

# SIOBAIN DUFFY

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## PROFESSIONAL EXPERIENCE

Associate Professor, 2015-  
Chancellor's Scholar, 2016-  
Assistant Professor, 2009-2015  
Department of Ecology, Evolution and Natural Resources  
School of Environmental and Biological Sciences  
Rutgers, the State University of New Jersey, New Brunswick, NJ

Postdoctoral Fellow, 2007-09  
Center for Infectious Disease Dynamics, Department of Biology  
The Pennsylvania State University, University Park, PA  
Mentor: Edward C. Holmes

## EDUCATION

PhD, Ecology and Evolutionary Biology, 2006  
Yale University, New Haven, CT  
Mentor: Paul E. Turner

Visiting Scholar, Biology, 2004-2006  
University of North Carolina, Chapel Hill, NC  
Mentor: Christina L. Burch

MS, Ecology and Evolutionary Biology, 2003  
Yale University, New Haven, CT

BA, with highest honors, Molecular Biology and Biochemistry, 2000  
Rutgers College, Rutgers University, New Brunswick, NJ

## PUBLICATIONS

- 2017 W. Mbewe, **S. Duffy**, S. Mukasa, I. Benesi, F. Tairo, P. Sseruwagi, J. Ndunguru, S. Sheat, M. Koerber and S. Winter. 2016. Variability in the PI gene redefines phylogenetic relationships among Cassava brown streak viruses. *Virology Journal*, 14:118.
- A. Lima, J. Silva, F. Silva, G. Castillo-Urquiza, F. Silva, Y.M. Seah, E. Mizubuti, **S. Duffy**, F.M. Zerbini. The diversification of begomovirus populations is predominantly driven by mutational dynamics. *Virus Evolution*, 3:vex005.

- C.A. Faillace, N.S. Lorusso, and **S. Duffy**. Overlooking the smallest matter: viruses impact species invasions. *Ecology Letters*, 20:524-538.
- E.M. Adriaenssens, M. Krupovic, P. Knezevic, H.W. Ackermann, J. Barylski, J.R. Brister, M.R. Clokie, **S. Duffy**, B.E. Dutilh, R.A. Edwards, F. Enault, H.B. Jang, J. Klumpp, A.M. Kropinski, R. Lavigne, M.M. Poranen, D. Prangishvili, J. Rumnieks, M.B. Sullivan, J. Wittmann, H.M. Oksanen, A. Gillis, J.H. Kuhn. Taxonomy of prokaryotic viruses: 2016 update from the ICTV bacterial and archaeal viruses subcommittee. *Archives of Virology*, 162:1153-1157.
- 2016 M. Krupovic, B.E. Dutilh, E.M. Adriaenssens, J. Wittmann, F.K. Vogensen, M.B. Sullivan, J. Rumnieks, D. Prangishvili, R. Lavigne, A.M. Kropinski, J. Klumpp, A. Gillis, F. Enault, R.A. Edwards, **S. Duffy**, M.R.C. Clokie, J. Barylski, H.W. Ackerman, J.H. Kuhn. Taxonomy of prokaryotic viruses: update from the ICTV bacterial and archaeal viruses subcommittee. *Archives of Virology*, 161:1095-1099.
- 2015 K. Rosario, Y.M. Seah, C. Marr, A. Varsani, J.E. Polston, **S. Duffy** and M. Breitbart. Vector-enabled metagenomic (VEM) surveys using whiteflies (Aleyrodidae) reveal novel begomovirus species in the New and Old Worlds. *Viruses*, 7: 5553-5570.
- 2014 P.E. Turner, E.S.C.P. Williams, C. Okeke, V.S. Cooper, **S. Duffy** and J. Wertz. Antibiotic resistance correlates with transmission in plasmid evolution. *Evolution*. 12:3368-3380.
- E.S. Ho, J. Kuchie and **S. Duffy**. Bioinformatic analysis reveals the emergence of tyrosine phosphorylation site in the movement protein of New World begomoviruses. *PLoS One*, 9:e111957.
- M. Lapidot, D. Gelbart, A. Gal-On, N. Sela, G. Anfoka, F.H. Ahmed, Y. Abou-Jawada, H. Soboh, H. Mazaya, A.E. Aboul-Ata, A.K. El-Attar, M.S. Ali-Shtayeh, R.M. Jamous, J.E. Polston **S. Duffy**. Frequent migration of introduced cucurbit-infecting begomoviruses among Middle Eastern countries. *Virology Journal*, 11:181.
- R.R. Sobrinho, C.A.D. Xavier, H.M.d.B. Pereira, G.S.A. de Lima, I.P. Assuncao, E.S.G. Mizubuti, **S. Duffy** and F.M. Zerbini. Contrasting genetic structure between two begomoviruses infecting the same leguminous hosts. *Journal of General Virology*, 95:2540-2552.
- A.L. Hicks and **S. Duffy**. Cell tropism predicts long-term nucleotide substitution rates of mammalian RNA viruses, *PLoS Pathogens*, 10:e1003838.
- 2013 J. Dennehy, **S. Duffy**, K.J. O'Keefe, S.V. Edwards and P.E. Turner. Frequent coinfection reduces RNA virus population genetic diversity. *Journal of Heredity*, 104:704-712.
- E.S. Ho, S.I. Gunderson and **S. Duffy**. A multispecies polyadenylation site model. *BMC Bioinformatics*, 14(S2):S9.
- A.T.M. Lima, R.R. Sobrinho, J. Gonzalez-Aguilera, C.S. Rocha, S.J.C. Silva, C.A.D. Xavier, F.N. Silva, **S. Duffy** and F.M. Zerbini. Synonymous site variation due to recombination explains

- higher genetic variability in begomovirus populations infecting non-cultivated hosts. *Journal of General Virology*, 94:418-431.
- D.J. Cardinale, K. DeRosa and **S. Duffy**. Diverse factors drive codon usage bias in plant viruses. *Viruses*, 5:162:181.
- 2012 Y.M. Seah, A. Sharma, S. Zhang, R.P.P. Almeida and **S. Duffy**. A novel *Grapevine leafroll-associated virus 3* variant from California. *Virology Journal*, 9:235.
- K. Rosario, **S. Duffy** and M. Breitbart. A field guide to eukaryotic circular single-stranded DNA viruses: Insights gained from metagenomics. *Archives of Virology*, 157:1851-1871.
- P.E. Turner, R.C. McBride, **S. Duffy**, R. Montville, L.S. Wang, Y. Yang, S.J. Lee and J. Kim. Evolutionary genomics of host-use in bifurcating demes of RNA virus phi-6. *BMC Evolutionary Biology*. 12:153.
- A.L. Hicks and **S. Duffy**. One misdated sequence of rabbit hemorrhagic disease virus prevents accurate estimation of its nucleotide substitution rate *BMC Evolutionary Biology*, 12:74.
- 2011 D.J. Cardinale and **S. Duffy**. Single-stranded genomic architecture constrains optimal codon usage. *Bacteriophage*, 1:219-224.
- A. Sharma, J. Wang, **S. Duffy**, S. Zhang, M. Wong, A. Rashed, M. Cooper, K. Daane, R. Almeida. Hierarchical genetic analysis of a plant disease caused by a virus complex. *PLoS One*, 6:e26227.
- J. Wang, A.M. Sharma, **S. Duffy**, R.P.P. Almeida. Genetic diversity at the 3' terminal region of Grapevine leafroll-associated virus 3. *Phytopathology*, 101:445-450.
- A.L. Hicks and **S. Duffy**. Genus-specific substitution rate variability among picornaviruses. *Journal of Virology*, 85:7942-7947.
- R. Acosta-Leal, **S. Duffy**, Z. Xiong, R. Hammond. And S.F. Elena, *Advances in plant virus evolution: Translating evolutionary insights into better disease management*. *Phytopathology*, 101:1136-1148.
- H.S. Yoon, D.C. Price, R. Stepanauskas, V.D. Rajah, M.E. Sieracki, W.H. Wilson, E.C. Yang, **S. Duffy**, D. Bhattacharya. Single cell genomics reveals trophic interactions and evolutionary history of uncultured protists. *Science*, 332:714-717.
- T.F.F. Ng, **S. Duffy**, E. Bixby, G.E. Vallad, J.E. Polston, M. Breitbart. Exploring the diversity of plant viruses and their satellites using vector-enabled metagenomics on whiteflies. *PLoS One*, 6:e19050.
- 2010 **S. Duffy** and Y.M. Seah. 98% identical, 100% wrong: percent nucleotide identity can lead plant virus epidemiology astray. *Philosophical Transactions of the Royal Society B*, 365:1891-1897.

- 2009 C. Firth, M.A. Charleston, **S. Duffy**, B. Shapiro and E.C. Holmes. Insights into the evolutionary history of an emerging livestock pathogen: Porcine circovirus 2. *Journal of Virology*, 83:12813-12821.
- K. Rosario, **S. Duffy** and M. Breitbart. Diverse circovirus-like genome architectures revealed by environmental metagenomics. *Journal of General Virology*, 90:2418-2424.
- J.M. Cuevas, **S. Duffy** and R. Sanjuán. Point mutation rate of  $\phi$ X174. *Genetics*, 183:747-749.
- G.W. Harkins, D.P. Martin, **S. Duffy**, A.L. Monjane, D.N. Shepherd, O.P. Windram, B.E. Owor, L. Donaldson, T. van Antwerpen, R.A. Sayed, B. Flett, M. Ramusi, E.P. Rybicki, M. Peterschmitt and A. Varsani. Dating the origins of the maize-adapted strain of maize streak virus, MSV-A. *Journal of General Virology*, 90:3066-3074.
- G. Harkins, W. Delpont, **S. Duffy**, N. Wood, A.L. Monjane, B.E. Owor, L. Donaldson, S. Saumtally, S. Verabudren, G. Triton, P.G. Markham, R.W. Briddon, D.N. Shepherd, E.P. Rybicki, D.P. Martin and A. Varsani. Experimental evidence indicating that mastreviruses probably did not co-diverge with their hosts. *Virology Journal*, 6:104.
- S. Duffy** and E.C. Holmes. Validation of high rates of nucleotide substitution in geminiviruses: Phylogenetic evidence from *East African cassava mosaic viruses*. *Journal of General Virology*, 90:1539-1547.
- 2008 **S. Duffy** and E.C. Holmes. Phylogenetic evidence for rapid rates of molecular evolution in the single-stranded DNA begomovirus *Tomato yellow leaf curl virus* (TYLCV). *Journal of Virology*, 82:957-965.
- S. Duffy**, L.A. Shackelton and E.C. Holmes. Rates of evolutionary change in viruses: patterns and determinants. *Nature Reviews Genetics*, 9:267-276.
- 2007 **S. Duffy**, C.L. Burch and P.E. Turner. Evolution of host specificity drives reproductive isolation among RNA viruses. *Evolution*, 61:2614-2622.  
 Highlighted in *The Economist: A god of small things*, 10/6/07, p.95.  
 Faculty of 1000 "must read", 5/16/08
- S. Duffy** and E.C. Holmes. Multiple introductions of the old world begomovirus *Tomato yellow leaf curl virus* in the new world. *Applied and Environmental Microbiology*, 73:7114-7.
- 2006 **S. Duffy**, P.E. Turner and C.L. Burch. Pleiotropic costs of niche expansion in the RNA bacteriophage  $\phi$ 6. *Genetics*, 172:1-7.
- 2003 D.W. Schaffner, J. McEntire, **S. Duffy**, R. Montville, and S. Smith. Monte Carlo simulation of the shelf life of pasteurized milk as affected by temperature and initial concentration of spoilage organisms. *Food Protection Trends*, 23:1014-1021.
- 2002 **S. Duffy** and D.W. Schaffner. Monte Carlo simulation of the risk of contamination of apples with *Escherichia coli* O157:H7. *International Journal of Food Microbiology*, 78:245-255.

- T.M. Ng, E. Viard, M.L. Caipo, **S. Duffy** and D.W. Schaffner. Expansion and validation of a predictive model for the growth of *Bacillus stearothermophilus* in military rations. *Journal of Food Science*, 67:1872-1878.
- M.L. Caipo, **S. Duffy**, L. Zhao and D.W. Schaffner. *Bacillus megaterium* spore germination is influenced by inoculum size. *Journal of Applied Microbiology*, 92:879-884.
- A.S. Battey, **S. Duffy** and D.W. Schaffner. Modeling yeast spoilage in cold-filled ready-to-drink beverages with *Saccharomyces cerevisiae*, *Zygosaccharomyces bailii* and *Candida lipolytica*. *Applied and Environmental Microbiology*, 68:1901-1906.
- 2001 A.S. Battey, **S. Duffy** and D.W. Schaffner. Modelling mould spoilage in cold-filled ready-to-drink beverages by *Aspergillus niger* and *Penicillium spinulosum*. *Food Microbiology*. 18:521-9.
- M.K. Llaudes, L. Zhao, **S. Duffy** and D.W. Schaffner. Simulation and modelling of the effect of small inoculum size on time to spoilage by *Bacillus stearothermophilus*. *Food Microbiology*. 18:395-405.
- S. Duffy** and D.W. Schaffner. Modeling the survival of *Escherichia coli* O157:H7 in apple cider using probability distribution functions for quantitative risk assessment. *Journal of Food Protection*, 64:599-605.
- H.E. Uljas, D.W. Schaffner, **S. Duffy** and S.C. Ingham. Modeling of combined processing steps for reducing *Escherichia coli* O157:H7 populations in apple cider. *Applied and Environmental Microbiology*, 67:133-141.
- 2000 **S. Duffy**, D.W. Schaffner, J. Churey and R.W. Worobo. Analysis and modeling of the variability associated with UV inactivation of *Escherichia coli* in apple cider. *Journal of Food Protection*, 63:1587-1590.
- 1998 **S. Duffy**, K.-L. Tsao and D.S. Waugh. Site-specific, enzymatic biotinylation of recombinant proteins in *Spodoptera frugiperda* cells using biotin acceptor peptides. *Analytical Biochemistry*, 262:122-128.

### **Book Chapters**

- 2016 **S. Duffy**. Viral informatics: tools for understanding the evolution of biology's most varied genomes. Chapter 2 in *Viral Evolution*. S.C. Weaver, M.R. Denison, M. Roossinck, M. Vignuzzi, eds. Horizon Press.
- 2009 S.T. Abedon, **S. Duffy** and P.E. Turner. Bacteriophage Ecology. p.42-57, in *The Encyclopedia of Microbiology*, 3<sup>rd</sup> edition, M. Schaechter, ed. Elsevier.
- 2008 **S. Duffy** and P.E. Turner. Phage evolutionary biology. Chapter 6, p.147-176, in *Bacteriophage Ecology: Population Growth, Evolution and Impact of Bacterial Viruses*. S.T. Abedon, ed. Cambridge, UK: Cambridge University Press.

P.E. Turner and **S. Duffy**. Evolutionary ecology of multiple phage adsorption and infection. Chapter 8, p.195-216, in Bacteriophage Ecology: Population Growth, Evolution and Impact of Bacterial Viruses. S.T. Abedon, ed. Cambridge, UK: Cambridge Univ. Press.

- 2002 **S. Duffy**, Y. Chen and D.W. Schaffner. Quantitative risk assessment of the safety of minimally processed foods. Chapter 8, p.165 -182, in The Microbial Safety of Minimally Processed Foods. J.S. Novak, G.M. Sapers and V.K. Juneja, eds. Boca Raton, FL: CRC Press.

### **Sequence Annotations**

- 2017 W. Mbewe, S. Winter, S. Mukasa, F. Tairo, P. Sseruwagi, J. Ndunguru and **S. Duffy**. Deep sequencing reveals a divergent *Ugandan cassava brown streak virus* isolate from Malawi. Genome Announcements 5:e00818-17.

### **GRANTS**

NSF OIA 15-45553 2015-2020 (Co-PI)

“PIRE: U.S.-East Africa Research and Education Partnership: Cassava mosaic disease - A paradigm for the evolution of insect-transmitted plant virus pathosystems”

NSF DEB 1453241 2015-2020 (PI)

“CAREER: The evolutionary genetics of constraint and evolvability in an RNA bacteriophage”

NSF DEB 1240049 2012-2018 (PI)

“Collaborative Research: AToL: ACCESS DNA Viruses: A Comprehensive Survey of Circular Eukaryotic Single-Stranded DNA Viruses in Invertebrates and Fungi to Bridge Gaps in a Tractable Branch of the Viral Tree of Life.”

BMGF/UK Dept of International Development Phase II OPPI052391 2013-2017 (senior personnel)

“Disease Diagnostics for Sustainable Cassava Production in Africa”  
Senior personnel

NIH NIAID 1R03AI096265-01 2011-2013 (PI)

“Effect of tissue tropism on RNA viral evolutionary rates: three family-level analyses”

NSF DEB 1026095, 2010-2014 (PI)

“Collaborative Research: Vector-Enabled Discovery: Exploiting Whiteflies to Investigate the Diversity, Evolution, and Biogeography of Begomoviruses”

NSF MCB 1034927, 2010-2012 (PI)

“Determining the Contribution of CT Mutation to the Overall Mutation Rate of a Model Single-Stranded DNA Virus”

NSF Postdoctoral Research Fellowship DBI 0630707, 2007-2008 (PI)

NSF Dissertation Improvement Grant DEB 0408000, 2004-2006 (Co-PI)

## **SELECTED AWARDS**

- 2017 Ann Palmenberg Junior Investigator, American Society for Virology
- 2016 Chancellor's Award for Excellence in Teaching, Rutgers University
- 2015 Board of Trustees Research Fellowship for Scholarly Excellence, Rutgers University  
Presidential Fellowship for Teaching Excellence, Rutgers University
- 2014 Young Investigator Prize, Theobald Smith Society (NJ branch of ASM)
- 2008 Women's Career Development Grant, American Society for Microbiology  
Postdoctoral Poster Prize, Society for Molecular Biology and Evolution
- 2007 John Spangler Nicholas Prize, Yale University
- 2006 Raymond W. Sarber Award, American Society for Microbiology
- 2001 Howard Hughes Medical Institute Predoctoral Fellowship
- 2000 Fulbright Full Grant, for study at the Technische Universität München

## **SELECTED SERVICE EXPERIENCE**

### ***Rutgers University***

- 2015- Faculty fellow, Honors College
- 2015- Advisory Board, Office for the Promotion of Women in Science, Engineering and Mathematics (SciWomen)
- 2012- Co-director, interdecanal Certificate in Evolutionary Medicine
- 2012- Member, G.H. Cook Honors thesis committee

### ***Society Positions and International Committees***

- 2017- Council on Microbial Sciences, ASM
- 2016-8 ASM Division R (Evolutionary Microbiology) Chair-Elect, then Chair
- 2014- International Committee on the Taxonomy of Viruses, Bacterial and Archaeal viruses
- 2015-6 President, Theobald Smith Society (NJ branch of ASM)
- 2013- ASM Career Development Grants for Postdoctoral Women Committee

### ***Editorial Boards***

- 2014- Guest Editor, PLoS Pathogens
- 2014- Associate Editor, Virus Evolution

Journal of Virology (2015-7) Virology (2014-6), Journal of General Virology (2012-3),  
Applied and Environmental Microbiology (2008-2013)

## **TEACHING EXPERIENCE**

### ***Instructor***

Experimental Evolution, 11:216:353, Rutgers University  
co-taught with M. Seth Pasricha, Summer 2017

Evolution of Infectious Disease, 11:216:405, Rutgers University  
Spring 2011, 2013, 2015, 2017

Capstone in Evolutionary Medicine 01:090:491, Rutgers University  
co-taught with R. Scott, Spring 2015, 2016, 2017

Fundamentals of Evolution, 11:216:251, Rutgers University  
co-taught with L. Struwe, Spring 2012, 2013, 2014, 2015  
co-taught with L. Struwe and K. Russell, Spring 2016, 2017

Fundamentals of Evolution lab, 11:216:252, Rutgers University  
co-taught with L. Struwe, Spring 2014, 2015, 2016, 2017

Advanced Evolution, 16:215:550, Rutgers University  
Fall 2013  
co-taught with K. Kjer: Spring 2011  
co-taught with L. Struwe: Fall 2011, 2012, 2014  
Spring 2012, 2013, 2014, 2015

Evolution of Emerging Viruses 16:695:622, Rutgers University  
Spring 2014

Special Topics in Ecology and Evolution 16:215:600, Rutgers University  
Spring 2013

Concepts in Human Biology, Vance-Granville Community College, Henderson, NC  
Fall 2005

### ***Course Coordinator***

Evolution, Disease and Medicine 11:216:110, Rutgers University  
advised M. Seth Pasricha, L. Williams, Fall 2016  
advised M. Seth Pasricha, S. Hlubik, Fall 2017

## **PROFESSIONAL AFFILIATIONS**

American Society for Microbiology, contributing member  
American Society for Virology, lifetime member



International Society for the Viruses of Microbes  
 Society for Molecular Biology and Evolution, lifetime member

## MENTORING EXPERIENCE

### *Postdoctoral Fellows*

Erik Lavington	2016-
Mansha Seth Pasricha	2015-
Li Li	2013-2015
Eric Ho	2010-2013

### *Graduate Students*

LaShanda Williams, Ecology & Evolution	PhD, 2019 expected
Lele Zhao, Microbial Biology	PhD, 2018 expected
Willard Mbewe, <i>Makerere University</i>	PhD, 2017 expected
Daniel Cardinale, Microbiology & Molecular Genetics	PhD, 2015
Yee Mey Seah, Microbiology & Molecular Genetics	PhD, 2015
Aubrey Watson, Microbial Biology	MS, 2015
Roberto Sobrinho, <i>Universidade Federal de Viçosa</i>	PhD, 2014 (co-advised)
Allison Hicks, Microbial Biology	MS, 2013
Alison Lima, <i>Universidade Federal de Viçosa</i>	PhD, 2012 (co-advised)

### *Undergraduate Students*

Raffia Ahmed	Kevin Apodaca	Kendra Avinger
Patrick Ayoola	Victoria Bucholz	Cassandra Burdziak
Alvin Crespo	Stefania Davia	Kate DeRosa
Shamlya Din	Allison Hicks	Alvin Crespo
Jacquiline Gagnon	Preshita Gadkari	Jessica Grandjean
Natasia Jacko	Joan Kuchie	German Lagunas Robles
Christopher Lin	Shannon Loelius	Hector Loyola Irizarry
Dylan McClung	Travis Mok	Lillian Nichols
Yuliya Olifer	Amy Patel	Vasvi Patel
Hermano Pereira	Dragos Stemate	

### *Selected Student Awards*

2017 LaShanda Williams, 1<sup>st</sup> prize poster award, Rutgers Microbiology Symposium  
 2016 Lele Zhao, Young Scientist Talk Award, 8<sup>th</sup> International Geminivirus Symposium/6<sup>th</sup> International ssDNA Comparative Virology Workshop  
 2016 Willard Mbewe, 3<sup>rd</sup> prize for best poster, First World Congress on Root and Tuber Crops  
 2016 LaShanda Williams, Smithsonian Fellowship  
 2015 Natasia Jacko, ASM Undergraduate Fellowship  
 2014 Yee Mey Seah, Victor Stollar Fellowship, Rutgers University  
 2012 Daniel Stern Cardinale, 2<sup>nd</sup> prize poster award, Rutgers Microbiology Symposium

2012 Preshita Gadkari, best poster, Theobald Smith Society (NJ chapter of ASM)