

J. Michael Brockman

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Research and Professional Experience

Post-doctoral Fellow, Jan 2009 – Present

The Jackson Laboratory, Bar Harbor, ME. Advisor: Joel Graber, PhD.
Working to update and automate a pipeline of existing programs that use EST-to-genome alignment to determine putative polyadenylation cleavage sites. Investigating probability-based gene/transcript assignment for putative polyadenylation sites.

Graduate Research Assistant, 2004 – 2008

The Jackson Laboratory, Bar Harbor, ME. Advisor: Joel Graber, PhD.
Designed, implemented, and maintained the Polyadenylation Cleavage Site and 3'-UTR database (PACdb, <http://harlequin.jax.org/pacdb>). Combined data from PACdb with gene expression data to investigate the role of post-transcriptional regulation during spermatogenesis, the oocyte to embryo transition, and in mRNA localization in neurons. Collaborated with biologists at The Jackson Lab, Texas Tech University, and Boston University. Tested computational predictions by in situ hybridization and constructed 11 plasmids for testing by a collaborator. Developed and applied analytical tools to test statistical significance of word frequency and motif placement within evolutionarily conserved sequence regions.

NIH/NCBI Scientific Research Visitor, 2003

National Center for Biotechnology Information (NCBI), Bethesda, MD.
Advisors: Steve Bryant, PhD; Anna Panchenko, PhD.
Investigated the use of protein structural information to classify and sub-classify related protein domains in NCBI's Conserved Domain Database (CDD).

Undergraduate Research Assistant, 2001 – 2002

Western Kentucky University, Bowling Green, KY. Advisor: Claire Rinehart, PhD.
Assisted a professor in setting up a bioinformatics laboratory by creating a local BLAST database with custom web-interface and built a distributed computer cluster.
Implemented an algorithm designed by the professor to analyze amino acid content of proteins and created a Perl/HTML web interface to the C++ algorithm.

Bioinformatics Programmer/Analyst, 2000

Research Genetics, Huntsville, AL.
Worked in a team of 6 developing gene expression analysis software. Specifically, helped develop microarray image import and alignment system for multiple image types. Also tested the cross-platform performance of the Java-based application and researched and recommended a secure software deployment system.

Education

- May 2009 Ph.D. in Bioinformatics, Boston University (BU). Dissertation: "Analysis of dendritic targeting elements and the potential impact of alternative polyadenylation on dendritic localization of mRNA". (Defended Dec. 2008)
- May 2004 M.S. in Bioinformatics, Boston University (BU).
- Aug 2002 B.S. in Computer Science and Mathematics, minor in Recombinant Genetics, Western Kentucky University (WKU). Summa Cum Laude.

Computer Skills

- Operating systems: Linux (Ubuntu, SuSE), Windows, Mac OS X
- Languages: Perl, C/C++, R/Splus, Java, HTML, XHTML/CSS, PHP, ASP, XML, SQL, OpenGL, LISP
- Applications, Tools, and Resources: MySQL, MS Office, OpenOffice, ImageJ, Gibbs Sampler, Improbizer, UCSC Genome Browser and Table Browser, BLAT, standalone BLAST, Ensembl, Mouse Genome Informatics (MGI), Gene Ontology (GO), ClustalW, Mfold, JMP, Vienna RNA Package (RNAforester, RNAalifold), Primer3, MacVector

Teaching Experience

2004-2008 The Jackson Laboratory, Bar Harbor, ME.

Guided 11 undergraduate and high school interns in learning Perl programming, webpage design, database design, use of Linux and MySQL, general research strategies, and preparation of final presentations.

2003 Boston University Bioinformatics Program, Boston, MA.

General Teaching Fellow. Responsible for homework sets, webpage, classroom laptops, occasional lecture, and office hours for the graduate level course, "Bioinformatics Applications." Also the grader for the graduate level course, "DNA & Protein Sequence Analysis."

2002 Western Kentucky University, Bowling Green, KY.

Trained incoming students to use Perl for bioinformatics research (graduate and undergraduate).

2001 Western Kentucky University, Dept. of Biology, Bowling Green, KY.

Teaching Assistant. Assisted teaching senior level course, "Recombinant Genetics Techniques." Supervised and assisted student research projects and taught sterile cell culture techniques.

Activities and Professional Associations

- RNA Society
- International Society for Computational Biology (ISCB)
- Founder of the BU Bioinformatics Student Group
- BU Student Association of Graduate Engineers
- Association for Computing Machinery
- WKU Association for Undergraduate Geneticists

Honors and Awards

- Appointment to NCBI Scientific Visitor's Program, sponsored by the National Library of Medicine and Oak Ridge Institute for Science and Education 2003.
- National Science Foundation IGERT Grant, Boston University 2002-2003
- Second place in computer science/mathematics undergraduate research competition, Joint meeting of Kentucky Academy of Science and Tennessee Academy of Science, Fall 2001. Title: "The Effects of Wavelet Transforms on the Entropy of a Signal (as applied to DNA sequences)".
- Second place in Cell/Molecular Biology undergraduate research competition, Joint meeting of Kentucky Academy of Science and Tennessee Academy of Science, Fall 2001. Title: "Applying Wavelet Transforms to Predict Functional Motifs in Proteins".
- Outstanding Junior Computer Science Major, WKU 1999
- WKU Honors Program Participant 1997-2002

Publications

Liu D*, Brockman JM*, Dass B, Hutchins LN, Singh P, McCarrey J, MacDonald C, Graber JH. "Systematic variation in mRNA 3'-processing signals during mouse spermatogenesis." *Nucleic Acids Research*, 2007 Jan 12; 35(1): 234-246.

Evsikov AV, Graber JH, Brockman JM, Singh P, Holbrook AE, Hampl A, Oh B, Eppig JJ, Solter D, Knowles BB. "Cracking the egg: developmental dynamics and molecular transitions from the fully grown oocyte to embryo." *Genes and Development*, 2006 Oct 1; 20(19): 2713-2727.

Brockman JM*, Singh P*, Liu D, Quinlan S, Salisbury J, Graber JH. "PACdb: PolyA Cleavage Site and 3'-UTR Database." *Bioinformatics*, 2005 Sep 15; 21(18): 3691-3. <http://harlequin.jax.org/pacdb>

*contributed equally

Manuscripts in Preparation

Brockman JM*, Singh P*, Graber JH*, Knowles BB, De Vries W. "Multiple cis-elements influence transcript stability during the oocyte to embryo transition." *contributed equally

Brockman JM, Hutchins LN, Singh P, Graber JH. "PACdb 2: An update of the PolyA Cleavage Site and 3'-UTR Database."

Presentations

"Analysis of dendritic targeting elements and the potential impact of alternative polyadenylation on dendritic localization of mRNA", oral presentation at The Jackson Laboratory, Bar Harbor, ME, November 2008.

"Investigating the Impact of Alternative Polyadenylation on mRNA Localization in Neurons", oral presentation at Maine Biological and Medical Sciences Symposium, Mount Desert Island Biological Laboratory (MDIBL), Salisbury Cove, ME, April 2008.

“Discovery and characterization of 3'-UTR regulatory elements during the mouse oocyte to embryo transition”, poster presentation at the RNA Society Conference, University of Wisconsin-Madison, Madison, WI, June 2007.

“Computational Discovery and Characterization of Cis-elements Involved in Post-transcriptional Regulation of mRNA in Neurons”, oral and poster presentations at Maine Biological and Medical Sciences Symposium, Mount Desert Island Biological Laboratory (MDIBL), Salisbury Cove, ME, April 2007.

“Discovery and Characterization of 3'-UTR Regulatory Elements”, poster presentation at Maine Biological and Medical Sciences Symposium, Mount Desert Island Biological Laboratory (MDIBL), Salisbury Cove, ME, April 2006.

“PACdb: PolyA Cleavage Site and 3'-UTR Database”, poster presentation at Intelligent Systems for Molecular Biology (ISMB), Detroit, MI, June 2005.

“PACdb: PolyA Cleavage Site and 3'-UTR Database”, poster presentation at Research in Computational Molecular Biology (RECOMB), Massachusetts Institute of Technology, Cambridge, MA, May 2005.

“PolyA Cleavage Site and 3' Untranslated Region Database (PACdb)”, poster presentation at Maine Biological and Medical Sciences Symposium (MBMSS), Mount Desert Island Biological Laboratory (MDIBL), Salisbury Cove, ME, April 2005.

“mRNA Secondary Structure in Eukaryotic Systems”, oral presentation at The Jackson Laboratory, Bar Harbor, ME, February 2005.

“The Effects of Wavelet Transforms on the Entropy of a Signal (as applied to DNA sequences)”, oral presentation at the Kentucky Academy of Science/Tennessee Academy of Science Joint Meeting, University of Tennessee, Knoxville, TN, November 2001.

“Applying Wavelet Transforms to Predict Functional Motifs in Proteins”, oral presentation at the Kentucky Academy of Science/Tennessee Academy of Science Joint Meeting, University of Tennessee, Knoxville, TN, November 2001.

References

Available upon request