

# Daniel B. Forger III

[forger@umich.edu](mailto:forger@umich.edu)

(734) 763-4544

December 10, 2010

Department of Mathematics, University of Michigan  
2074 East Hall 525 East University  
Ann Arbor, MI 48109

## **Education**

<u>Institution</u>	<u>Degree</u>	<u>Year</u>	<u>Field of Study</u>
Harvard College	B.A.	1999	Applied Mathematics (Medical Sciences)
Harvard GSAS	M.S.	1999	Applied Mathematics (Medical Sciences)
New York University	Ph.D.	2003	Mathematics

## **Employment**

1997-1999(summers)	Research Assistant, Division of Engineering and Applied Sciences, Harvard University
1998(fall)	Course Assistant in Nonlinear Dynamics and Chaos, Harvard University
2000-2001(summers)	Research Associate, Paydarfar and Clay Labs, Marine Biological Laboratories, Woods Hole, MA
2003 (early fall)	Research Consultant, Paydarfar Lab, Department of Neurology, UMASS Medical School
2003-2005	Sloan Post-Doctoral Fellow, Blau Lab, Biology Department, NYU
2005-2009	Assistant Professor of Mathematics, University of Michigan
2009-current	Associate Professor of Mathematics and Assistant Research Professor of Computational Medicine and Bioinformatics, University of Michigan

## **Fellowships**

1999-2000	Pre-doctoral Trainee in Sleep, Circadian and Respiratory Neurobiology, Brigham and Women's Hospital, Harvard Medical School (NRSA T32)
2000-2003	National Science Foundation Graduate Research Fellowship
2003-2005	Sloan Foundation Fellowship in Computational Molecular Biology

## **Awards and Honors**

1999	Richard Kronauer Travel Award for Excellence in Biological Modeling
2000, 2002	Travel Award, Society for Research on Biological Rhythms
2003	Stuyvesant High School Mentor Award
2004	Wilhelm Magnus Memorial Prize for Significant Contributions to the Mathematical Sciences
2004	Dean's Outstanding Dissertation Award in the Natural Sciences
2004	Burroughs Wellcome Fund Career Award at the Scientific Interface (Finalist)
2007	Air Force Office of Scientific Research Young Investigator

## Publications

Forger DB Paydarfar D, Clay JR Optimal Stimulus Shapes for Neuronal Excitation Plos Computational Biology **7** (2011) e1002089.

Forger DB Signal Processing in Cellular Clocks PNAS (2011), **108** (2011) 4281-5.

Fleshner M, Booth V, Forger DB Diniz Behn CG Multiple Signals from the suprachiasmatic nucleus are required for circadian regulation of sleep-wake behavior in the nocturnal rat, Philosophical Transactions of the Royal Society A *Accepted*

Yamada YR, Forger DB Multiscale Complexity in the Mammalian Circadian Clock Curr. Opinion Genes Dev **20** (2010) 626. (Review).

Ko CH, Yamada YR, Welsh DK, Buhr ED, Liu AC, Zhang EE, Ralph MR, Kay SA, Forger DB, Takahashi JS, Emergence of noise-induced oscillations in the central circadian pacemaker PLoS Biology **8** (2010) e1000513.

Chang DE, Leung S, Atkinson MR, Reifler A Forger DB, Ninfa AJ Building Biological Memory by Linking Positive Feedback Loops PNAS, **107** (2010) 175-180.

Belle M.D.C., Diekman C.O., Forger D.B. and Piggins H.D., Temporal Electrical Silencing in the Mammalian Circadian Clock Science **326** (2009) 281-4.

Diekman CO, Forger DB Clustering Predicted by an Electrophysiological Model of the Suprachiasmatic Nucleus, Journal of Biological Rhythms, **24** (2009) 322-33.

Dean DA, Forger DB and Klerman EB Taking the Lag out of Jet Lag through Model Based Schedule Design. PLoS Computational Biology (2009) 5(6).

Virshup DM, Forger DB Keeping the Beat in the Rising Heat Cell (2009) 137 602-4 (Preview).

Clay JR, Paydarfar D and Forger DB A Simple Modification of the Hodgkin & Huxley Equations explains Type 3 Excitability in Squid Giant Axons, J Royal Society Interface **5** (2008) 1421-8.

Ninfa AJ, Atkinson MR, Forger DB, Atkins S, Arps D, Selinsky S, Court D, Perry N and Mayo AE A Syntehtic Biology Approach to Understanding Biological Oscillations: Developing a Genetic Clock for *Escherichia coli* in Bacterial Circadian Programs, Ditty et al. (2009) Book Chapter.

Conrad E, Mayo AE, Ninfa AJ and Forger DB Rate constants rather than biochemical mechanism determine behavior of genetic clocks J Royal Society Interface **5** (2008) S9-15.

Virshup DM, Eide EJ, Forger DB, Gallego M, and Harnish EV Reversible protein phosphorylation regulates circadian rhythms Cold Spring Harbor Symposium on Quantitative Biology **72** (2007) 413-20.

Sim CK and Forger DB Modeling the Electrophysiology of Suprachiasmatic Nucleus Neurons Journal of Biological Rhythms **22** (2007) 445-453.

Virshup, DM and Forger DB After hours keeps clock researchers CRYing Overtime. Cell **129** (2007) 857-859 (Preview).

Forger DB, Gonze D, Virshup DM and Welsh DK Beyond Intuitive Modeling: Combining Biophysical Models with Innovative Experiments to Move the Circadian Clock Field, Journal of Biological Rhythms **22** (2007) 200-210 (Review).

Paydarfar D, Forger DB, and Clay JR Noisy Inputs and the Induction of On-Off Switching Behavior in a Neuronal Pacemaker. J Neurophysiol., **96** (2006) 3338-3348.

Gallego M, Eide EJ, Woolf MF, Virshup DM and Forger DB. An opposite role for tau in circadian rhythms revealed by mathematical modeling, PNAS, **103** (2006) 10618-23.

Forger DB, Drapeau M, Collins B, and Blau J, A new model for circadian clock research? Molecular Systems Biology (News and Views) msb4100019-E1 (2005)

Indic P, Forger DB, Dean DA, Brown EN, Kronauer RE and Jewett ME Comparison of the Amplitude Recovery Dynamics of Two Limit Cycle Oscillator Models of the Human Circadian Pacemaker. Chronobiology International, **22** (2005) 613-629.

Paydarfar D, Forger DB and Clay JR Starting and stopping a bistable pacemaker: stochastic stimulation identifies critical perturbations. In: *Noise and Fluctuations*, edited by Gonzalez T, Mateos J, and Pardo D, , American Institute of Physics, NY, pages 571-575, 2005.

Forger DB and Peskin CS, Stochastic Simulation of the Mammalian Circadian Clock, PNAS, **102** (2005) 321-324.

Forger DB and Paydarfar D, Starting, Stopping and Resetting Biological Oscillators: In Search of Optimum Perturbations, Journal of Theoretical Biology, **230** (2004) 521-532.

Forger DB and Peskin CS, Model Based Conjectures on Mammalian Clock Controversies, Journal of Theoretical Biology, **230** (2004) 533-539.

Forger DB and Peskin CS, A Detailed Predictive Model of the Mammalian Circadian Clock, PNAS, **100** (2003) 14806-14811.

Forger DB, Dean DA, Gurdziel K, Leloup J-C, Lee C, von Gall C, Etchegaray J-P, Kronauer RE, Goldbeter A, Peskin CS, Jewett ME and Weaver DR, Development and Validation of Computational Models for Mammalian Circadian Oscillators, Omics, **7** (2003) 387-400.

Forger DB, Deterministic and Stochastic Mathematical Modeling and Computer Simulation of the Mammalian Intracellular Circadian Clock, PhD Dissertation

Forger DB and Kronauer RE, Reconciling Mathematical Models of Biological Clocks by Averaging on Approximate Manifolds, SIAM J. Appl. Math. **62** (2002) 1281-1296.

Forger DB, Jewett ME and Kronauer RE A Simpler Model of the Human Circadian Pacemaker, J. Biol. Rhythms **14** (1999) 532-537.

Kronauer RE, Forger DB and Jewett ME Quantifying Human Circadian Pacemaker Response to Brief, Extended and repeated Light Stimuli over the Phototopic Range, J. Biol. Rhythms **14** (1999) 500-515.

Jewett ME, Forger DB and Kronauer RE Revised Limit Cycle Oscillator Model of Human Circadian Pacemaker, J. Biol. Rhythms **14** (1999) 493-499.

Undergraduate Thesis, The Modeling of Circadian Oscillators, Harvard College.

Paydarfar D, Forger DB and Clay JR Control of Transitions Between Repetitive Firing and Quiescence by Stochastic Stimulation of Squid Axons with Membrane Bistability (abstract) J. Physiol. (2001) **536.P** 120.P.

## **Selected Talks**

2010	Riken (Kamisuwa, Japan), University of Hiroshima (Japan)
2010	Lorenz Center (Leiden, Holland), University of Warwick (UK)
2010	Math Department Colloquium (Michigan)
2009	SECTS (Keynote), Ohio APS (Keynote),
2009	Michigan Systems Biology, MPIPKS (Dresden, Germany)
2009	University of Manchester (UK), UT Southwestern
2008, 2010	SIAM Life Sciences,
2008	Cold Spring Harbor Meeting, IMA (3 talks)
2008	UNC, Wisconsin, Pfizer
2007	NUS Singapore, Riken Japan, IUPUI, Duke, KITP
2007	Featured Speaker MAA Indiana Section
2007, 2008	Harvard
2004, 2006, 2008	Mathematical Biosciences Institute
2009, 2010	Mathematical Biosciences Institute

2004, 2006, 2008 Society for Math Biology  
2004 UC Santa Barbara  
2003, 2004 UMASS Medical School  
2003 Applied Math Days, RPI  
2002, 2004 PI presentation, DARPA Biocomp Program, Washington, DC  
2002 Ecole Polytechnique, France  
1999, 2000, 2001 Biomathematics Lunchtime Seminar, Courant Institute, NYU  
1999, 2000 Brigham and Women's Hospital, Boston, MA

### **Affiliations, Committees and Memberships**

External Advisory Board for the Center for Research on Biological Clocks; Society for Research on Biological Rhythms; Society for Industrial and Applied Mathematics; Air Force PRET External Review (2004). Advisory Board for 2010-2011 Theme Year Mathematical Biosciences Institute, Center for Biological Clocks (Advisory Board 2008-current)

### **Editorial Duties**

Guest Editor for the Journal of Biological Rhythms (June 2007 issue). Editorial Board, Journal of Biological Rhythms

### **Conferences Organized**

Chair of organizing committee: Workshop on Modeling Circadian Rhythmicity, Sleep Regulation and Neurobehavioral Function, held concurrently with the annual meetings of the Society for Mathematical Biology and the SIAM Life Sciences Meeting; Organizer, Workshop on Circadian Rhythms in Plants and Fungi (MBI)

### **Supervision of Students for the Intel (Westinghouse) Competition**

Albert Leung: A Tissue Level Model of the Human Circadian Clock **Finalist 2001**  
Varun Narendra: A Mathematical Model of Gaucher Disease **Finalist 2002**  
Xiao Wei: Modeling Tumor Growth and Chemotherapy **Semifinalist 2004**

### ***Ad Hoc Reviewer***

NSF, PNAS, Journal of Theoretical Biology, CNS 04, Journal of Neuroscience, PLOS Computational Biology, The Journal of Biological Rhythms, Physics Letters A, Journal of Neuroscience, ComPlexUs, Cell and Molecular Systems Biology, Cell