

Trevor W. Siggers, PhD

Boston, MA

tsiggers@bu.edu

Tel: (617)-358-7118

Education

Columbia University, New York, NY 09/1999 - 02/2006

Degree: Ph.D. (with Distinction) Biochemistry & Molecular Biophysics

Thesis: Aligning and Modeling Protein-DNA Interfaces: Towards an understanding of Protein-DNA binding specificity.

Advisor: Barry Honig, Ph.D., Columbia University, HHMI

Simon Fraser University, Vancouver, BC, Canada 09/1993 - 05/1999

Degree: B.Sc. (with Honors) Mathematical Physics

Post-doctoral Training

Brigham & Women's Hospital/ Harvard Medical School, Boston, MA 01/2006 - 06/2012

Advisor: Martha L. Bulyk, Ph.D

Appointments

Associate Professor, Biology Dept., Boston University, Boston, MA 05/2019 - present

Assistant Professor, Biology Dept., Boston University, Boston, MA 07/2012 – 04/2019

Programmatic Appointments

Director of Master's Studies BU Biology Department 2019 – present

Member BUMC Immunology Training Program (ITP) 2018 - present

Member BU Biological Design Center (BDC) 2017 - present

Member BU MCBB Graduate Program 2012 - present

Member BU Bioinformatics Graduate Program 2012 - present

Grants

NIH (NIAMS) R01 (Sub-Site Investigator) 2019 - 2024

NIH (NIAID) R01 (PI) 2016 - 2020

NSF (IOS) Grant (co-PI) 2014 - 2018

Joslin Diabetes Center/BU Pilot Project Grant (PI) 2016 - 2017

NIH (NIAID) R56 (PI) 2015 - 2016

BU Genome Sciences Institute (GSI) Pilot Grant (PI) 2015 - 2016

Joslin Diabetes Center/BU Pilot Project Grant (PI) 2014 - 2015

American Cancer Society (ACS) Pilot Project Grant (PI) 2014 - 2015

BU Genome Sciences Institute (GSI) Pilot Grant (co-PI) 2013 - 2014

Honors & Awards

Dean's Award for Excellence in Graduate Education (Boston University) 2018

(*Finalist*) Metcalf Award (Boston University) 2018

NIH/NIAID K22 Research Scholar Development Award	2012
Peer Mentor Award (Brigham & Women's Hosp., Harvard Med. School)	2012
NSF Postdoctoral Research Fellowship in Biological Informatics	2006

Teaching

CAS BI 560: Systems Biology (<i>Developed as new course 2013</i>)	
	10 students Spring 2013
	8 students Fall 2014
	16 students Fall 2015
	34 students Fall 2016
	23 students Fall 2017
	15 students Fall 2018
	22 students Fall 2019

CAS BI 385: Immunology	
	69 students Spring 2014
	73 students Spring 2015
	130 students Spring 2016
	131 students Spring 2017
	143 students Spring 2018
	122 students Spring 2019
	126 students Spring 2020

AIM Introduction to Medicine (BU Summer Program)	
Infectious Disease Section (<i>Developed as new course 2015</i>)	
	50 students Sum. 2015
	50 students Sum. 2016
	50 students Sum. 2017
	50 students Sum. 2018
	50 students Sum. 2019

Community Involvement

BU Biology Department Graduate Committee	2014 – 2016, 2020
BU SMED Program Appeals Committee	2015 – present
BU Biology Cell & Molecular (CM) Program Admissions Committee	2013 – present BU
BDC Annual Symposium Organizer	2019
BU Biology Department Seminar Series Organizing Committee	2015 – 2019
BU Biology Faculty Search Committee	2016 search
BU Bioinformatics Graduate Program Admissions Committee	2014 – 2016
BU Bioinformatics Graduate Program Curriculum Committee	2012 – 2015
BUMC SMED Program Admissions Committee	2014 – 2015

BUMC MMEDIC Program Admission Committee	2015
RCR Training Mentor	2013 – 2014

Mentoring Experience

Nima Mohaghegh (BU, Postdoctoral fellow)	01/2013 - 04/2019
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PhD Graduate Students (Boston University)

Kellen Andrienas (graduated)	05/2013 – 08/2019
Ashley Penvose (graduated)	05/2013 – 08/2019
Jessica Keenan (graduated)	05/2013 – 08/2019
David Bray	05/2016 - present
Heather Hook	05/2018 - present

Master's Graduate Students (Boston University)

Robert Buckshaw	07/2019 – present
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BU Undergraduates

Kadesh Daniels	01/2020 – present
Matthew Arnold	09/2019 – present
Rose Zhao	09/2018 – present
Yemi Osayame	09/2018 – present
Davis Settipane	09/2018 – 05/2019
Amanda Chaplin	09/2016 – 05/2018
Heather Dennett	01/2017 – 10/2017
Vijendra Ramlall (also as Lab Technician)	10/2012 – 08/2017
Kailyn Doiron	01/2015 – 06/2017
Matthew Caputo	01/2016 – 05/2016
David Mueller	01/2016 – 05/2016
Ryan Webster	09/2013 – 11/2015
Nicole Akramoff	09/2013 – 12/2015
Nanrui Tan	09/2014 – 05/2015
Brandon Leung	09/2014 – 12/2015
Jesse Kurland	01/2013 – 05/2014
Katherine Tooley	07/2013 – 05/2014
Michael Simpson	01/2013 – 05/2014
Kavin Zhu	01/2013 – 09/2013

Other Institutions (prior to 2012)

Bilal Ahmed (HST Program in Bioinformatics and Genomics)	06/2010 - 08/2010
Jessica Reddy (Lab Technician)	06/2008 - 08/2009
Sidra Khan (UROP, MIT Chem. Biological. Eng Senior)	06/2008 - 08/2008
Brian Ho (Rotation Student, Harvard BBS graduate program)	01/2008 - 05/2008
Michael Duyzend (HST Program in Bioinformatics and Genomics)	06/2007 - 08/2007

Journal Reviews

I have reviewed papers for the following peer-review journals: JMB, Bioinformatics, Molecular Systems Biology, Genome Biology, Genomics, Nucleic Acids Research, PLoS ONE, Journal of Inflammation, F1000Research, Science Signaling, Frontiers in Immunology, Nature Communications, Molecular Cell

Publications

William LM, Inge MM, Mansfield KM, Rasmussen A, Afghani J, Agrba M, Albert C, Andersson C, Babaei M, Babaei M, Bagdasaryants A, Bonilla A, Browne A, Carpenter S, Chen T, Christie B, Cyr A, Dam K, Dulock N, Erdene G, Esau L, Esonwune S, Hanchate A, Huang X, Jennings T, Kasabwala A, Kehoe L, Kobayashi R, Lee M, LeVan A, Liu Y, Murphy E, Nambiar A, Olive M, Patel D, Pavesi F, Petty CA, Samofalova Y, Sanchez S, Stejskal C, Tang Y, Yap A, Cleary JP Jr, Yunes SA, **Siggers T**, Gilmore TD (2020) Transcription factor NF- κ B in a basal metazoan, the sponge, has conserved and unique sequences, activities, and regulation. *Dev Comp Immunol.* 104:103559 (PMID:31751628)

Bruno L, Ramlall V, Studer RA, Bradley D, Dharmalingam G, Carroll T, Ghoneim M, Chopin M, Nutt SL, Elderkin S, Rueda DS, Fisher AG, **Siggers T**, Beltrao P, Merkenschlager M (2019) Selective deployment of transcription factor paralogs with submaximal strength facilitates gene regulation in the immune system. *Nature Immunology.* doi 10.1038/s41590-019-0471-5 (PMID:31451789)

Mansfield KM, Cleves PA, Van Vlack E, Kriefall NG, Benson BE, Camacho DJ, Hemond O, Pedroza M, **Siggers T**, Pringle JR, Davies SW, Gilmore TD (2019) “Varied effects of algal symbionts on transcription factor NF- κ B in a sea anemone and a coral: possible roles in symbiosis and thermotolerance” BioRxiv <https://doi.org/10.1101/640177>

Penvose A*, Keenan J*, Bray D, Ramlall V, **Siggers T** (2019) Comprehensive study of nuclear receptor DNA binding provides a revised framework for understanding receptor specificity. *Nature Communications* 10(1):2514 (PMID:31175293)

Mohaghegh N*, Bray D*, Keenan J, Penvose A, Andrienas KK, Ramlall V, **Siggers T** (2019) NextPBM: a platform to study cell-specific transcription factor binding and cooperativity. *Nucleic Acids Research* 47(6):e31 (PMID:30657937)

Andrienas KK, Ramlall V, Kurland J, Leung B, Harbaugh AG, **Siggers T** (2018) DNA-binding landscape of IRF3, IRF5 and IRF7 dimers: implications for dimer-specific gene regulation. *Nucleic Acids Research* 46:2509-2520 (PMID:29361124)

Mansfield KM, Carter NM, Nguyen L, Cleves PA, Alshanbayeva A, Williams LM, Crowder C, Penvose AR, Finnerty JR, Weis VM, **Siggers T**, Gilmore TD (2017) Transcription factor NF- κ B is modulated by symbiotic status in a sea anemone model of cnidarian bleaching. *Scientific Reports* 7:16025 (PMID:29167511)

Kuzu G, Kaye EG, Chery J, **Siggers T**, Yang L, Dobson JR, Boor S, Bliss J, Liu W, Jogi, Rohs R, Singh ND, Bulyk ML, Tolstorukov MY, Larschan E (2016) Expansion of GA Dinucleotide Repeats Increases the Density of CLAMP Binding Sites on the X-Chromosome to Promote Drosophila Dosage Compensation. *PLoS Genetics* 12:e1006120 (PMID:27414415)

Barrera LA, Vedenko A, Kurland JV, Rogers JM, Gisselbrecht SS, Rossin EJ, Woodard J, Mariani L, Kock KH, Inukai S, **Siggers T**, Shokri L, Gordan R, Sahni N, Cotsapas C, Hao T, Yi S, Kellis M, Daly MJ, Vidal M, Hill DE, Bulyk ML (2016) Survey of variation in human transcription factors reveals prevalent DNA binding changes *Science* 35:1450-1454 (PMID:27013732)

Menke C, Cionni M, **Siggers T**, Bulyk ML, Beier DR, Stottmann RW (2015) Grhl2 is required in nonneural tissue for neural progenitor survival and forebrain development. *Genesis* 53(9):573-582 (PMID:26177923)

Andrilenas K, Penvose A, **Siggers T**. Using protein-binding microarrays to study transcription factor specificity. (2015) *Briefings in Functional Genomics* 14:17-29 (PMID:25431149)

Siggers T, Gilmore T, Barron B, Penvose A. Characterizing the DNA binding sites specificity of NF- κ B with Protein Binding Microarrays (PBM) (2015) *Methods in Molecular Biology* 128:609-630 (PMID:25736775)

Siggers T, Reddy J, Barron B, Bulyk ML. Diversification of transcription factor paralogs via noncanonical modularity in C2H2 zinc finger DNA binding (2014) *Molecular Cell* 55:640-648 (PMID:25042805)

Siggers T, Gordan R. Protein-DNA binding: complexities and multi-protein code (2014) *Nucleic Acids Research*. 42:2099-2111 (PMID:24243859)

Soruco MM, Chery J, Bishop EP, **Siggers T**, Tolstorukov MY, Leydon AR, Sugden AU, Goebel K, Feng J, Xia P, Vedenko A, Bulyk ML, Park PJ, Larschan E. (2013) The CLAMP protein links the MSL complex to the X chromosome during Drosophila dosage compensation. *Genes & Development* 27(14):1551-1556 (PMID:23873939)

Siggers T*, Chang AB*, Teixeira A, Wong D, Williams KJ, Ahmed B, Ragoussis J, Udalova IA, Smale ST, Bulyk ML. (2012) Principles of dimer-specific gene regulation revealed by a comprehensive characterization of NF- κ B family DNA binding. *Nature Immunology* 13(1):95-102 (PMID:22101729)

Siggers T, Duyzend MH, Reddy J, Khan S, Bulyk ML. (2011) Non-DNA-binding cofactors enhance DNA-binding specificity of a transcriptional regulatory complex. *Molecular Systems Biology* 7:555 (PMID:22146299)

Wong D, Teixeira A, Oikonomopoulos S, Humburg P, Lone IN, Saliba D, **Siggers T**, Bulyk ML, Angelov D, Dimitrov S, Udalova I, Ragoussis J. (2011) Extensive characterization of NF- κ B binding uncovers non-canonical motifs and advances the interpretation of genetic

functional traits *Genome Biol.* 12(7):R70 (PMID:21801342)

Rowan S*, **Siggers T***, Lachke SA, Yue Y, Bulyk ML, Maas RL. (2010) Precise temporal control of the eye regulatory gene Pax6 via enhancer binding site affinity *Genes Dev.* 24(10):980-985. (PMID:20413611)

Giorgetti L, **Siggers T**, Tiana G, Caprara G, Notarbartolo S, Corona T, Pasparakis M, Milani P, Bulyk ML, Natoli G (2010) Noncooperative interactions between transcription factors and clustered DNA binding sites enable graded transcriptional responses to environmental inputs. *Mol. Cell.* 37(3):418-428. (PMID:20159650)

Viiri KM, Janis J, **Siggers T**, Heinonen TY, Valjakka J, Bulyk ML, Maki M, Lohi O (2009) DNA-binding and -bending activities of SAP30L and SAP30 are mediated by a zinc-dependent module and monophosphoinositides *Mol. Cell Biol.* 29:342-356.

Siggers T, Honig B (2007) Structure-based prediction of C2H2 zinc-finger binding specificity: sensitivity to docking geometry. *Nucleic Acids Res.* 35(5):1085-1097. (PMID:17264128)

Siggers T, Silkov T, Honig B (2005) Bending in the right direction. *Structure* 13:1400-1401. (PMID:16216570)

Siggers T, Silkov A, Honig B (2005) Structural alignment of protein-DNA interfaces: insights into the determinants of binding specificity. *JMB* 345(5):1027-1045. (PMID:15644202)

*Authors contributed equally

Publications (in preparation)

Mansfield KM, Cleves PA, Van Vlack E, Kriefall NG, Benson BE, Camacho DJ, Hemond O, Pedroza M, **Siggers T**, Pringle JR, Davies SW, Gilmore TD (2019) Varied effects of algal symbionts on transcription factor NF- κ B in a sea anemone and a coral: possible roles in symbiosis and thermotolerance. *BioRxiv* <https://doi.org/10.1101/640177>

Bray D*, Hook H*, Zhao R, Osayame Y, Keenan J, Mohaghegh N, **Siggers T** (in preparation) CASCADE: a method to identify regulatory complexes bound at enhancers and affected by non-coding polymorphisms (anticipated submission, Feb 2020)

Keenan J, Hook H, Zhao R, Osayame Y, Bray D, Mohaghegh N, Li H, Wong W, **Siggers T** (in preparation) CoRec: a microarray-based approach to determine binding specificity for regulatory cofactors. (anticipated submission, March 2020)

Penvose A, Keenan J, **Siggers T** (in preparation) Ligands and Cofactors Alter the Nuclear Receptor Specificity Landscape (anticipated submission, April 2020)

*Authors contributed equally