

# Daria Natalie Van Tyne

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## Education

- Harvard University**, Boston, Massachusetts 2013  
PhD, Biological Sciences in Public Health  
Dissertation title: "Identification and characterization of novel drug resistance loci in *Plasmodium falciparum*"
- Vassar College**, Poughkeepsie, New York 2006  
B.A. cum laude in Biochemistry, minor in Hispanic Studies

## Research Experience

- Massachusetts Eye and Ear Infirmary**, Boston, Massachusetts 2013-2018  
Post-doctoral Fellow in the laboratory of Professor Michael Gilmore  
Research interests:  
  1. Functional genomics of multidrug-resistant bacteria; new mechanisms of resistance
  2. Evolution of resistance to host immune defenses
  3. Development of novel therapeutics for drug-resistant bacterial infections
- Harvard School of Public Health**, Boston, Massachusetts 2007-2013  
Graduate Student in the laboratory of Professor Dyann Wirth  
Doctoral research: Identification and functional characterization of novel drug resistance genes in the malaria parasite, using genetic epidemiology, molecular biology, and genomics approaches
- Marine Biological Laboratories**, Woods Hole, Massachusetts 2011  
Participant, Biology of Parasitism Course
- Institute of Parasitology and Biomedicine López-Neyra**, Granada, Spain 2006-2007  
Fulbright Scholar in the laboratory of Professor Miguel Navarro  
Studied antigenic variation and transcriptional regulation in *Trypanosoma brucei*
- University of Colorado, Boulder**, Colorado 2006  
Technician in the laboratory of Professor Robert Batey  
Synthesized and crystallized riboswitch RNA
- Darmstadt University of Technology**, Darmstadt, Germany 2004, 2005  
HHMI Summer Research Fellow in the laboratory of Professor H. Ulrich Göringer  
Studied mRNA editing in *Trypanosoma brucei*

**Vassar College**, Poughkeepsie, New York 2003-2006  
 Independent research student with Professor Eric Eberhardt  
 Worked on organic synthesis of amide compounds, *E. coli* protein expression and proteomics of prions

### Grants and Awards

K99/R00 Pathway to Independence Award EY028222 (PI) National Eye Institute, National Institutes of Health	9/1/17-8/31/21 \$840,127
Broad Next10 Round Three Award for Trainee-led Research Project (PI) Broad Institute	1/1/17-12/31/17 \$40,000
Charles A. King Trust Postdoctoral Fellowship (Declined) The Medical Foundation, Health Resources in Action	2017
Post-doctoral Fellowship F32AI109855 (PI) Ruth L. Kirschstein National Research Service Award (NRSA) National Institute of Allergy and Infectious Diseases, National Institutes of Health	11/1/14-10/31/16 \$107,648
Career Development Grant for Postdoctoral Women American Society for Microbiology	2015
Post-doctoral Fellowship T32EY007145 (Trainee) Molecular Bases of Eye Disease post-doctoral training fellowship National Eye Institute, National Institutes of Health	2013-2014
Conference Travel Awards 3 <sup>rd</sup> International Conference on Model Hosts Microbiology after the Genomics Revolution: Genomes 2014	2015 2014
Certificate of Distinction in Teaching Harvard University Faculty of Arts and Sciences	2011, 2013
Andrew Spielman Travel Fellowship Department of Immunology and Infectious Diseases, Harvard School of Public Health	2009
Fulbright Research Grant, Spain Institute for International Education and Fulbright Commission of Spain	2007
Olive M. Lammert Prize Vassar College Department of Biochemistry	2006
Howard Hughes Medical Institute Summer Fellowship Vassar College Undergraduate Research Summer Institute	2004

**Teaching and Advising Experience****American Society for Microbiology**

Fall 2015-Spring 2016

Science Teaching Fellow

**Harvard University**, Cambridge, Massachusetts

Resident/Senior Staff Tutor (Lowell), Sophomore Advising Coordinator      Fall 2011-present

Guest Lecturer in Organismal and Evolutionary Biology 290      Spring 2015

Course title: Microbial Sciences: Chemistry, Ecology and Evolution

Professor: Michael Gilmore

Special Topics Lecturer in Science of Living Systems 17      Spring 2013

Course title: The Human Organism

Professors: Joseph Brain and Stephanie Shore

Teaching Fellow in Societies of the World 24      Spring 2013

Course title: Global Health Challenges: Complexities of Evidence-Based Policy

Professor: Sue Goldie

Teaching Fellow in Life Sciences 120      Spring 2011

Course title: Global Health Threats

Professors: Barry Bloom and Richard Losick

**Harvard School of Public Health**, Boston, Massachusetts

Guest Lecturer in Microbial Genomics Nanocourse      Spring 2015

Professor: Bill Hanage

Teaching Assistant in Immunology and Infectious Diseases 216      Spring 2010

Course title: Cellular and Molecular Biology of Parasites

Professor: Barbara Burleigh

Teaching Assistant in Immunology and Infectious Diseases 201      Fall 2009

Course title: Ecology, Epidemiology and Control of Important Parasitic Diseases in Developing Areas

Professor: Dyann Wirth

**Colgate University**, Hamilton, New York

Guest Lecturer in Advanced Cellular Physiology      Fall 2011

Professor: Anna McLoon

**Vassar College**, Poughkeepsie, NY

Biochemistry Majors Committee      2005-2006

Academic Intern, Organic Chemistry Lab      Spring/Fall 2005

Student Fellow, Noyes House      2003-2004

**Other Experience and Professional Memberships**

Boston Bacterial Meeting Organizing Committee (2015 Meeting Chair)      2014-2016

Member, American Society for Microbiology      2013-

Microbial Sciences Initiative, Harvard University	2011-
Member, Sigma Xi	2006-
Graduate Student Council, Harvard University	2008-2013
Captain, Women's Crew Team, Vassar College	2005-2006

## Publications

1. Dabul AN, Avaca-Crusca JS, **Van Tyne D**, Gilmore MS, Carmago IL (2018). Resistance in *in vitro*-selected tigecycline resistant MRSA ST5 is driven by mutations in *mepR* and *mepA* genes. *Microb Drug Resist* 24(5):519-526.
2. Johnston T, **Van Tyne D**, Chen RF, Fawzi NL, Kwon B, Kelso MJ, Gilmore MS, Mylonakis E (2018). Propyl-5-hydroxy-3-methyl-1-phenyl-1H-pyrazole-4-carbodithioate (HMPC): a new bacteriostatic agent against methicillin-resistant *Staphylococcus aureus*. *Sci Rep* 8(1):7062.
3. Kim W, Zhu W, Hendricks GL, **Van Tyne D**, Steele AD, Keohane CE, Fricke N, Conery AL, Shen S, Pan W, Lee K, Rajamuthiah R, Fuchs BB, Vlahovska PM, Wuest WM, Gilmore MS, Gao H, Ausubel FM, Mylonakis E (2018). A new class of synthetic retinoid antibiotics effective against bacterial persisters. *Nature* doi: 10.1038/nature26157.
4. Keohane C, Steele A, Fetzer C, Khowsathit J, **Van Tyne D**, Moynie L, Gilmore MS, Karanicolas J, Sieber SA, Wuest WM (2018). Promysalin Elicits Species-Selective Inhibition of *Pseudomonas aeruginosa* by Targeting Succinate Dehydrogenase. *J Am Chem Soc* 140(5):1774-1782.
5. Welsh MA, Taguchi A, Schaefer K, **Van Tyne D**, Lebreton F, Gilmore MS, Kahne D, Walker S (2017). Identification of a Functionally Unique Family of Penicillin-Binding Proteins. *J Am Chem Soc* 139(49):17727-17730.
6. **Van Tyne D**, Gilmore MS (2017). Raising the Alarmone: Within-Host Evolution of Antibiotic-Tolerant *Enterococcus faecium*. *MBio* 8(1) pii: e00066-17.
7. **Van Tyne D**, Ciolino JB, Wang J, Durand ML, Gilmore MS (2016). Novel Phagocytosis-Resistant Extended-Spectrum  $\beta$ -Lactamase-Producing *Escherichia coli* From Keratitis. *JAMA Ophthalmol* 134(11):1306-1309.
8. de Mello SS, **Van Tyne D**, Dabul AN, Gilmore MS, Camargo IL (2016). High-Quality Draft Genome Sequence of the Multidrug-Resistant Clinical Isolate *Enterococcus faecium* VRE16. *Genome Announc* 4(5) pii: e00992-16.
9. Kumar AA, Lim C, Moreno Y, Mace CR, Syed A, **Van Tyne D**, Wirth DF, Duraisingh MT, Whitesides GM (2015). Enrichment of reticulocytes from whole blood using aqueous multiphase systems of polymers. *Am J Hematol* 90(1):31-6.
10. **Van Tyne D**, Gilmore MS (2014). A delicate balance: maintaining mutualism to prevent disease. *Cell Host Microbe* 16(4):425-7.

11. **Van Tyne D**, Gilmore MS (2014). Friend Turned Foe: Evolution of Enterococcal Virulence and Antibiotic Resistance. *Annu Rev Microbiol* 68:337-56.
12. **Van Tyne D**, Tan Y, Daily JP, Kamiza S, Seydel K, Taylor T, Mesirov JP, Wirth DF, Milner DA Jr (2014). *Plasmodium falciparum* gene expression measured directly from tissue during human infection. *Genome Medicine* 6(11):110.
13. **Van Tyne D**, Gilmore MS (2014). Virulence Plasmids of Nonsporulating Gram-Positive Pathogens. *Microbiology Spectrum* 2(5) doi:10.1128/microbiolspec.PLAS-0002-2013.
14. **Van Tyne D**, Dieye B, Valim C, Daniels R, Séne PD, Lukens AK, Ndiaye M, Bei AK, Ndiaye YD, Hamilton EJ, Ndir O, Mboup S, Volkman SK, Wirth DF, Ndiaye D (2013) Changes in drug sensitivity and anti-malarial drug resistance mutations over time among *Plasmodium falciparum* parasites in Senegal. *Malaria Journal* 12:441.
15. Ndiaye D, Dieye B, Ndiaye YD, **Van Tyne D**, Daniels R, Bei AK, Mbaye A, Valim C, Lukens A, Mboup S, Ndir O, Wirth DF, Volkman S (2013) Polymorphism in *dhfr/dhps* genes, parasite density and *ex vivo* response to pyrimethamine in *Plasmodium falciparum* before and after implementing intermittent preventive treatment for pregnancy malaria in Thies, Senegal. *Int J for Parasitol: Drugs and Drug Resistance* 3:135-142.
16. Gilmore MS, Lebreton F, **Van Tyne D** (2013) Dual defensin strategy for targeting *Enterococcus faecalis*. *Proc Natl Acad Sci U S A* 110(50):19980-1.
17. **Van Tyne D**, Martin MJ, Gilmore MS (2013) Structure, function, and biology of the *Enterococcus faecalis* cytolysin. *Toxins* 5(5):895-911.
18. **Van Tyne D**, Uboldi AD, Healer J, Cowman AF, Wirth DF (2013) Modulation of PF10\_0355 (MSPDBL2) alters *Plasmodium falciparum* response to antimalarial drugs. *Antimicrob Agents Chemother.* 57(7):2937-41.
19. Daniels R, Chang HH, Séne PD, Park DC, Neafsey DE, Schaffner SF, Hamilton EJ, Lukens AK, **Van Tyne D**, Mboup S, Sabeti PC, Ndiaye D, Wirth DF, Hartl DL, Volkman SK (2013) Genetic surveillance detects both clonal and epidemic transmission of malaria following enhanced intervention in Senegal. *PLoS ONE* 8(4):e60780.
20. Park DJ, Lukens AK, Neafsey DE, Schaffner SF, Chang HH, Valim C, Ribacke U, **Van Tyne D**, Galinsky K, Galligan M, Becker JS, Ndiaye D, Mboup S, Wiegand RC, Hartl DL, Sabeti PC, Wirth DF, Volkman SK (2012) Sequence-based association and selection scans identify drug resistance loci in the *Plasmodium falciparum* malaria parasite. *Proc Natl Acad Sci USA* 109(32):13052-7.
21. Amambua-Ngwa A, Park DJ, Volkman SK, Barnes KG, Bei A, Lukens AK, Sene P, **Van Tyne D**, Ndiaye D, Wirth DF, Conway DJ, Neafsey DE, Schaffner SF (2012) SNP genotyping identifies new signatures of selection in a deep sample of West African *P. falciparum* malaria parasites. *Mol Biol Evol.* 29(11):3249-53.
22. Martincová E, Voleman L, Najdová V, De Napoli M, Eshar S, Gualdron M, Hopp CS, Sanin DE, Tembo DL, **Van Tyne D**, Walker D, Marcinčíková M, Tachezy J, Doležal P (2012)

Live imaging of mitosomes and hydrogenosomes by HaloTag technology. *PLoS ONE* 7(4): e36314.

23. Milner DA Jr, Vareta J, Valim C, Montgomery J, Daniels RF, Volkman SK, Neafsey DE, Park DJ, Schaffner SF, Mahesh NC, Barnes KG, Rosen DM, Lukens AK, **Van Tyne D**, Wiegand RC, Sabeti PC, Seydel KB, Glover SJ, Kamiza S, Molyneux ME, Taylor TE, Wirth DF (2012) Human cerebral malaria and *Plasmodium falciparum* genotypes in Malawi. *Malaria Journal* 11:35.

24. Melnikov A, Galinsky K, Rogov P, Fennell T, **Van Tyne D**, Russ C, Daniels R, Barnes KG, Bochicchio J, Ndiaye D, Sene PD, Wirth DF, Nusbaum C, Volkman SK, Birren BW, Gnirke A, Neafsey DE (2011) Hybrid selection for sequencing pathogen genomes from clinical samples. *Genome Biology* 12(8): R73.

25. Broadbent KM, Park D, Wolf AR, **Van Tyne D**, Sims JS, Ribacke U, Volkman S, Duraisingh M, Wirth D, Sabeti PC, Rinn JL (2011) A global transcriptional analysis of *Plasmodium falciparum* malaria reveals a novel family of telomere-associated lnc-RNAs. *Genome Biology* 12(6): R56

26. **Van Tyne D**, Park DJ, Schaffner SF, Neafsey DE, Angelino E, Cortese JF, Barnes KG, Rosen DM, Lukens AK, Daniels RF, Milner DA Jr, Johnson CA, Shlyakhter I, Grossman SR, Becker JS, Yamins D, Karlsson EK, Ndiaye D, Sarr O, Mboup S, Happi C, Furlotte NA, Eskin E, Kang HM, Hartl DL, Birren BW, Wiegand RC, Lander ES, Wirth DF, Volkman SK, Sabeti PC (2011) Identification and functional validation of the novel antimalarial resistance locus PF10\_0355 in *Plasmodium falciparum*. *PLoS Genetics* 7(4): e1001383.

27. Montange RK, Mondragón E, **Van Tyne D**, Garst AD, Ceres P, Batey RT. (2010) Discrimination between closely related cellular metabolites by the SAM-I riboswitch. *J Mol Biol.* 186(2): 243-54.

28. Landeira D, Bart JM, **Van Tyne D**, Navarro M (2009) Cohesin regulates VSG monoallelic expression in *Trypanosoma brucei*. *J Cell Biol.* 186(2): 243-54.

29. Gilbert SD, Rambo RP, **Van Tyne D**, Batey RT (2008) Structure of the SAM-II riboswitch bound to S-adenosylmethionine. *Nat Struct Molec Biol.* 15(2): 177-82.

## **Oral Presentations**

1. "Impact of antibiotic and innate immune pressures on enterococcal adaptation in the human bloodstream." 5<sup>th</sup> International Conference on Enterococci, Chamonix, France. April, 2018. **Invited speaker.**

2. "Changes in antibiotic use drive enterococcal evolution during a hospital outbreak." Boston Bacterial Meeting, Boston, MA. June, 2017. **Invited speaker.**

3. "Changes in antibiotic use drive enterococcal evolution during a hospital outbreak." Lake Arrowhead Microbial Genomics Meeting, Lake Arrowhead, CA. September, 2016. **Invited speaker.**

4. "In-host evolution of multidrug-resistant *E. faecalis* during a bacteremia outbreak." American Society for Microbiology General Meeting, Boston, MA. June, 2016. **Invited speaker.**
5. "In-host evolution of antibiotic resistant *Enterococcus faecalis* during an extended hospital outbreak." 3<sup>rd</sup> International Conference on Model Hosts, Chania, Crete, Greece. September, 2015. **Travel award recipient.**
6. "Application of Nanostring<sup>TM</sup> technology to measure changes in gene expression in *Plasmodium falciparum*," American Society of Tropical Medicine and Hygiene Annual Meeting, Atlanta, GA. November, 2012. **Session co-chair.**
7. "Genome-wide association uncovers a novel antimalarial resistance gene in *P. falciparum*," New England Association of Parasitologists Annual Meeting, University of Massachusetts, Amherst, MA. November, 2010. **Outstanding speaker award.**