students is of significant concern. Students often already have large education loans, since public health is typically a secondary or tertiary professional degree.

To support at least four deserving students, the Department aspires to raise $6 million to endow new doctoral fellowships. Since JHSPH serves as a wellspring of basic knowledge and on-the-ground application for environmental health science, scholarships have an impact far beyond an individual career. They empower Johns Hopkins graduates to strengthen the public health and scientific missions of the wide spectrum of organizations that employ them, including academia, government, philanthropy, and research institutes.

THE FUTURE OF ENVIRONMENTAL HEALTH SCIENCES

The Rising to the Challenge campaign will enable the Department of Environmental Health Sciences to become an all-inclusive research and training center dedicated to solving environmental health problems from the molecular to the population levels. Our work is not only aimed at protecting and improving human health, but encompasses the even broader commitment to ensure that the global environment will continue to sustain all types of life. Whether by partnering with the Environmental Protection Agency to provide continuing education in food safety or by providing the highly sophisticated scientific expertise necessary to analyze massive data sets from electronic health records to determine the health consequences of multiple environmental variables, EHS faculty and students are making the world safer and healthier. Their efforts are truly ensuring a more livable future for generations to come.

For nearly a century, the Department of Environmental Health Sciences and the Johns Hopkins Bloomberg School of Public Health have been advancing the science of public health, but we have only begun to address the continuing challenges of environmental health problems in the United States and the developing world. There is no better place to invest in research and training programs to protect human health and the environment.

CAMPAIGN GOALS FOR ENVIRONMENTAL HEALTH SCIENCES

- $3.5 million Endowed department chair
- $6 million Endowed professor and core funding for Center for Global Clean Air
- $6 million 4 doctoral scholarships at $1.5 million per endowment
- $1 million Faculty recruitment and retention fund