Approved by the Regents
May 18, 2017

PROMOTION RECOMMENDATION
The University of Michigan
School of Public Health
Department of Environmental Health Sciences

Chuanwu Xi, associate professor of environmental health sciences, with tenure, Department of Environmental Health Sciences, and associate professor of global public health, without tenure, School of Public Health, is recommended for promotion to professor of environmental health sciences, with tenure, Department of Environmental Health Sciences, and professor of global public health, without tenure, School of Public Health.

Academic Degrees:

Ph.D.	2000	Applied Biological Sciences (Molecular Microbiology), Katholieke Universiteit Leuven (University of Leuven), Belgium
M.S.	1996	Molecular Microbiology, Guangxi University, China
B.S.	1993	Biology, Anhui Normal University, China

Professional Record:

2017 – Present	Associate Professor of Global Public Health, University of Michigan School of Public Health
2016 – Present	Executive Director, U-M-BICI Partnership Program, U-M Office of Research
2014	Visiting Professor, Tsinghua University School of Environment
2012 – Present	Associate Professor with tenure, Department of Environmental Health Sciences, University of Michigan School of Public Health
2012 – Present	Director, Global Environmental Health program, University of Michigan, School of Public Health
2005 – 2012	Assistant Professor, Department of Environmental Health Sciences, University of Michigan School of Public Health
2008 – Present	Affiliate Faculty, Program in the Environment and the Graham Sustainability Institute, University of Michigan
2003 – 2005	Research Assistant Professor, Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign
2001 – 2003	Post-Doctoral Research Associate, Department of Civil and Environmental Engineering and Beckman Institute for Advanced Science and Technology, University of Illinois at Urbana-Champaign
2000 – 2001	Post-Doctoral Research Fellow, Centre of Microbial and Plant Genetics, Katholieke Universiteit Leuven, Belgium
1996 – 2000	Graduate Research Assistant, F. A. Janssens Laboratory of Genetics, Katholieke Universiteit Leuven. Belgium
1994 – 1996	Graduate Research Assistant, Lab of Molecular Genetics, Guangxi Agricultural University,
1992 – 1993	Undergraduate Research Assistant Anhui Normal University

Summary of Evaluation:

Teaching: Professor Xi's diverse and productive teaching portfolio is founded upon his expressed commitment to providing meaningful and experiential learning experiences for his students. As a dedicated and accomplished teacher and scholar, he gives high priority to his instructional responsibilities. Throughout his tenure, he has fulfilled his didactic teaching requirements in EHS through offering key programmatic courses, most of which he has developed himself, such as EHS 570, Water Quality Assessment and Management, EHS 576, Microbiology in Environmental Health, and EHS 653, Environmental Sampling and Analysis Lab (co-taught). Student ratings have been consistently good and content has been of high quality. Since his last promotion in 2012, he has also provided guest lectures in multiple additional courses.

Recently, he established a pilot Global Environmental Health Program within EHS to help students find international internships and to help them optimize their global learning experiences. He has served as director of the program since 2013. This effort included the development two new courses: 1) EHS 690, Practice in Global Environmental Health, which prepares students for international internships by identifying of funding opportunities, writing grant applications, and preparation for immersion into new cultures; and 2) EHS 614 Water and Global Health which covers a diverse range of topics about global water issues. This program and its courses are prime examples of Professor Xi's focus on experiential learning and comprise an integral and important part of the EHS curriculum.

Professor Xi has supervised the research of several PhD and MS students and has been active in the academic advising of numerous MPH students. Since 2012, he has been the primary or co-research advisor to three PhD candidates. Two of these students have successfully defended their dissertations and graduated, the third has already published multiple peer-reviewed articles from his dissertation and is in the process of preparing for his final defense. He is also currently supervising the research of a MS thesis. Since his last promotion, Professor Xi has also hosted four visiting scholars and advised five post-doctoral fellows as well as serving as faculty advisor to numerous students in the EHS MPH program and has supervised dozens of undergraduate students from the Undergraduate Research Opportunity Program at the UM. Some of them have continued to work in his laboratory after they completed their UROP experience.

Research: Professor Xi's research is focused within three major inter-related areas of biofilm research: (A) molecular mechanisms of biofilm development; (B) characterization of biofilms/microbiome in industrial and clinical settings; and (C) development/evaluation of novel approaches for biofilm control. Biofilms are defined as a complex collection of bacterial cells that attach and grow on environmental surfaces and within biological organisms. Ubiquitous in biological and industrial environments, biofilms provide a primary habitat for microorganisms where they are protected microbes from antibiotics and biocides. The scholarly study of biofilms and their public health implications occupies a rather small niche within the fields of microbiology and human health, but an increasingly very important one. Exposure to these microbial pathogens or their components (e.g. endotoxins) is one of the major causes for adverse human health effects. As such, rigorous study of the persistence and management of these organisms in the environment is critical to reducing health risks. Biofilms have been associated

with a wide range of problems both in industry and in medicine and cause billions of dollars of losses every year. According to the NIH, biofilms account for over 80% of microbial infections in the human body.

As a leading expert in this field, Professor Xi has made significant and novel contributions to our understanding of the molecular and clinical biology of biofilms, their relationships to the microbiome, and to the practical control of biofilms related infections and contamination. The research done within these contexts is unique and important because it provides a mechanistic link between microbes in our environmental and their impact on our own health and wellbeing through our intrinsic microbiome, and area of current medical interest.

Since his last promotion in 2012, Professor Xi has published 42 peer reviewed original papers in top tier journals including: *Nature Communications*, *Science Translational Medicine*, *Environmental Science & Technology*, and *Applied and Environmental Microbiology*, with an additional six manuscripts recently submitted (under review); and several manuscripts in preparation. His research has been cited highly by peers and received significant attention from the public media. The Google scholar stats show that his publication citations total 1850 with six articles having been cited more than 100 times. His RG Score is 35.18, which is higher than 92.5% of Research Gate members. Of particular importance to the School of Public Health's emerging emphasis on innovation are two inventions that were based directly on Professor Xi's research for which one provisional patent has been filed. He currently has seven active federal grants where he serves as the PI or co-I, with six additional applications currently pending. Based on this stellar record, he was invited and awarded the position of Scholar in Residence (SIR) at US FDA in 2015 with support from the US National Science Foundation. It has been reported that this invitation will soon be extended for an additional year. He has been invited to present more than 20 seminars at various professional meetings and workshops including US Environmental Protection Agency, Food and Drug Administration, New York State Health Department, Chinese Academy of Sciences. He has also served as a manuscript reviewer for more than 15 scientific journals, and has served on the study sections for NIH and scientific review panels for the US EPA, and as ad hoc reviewer for NSF and several other funding agencies.

<u>Recent and Significant Publications</u>:

Wu J, Wen C, Faulk C, Boehnke K, Zhang H, Dolinoy DC, Xi C. (2016) Perinatal Lead (Pb) exposure alters gut microbiota composition and results in sex-specific bodyweight increases in adult mice. *Toxicology Sciences*, 151(2): 324-333.

Greene C, Vadlamudi G, Newton D, Foxman B, Xi C. (2016) The impact of biofilm formation and multidrug resistance on environmental survival of clinical and environmental isolates of *Acinetobacter baumannii*. *American Journal of Infection Control*, 44(5): e65-71.

Park SR, Tripathi A, Wu J, Schultz PJ, Yim I, McQuada TJ, Yu F, Arevang CJ, Mensah AY, Tamayo-Castillo G, Xi C, Sherman DH. (2016) Discovery of cahuitamycins as biofilm inhibitors derived from a convergent biosynthetic pathway. *Nat. Comm*. 16(7): 10710.

Coletta A, Wu J, Wo Y, Kappler M, Chen H, Xi C, Meyerhoff ME. (2015) S-Nitroso-N-acetylpenicillamine (SNAP) impregnated silicone Foley catheters: A potential

biomaterial/device to prevent catheter associated urinary tract infections. *ACS Biomaterials Science & Engineering*, 1(6):16-424.
Holder D, Berry D, Dai D, Raskin L, Xi C. (2013) A dynamic and complex monochloramine stress response in *Escherichia coli* revealed by transcriptome analysis. *Water research*, 47(14): 4978-4985.

Service: In addition to chairing the departmental admissions and executive committees, as well as his other departmental duties, Professor Xi continues to extend the scope of his departmental service with the establishment of a pilot Global Environmental Health (GEH) program, which provides support and opportunities for EHS students to practice global environmental heath in international settings. He has been an enthusiastic ambassador for SPH in recruiting students to our MPH programs and in initiating international collaborations. Professor Xi has worked with the School of Natural Resources and Environment and the Department of Civil and Environmental Engineering to initiate an accelerated Masters of Public Health Program (commonly known as "3+2" program) to bring students from Tsinghua and Peking Universities to study at the University of Michigan.

During his sabbatical year 2014-2015 in Tsinghua and Peking Universities, he worked to establish a partnership program between University of Michigan and Beijing Institute of Collaborative Innovation. This program will provide more than one million US dollars per year for five years to support UM faculty translational research in the areas of engineering, health and sciences. He currently serves as a co-PI and executive director for the program. He is also actively working to establish other partnership programs between the University of Michigan and South University of Science and Technology of China (a memorandum of understanding signed on May 10, 2016) and will support joint research between faculty from two universities with a budget of 2 million USD per year for next five years. In 2016, he was appointed as the executive director of the UM-BICI Partnership Program in the University of Michigan Office of Research.

Professor Xi serves as the chair of the American Society for Microbiology Council of Division Q (General and Environmental Microbiology). He has also been elected to serve as the president-elect and secretary of Overseas Chinese Society for Microbiology.

External Reviewers:

Reviewer A: "Dr. Xi has continued his high quality and very productive research program in the area of biofilms. Equally impressive is his work on biofilm control and the interactions within the FDA. He has developed an internationally recognized program on the health impacts of biofilms."

Reviewer B: "[He] has been a productive scholar in terms of the quality and quantity of his publications. He has also been successful with regard to intellectual property having been awarded one patent and having additional submissions. It is the totality of his depth and breadth that sets him apart and makes him a world class scientist."

Reviewer C: "His scholarly impact is also demonstrated qualitatively by his strong h-Index and high number of citations. I rank him certainly in the top 20% of scientists at his career stage

working in the area of environmental microbiology, and probably in the top 10%. I strongly and without reservation support his promotion to Professor."

Reviewer D: "In addition to the quantity, the quality of the papers is also very high. He is conducting cutting edge research on some of the most important and interesting questions related to bacterial biofilms and making seminal contributions to understand how bacterial biofilms are impacting environmental and human health."

Reviewer E: "Professor Xi's standing among mid-career, application-oriented, public health microbiologists is very high. His publication record since his last promotion, around 40 papers is exceptional, and his grant record is also exceptional."

Reviewer F: "Dr. Xi's research has been in the forefront of environmental and clinical microbiology and utilizes innovative and multidisciplinary approaches. Dr. Xi is not only an independent investigator, but also a highly desired collaborator. [He] has established a reputed research program that is recognized nationally and internationally. He would certainly meet the requirements for promotion to Full Professor at my university."

Reviewer G: "Dr. Xi's research is focusing on three areas. All of these areas are frontiers in both basic and applied microbiology. In summary Dr. Xi is an excellent scientist in environmental microbiology important to public health."

Summary of Recommendation:
Professor Xi is a leading researcher in his field and he contributes significantly to our understanding of the environmental and public health consequences and overall implications of biofilms. His work touches upon our ability to avoid infection in many different places and environmental conditions and addresses the important implications of microbial resistance to antibiotics. Few others have attempted to integrate the environment contexts in which these microbes are found and thrive to specific human infection and adverse health outcomes. Moreover, his areas of expertise and scholarship continue to be pivotal in attracting the best PhD students and new faculty in the EHS Department. It is with the support of the School of Public Health Executive Committee that I recommend Chuanwu Xi for promotion to professor of environmental health sciences, with tenure, Department of Environmental Health Sciences, and professor of global public health, without tenure, School of Public Health.

Martin A. Philbert, Ph.D.
Dean, School of Public Health

May 2017