

Curriculum Vita, Caroline Colijn

Department of Engineering Mathematics, University of Bristol, BS8 1TR, Bristol UK
Website: <http://seis.bris.ac.uk/~encgc> Email: C.Colijn@bristol.ac.uk
Citizenship: Canadian

Current Position **Lecturer**, Department of Engineering Mathematics
University of Bristol, United Kingdom

Professional Experience **Postdoctoral Researcher**, 2006-2007
Harvard School of Public Health; Advisor: Dr. Megan Murray
Cambridge, MA, USA

NSERC Postdoctoral Fellow, 2004-2005
Natural Sciences and Engineering Research Council of Canada
McGill University; Advisor: Dr. Michael C. Mackey.
Montreal, QC, Canada

Education **PhD, Applied Mathematics, Waterloo**, 2003
University of Waterloo, Waterloo, ON, Canada
Advisor: Dr. E. R. Vrscay.

Master of Environmental Studies, York, 1999
York University, Toronto, ON, Canada
Advisor: Dr. David Morley.

B.Sc., Honours Math and Physics, UBC 1996
University of British Columbia, Vancouver, B.C., Canada

Research Interests Network epidemic models, epidemics with multiple strains, computational models of bacterial metabolism.

Refereed Articles C. Colijn, T. Cohen, C. Fraser, W. Hanage, E. Goldstein, N. Givon-Lavi, R. Dagan, M. Lipsitch *What Is the Mechanism for Persistent Coexistence of Drug-Susceptible and Drug-Resistant Strains of Streptococcus pneumoniae?* In press, J. Roy. Soc. Interface, 2009.

C. Colijn, A. Brandes, J. Zucker, D. S. Lun, B. Weiner, M. Farhat, T. Cheng, D. B. Moody, M. Murray, J. Galagan. *Interpreting Expression Data with Metabolic Flux Models: Predicting Mycobacterium tuberculosis Mycolic Acid Production* PLoS Computational Biology, 5 (8) 2009.

M. Lipsitch, C. Colijn, T. Cohen, W. Hanage, C. Fraser. *No co-existence for free: neutral null models for multistrain pathogens.* Epidemics, Volume 1, Issue 1, 2009.

C. Colijn, T. Cohen, M. Murray. *Latent coinfection and the maintenance of strain*

diversity. Bulletin of Mathematical Biology, 71 (1) 2009.

T. Cohen, C. Colijn, M. Murray. *Modeling the effects of strain diversity and mechanisms of strain competition on the potential performance of new TB vaccines*, PNAS, 105 (42) 2008.

H. Lin, M. Murray, T. Cohen, C. Colijn, E. Majid. *Effects of smoking and solid fuel use on COPD, lung cancer and tuberculosis in China: a time-based, multiple risk factor modeling study*. Lancet 372 (9648) 1473-83 2008.

T. Cohen, C. Colijn, A. Wright, M. Zignol, A. Pym, M. Murray. *Challenges in estimating the total burden of drug resistant tuberculosis American Journal of Respiratory and Critical Care Medicine*. 177, pp 1302-1306, (2008).

T. Cohen, C. Colijn, B. Finklea, A. Wright, M. Zignol, A. Pym, M. Murray. *Are Survey-Based Estimates of the Burden of Drug Resistant TB Too Low? Insight from a Simulation Study*. PLoS One 3 (6) 2008.

C. Colijn, T. Cohen, and M. Murray. *Emergent heterogeneity in declining tuberculosis epidemics*, J. Theor. Biol. 247, 765-774, 2007.

C. Colijn and M. Mackey. *Bifurcation and bistability in a model of hematopoietic regulation*. SIAM J. Applied Dynamical Systems, 6 (2), 378-394, 2007.

C. Colijn, C. Foley and M. Mackey. *G-CSF treatment of cyclical neutropenia: an inclusive mathematical model*, Exp. Hematology, 35, 898-907, 2007.

T. Cohen, C. Colijn, B. Finklea and M. Murray. *Exogenous reinfection and the dynamics of tuberculosis epidemics: local effects in a network model of transmission*, J. Roy. Soc. Interface, 4 (14), 523-531 2007.

C. Colijn, A. Fowler and M. Mackey. *High frequency spikes in long period blood cell oscillations*. J. Math. Biol., 53, 499-519, 2006.

C. Colijn and M. Mackey. *A Mathematical Model of Hematopoiesis: 1. Periodic Chronic Myelogenous Leukemia* J. Theor. Biol. 237 No. 2, 2005.

C. Colijn and M. Mackey. *A Mathematical Model of Hematopoiesis: 2. Cyclical Neutropenia*. J. Theor. Biol. 237 No. 2, 2005.

C. Colijn and E. R. Vrscaj. *Quantum Relaxation in Hydrogen Systems*. Phys. Lett. A. 327, 2004.

C. Colijn and E. R. Vrscaj *Spin-dependent Bohm trajectories for hydrogen eigenstates*. Phys. Lett. A. 300 334-340, 2002.

C. Colijn and E.R. Vrscaj. *Spin-dependent Bohm trajectories associated with electronic transition in hydrogen*. J. Phys. A: Math. Gen. 36 4689-4702, 2003.

C. Colijn and E. R. Vrscaj *Spin-dependent Bohm trajectories for relativistic eigen-*

states of hydrogen. Found. Phys. Lett. 16 No. 4 303-323, 2003.

**Refereed
Proceedings**

C. Colijn. *Dynamic networks and the propagation of disease*. IEEE Information Theory Workshop 2009.

C. Colijn, T. Cohen and M. Murray. *Mathematical Models of Tuberculosis: accomplishments and future challenges*. International Symposium on Mathematical and Computational Biology. World Scientific Co. Pte. Ltd. 2006.

**Book
Chapters**

T. Cohen, C. Colijn, M. Murray. Mathematical models of tuberculosis transmission dynamics. To appear in: Tuberculosis Handbook (Ed. Stefan Kaufmann), Wiley.

Theses

C. Colijn. *An Investigation of the Causal Interpretation of Quantum Mechanics*, PhD Thesis, University of Waterloo, 2003.

C. Colijn. *Addressing Complexity: Exploring Social Change Through Chaos and Complexity Theory*, Master's Thesis, York University, 1999.

C. Colijn. *Topological Censorship*, Undergraduate Honours Thesis, University of British Columbia, 1996.

**Selected
Invitations**

Modelling, Computation, and Measurement of Multitype Carriage Workshop, Finland, December 2009.

Dynamic networks and epidemics, IEEE Information Theory Workshop, Italy, October 2009.

Models of tuberculosis with coinfection: implications for population dynamics and vaccination. Imperial College London, Infectious Disease Epidemiology, May 2008.

Mathematical models of tuberculosis: from cellular metabolism to epidemics Centre for Mathematical Biology, Bath, March 2008.

Treatment of hematological disease: implications from mathematical modelling Broad Institute of MIT and Harvard, 11/2005.

A mathematical model of hematopoiesis: application to cyclical neutropenia and periodic chronic myelogenous leukemia, European Conference on Mathematical and Theoretical Biology, Dresden, 07/2005.

A quantitative investigation into the role of apoptosis in hematological disease Bauer Center Genomics Talk, Harvard University Bauer Center for Genomics Research, 09/2005.

Grants

Prevalence, risk factors, and consequences of complex M. tuberculosis infections (Co-I; PI Dr. T. Cohen). NIH, 09/2009-08/2014.

Cross-Disciplinary Feasibility Account, (Co-I). Engineering and Physical Sciences Re-

search Council (EPSRC EP/H024786/1), 10/09- 03/2011.

NSERC PDF: *Natural Sciences and Engineering Research Council Postdoctoral Fellowship (PDF)*, McGill University (2004-2005)

NSERC PGS-B: *Post Graduate Scholarship B*, University of Waterloo (1999-2001)

NSERC PGS-A: *Post Graduate Scholarship A* York University (1997-1999)

Patents

Computational Method for the Metabolic Interpretation of Gene Expression Data, Serial No. 11/973,894. Patent application on file. C. Colijn and J. Galagan.

Academic Awards

Mathematics of Information Technology and Complex Systems (MITACS) Research Paper Prize, Toronto, 2005.

Mathematics of Information Technology and Complex Systems (MITACS) Poster Prize, Calgary, 2005.

OGSST: *Ontario Graduate Scholarship for Science and Technology*, University of Waterloo (2001-2002)

University of Waterloo Math Faculty Provost Scholarship University of Waterloo (1999-2003)

University of British Columbia Top 20 in Science (1995)

University of British Columbia National Entrance Scholarship University of British Columbia (1992-1996)

Teaching Experience

Graduate Instruction

- **Supervisor** Doctoral student (K. Robinson): dynamics of human sexual contact networks and the implications for STI spread, 2008-present.
- **Supervisor** Doctoral-level project (H. Mills): modelling HIV/TB co-epidemics on two networks. 2009-present.
- **Supervisor** Doctoral project (E. Nicoli) on influenza coinfections with bacterial pathogens.
- **Supervisor** M. Eng. project (R. Sandwell): Flux balance models of bacterial metabolism with application to *B. pertussis*. 2009-2010.
- **Advisor**. BCCS-Bristol iGEM team. Gold medal and Best Model prize, iGEM 2009 Competition at MIT.
- **Co-supervisor** M. Eng. project on modelling sustainable energy systems, 2008.
- **Postgraduate-level TA**
McGill University, Centre for Nonlinear Dynamics modelling summer school.

Undergraduate Instruction

- Calculus of variations (University of Bristol), 2008
- Numerical Methods (University of Bristol), 2008, 2009
- Mathematical Physiology (University of Bristol) 2009
- Calculus, vector calculus (University of Waterloo) 2001-2003
- Visualization of quantum mechanics (University of Waterloo) 2002
- Differential equations (Wilfrid Laurier University, Waterloo) 2003

Service

Recent peer review: PLoS Computational Biology, Journal of Theoretical Biology, Journal of Physics A: Math. Theor., New Journal of Physics, IEEE International Symposium on Circuits and Systems.

Promoting development of interdisciplinary work at Bristol through support and promotion of the Bristol Microbiology Forum, and the development of an Infection and Immunity University Research Theme.

Departmental service: interviewing prospective students and postdoctoral candidates, participation in open days, etc.

Languages

English (native language); French (spoken and written), Dutch (spoken).

References

- 1) Prof. M. Murray
Department of Epidemiology, Harvard School of Public Health
Harvard University. 677 Huntington Avenue, Boston, MA 02115, USA.
(617) 432 2781. Email: mmurray@hsph.harvard.edu
- 2) Prof. M. Lipsitch
Department of Epidemiology, Harvard School of Public Health
Harvard University. 677 Huntington Avenue, Boston, MA 02115, USA.
(617) 432 4559. Email: mlipsitch@hsph.harvard.edu
- 3) Dr. J. Galagan Microbial Sequencing Center, Broad Institute of MIT and Harvard.
7 Cambridge Centre, Cambridge, MA. USA
(617)714 7000. Email: jgalag@broad.mit.edu
- 4) Prof. M. Mackey, Director, Centre for Nonlinear Dynamics
Departments of Mathematics and Physiology, Centre for Nonlinear Dynamics
McGill University. 3655 Prom. Sir William Osler, Montreal, QC, H3G 1Y6, Canada.
(514) 398-4336. Email: mackey@cnd.mcgill.ca