
MOLLY A. MATTY

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EDUCATION

Duke University 2012-2018

Ph.D., University Program in Genetics & Genomics

Thesis Advisor: David Tobin, Ph.D.

Thesis: “Chemical and genetic modulation of the host immune responses to mycobacterial infection”

North Carolina State University 2008-2012

B.S. Chemistry, GPA: 3.99

Honors Thesis: “Developing an assay for telomere length in Collaborative Cross mice”

RESEARCH EXPERIENCE

Salk Institute for Biological Studies *San Deigo, CA*

Postdoctoral Advisor: Sreekanth Chalasani, Ph.D. 2019-Present

- Exploring the effects of microbial colonization on behavior in the nematode *C. elegans*
- Understanding alterations in neuronal outputs during microbial colonization in *C. elegans*
- Characterizing genetic and metabolic signals in starvation-induced behaviors
- Mentoring undergraduate student in independent research project investigating the role of microbes on the *C. elegans* cuticle
- Leading and organizing weekly virtual journal club

Duke University *Durham, NC*

Thesis Advisor: David Tobin, Ph.D. 2012-2019

- Performed a large-scale chemical screen in a whole animal mycobacterial infection model to identify a novel host-directed therapy for mycobacterial disease
- Generated CRISPR/Cas9-edited zebrafish to identify drug target
- Developed a new method for *in vivo* temporal control of calcium dynamics in neutrophils
- Determined methods for long-term imaging of established mycobacterial granulomas using light sheet microscopy and spinning disk confocal microscopy
- Mentored undergraduate students in molecular biology techniques and experimental design
- Authored and co-authored eight articles (four first-author)

MRC - Laboratory of Molecular Biology *Cambridge, UK*

Advisor: Lalita Ramakrishnan, Ph.D. Fall 2016

- Assisted in forward genetic screen for genes that enhance susceptibility to mycobacterial infection in zebrafish
- Determined genes involved in efficacy of host-directed drugs

North Carolina State University *Raleigh, NC*

Honors Thesis Advisor: David Threadgill, Ph.D. 2010-2012

- Surveyed aging and cancer heritability in Collaborative Cross mice
- Examined effects of trichloroethylene and arsenic on fine motor skills in mice

PUBLICATIONS

- 11) **Matty, M. A.**, Lau, H. E., Singh, A., Haley, J. A., Chakraborty A., Kono, K., Reddy, K. C., Hansen, M. A., Chalasani, S. H., (2021) Intestine-to-neuronal signaling alters risk-taking behaviors in food-deprived *Caenorhabditis elegans* *Submitted to PLoS Genetics*
- 10) **Matty, M.A.**, Chalasani, S.H. (2020) Microbial Mind Control. *Cell Host & Microbe* 28(2):147-149
** invited preview
- 9) Espenschied, S.T., Cronan, M.R., **Matty, M.A.**, Mueller, O., Redinbo, M., Tobin, D.M., Rawls, J.F. (2019) Epithelial Delamination is Protective During Pharmaceutical-Induced Enteropathy. *Proceedings of the National Academy of Sciences* 116(34):16961-16970
- 8) Murdoch, C.M., Espenschied, S.T., **Matty, M.A.**, Mueller, O., Tobin, D.M., Rawls, J.F. (2019) Intestinal Serum Amyloid A suppresses systemic neutrophil activation and bactericidal activity in response to microbiota colonization. *PLoS Pathogens* 15(3): e1007381.
- 7) **Matty, M.A.**, Knudsen, D.R.*, Beerman, R.W., Cronan, M.R., Hernandez, R.E., Tobin, D.M. (2019) Whole Animal Chemical Screening Identifies Modulation of P2RX7 as a Host-Directed Strategy for Control of Mycobacterial Infection. *eLife* 2019;8:e39123.
* highlighted article *Faculty of 1000*, 2019
Undergraduate mentee
- 6) Cronan, M.R., **Matty, M.A.**, Rosenberg, A.F., Blanc, L., Dartois, V., Tobin, D.M. (2018) An Explant Technique for High-Resolution Imaging and Manipulation of Mycobacterial Granulomas. *Nature Methods* 15:1098–1107.
- 5) Sullivan, C., **Matty, M.A.**, Jurczynszak, D., Gabor, K.A., Millard, P.J., Tobin, D.M., Kim, C.H. (2017) Infectious disease models in zebrafish. *Methods in Cell Biology* 138:101-36.
- 4) **Matty, M.A.**, Oehlers, S. O., Tobin, D.M. (2016) Live imaging of host-pathogen interactions in zebrafish larvae. *Methods in Molecular Biology* 1451:207-23.
- 3) **Matty, M.A.**, Beerman, R.W., Tobin, D.M. (2016) Drug-Inducible, Cell-Specific Manipulation of Intracellular Calcium in Zebrafish through Mammalian TRPV1 Expression. *Zebrafish* 13(4):374–375.
- 2) Beerman, R.W., **Matty, M.A.**, Au, G.G., Looger, L.L., Choudury, K.R., Keller, P.J., Tobin, D.M. (2015) Direct in vivo manipulation and imaging of calcium transients in neutrophils identifies a critical role for leading-edge calcium flux. *Cell Reports* 13(10):2107-17.
- 1) **Matty, M.A.**, Roca, F.J., Cronan, M.R., Tobin, D.M. (2015) Adventures within the speckled band: heterogeneity, angiogenesis, and balanced inflammation in the tuberculous granuloma. *Immunological Reviews*. 264:276-287.

FELLOWSHIPS & AWARDS

Genetics Society of America's DeLill Nasser Award	2021
NSF Postdoctoral Research Fellowship in Biology	2020-2022
Keystone Symposium Travel Award	2018
Duke Professional Development Grant Recipient	@014-2016
Duke University Chancellor's Scholar Award	2012
NSF Graduate Research Fellowship (NSF GRFP)	2012-2017
N.C. State University Jacob and Betty Belin Scholar	2008-2012

RECOGNITIONS

8th Annual Postdoctoral Research Communication Symposium: 1st Place Speaker	2020
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Salk Education Outreach Volunteer of the Year	2020
Zebrafish Disease Models Conference: Best Poster	2017
NC Science Olympiad Volunteer Award	2017
Genetics Society of America, Allied Genetics Conference: Best Poster	2016
N.C. State University PAMS SCOPE featured scholar	2012

ORAL PRESENTATIONS

East Carolina University's Research In Progress Meeting	<i>Virtual: Greenville, NC</i>
Invited Speaker: <i>Hangry Worms: Internal State Determines Behavioral Responses in C. elegans</i>	January 2021
8th Annual Postdoctoral Research Communication Symposium	<i>Virtual: San Diego, CA</i>
<i>"What Can We Learn from a Worm?"</i>	December 2020
Centenary Institute TB Program Meeting	<i>Sydney, Australia</i>
Invited Speaker: <i>"Whole Animal Chemical Screening Identifies Modulation of P2RX7 as a Host-Directed Strategy for Control of Mycobacterial Infection"</i>	August 2019
International Zebrafish Conference	<i>Madison, WI</i>
Invited Speaker: <i>"A Chemical Screen Identifies a Purinergic Receptor as a Host Target for Control of Mycobacterial Infection in Zebrafish"</i>	June 2018
Duke Innate Immunity Symposium	<i>Durham, NC</i>
Invited Speaker: <i>"A Whole Animal Chemical Screen Identifies P2RX7 Modulation as a Host-Directed Strategy for Control of Mycobacterial Infection"</i>	April 2018
Keystone Symposium: Intrinsic Host Defenses and Counter Defenses	<i>Monterey, CA</i>
Invited Speaker: <i>"Whole Animal Chemical Screen Identifies P2RX7 Modulation as a Host-Directed Strategy for Control of Mycobacterial Infection"</i>	March 2018
University of Bristol, Host: Paul Martin, Professor of Cell Biology	<i>Bristol, UK</i>
Invited Seminar Speaker: <i>"Two Fishy Stories"</i>	November 2016
Center for Host Microbial Interactions Supergroup	<i>Durham, NC</i>
<i>"Fishing for Host-Directed Therapies"</i>	September 2015
Duke Women in Science and Engineering (WISE) Symposium	<i>Durham, NC</i>
Invited Speaker: <i>"Calcium Signaling in Immune Cells"</i>	April 2015
Molecular Genetics and Microbiology Departmental Seminar	<i>Durham, NC</i>
<i>"Host Directed Therapies for Mycobacterial Disease: A Zebrafish Chemical Screen"</i>	October 2014
N.C. State Honors Program	<i>Raleigh, NC</i>
<i>Class of 2012 Graduation Speaker</i>	May 2012

POSTER PRESENTATIONS

The Allied Genetics Conference (TAGC), 2020	<i>Virtual Conference</i>
Zebrafish Disease Models Conference (ZDM10), 2017	<i>San Diego, CA</i>
Southeastern Mycobacterial Conference, 2017	<i>Athens, GA</i>
Genetics Society of America, 2016	<i>Orlando, FL</i>
Triangle Zebrafish Meeting, 2016	<i>Durham, NC</i>
Molecular Genetics and Microbiology (MGM) Annual Retreat, 2015	<i>Wilmington, NC</i>
Zebrafish Disease Models Conference (ZDM8), 2015	<i>Boston, MA</i>

TEACHING & MENTORING EXPERIENCE

Virtual Active Science Engagement (VASE) *Virtual*
Organizer 2020-present

- Empowering over 30 undergraduates to engage with research topics and science careers
- Teaching skills in scientific reading, resource curation, communication, and networking
- Organizing weekly guest speakers and professional development opportunities virtually
- Serving the needs of globally distributed students by editing personal statements, exploring research program options, and discussing future career goals
- Partnering with researchers to develop Virtual Itty Projects to provide shortresearch opportunities for VASE students

University of California - San Diego *Virtual*
Guest Lecturer 2020-present

- Invited lecturer for Multicellular Life, “How do animals respond to infection?”
- Invited lecturer for Brain Energy Homeostasis, “How to Read a Scientific Paper”
- Invited lecturer for Neurobiology and Behavior (for non-majors), “What is scientific literature”

SciREN: Science Research Educator Network - San Diego *Virtual: San Diego, CA*
Co-Organizer 2020-present

- Organized the inaugural San Diego branch of SciREN
- Building a network of STEM researchers and San Diego-based K-12 educators
- Taught a team of over 100 researchers to develop lesson plans and share them with local educators

Biology Undergraduate and Master’s Mentorship Program (BUMMP) *San Diego, CA*
Mentor to two students 2020-present

- Fostering a sense of belonging among two undergraduate students from backgrounds historically under-served in biology
- Providing insight into science as a career

National Summer Undergraduate Research Project (NSURP) *Virtual*
Mentor to 3 students Summer 2020

- Building confidence in undergraduates doing independent scientific research
- Met weekly to discuss research, career goals, and networking
- Organized and edited mentee’s literature reviews and research proposals

Cientifico Latino’s Graduate School Mentorship Program *Virtual*
Mentor 2020-present

- Meet monthly to discuss graduate school opportunities and applications
- Organize and edit mentee’s personal statements
- Practice mentee’s interview skills for virtual graduate school interviews

UC-San Diego Biology Bootcamp *San Diego, CA*
Microrotation Advisor 2019, 2020

- Acquainted first year graduate students to *C. elegans* as a model system
- Introduced microscopy techniques and tools to understand transcriptional regulation of genes

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- Assisted in developing a scientific presentation to non-specialists

Heithoff-Brody High School Scholars Program

Mentor

San Diego, CA
June 2019-August 2019

- Introduced a high school student to laboratory research
- Assisted in development of presentation skills to lay audience and specialists
- Developed experiments and assays for understanding food preference in *C. elegans*

Genetic Solutions to Biological Problems: Zebrafish Genetics

Teaching Assistant

Durham, NC
2017

- Helped develop graduate course to teach the basics of zebrafish genetics in the University Program in Genetics and Genomics Core Course
- Prepared course materials and led discussion

N.C. State University Tutorial Center

Supplemental Instructor

Raleigh, NC
2010-2012

- Organized and implemented lessons to train undergraduates in the field of quantitative chemistry

Duke Talent Identification Program (TIP)

Teaching Assistant- Medical Science

Lawrence, KS
2010

- Created daily medical science lessons for gifted middle school students
- Collaborated with course instructor for experiments, field trips, and lessons

EDUCATIONAL TRAINING

Torrey Pines Leadership Development Program

“SBP Leadership Training”

Virtual
In Progress

National Institute on Scientific Teaching

Certificate from MacMillan Learning

Virtual
Fall 2020

Introduction to College Teaching

UC-San Diego Teaching and Learning Commons

San Diego, CA
Summer 2020

Research Mentoring

Salk Institute Office of Equity and Inclusion

San Diego, CA
Summer 2020

PROFESSIONAL SERVICE

Genetics Society of America Early Career Scientist Leadership Program Jan 2020-present

Career Development Subcommittee, co-chair

- Organizing a team of 12 early career scientists
- Developing and implementing programming to assist in the career development of early career scientists
- Interviewing professionals, writing and editing blog posts, moderating discussion panels

Salk Institute’s Society of Research Fellows

Chair

2019-present

- Leading meetings and organize a team of 16 trainees
- Developing community-building events and leadership opportunities within Salk
- Advocating for the needs of trainees within Salk

Salk Institute's Black Association at Salk <i>Supporting Member</i>	2020-present
Ad Hoc Reviewer <i>Disease Models & Mechanisms, Scientific Reports, Cell Reports</i>	2018-2020
SACNAS 2020 Conference Mentor Judge <i>Society for Advancement of Chicanos/Hispanics and Native Americans in Science</i>	2020
National Science Foundation <i>Reviewer</i>	2020
Salk Institute's Science at the Seaside Retreat <i>Organizing Committee, chair</i>	2019, 2020
San Diego Worm Community <i>Organizing Committee</i>	2019-2020
Duke Zebrafish Community <i>Organizing Committee</i>	2017-2018
Triangle Zebrafish Symposium <i>Organizing Committee</i>	2016-2018
N.C. State Honors Program <i>Admissions Reviewer</i>	2015-2021
Science Communication Conference (ComSciCon) Triangle <i>Organizing Committee</i>	2016-2017
Gordon G. Hammes Distinguished Faculty Selection Committee	2014-2016
Duke University Program in Genetics and Genomics <i>Student Representative to Faculty; Recruitment, Retreat, and Outreach Committees</i>	2012-2017

SCIENCE OUTREACH & ENGAGEMENT

The League of Extraordinary Scientists and Engineers (LXS) <i>Volunteer Educator</i>	<i>San Diego, CA</i> January 2019-present
<ul style="list-style-type: none"> • Introduce Title 1 students to oceanographic research, tide pools, and microscopy • Present educational tours for San Diego County Public Schools • Organize hands-on community science presentations • Collaborate with local scientists to develop educational materials • Perform science experiments at the San Diego County Fair 	
Salk Institute Education/Outreach <i>Volunteer Educator</i>	<i>San Diego, CA</i> April 2019-present
<ul style="list-style-type: none"> • Develop new educational materials for public engagement • Organize lab tours for March of Dimes High School Science Day • Present research to public through SciChats program (at least 4 per year) 	
R.H. Fleet Science Center <i>Volunteer Educator</i>	<i>San Diego, CA</i> January 2019-present
<ul style="list-style-type: none"> • Assist with lessons for Science Sundays / Saturdays • Serve as a mentor and educator for BeWISE overnight events for middle school girls interested in STEM 	
San Diego Science Olympiad <i>Event Leader</i>	<i>San Diego, CA</i> January-March 2019
<ul style="list-style-type: none"> • Wrote hands-on forensics-based test for middle school and high school events • Proctor tests and managed team of volunteers 	
Duke Outreach in Genetics and Genomics (DOinGG) <i>Founder</i>	<i>Durham, NC</i> 2013-2019

- Developed and presented lesson plans in local elementary, middle, and high schools
- Organized hands-on community science presentations
- Collaborated with NC DNA Day and served as an ambassador, presenting DNA extraction techniques to schools and students at local juvenile detention center
- Collaborated with NC Science Olympiad to write and proctor tests

NC Science Olympiad Event Leader

Raleigh, NC

Event Leader

2015-2017

- Developed, proctored, and graded hands-on regional and statewide tests in elementary, middle, and high school level genetics

Endless Frontier Science Radio for Duke University and Beyond

Durham, NC

WXDU, 88.7FM Radio Host

2014-2016

- Interviewed researchers, community members, and students
- Edited and produced audio
- Hosted radio show twice monthly

COMMUNITY INVOLVEMENT

Porchlight Community Services

San Diego, CA

Grant Writer

March-September 2020

San Diego Comic-Con @ HOME

Virtual

Educational Panelist: "The supernatural can be super normal"

July 2020

San Diego STEM Ecosystem

Virtual

Virtual Mentoring Panelist

June 2020

Salk Women in STEM Wikipedia Edit-a-Thon

San Diego, CA

Edit and create wikipedia pages for women in STEM

September 2019

San Diego Comic-Con

San Diego, CA

Educational Panelist: "More Science in Your Fiction"

July 2019

BOOST Professional Development Team

Durham, NC

Provide lesson plans and support for Durham Public School Teachers

2015

Girls on the Run

Durham, NC

Coach

2014

- Instructed afterschool group of 3rd-5th grade girls in positive physical and mental health
- Served as a role model for young girls
- Coordinated a 5K for students and families

WKNC 88.1 FM

Raleigh, NC

General Manager

2011-2012

- Directed staff of 120 students, \$60,000 budget, and professional development of 20 paid staff members
- Oversaw the daily activities of the fifth largest college radio station for quality of sound, community involvement, and technical operations

Disc Jockey

2009-2012

N.C. State Alternative Spring Break

Crownpoint, NM

Team Leader

2011