

PROMOTION RECOMMENDATION
THE UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
DEPARTMENT OF INTERNAL MEDICINE
DEPARTMENT OF MICROBIOLOGY AND IMMUNOLOGY
COLLEGE OF LITERATURE, SCIENCE, AND THE ARTS
DEPARTMENT OF ECOLOGY AND EVOLUTIONARY BIOLOGY

Adam S. Lauring, M.D., Ph.D., assistant professor of internal medicine, Department of Internal Medicine, assistant professor of microbiology and immunology, Department of Microbiology and Immunology, Medical School, and assistant professor of ecology and evolutionary biology, Department of Ecology and Evolutionary Biology, College of Literature, Science, and the Arts, is recommended for promotion to associate professor of internal medicine, with tenure, Department of Internal Medicine, associate professor of microbiology and immunology, without tenure, Department of Microbiology and Immunology, Medical School, and associate professor of ecology and evolutionary biology, without tenure, Department of Ecology and Evolutionary Biology, College of Literature, Science, and the Arts.

Academic Degrees:

M.D.	2002	University of Washington, Seattle, WA.
Ph.D.	2000	University of Washington, Seattle, WA.
B.S.	1994	Yale University

Professional Record:

2017-present	Assistant Professor of Ecology and Evolutionary Biology, University of Michigan
2012-present	Assistant Professor of Internal Medicine, University of Michigan,
2012-present	Assistant Professor of Microbiology and Immunology, University of Michigan
2009-2012	Adjunct Assistant Professor of Internal Medicine, University of California, San Francisco
2008-2009	Clinical Instructor, Department of Internal Medicine, University of California, San Francisco

Summary of Evaluation:

Teaching: Dr. Lauring has demonstrated a strong commitment to teaching. While attending on the infectious disease consult service, Dr. Lauring supervises medical students, internal medicine residents and infectious disease fellows. His teaching is case-based at the patient's bedside. Dr. Lauring also devotes his time and effort to classroom based teaching. He routinely teaches Viral Pathogenesis, the M1 Infectious Disease Sequence, Experimental Genetic Systems, and the LSA freshman seminar. Dr. Lauring takes most pride in his role as the course director for science in the clinics. This course is a requirement for both graduate students and post-doctoral fellows in the T32 supported Molecular Mechanisms of Microbial Pathogenesis Training Program. The

majority of Dr. Lauring's teaching takes place in his laboratory, where he trains students and fellows in the conduct of research and mentors their development as independent scientists. Since establishing his lab in 2012, Dr. Lauring has trained three postdoctoral fellows, four Ph.D. students in microbiology, five Ph.D. students engaged in research rotations, a MPH student, a visiting graduate student from the University of Lubeck as well as two undergraduates. Dr. Lauring mentored Robert Woods, an assistant professor in the Division of Infectious Diseases and currently serves as his primary K08 award mentor. Dr. Lauring has also extended his teaching to community outreach events. In 2014, he delivered a lecture on the general aspects of infectious diseases to the public as part of the University of Michigan Mini Medical School. Additionally, he participated in a panel discussion on Ebola at the University's International Institute.

Research: Dr. Lauring's scholarly interests lie in the fundamental mechanisms of virus evolution. Throughout his post-doctoral training, Dr. Lauring worked specifically with the poliovirus, however since joining the University of Michigan faculty, he expanded beyond polio and is now also working with the influenza virus. Dr. Lauring's work seeks to define the importance of mutation rate and mutational tolerance to the behavior of RNA viruses. This current work is being funded by an R01 from the NIAID. Dr. Lauring has been actively developing projects to define the population genetics of influenza viruses within and between human hosts. One such project was funded thru the Doris Duke Charitable Foundation. In this investigation, Dr. Lauring analyzed viruses collected as part of a randomized, placebo-controlled trial of vaccine efficacy. This study helped to define the impact of vaccine induced immunity on host virus populations. Building on this, Dr. Lauring then used sequence data to infer transmission events within households and to quantify the transmission bottleneck for influenza. It was through this work that Dr. Lauring began funded collaborations with investigators at the School of Public Health. Dr. Lauring has 33 peer-reviewed publications, 17 of those while in his current rank, five submitted publications, one submitted patent and continuous industry and NIH sponsored funding, including an active R01 grant. Dr. Lauring has established a national reputation as evidenced by service on NIH and NSF review panels, extramural invited presentations and three oral presentations at major scientific meetings. Dr. Lauring was recently recognized for his work and awarded the highly competitive Investigator in the Pathogenesis of Infectious Diseases grant from the Burroughs Wellcome Fund.

Recent and Significant Publications:

Pauly MD, Procario MC, Lauring AS: A novel twelve class fluctuation test reveals higher than expected mutation rates for influenza A viruses. *eLife*, 2017, advance online publication <https://elifesciences.org/articles/26437>.

Debbink K, McCrone JT, Petrie JG, Truscon R, Johnson E, Mantlo EK, Monto AS, Lauring AS: Vaccination has minimal impact on the intrahost diversity of influenza virus. *PLoS Pathogens* 13:e1006194, 2017.

Visher E, Whitefield SE, McCrone JT, Fitzsimmons W, Lauring AS: The mutational robustness of influenza A virus. *PLoS Pathogens* 12:e1005856, 2016.

McCrone JT, Lauring AS: Measurements of intrahost diversity are extremely sensitive to systematic errors in variant calling. *Journal of Virology* 90:6884-6895, 2016.

Pauly MD, Lauring AS: Effective lethal mutagenesis of influenza virus with three nucleoside analogs. *Journal of Virology* 89:3584-3597, 2015.

Service: Dr. Lauring is an active infectious disease specialist who sees patients on the inpatient consult service as well as in the outpatient clinic. Institutionally, Dr. Lauring serves as a member of the Faculty Search Committee for the Division of Infectious Diseases as well as a member of the Graduate Studies Committee for the Department of Microbiology and Immunology. He also provides his services as a committee member for the Dissertation Committee. Dr. Lauring is a member of the American Society for Virology, Infectious Diseases Society of America and the American Society for Microbiology. His expertise in the field is recognized through his peer review service for top-tier journals such as *Journal of Virology*, *PLoS One*, and *eLife*. In addition to this, he has been appointed as an associate editor for *PLoS Pathogens*. In 2016, Dr. Lauring provided his services as an abstract reviewer for *ASM Microbe*. This year Dr. Lauring has begun assisting the ETH Zurich Post-doctoral Fellowship Program as a grant reviewer.

External Reviewers:

Reviewer A: “Perhaps most impressive is Dr. Lauring’s work on next-generation sequencing of influenza viruses in clinical specimens, which straddles the fields of molecular epidemiology and viral evolution. The bioinformatics involved in such efforts are challenging, as many studies are plagued by false-positive variant calls....He is a gifted scientist and gives amply of his talents in teaching and training. He has made important contributions to an understanding of viral evolution and pathogenesis and is on a research trajectory to make even more important contributions in the future.”

Reviewer B: “Dr. Lauring and his team have carefully measured both the rates and fitness effects of mutation in the RNA genomes of influenza viruses ...demonstrated the susceptibility of these viruses to antiviral drugs that increase their mutation rates. By combining fluctuation tests and sequencing methods, ...showed that the mutation rate of the influenza virus is even higher than previously thought.”

Reviewer C: “In the field of viral evolution, I would rank him among the best scientists in the field....his most exciting work is in front of him, including two papers in review at Science, which could be career- and indeed paradigm-defining....His originality and the ability to see beyond the well-accepted dogma, more than anything else, convinces me that he is one of the experts in this field....**Dr. Lauring is on his way to becoming an iconic scientist...**”

Reviewer D: “Among researchers with medical training he would be in the very top group, and a likely leader in the future. He is now widely recognized as an authority in the areas of viral biology and virus host interactions, and for his work using new approaches to advance the study of virus evolution....Adam is developing as a leader within both the virology and more general infectious diseases communities, who is conducting innovative research on the evolution and variation of important human viruses.”

Reviewer E: “He has two prestigious grants in play (R01, Burroughs Wellcome) and has been publishing important beefy papers in the leading journals in his field at an impressive rate since he first made assistant professor. I think there is no doubt he would get tenure here....His incredibly careful dissection of deep sequencing errors and how to separate those from real viral diversity is already a classic in the field.”

Reviewer F: “His laboratory has developed new methods to analyze next generation sequence data and new techniques to assess the mutation rate of influenza viruses. His work has important implications for public health, in the areas of antiviral treatment and vaccines.”

Summary of Recommendation:

Dr. Lauring is recognized as an authority in the areas of viral biology and virus host interactions. He has made substantial contributions to the field through his research, clinical work, teaching and service. Therefore, we enthusiastically recommend Adam S. Lauring, M.D., Ph.D. for promotion to associate professor of internal medicine, with tenure, Department of Internal Medicine, associate professor of microbiology and immunology, without tenure, Department of Microbiology and Immunology, Medical School, and associate professor of ecology and evolutionary biology, without tenure, Department of Ecology and Evolutionary Biology, College of Literature, Science, and the Arts.



Marschall S. Runge, M.D., Ph.D.
Executive Vice President for Medical Affairs
Dean, Medical School



Andrew D. Martin, Dean
Professor of Political Science and Statistics
College of Literature, Science, and the Arts

May 2018