Approved by the Regents
May 17, 2012

PROMOTION RECOMMENDATION
UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
DEPARTMENT OF MICROBIOLOGY AND IMMUNOLGY

Philip C. Hanna, Ph.D., associate professor of microbiology and immunology, with tenure, Department of Microbiology and Immunology, Medical School, is recommended for promotion to professor of microbiology and immunology, with tenure, Department of Microbiology and Immunology, Medical School.

Academic Degrees:

Ph.D.	1990	University of Pittsburgh
B.S.	1984	Loyola College, Baltimore, MD

Professional Record:

2005-present	Associate Professor of Microbiology and Immunology, University of Michigan
1999-2005	Assistant Professor of Microbiology and Immunology, University of Michigan
1995-1999	Assistant Professor of Microbiology and Immunology, Duke University

Summary of Evaluation:

Teaching: Dr. Hanna has contributed significantly at every level of teaching in the Department of Microbiology and Immunology. Currently he is the course director for Microbiology and Immunology 405, a microbial pathogenesis course offered for senior undergraduates as part of the microbiology concentration. He also directs Microbiology and Immunology 607, a key offering in our graduate curriculum. He contributes to the interdisciplinary course Cellular Biotechnology 540, taught as a component of the Cellular Biotechnology Training Program and cross-listed in the Department of Microbiology. Dr. Hanna earns very good evaluations in student satisfaction surveys, with high marks for his level of knowledge, his preparation and his general excellence as an instructor. One student in 405 indicated that Dr. Hanna has "an exquisite touch" in his handling of the class, while another called him "incredible." Dr. Hanna also contributes to teaching efforts in the department by mentoring students in his laboratory. Over the years he has attracted 13 Ph.D. students to his lab, four post-doctoral fellows and numerous undergraduates. These students receive excellent training from him as evidenced by their productivity and success both while in his lab and after leaving it. He is also popular as an advisor to students from other labs, many of whom ask him to serve on their thesis committees; he has served on 43 such committees since joining the faculty at Michigan.

Research: Dr. Hanna studies the pathogenicity mechanisms of *Bacillus anthracis* and, more recently, *Clostridium difficile*. It is largely for his work on *B. anthracis* and anthrax that he has built his reputation, and his contributions are notable. He was an early proponent of adapting

genome-based methods for studying pathogen biology, well before these methods became routinely used by others. His work provided the first comprehensive analysis of spore coat composition using proteomics, and he also presented an early model for how spore production is regulated based on transcription profiling. In fact he is acknowledged as a leader in developing new and varied technologies for the study of *B. anthracis*. Using these, he identified an iron-uptake system based on the molecule petrobactin, which is required for vegetative growth by *B. anthracis*. He also demonstrated the essential nature of petrobactin during infection. This has led him and a collaborator, Dr. David Sherman of the University of Michigan Life Sciences Institute, to continue delving into the petrobactin biosynthetic pathway as a potential target for designing new therapeutics against anthrax. His current emphasis on *B. anthracis* is toward understanding mechanisms by which spores germinate into the vegetative cells that grow and cause disease, and he is widely considered to be a world expert in this area of research. This work has focused both on the signals and signal receptors that trigger germination, and on discovery and characterization of the lytic enzymes that break down the spore so that germination can proceed. In addition to the lytic enzymes made by the microbe, he also observed that a lytic enzyme provided by the host may play a role in germination. This led him to collaborate with an investigator at University of Cincinnati using a knockout mouse lacking that enzyme to study the effectiveness of spore germination in that host.

With the terrorism events of 2001, Dr. Hanna emerged as a leading national voice educating the public on the threat of bioterrorism agents. His expertise was also acknowledged among his scientific colleagues as he became an important contributor and collaborator in efforts to develop mechanisms of prevention of, or in response to, such attacks through the regional research centers of excellence on biodefense that arose with significant NIH support after 2001. In addition to support through these biodefense mechanisms, he has generated significant research support through more traditional investigator-initiated processes, again a testament to the respect with which his work is viewed by his peers. He has been invited to present his research to a wide range of groups across the country and at international meetings (at which he has also chaired sessions). His presentations are marked by a high degree of scholarship and an authoritative yet very approachable style.

With the increasing incidence of aggressive *C. difficile* infections, Dr. Hanna has turned his attention and talents to uncovering new knowledge about this pathogen. He is collaborating with other investigators at Michigan under the auspices of an "Enteric Research Investigational Network" – a cooperative research center funded by NIH – to develop and apply new genetic tools to study *C. difficile*. His acknowledged expertise in this area from his research on *B. anthracis* makes him particularly suited to this work.

Recent and Significant Publications:

Carr K, Lybarger S, Anderson E, Janes B, Hanna P: The role of *Bacillus anthracis* germinant receptors in germination and virulence. *Mol Microbiol* 75:365-475, 2010.

Carlson P, Dixon S, Janes B, Carr K, Nusca T, Anderson E, Keene S, Sherman D, Hanna P: Genetic analysis of petrobactin transport in *Bacillus anthracis*. *Mol Microbiol* 75:900-909, 2010.

Giebel J, Carr K, Anderson E, Hanna P: The germination-specific lytic enzymes SleB, SwlJ1 and CwlJ2 each contribute to *Bacillus anthracis* spore germination and virulence. *J Bacteriol* 191:5569-5576, 2009.

Carlson P, Carr K, Janes B, Anderson E, Hanna P: Transcriptional profiling of *Bacillus anthracis* Sterne (34F2) during iron starvation. *PLoSOne* 4:e6988, 2009.

Pfleger B, Kim Y, Nusca T, Maltseva N, Lee J, Rath C, Scaglione J, B Janes, Anderson E, Bergman N, *Hanna P, *Joachimiak A, *Sherman D: Structural and functional analysis of AsbF: origin of the stealth 3,4- dihydroxybenzoic acid subunit for petrobactin biosynthesis. *Proc Natl Acad Sci (USA)* 105:17133-17138, 2008. *equal contribution.

Service: Dr. Hanna currently serves as the vice-chair of the Graduate Studies Committee in the Department of Microbiology and Immunology. In this capacity he leads recruiting efforts as part of the Program in Biomedical Science (PIBS) admissions process. With the large number of students who apply to PIBS with a primary interest in microbiology and immunology, this is a big job and he handles it professionally and with great collegiality. Noted already is his service on numerous student committees, further recognition of his enthusiasm for graduate training. Keeping within this admirable focus on graduate education, he serves on a panel at Rackham Graduate School reviewing nominations for student awards. He currently chairs the University Institutional Biosafety Committee, an important and time-consuming activity that provides key oversight for research at Michigan. He also serves on the university committee that oversees our important Animal Biosafety Level-3 facility, used for state-of-the-art animal research to study BSL-3 pathogens such as those causing plague and TB. Nationally, Dr. Hanna has been called on to provide his expertise on grant reviews for NIH and other agencies, manuscript reviews for numerous journals, as a consultant for the biotechnology industry, and as external advisor for federal agencies and biodefense centers.

External Reviewers:

Reviewer A: "...Dr. Hanna's service to the bio-defense community has been exemplary at several levels, especially at a time when bio-security was a clear national priority."

Reviewer B: "His work on spore germination and siderophore function are outstanding contributions that have direct relevance for pathogenesis and have set the standards for the study of other gram positive spore forming organisms such as Clostridia spp."

Reviewer C: "His presentations are clear and follow a logic and rationale that makes it easy to forget how complex and sophisticated his approaches are....Overall, I would rate him as an outstanding teacher and mentor....Clearly, he has established a national and international reputation as being a top-notch scientist."

Reviewer D: "I believe there is no question that Phil has the scholarship and productivity, commitment to teaching and service, and international reputation that any top academic institution would expect for promotion to Professor."

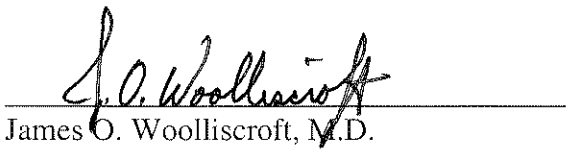
Reviewer E: "His work is considered of highest international quality by his peers, and he has been successful in obtaining strong funding support for his various research activities, as well as for a very large proteomic facility, which he directs. His publication record is substantive, and his work is recognised by frequent invited contributions to meetings..."

Reviewer F: "Dr. Hanna's studies are meticulously done, well documented, and often lead to a new paradigm or provide data that allows others to derive new hypotheses....Dr. Hanna, in my opinion, has no equal."

Reviewer G: "There is every expectation that Phil's energy and productivity, and his love for science and so many aspects of the academy, will continue into the foreseeable future. That is good for Phil, for the Department, and for the University! The field's respect for Phil continues to grow as his career grows. Every area that on analyzes supports Phil's promotion to professor."

Summary of Recommendation:

Dr. Hanna has clearly had outstanding accomplishments in teaching, research and service since his last promotion. His expertise in microbial pathogenesis is well recognized around the world, and he is sought after for his scientific knowledge and judgment. He is a dedicated teacher with a great track record of education at every level. I enthusiastically recommend Philip C. Hanna, Ph.D. for promotion to professor of microbiology and immunology, with tenure, Department of Microbiology and Immunology, Medical School.



James O. Woolliscroft, M.D.
Dean
Lyle C. Roll Professor of Medicine

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