

# Anna Tyler

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## Education

- 2012-present **The Jackson Laboratory, Bar Harbor, ME**  
Postdoctoral Research Fellow  
Center for Genome Dynamics
- 2010-2012 **Dartmouth Medical School, Hanover, NH**  
Postdoctoral Research Fellow  
Department of Physiology and Neurobiology
- 2004-2010 **Dartmouth Medical School, Hanover, NH**  
PhD September 2010, Department of Genetics  
*A Network Basis for Pleiotropy in Yeast and Evolving Populations of Boolean Networks.*  
Jason H. Moore (adviser), Albert J. Erives, Scott M. Williams (Vanderbilt University)
- 1999-2003 **Swarthmore College, Swarthmore, PA**  
BA in Biology with minor in Environmental Studies

## Research Experience

- 2012-present Adviser: Gregory W. Carter. The Jackson Laboratory, Bar Harbor, ME.  
Research Focus: I am interested in understanding how epistatic interactions contribute to the genetic architecture of complex traits. My adviser, Greg Carter, previously developed an analytical method, called the Combined Analysis of Pleiotropy and Epistasis (CAPE), which combines information across multiple phenotypes to constrain possible epistatic models and thereby infer the direction of interaction between genetic variants. I have packaged the analytical pipeline into a freely available R package. CAPE has been used to infer directed epistatic networks in yeast, *Drosophila*, and mice, and I am currently working to adapt the method for use in human populations. This adaptation will include development of a new software package for detection and interpretation of epistatic interactions in medical genetics.
- 2010 - 2012 Advisers: Rod C. Scott MD/PhD and Gregory L. Holmes MD. Dartmouth Medical School, Hanover, NH, Department of Neurology.  
Research Focus: I analyzed data from groups of individually recorded neurons in the rat hippocampus. I used maximum entropy techniques to build networks that illustrate functional relationships between these neurons. I compared the networks derived from epileptic rats to those derived from healthy rats to investigate how communication between neurons affects spatial memory in epileptic rats.
- 2006-2010 Adviser: Jason Moore, PhD. Dartmouth Medical School, Hanover, NH, Department of Genetics.  
Research Focus: I used microarray data from yeast crosses as well as simulations in Boolean

networks to investigate the phenotypic impact of recombination in evolving populations of complex networks.

2004-2006 Adviser: Claudio Pikielny, PhD. Dartmouth College, Hanover, NH, Department of Genetics.

Research Focus: Characterized the behavior of *Drosophila* carrying null mutations in *ppk25*. This involved maintaining stocks of mutant and wild type flies, and assessing video-captured courtship behaviors using Lifesong X software (version 0.5-r2). I also examined expression patterns of *ppk25* in *Drosophila* by dissecting legs and brains of adult flies and using confocal microscopy to observe fluorescent signal from a GFP-tagged *ppk25* construct.

Summer 2003 Advisers: Andrew Ochroch, MD and Albert Cheung, MD. University of Pennsylvania, Philadelphia, PA, Department of Anesthesiology

Research Focus: Clinical evaluation of drug targeting C-reactive protein, designed to reduce inflammation during and after cardiac surgery. Clinical evaluation of preemptive analgesia.

January 2003 Adviser: David Harrison, PhD. The Jackson Laboratory, Bar Harbor, Maine.

Research Focus: Investigated the relationship between mouse aging rate and *in vitro* clone size of mouse dermal fibroblasts.

## Other Skills

### Laboratory Techniques

Maintenance of *Drosophila melanogaster* stocks and basic *Drosophila* care. Assessment of *Drosophila* behaviors, such as courtship behavior, proboscis extension reflex assays, and taste preference assays. Confocal microscopy. Basic care and maintenance of *Caenorhabditis elegans* stocks. I also have experience designing primers, performing PCR, and running DNA gels. Basic care and maintenance of Djungarian hamsters. Intraperitoneal injections of Djungarian hamsters.

### Programming Languages

I have an intermediate skill level with the R statistical programming language, Perl, and LaTeX.

## Publications, Presentations and Posters

### Peer reviewed articles

- 2014 **A.L. Tyler** T.C. McGarr, B.J. Beyer, W.N. Frankel and G.W. Carter. A genetic interaction network model of a complex neurological disease. *Genes, Brain and Behavior*, epub ahead of print.
- 2014 V.M. Philip, **A.L. Tyler**, and G.W. Carter. Dissection of complex gene expression using the combined analysis of pleiotropy and epistasis. In *Pacific Symposium on Biocomputing*.
- 2013 *Pacific Symposium on Biocomputing* 19, 212. **A.L. Tyler**, W. Lu, J.J. Hendrick, V.M. Philip and G.W. Carter. CAPE: an R package for combined analysis of pleiotropy and epistasis. *PLoS Comput. Biol.* 9, e1003270. **A.L. Tyler**, J.M. Mahoney, G.R. Richard, G.L. Holmes, P.P. Lenck-Santini, and R.C. Scott. Functional Network Changes in Hippocampal CA1 after Status Epilepticus Predict Spatial Memory Deficits in Rats. *The Journal of Neuroscience*, 32(33), 11365-11376.
- 2012 M.R. Karagas, A.S. Andrew, H.H. Nelson, Z. Li, T. Punshon, A. Schned, C. Marsit, J.S. Morris, J.H. Moore, **A.L. Tyler**, M.L. Guerinot, and K.T. Kelsey. SLC39A2 and FSIP1 polymorphisms as potential modifiers of arsenic-related bladder cancer. *Hum. Genet* pub. online first.

2011 T.W. McAllister, **A.L. Tyler**, L.A. Flashman, C.H. Rhodes, B.C. McDonald, A.J. Saykin, T.D. Tosteson, G.J. Tsongalis, J.H. Moore. Polymorphisms in the brain derived neurotrophin factor (BDNF) gene influence memory and processing speed one month after brain injury. *Journal of Neurotrauma* 29(6):1111-1118.

2009 **A. L. Tyler**, B. C. White, C. S. Greene, R. Cowper-Sallari, and J. H. Moore. Development and Evaluation of an Open-ended Computational Evolution System for the Creation of Organisms with Complex Genetic Architecture. *IEEE Congress on Evolutionary Computing*. 2907-2912.

2009 **A. L. Tyler**, F. W. Asselbergs, S. M. Williams, and J. H. Moore. Shadows of complexity: what biological networks reveal about epistasis and pleiotropy. *Bioessays*. 31(2):220-7.

2008 McAllister T.W., Flashman L.A., Harker Rhodes C., **Tyler A.L.**, Moore J.H., Saykin A.J., McDonald B.C., Tosteson T.D., Tsongalis G.J. Single nucleotide polymorphisms in ANKK1 and the dopamine D2 receptor gene affect cognitive outcome shortly after traumatic brain injury: a replication and extension study. *Brain Inj.* 22(9):705-14.

### Software

2013

**A.L. Tyler**, W. Lu, J.J. Hendrick, V.M. Philip and Carter GW. CAPE: Combined Analysis of Pleiotropy and Epistasis. An R package available at: <http://cran.r-project.org/web/packages/cape/index.html>.

### Workshops

2014

**A.L. Tyler**, S.A. Pendergrass, and D.C. Crawford. Detecting And Characterizing Pleiotropy: New Methods For Uncovering The Connection Between The Complexity Of Genomic Architecture And Multiple Phenotypes. *Pacific Symposium on Biocomputing*, Kona, HI.

### Books

2005 Scott F. Gilbert, **Anna L. Tyler**, Emily J. Zackin. (2005), *Bioethics and the New Embryology: Springboards for Debate*, Sunderland, MA: Sinauer Associates.

### Presentations

2012 Alterations in CA1 Interaction Network Structure following Status Epilepticus Correlate with Behavior. *National Centre for Young People with Epilepsy Retreat, East Grinstead, UK*, January 26, 2012.

2012 Are you talking to me? Neuronal Network Changes in Epileptic Rats. *Citizen Science, Bard College, Annandale-on-Hudson, NY*, January 24, 2012.

2009 Development and Evaluation of an Open-ended Computational Evolution System for the Creation of Organisms with Complex Genetic Architecture. *IEEE Congress on Evolutionary Computing, Trondheim, Norway*. May 21, 2009.

2007 Embracing the Complexity of Interactions in Biology. *Celera Diagnostics, Alameda, CA*. August 27, 2007.

### Posters

2014 **A.L. Tyler**, V.M. Philip, J.J. Hendrick, G.A. Churchill, L.R. Donahue and G.W. Carter. Combining Epistasis and Pleiotropy Reveals Genetic Interaction Network Influencing Bone Density Phenotypes. *Center for Genome Dynamics Retreat* January, Chapel Hill, NC.

2013 **A.L. Tyler**, V.M. Philip, D.M. Gatti, G.A. Churchill, K.L. Svenson, and G.W. Carter.

- Combined Analysis of Pleiotropy and Epistasis in Diversity Outbred Mice. *Center for Genome Dynamics Retreat* January 16-18, 2013, Chapel Hill, NC.
- 2011 **A.L. Tyler**, J.M. Mahoney, G. Richard, G.L. Holmes, P.P. Lenck-Santini, and R.C. Scott. Network properties of hippocampal neurons in a rat model of temporal lobe epilepsy. *Society for Neuroscience Meeting* November 11-16, 2011, Washington D.C.
- 2010 P.P. Lenck-Santini, **A.L. Tyler**, G. Richard, G.L. Holmes, R.C. Scott. Network properties of hippocampal neurons in a rat model of temporal lobe epilepsy. *Gordon Conference on Mechanisms of Epilepsy and Neuronal Synchronization* August 8-13 2010, Colby College, Waterville, ME.
- 2009 **A.L. Tyler** and J.H. Moore. Epistasis in Digital Organisms. *Integrative Biology Symposium*. April 28-29, 2009. Dartmouth College, Hanover, NH.
- 2008 **A.L. Tyler** and J.H. Moore. Epistasis in Digital Organisms. *American Society of Human Genetics*. November 11-15, 2008. Philadelphia, PA.
- 2008 T.W. McAllister, **A.L. Tyler**, L.A. Flashman, C.H. Rhodes, A.J. Saykin, B.C. McDonald, T.D. Tosteson, G.J. Tsongalis, L. Hoskins, and J.H. Moore. *American Society of Human Genetics*. November 11-15, 2008. Philadelphia, PA.
- 2008 **A.L. Tyler** and J.H. Moore. Epistasis in Digital Organisms. *Pacific Symposium on Biocomputing*. January 4-8, 2008. Kailua-Kona, HI.
- 2007 **A.L. Tyler**, F.W. Asselbergs, S.M. Williams, J. H. Moore. Epistasis and pleiotropy in the renin-angiotensin, fibrinolytic, and bradykinin systems. *Pacific Symposium on Biocomputing*. January 3-7, 2007. Kailua-Kona, HI.

## Manuscript Reviews

- 2012 Reviewed research article for *Clinical Neurophysiology*.
- 2014 Reviewed two research articles for *Pacific Symposium on Biocomputing*.

## Grants

- 2010-2012 Translational neuroscience postdoctoral training program. 5T32NS051176-05.
- 2006-2008 Dartmouth College molecular and cellular biology training grant. 5T32GM008704-09.

## Teaching and Mentoring Experience

Bard College, Annandale-on-Hudson, NY

- January 2021 **Faculty Member at Citizen Science** I developed a three-week intensive course for the Citizen Science project at Bard College, which has been created increase the scientific literacy of all students at Bard, regardless of major. This program has a wet laboratory component, a computer modeling component, and a problem-based learning component. As a faculty member I designed my own course in each of these areas and taught a section of 21 Bard first-year students.

Colby-Sawyer College, New London, NH

- Fall 2011 **Adjunct Faculty in Natural Sciences** I taught the first semester of introductory biology to a section of 24 first-year students at Colby-Sawyer College. This course included a lecture component and a laboratory component. I taught both components for this section.

## Dartmouth College, Hanover, NH

- Spring 2010 **Mentored rotation student** I mentored a rotation student, helping to design her rotation project. I designed and assisted her in carrying out computational simulations of evolution of boolean networks. I also assisted her in writing up her results for publication.
- Fall 2009 **Mentored rotation student** I mentored a rotation student in his collaboration with a neuropsychiatry team at Dartmouth-Hitchcock Medical Center. Over the course of one term, I trained him to analyze genetic data to look for associations between single nucleotide polymorphisms and clinical outcomes of patients with traumatic brain injury.
- 2006 **Mentoring course series** Completed mentoring course series at *Dartmouth Center for Teaching and Learning*.
- 2005 **Teaching assistant** for introductory genetics. Oversaw a lab section of 20 students under the supervision of Dr. Corinne Pierce. Gave weekly lectures to introduce laboratory material and concepts. Supervised students' lab work and graded exams and lab materials.

## Swarthmore College, Swarthmore, PA

- 2003 **Lecturer Training** Completed a 5 week teacher training course for teaching the Medical College Admission Test (MCAT) preparatory course for Kaplan. Consisted of five four-hour sessions in which trainees practiced lecturing, were critiqued on lecturing style, and critiqued style of other trainees.
- 2003-2004 **Lecturer** Kaplan Medical College Admission Test (MCAT) sciences lecturer/tutor. Selected to lecture based on MCAT scores, and trained to teach for Kaplan. Presented three three-hour lectures per week in Biology, Physics, and Chemistry covered by MCAT. Also tutored students individually.
- 2002 **Teaching assistant** for Marine Biology. Selected by Dr. Rachel Merz to assist with Marine Biology course. Led paper discussion section of primary literature for groups of 10 students once per week.

## References

### **Gregory Carter**

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### **Rod Scott, MD, PhD**

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Phone: (802) 656-4588  
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