

Leah Renee Johnson

CONTACT INFORMATION	Department of Ecology and Evolution University of Chicago 1101 E. 57th Street Chicago, IL 60637	lrjohnson@uchicago.edu www.lifesci.ucsb.edu/~lrjohnson/
RESEARCH INTERESTS	Mathematical modeling of biological systems, especially applications in ecology and infectious diseases, with emphases on: how interactions of processes at multiple scales contribute to system dynamics; practical statistical methodologies for parameter inference for complex mechanistic models.	
EDUCATION	Ph.D. (Applied Mathematics and Statistics/Physics) June 2006 University of California Santa Cruz Dissertation: <i>Mathematical Modeling of Cholera: from Bacterial Life Histories to Human Epidemics</i> Advisor: Marc Mangel M.S. (Physics) September 2003 University of California Santa Cruz B.S. with Honors (Physics) June 2001 The College of William and Mary, Williamsburg, VA Advisors: Marc Sher and Christopher Carone	
HONORS AND AWARDS	<ul style="list-style-type: none">• Finalist, Kings College Junior Research Fellowship, University of Cambridge (2008)• College Research Associate, Jesus College, University of Cambridge (2006-09)• President's Dissertation Year Fellow, UCSC (2005-06)• GAANN Fellow (Graduate Assistance in Areas of National Need), UCSC (2002-05)• International Society for Bayesian Analysis (ISBA) Travel Grant (2004) from NSF for World Meeting in Vina del Mar, Chile• Institute of Electrical and Electronics Engineers (IEEE) Travel Grant (2002), for outstanding student researcher/presenter for the NSS/MIC Conference in Norfolk, VA• Regents Fellowship, UCSC (2001)	
EMPLOYMENT	Temporary Lecturer Environmental Sciences Loyola University Chicago	Fall 2011 Chicago, IL
	Post-Doctoral Researcher Ecology and Evolution University of Chicago with Joy Bergelson	2011 to present Chicago, IL
	Post-Doctoral Researcher Ecology, Evolution, and Marine Biology, University of California Santa Barbara with Roger Nisbet and Cherie Briggs	2009 to 2011 Santa Barbara, CA

Post-Doctoral Researcher

National Centre for Statistical Ecology,
Statistical Lab, University of Cambridge

2006 to 2009
Cambridge, UK

REFEREED
PUBLICATIONS

Analyzing variations in life-history traits of five Pacific salmon species in the context of Dynamic Energy Budget (DEB) theory: L. Pecquerie, **L.R. Johnson**, S.A.L.M. Kooijman and R.M. Nisbet. *Journal of Sea Research*, 2011, 60:424-433.

Parameter Inference for an Individual Based Model of Chytridiomycosis in Frogs: **L.R. Johnson** and C.J. Briggs. *Journal of Theoretical Biology*, 2011, 277(1):90-98.
doi:10.1016/j.jtbi.2011.02.010

Dynamic Energy Budget Theory and Population Ecology: Lessons from Daphnia: R.M. Nisbet, E. McCauley, and **L.R. Johnson**. *Phil. Trans. R. Soc. B*, 2010, 365: 3541-3552. doi: 10.1098/rstb.2010.0167.

amei: An R package for the Adaptive Management of Epidemiological Interventions: D. Merl, **L.R. Johnson**, R.B. Gramacy and M. Mangel. *Journal of Statistical Software*, 2010, 36(6):1-32. url: <http://www.statssoft.org/v36/i06>

Implications of Dispersal and Life History Strategies for the Persistence of Linyphiid spider Populations: **L. R. Johnson**. *Ecological Modelling*, 2010, 221:1138-1147.
doi:10.1016/j.ecolmodel.2009.12.026

A statistical framework for the adaptive management of epidemiological interventions. D. Merl, **L. R. Johnson**, R. B. Gramacy and M. Mangel. *PLoS ONE*, 2009 4(6): e5807.
doi:10.1371/journal.pone.0005807

Microcolony and Biofilm Formation as a Survival Strategy for Bacteria: **L. R. Johnson**. *Journal of Theoretical Biology*, 2008, 251:24-34. doi: 10.1016/j.jtbi.2007.10.039

Life histories and the evolution of aging in bacteria and other single-celled organisms: **L. R. Johnson** and M. S. Mangel, *Mechanisms of Aging and Development*, 2006, 127(10):786-793. doi:10.1016/j.mad.2006.07.004

Conceptual design of a proton computed tomography system for applications in proton radiation therapy: R. Schulte, V. Bashkurov, K. Shanazi, T. Li, Z. Liang, K. Mueller, J. Heimann, **L. R. Johnson**, B. Keeney, H. F.-W. Sadrozinski, A. Seiden, D. C. Williams, L. Zhang, Z. Li, S. Peggs, T. Satogata, and C. Woody. *IEEE Trans. on Nuclear Science*, 2004, 51(3):866- 872.

Toward proton computed tomography: H.F.-W. Sadrozinski, V. Bashkurov, B. Keeney, **L. R. Johnson**, S. G. Peggs, G. Ross, T. Satogata, R. W. M. Schulte, A. Seiden, K. Shanazi, and D. C. Williams. *IEEE Trans. on Nuclear Science*, 2004, 51(1):3-9.

Initial studies on proton computed tomography using a silicon strip detector telescope: **L. Johnson**, B. Keeney, G. Ross, H. F.-W. Sadrozinski, A. Seiden, D.C. Williams, L. Zhang, V. Bashkurov, R. W. Schulte, K. Shanazi. *Nucl. Inst. Meth. A*, 2003, 514:215-223. (refereed proceedings)

Issues in Proton Computed Tomography: H. F. -W. Sadrozinski, V. Bashkirov, M. Bruzzi, **L. R. Johnson**, B. Keeney, G. Ross, R. W. Schulte, A. Seiden, K. Shanazi, D. C. Williams, and L. I. Zhang. Nucl. Inst. Meth. A, 2003, 511:275-281. (refereed proceedings)

OTHER PAPERS

Correction to: Aerial activity of Linyphiid spiders: modeling dispersal distances from meteorology and behavior: Journal of Applied Ecology, 2007, Vol 44, pg 1263.

Design of a proton computed tomography system for applications in proton radiation therapy: R. Schulte, V. Bashkirov, T. Li, J.Z. Liang, K. Mueller, J. Heimann, **L. R. Johnson**, B. Keeney, H. Sadrozinski, A. Seiden, D.C. Williams, L. Zhang, Z. Li, S. Peggs, T. Satogata, C. Woody. IEEE Nuclear Science Symposium Conference Record, 2003 Vol 3, pg 1579 - 1583

Reconstruction for proton computed tomography: a Monte Carlo study: T Li, Z. Liang, K. Mueller, J. Heimann, **L. Johnson**, H. Sadrozinski, A. Seiden, D. Williams, L. Zhang, S. Peggs, T. Satogata, V. Bashkirov, and R. Schulte. IEEE Nuclear Science Symposium Conference Record, 2003, Vol 4, pg 2767–2770

Reconstruction for proton computed tomography: A practical approach: Mueller, K., Liang, Z., Li, T., Xu, F., Heimann, J., **Johnson, L.**, Sadrozinski, H., Seiden, A., Williams, D., Zhang, L., Peggs, S., Satogata, T., Bashkirov, V., Schulte, R. IEEE Nuclear Science Symposium Conference Record, 2003, Volume 5, Article number M14-342, Pages 3223-3225

The requirements and limitations of computer simulations applied to proton computed tomography: Heimann, J., **Johnson, L.**, Satogata, T., Williams, D.C. IEEE Nuclear Science Symposium Conference Record, 2003 Volume 5, Article number HT1-5, Pages 3663-3666

Monte Carlo Studies on Proton Computed Tomography using a Silicon Strip Detector Telescope: **L. R. Johnson**, B. Keeney, G. Ross, H. F.-W. Sadrozinski, A. Seiden, D. C. Williams, L. Zhang, V. Bashkirov, R. W. Schulte, K. Shanazi. IEEE Nuclear Science Symposium Conference Record, 2002, Vol 2, pg 916–920

SUBMITTED

Nonlinearities in thermal performance dramatically lower the optimum temperature for malaria risk: E. Mordecai, K. Paaijmans, **L.R. Johnson**, S. Pawar, C. Balzer, T. Ben-Horin, E. de Moor, A. McNally, S. Ryan, T. Smith, K. Lafferty

*Temperature alters reproductive life history patterns in *Batrachochytrium dendrobatidis*, a lethal pathogen associated with the global loss of amphibians:* J. Voyles, **L.R. Johnson**, C.J. Briggs, S.D. Cashins, R.A. Alford, L. Berger, L.F. Skerratt, R. Speare, E.B. Rosenblum

IN PREPARATION

Bayesian inference for bioenergetic models: the consequences of food model misspecification: **L.R. Johnson**, L. Pecquerie, and R.M. Nisbet.

THESES

Dissertation, Department of Physics, University of California Santa Cruz. *Mathematical Modeling of Cholera: from Bacterial Life Histories to Human Epidemics.* (2006)
UCSC Science Library call number: 978-0-542-70547-2

Senior Honors Thesis, Department of Physics, College of William and Mary. *How Parallel are Parallel Universes?:* William and Mary Library. LD6051.W5m Physics, 2001, J63.

SOFTWARE	<p>amei: An R package for the Adaptive Management of Epidemiological Interventions: D. Merl, L. R. Johnson, R. B. Gramacy, M. S. Mangel. http://www.cran.r-project.org/web/packages/amei/index.html</p>
TEACHING AND MENTORING EXPERIENCE	<p>Temporary Lecturer (Loyola University Chicago) <i>ENV 204 - Evolution and Genetics, Fall 2011</i> (undergraduate) I taught a semester long course on the basics of evolution and genetics for non-majors.</p> <p>Workshop Instructor 2011 Ecology and Evolution of Infectious Diseases (EEID) Ecology workshop. (22-25 June 2011)</p> <p>Guest Lecturer (UCSB) <i>EEMB 172 - Theoretical Population Ecology, Spring 2010</i> (undergraduate) I designed and taught a 2 week (5 lecture) module on stochastic modelling.</p> <p>Supervisor (University of Cambridge) This consisted of small group teaching (1-3 students) to cover coursework in depth. (Part IA/B = first and second year undergraduate; Part II = advanced undergraduate)</p> <p><i>Part II Mathematical Biology</i> (Michaelmas 2006), <i>Part IB Statistics</i> (Lent 2007), <i>Part IA Differential Equations</i> (Michaelmas 2007), <i>Part IA Newtonian Dynamics</i> (Lent 2008)</p> <p>Mentor (University of Cambridge) I set and supervised a project for students taking Part III (master's level) mathematics, and co-supervised a summer undergraduate researcher with scientists from the British Antarctic Survey.</p> <p>Teaching Assistant (UCSC) <i>UCSC PHYS 006L - Introductory Physics I (Lab)</i> (Fall 2001), <i>UCSC PHYS 007L - Introductory Physics II (Lab)</i> (Winter 2002 and 2004), and <i>UCSC MATH 011A - Calculus</i> (Fall 2003)</p> <p>Tutor/Grader (UCSC) <i>UCSC ENGR 113 - Managerial Statistics</i> (Winter 2003), <i>UCSC ENGR 131 - Intro to Probability Theory</i> (Spring 2004), <i>UCSC AMS 162 - Design and Analysis of Computer Simulation Experiments</i> (Spring 2005) (volunteer)</p>
RESEARCH EXPERIENCE	<p>Post-Doctoral Researcher 2009 to 2011 <i>EEMB with C. Briggs & R. Nisbet</i> University of California Santa Barbara</p> <p>In this studied how the dynamics of infectious diseases within individuals affect the spread of epidemics between individuals and the population dynamics of the infected population. This research consists of two primary projects. First, I am developing models to understand the spread of the Chytrid fungus through frog populations in the California Sierra Nevada. Second, I am using Dynamic Energy Budget (DEB) theory for <i>Daphnia</i> populations. For both projects a significant component of my work is to develop statistical tools for inference of model parameters.</p>

Post-Doctoral Researcher 2006 to 2009
National Centre for Statistical Ecology University of Cambridge

In this position my research focused on modeling life history and dispersal strategies of money (*Linyphiid*) spiders. In particular, I was interested in how various dispersal and reproductive strategies combined with human activity in agricultural landscapes impacts population persistence. I also collaborated with researchers at the British Antarctic Survey on a project to understand the factors shaping the foraging strategies of albatrosses.

Doctoral Research 2004-2006
Applied Mathematics and Statistics UCSC

My dissertation research focused on life history models of bacteria, bacterial community dynamics, and the population dynamics of disease. In particular, I explored how *V. cholerae* bacteria survive in the environment, and how this effects the dynamics of cholera in a human population.

Research Assistant 2004
Applied Mathematics and Statistics UCSC with Marc Mangel

In collaboration with Marc Mangel and Daniel Merl, I worked to develop and implement a statistical model to infer transmission, recovery, and death parameters from data gathered during an epidemic which we used to adaptively manage epidemiological interventions.

Visiting Scientist Summer 2001 and 2002
NASA Goddard Space Flight Center Greenbelt, MD

I was originally hired as a research intern for the ARCADE (Absolute Radiometer for Cosmology, Astrophysics, and Diffuse Emission) project in 2001, and was then rehired the following summer as a visiting scientist. I assisted in assembling, wiring, interfacing and debugging the instrument payload and associated electronics. I also supervised other interns working on the project.

Research Assistant Spring 2002 to Spring 2003
Santa Cruz Institute for Particle Physics UCSC

I studied the feasibility of Proton Radiology and Tomography for medical diagnosis and imaging. I simulated the passage of protons through matter using GEANT4 to compare with experimental studies and presented this work at the 2002 IEEE NSS/MIC.

Research Internships Summer 2000 & 1999
NSF REU program

Particle Theory Group, College of William and Mary.
Nuclear Structures Laboratory, University of Notre Dame

PRESENTATIONS

Parameter Inference for an Individual Based Model of Chytridiomycosis in Frogs:

- Contributed Talk, Amphibian Pathogens Annual Meeting, Tempe, Arizona, Nov 2010
- Contributed Talk, International Statistical Ecology Conference, Canterbury, July 2010
- Statistics Seminar Series, UCSB, May 2010 (jointly with Cherie Briggs)

Optimal Foraging Strategies in Albatrosses: Contributed talk, Annual Meeting of the Society for Mathematical Biology, July 2009

A statistical framework for the adaptive management of epidemiological interventions: Worms and Bugs Seminar Series, DAMTP, University of Cambridge, January 2009

Dispersal Strategies and Population Persistence of Linyphiid spiders: Contributed Talk, International Statistical Ecology Conference (ISEC), St. Andrews, July 2008

*Modeling Microcolony Formation in **Vibrio Cholerae**:*

- Ecology Seminar, Zoology Dept, University of Cambridge, December 2007
- Mechanics and Mathematical Biology Seminar, DAMTP, University of Cambridge, February 2008

Implications of Aging in Bacteria:

- Worms and Bugs Seminar Series, DAMTP, University of Cambridge, January 2008
- Invited talk at the 2005 UVA Meeting on Evolutionary Demography, University of Virginia, Charlottesville, VA. Oct. 28-30 2005

POSTERS

Parameter Inference for an Individual Based Model of Chytridiomycosis in Frogs. 2011 EEID Conference in Santa Barbara, CA. 19-20 June 2011

Life Histories and Aging in Bacteria and other Single-celled organisms: Evolution 2007 conference in Christchurch, New Zealand. 16-19 June 2007.

Monte Carlo Studies on Proton Computed Tomography using a Silicon Strip Detector Telescope: Poster Talk at the 2002 IEEE Nuclear Science Symposium and Medical Imaging Conference, Norfolk, VA.

PROFESSIONAL
ACTIVITIES

Reviewer for: Journal of the Royal Society Interface; American Naturalist; Theoretical Population Biology; Oikos; Theory in Biosciences; Aging Cell

Member of the University of Chicago Postdoctoral Association Seminar Committee