Efraín E. Rivera-Serrano, Ph.D.

Virologist & Cell Biologist, Social Media Science Communicator, and Founder of #UniqueScientists

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EDUCATION & TRAINING

2018 – 2019 **Postdoctoral Scholar (Focus: Virology/Cell Biology), University of California, Davis**
Research: *Development of a synthetic guide RNA-based CRISPRi platform for identification of genes important for flavivirus replication*
Advisor: Priya Shah, Ph.D.

2017 – 2018 **Postdoctoral Fellow (Focus: Molecular Virology), University of North Carolina at Chapel Hill**
Research: *Mechanisms of cellular entry and egress of quasi-enveloped hepatitis A virus.*
Advisor: Stanley Lemon, M.D.

2012 – 2016 **Ph.D. in Biomedical Sciences (Focus: Cell Biology/Virology), North Carolina State University**
Dissertation: *Cardiac cell type-specific antiviral responses and mechanisms of viral antagonism of cellular innate responses.*
Advisor: Barbara Sherry, Ph.D.

2009 – 2012 **M.Sc. in Plant Cell Biology and Biotechnology, North Carolina State University**
Thesis: *Chemical genetic approaches for the study of tonoplast protein trafficking in Arabidopsis thaliana.*

2005 – 2009 **B.Sc. in Biology & Chemistry (*Summa Cum Laude*), Pontifical Catholic University of Puerto Rico**

RESEARCH EXPERIENCE

11/2018 – 8/2019 **Postdoctoral Research Associate, Department of Microbiology & Molecular Genetics, University of California - Davis**

• Developed a synthetic gRNA-based platform for transient transcriptional inhibition of host genes to identify antiviral and/or proviral genes during flavivirus infection.

1/2017 – 10/2018 **Postdoctoral Research Fellow, Department of Microbiology & Immunology, UNC-Chapel Hill**

• Characterized the cellular entry and uncoating pathways for naked and quasi-enveloped hepatitis A virions (*Rivera-Serrano et al, 2019, eLife*).

• Collaborated in the characterization of how hepatitis A virus acquires its quasi-envelope during viral egress, the proteomic composition of this envelope, and intrinsic immune responses against RNA viruses (multiple publications).

5/2012 – 12/2016 **Graduate Research Assistant, Department of Molecular Biomedical Sciences, NCSU**

• Characterized the molecular mechanism that determines high basal expression of the antiviral cytokine interferon-β in cardiomyocytes (*Rivera-Serrano et al, 2017, J Mol Cell Cardiol*).

• Demonstrated that the magnitude of activation of the transcription factor NF-κB in the heart is cardiac cell type-specific (*Rivera-Serrano and Sherry, 2017, Virol*).

• Identified and characterized a novel role for the mRNA splicing factor SRSF2 in antiviral responses and its antagonism by a viral protein (*Rivera-Serrano et al, 2017, J Virol*).

• Extensive experience in mammalian tissue culture, confocal microscopy, quantitative microscopy, generation of primary cultures, immunofluorescence, *in situ* proximity ligation assays, viral infections, viral replication assays, nucleic acid transfections, SDS-PAGE, co-immunoprecipitations (co-IPs), immunoblotting, qRT-PCR, siRNA-mediated gene knock-down, RNA FISH, bioinformatics.

5/2009 – 4/2012 **Graduate Research Assistant, Department of Plant Biology, NCSU**

• Performed a confocal microscopy-based screen and identified and characterized the bioactivity of a small chemical inhibitor of protein trafficking, which provided the first *in planta* evidence for the existence of two distinct targeting routes for the intracellular targeting of vacuolar membrane proteins in Arabidopsis (*Rivera-Serrano et al, 2012, PLoS ONE*).

• Gained experience in plant tissue culture, confocal microscopy, nucleic acid and protein extraction, microsome isolation, yeast-2-hybrid screens, plant transformation, cloning, PCR, RT-PCR, SDS-PAGE, bioinformatics, genome mapping, wet chemistry, UV-*vis* spectroscopy, HPLC, and high-throughput chemical genomics screens.

5/2008 – 8/2008 **Undergraduate Research Intern, Department of Microbiology, NCSU**

• Involved in the cloning and expression of genes from the yeast *Sporobolomyces singularis* into *Escherichia coli* for large-scale production of β-galactosidase-like enzymes.

• Gained experience in bacterial transformation, protein expression, and protein purification.

12/2007 – 5/2009 **Undergraduate Research Assistant, Department of Biology, PUCPR**

• Studied the effects of natural plant products on glucose uptake in mammalian cells.

• Experience in mammalian tissue culture, purification of plant extracts, and spectroscopy.

PUBLICATIONS (Click here for link to PubMed)

[10] Yamane D, Feng H, **Rivera-Serrano EE**, Selitsky SR, Hirai-Yuki A, Das A, McKnight KL, Misumi I, Hensley L, Lovell W, González-López O, Suzuki R, Matsuda M, Nakanishi H, Ohto-Nakanishi T, Hishiki T, Wauthier E, Oikawa T, Morita K, Reid LM, Sethupathy P, Kohara M, Whitmire JK, Lemon SM. (**2019**) Basal expression of interferon regulatory factor 1 drives intrinsic hepatocyte resistance to multiple RNA viruses. *Nat Microbiol*. 4: 1096–1104

[9] Li Y, Wang L, **Rivera-Serrano EE**, Chen X, Lemon SM. (**2019**) TNRC6 proteins modulate hepatitis C virus replication by spatially regulating the binding of miR-122/Ago2 complexes to viral RNA. *Nucleic Acids Res*. 9;47(12):6411-6424

[8] **Rivera-Serrano EE**, González-López O, Das A, and Lemon SM (**2019**). Cellular entry and uncoating of naked and quasi-enveloped human hepatoviruses. *eLife*. 8:e43983

[7] González-López O, **Rivera-Serrano EE**, Hu F, Hensley L, McKnight KL, Ren J, Stuart DI, Fry EF, Lemon SM. (**2018**) Redundant late domain functions of tandem VP2 YPX_3L motifs in cellular egress of quasi-enveloped hepatitis A virus. *J Virol.* 92(23): e01308-18

[6] McKnight KL, Xie L, González-López O, **Rivera-Serrano EE**, Chen X, Lemon SM. (**2017**) Protein composition of the hepatitis A virus quasi-envelope. *Proc Natl Acad Sci* USA. 114(25): 6587-6592

[5] **Rivera-Serrano EE**, DeAngelis N, and Sherry B. (**2017**) Spontaneous activation of a MAVS-dependent antiviral signaling pathway determines high basal interferon-β expression in cardiac myocytes. *J Mol Cell Cardiol.* 111: 102-113

- ***Selected for Journal Cover (Volume 111, October 2017)***

[4] **Rivera-Serrano EE**, Fritch EJ, Scholl EH, Sherry B. (**2017**) A cytoplasmic RNA virus alters the function of the cell splicing protein SRSF2. *J. Virol.* 91(7): e02488-16
- ***Selected by the Editors as a 'JVI Spotlight' article; Selected for Journal Cover (Volume 91, Issue 9)***

[3] **Rivera-Serrano EE** and Sherry B. (**2017**) NF-κB activation is cell type-specific in the heart. *Virology*. 502: 133-143

[2] Stebbing RE, Irvin SC, **Rivera-Serrano EE**, Boehme KW, Ikizler M, Yoder JA, Dermody TS, Sherry B. (**2014**). An ITAM in a nonenveloped virus regulates activation of NF-κB, induction of beta interferon, and viral spread. *J Virol.* 88(5): 2572-2583

[1] **Rivera-Serrano EE**, Rodriguez-Welsh MF, Hicks GR, Rojas-Pierce M. (**2012**) A small molecule inhibitor partitions two distinct pathways for trafficking of tonoplast intrinsic proteins in Arabidopsis. *PLoS ONE.* 7(9): e44735

RESEARCH PRESENTATIONS (selected)

Rivera-Serrano EE (**2019**) Through the looking glass: Illuminating the Micro-World to Understand Viral Infections. University of Oregon. Eugene, OR (Invited Seminar)

Rivera-Serrano EE (**2019**) Through the looking glass: imaging virus-cell interactions. Pennsylvania State University. College Park, PA (Invited Seminar)

Rivera-Serrano EE (**2018**) From tries to touchdowns: imaging virus-cell interactions. University of California, Davis. Davis, CA (Invited Seminar)

Rivera-Serrano EE, González-López O, Lemon SM. (**2018**) Distinct cellular entry pathways for naked and quasi-enveloped hepatitis A virions. *37th Annual American Society for Virology Meeting*. College Park, MD (Oral)

Rivera-Serrano EE, González-López O, Staring J, Brummelkamp TR, and Lemon SM. (**2018**) Distinct cellular entry pathways for naked and quasi-enveloped hepatitis A virions. *European Congress on Picornavirus Research ('Europic') 2018*. Egmond aan Zee, the Netherlands (Oral and Poster)

Rivera-Serrano EE (**2018**) One hundred(ish) years of solitude – a molecular arms race between viruses and their host. *Science Week and XVI Scientific Research Symposium*. Pontifical Catholic University of Puerto Rico. Ponce, Puerto Rico (Invited Seminar)

Rivera-Serrano EE, Fritch EJ, and Sherry B. (**2016**) The mRNA splicing factor SRSF2 is involved in the host interferon antiviral response and it is antagonized by a viral protein. *NCSU College of Veterinary Medicine Annual Research Forum*. Raleigh, NC (Poster; received "***Award of Excellence – First Prize Poster Presentation***")

Rivera-Serrano EE, and Sherry B. (**2015**) MAVS abundance and subcellular localization is a determinant of high basal expression of interferon-β in cardiac myocytes. *NCSU College of Veterinary Medicine Annual Research Forum*. Raleigh, NC (Oral)

Rivera-Serrano EE, and Sherry B. (**2015**) Novel subcellular NF-κB location is associated with basal expression of interferon-β in cardiac myocytes. *34th Annual American Society for Virology Meeting*. Ontario, Canada (Oral)

Rivera-Serrano EE, and Sherry B. (**2015**) MAVS abundance and subcellular localization is a determinant of basal expression of interferon-β in cardiac myocytes. *Duke Innate Immunity Group Symposium - Innate Immunity, Inflammation and Disease*. Durham, NC (Poster)

Rivera-Serrano EE, and Sherry B. (**2015**) MAVS abundance and subcellular localization is a determinant of basal expression of interferon-β in cardiac myocytes. *10th Annual NC State University Graduate Student Research Symposium*. Raleigh, NC (Poster)

Rivera-Serrano EE, and Sherry B. (**2013**) TRAF3, an adaptor required for induction of interferon, is spontaneously activated in cardiac myocytes and sequestered in viral factories during reovirus infection. *32nd Annual American Society for Virology Meeting*. University Park, PA (Oral)

Rivera-Serrano EE, and Sherry B. (**2012**) TRAF3, an adaptor required for induction of interferon, is sequestered in viral factories in reovirus-infected cells. *11th International Symposium on Double-Stranded RNA Viruses*. San Juan, Puerto Rico (Poster; received "***Outstanding Poster Award***")

Rivera-Serrano EE, and Sherry B. (**2012**) Reovirus represses the cell protective interferon response by sequestering cell factors in viral factories. *2012 Molecular Biotechnology Training Program Research Symposium*. Raleigh, NC (Oral and Poster)

Rivera-Serrano EE (**2012**) Chemical genetic approaches for the study of tonoplast protein trafficking in Arabidopsis. *NCSU Plant Biology Department Seminar*. Raleigh, NC (Seminar)

Rivera-Serrano EE, Rodriguez-Welsh MF, Hicks GR, Raikhel NV, Rojas-Pierce M. (**2011**) Chemical genomics identifies inhibitors of a Golgi-independent pathway for tonoplast proteins in Arabidopsis. *2011 Molecular Biotechnology Training Program Research Symposium*. Raleigh, NC (Poster; received "***Best Poster Presentation Award***")

Rivera-Serrano EE, Rodriguez-Welsh MF, Hicks GR, Raikhel NV, Rojas-Pierce M. (**2011**) Chemical genomics identifies inhibitors of a Golgi-independent pathway for tonoplast proteins in Arabidopsis. *22nd International Conference on Arabidopsis Research.* Madison, WI (Poster)

Rivera-Serrano EE, Rodriguez-Welsh MF, Hicks GR, Raikhel NV, Rojas-Pierce M. (**2011**) Tonoplast proteins are targeted to the vacuole membrane via multiple pathways in Arabidopsis. *6th Annual NCSU Plant Biology Graduate Student Symposium*. Raleigh, NC (Oral)

Rivera-Serrano EE*, Ananthakrishnan S*, Bruno-Bárcena JM. (**2008**) Cloning of the β-galactosidase-like gene (*BglA*) from *Sporobolomyces singularis* into *Escherichia coli* and *Pichia pastoris*. *17th Annual NC State Undergraduate Research Symposium*. Raleigh, NC (Poster; *co-first authors)

SCIENCE COMMUNICATION, DIVERSITY & INCLUSION, AND OUTREACH

2019	Twitter Fellow for the Molecular Biology of the Cell (MBoC) journal (Tweets from @MBoC)
2019	Inclusive SciComm Workshop Leader (**Invited**), SACNAS Annual Meeting, Honolulu, HI
2019	'Hashtag UniqueScientists – Development of a Pro-Diversity Platform Based on Social Media Experiences', University of Rhode Island, USA (Accepted proposal, Workshop Speaker)
2019	'A Logic of Diversity: Applying Virological Concepts to Solve Social Problems', University of Oregon, USA (**Invited** Seminar Speaker)
2019	**Founder of #UniqueScientists**, a program dedicated to highlight and embrace diversity in science through sharing the stories of scientists worldwide. https://uniquescientists.com/
2019	'Getting Published' Virtual Panel, Yale Ciencia Academy (**Invited** Panelist, July 11th, 2019)
2019	'Hashtag SciComm: How Social Media Platforms Are Shaping the Future of Science' *PLOS SciComm*. (**Invited** Blog Post)

2019	'Hashtag SciComm: How Social Media Platforms Are Shaping the Future of Science', University of California, Davis, USA. (**Invited** Speaker)
2016	'Exploring the Micro-World: Where Science Meets Art', NC State University. (**Invited** Speaker)
2016	'Cultivating Cultures of Ethics in STEM: Comparing Meanings of Responsible Innovation across Bioengineering Communities', The Genetic Engineering and Society (GES) Center at NC State University. (Focus Group Co-Moderator)
2016	'Photographing the Invisible', *Verve: the NCSU Postdoc Magazine*. (**Invited** Article + Magazine Cover) https://grad.ncsu.edu/research/opa/verve/fall2016/photographing-the-invisible/

FELLOWSHIPS, AWARDS, & RECOGNITIONS

2019	Molecular Biology of the Cell (MBoC) Twitter Fellowship – Responsible for communicating new scientific articles published on MBoC through Twitter ($2,000 from ASCB)
2019	Kavli Foundation Scholarship – to attend and lead a science communication workshop during the SACNAS 2019 Annual Meeting, Honolulu, Hawai'i
2019	Chan Zuckerberg Foundation – to attend #InclusiveSciComm 2019 Symposium in Rhode Island
2019	Invited professional interview, Journal of Cell Biology, DOI: 10.1083/jcb.201907120
2019	Invited professional interview, eLife Journal: https://elifesciences.org/interviews/1d196599/efrain-rivera-serrano
2019	Our article on entry and uncoating of hepatitis A virus was discussed on the science podcast "This Week in Virology (TWiV)", Episode 541: http://www.microbe.tv/twiv/twiv-541/
2018	37th Annual American Society for Virology (ASV) Meeting Postdoctoral Travel Award ($500)
2017	UNC-CH/NIH T32 Infectious Disease Pathogenesis Postdoctoral Institutional Training Grant, (NIH AI007151-39), "Cellular entry of naked and quasi-enveloped hepatitis A virus (HAV)"
2017	Our article on basal interferon production in cardiomyocytes showcased in the 'NC State University News': https://news.ncsu.edu/2017/09/sherry-mavs/
2016	Featured as an NCSU '*Spotlight Story*' highlighting the use of fluorescence microscopy to address biological questions. https://cvm.ncsu.edu/in-living-color/
2016	First Prize Award of Excellence, Poster Presentation at the NC State University College of Veterinary Medicine Research Forum
2016	Student Fellow, *Cultivating Cultures of Ethics in STEM: Comparing Meanings of Responsible Innovation Across Bioengineering Communities*, The Genetic Engineering and Society (GES) Center at NCSU ($3,000)
2016	Honorable Mention, *NC State University Research Image Contest* – Microscopy Category
2014	Featured as one of "*30 Male Scientists of Color That You Should Know*"; by Dr. Lewis and Dr. Fullilove, American Chemical Society Diversity eBrief
2013	Graduate Student of the Month (November), College of Veterinary Medicine; NCSU
2013	32nd Annual American Society for Virology (ASV) Meeting Student Travel Award ($500)
2013	Alliances for Graduate Education and the Professoriate (AGEP) Supplemental Fellowship ($450)

2012	Outstanding Poster Award, 11th International Symposium on dsRNA Viruses Meeting
2012	NCSU College of Veterinary Medicine Graduate Student Association Travel Award ($500)
2012	11th International Symposium on dsRNA Viruses Meeting Travel Award; NIH-NIAID ($625)
2011	Best Poster Presentation Award, 2011 Molecular Biotechnology Training Program Research Symposium; NCSU
2011	NCSU Graduate School Diversity Enhancement Grant ($800)
2010	Graduate Assistance in Areas of National Need (GAANN) Fellowship in Biotechnology; Department of Education (approx. $60,000 + tuition)
2009	NCSU Graduate School Diversity Enhancement Grant ($3,000)
2009	Initiative for Maximizing Student Diversity (IMSD) Scholarship; NIH (approx. $19,000 + tuition)
2009	Alliances for Graduate Education and the Professoriate (AGEP) Initial Summer Research (ISR) Scholarship; NSF ($6,000)
2009	Highest GPA in the Department of Biology Award – PUCPR Class of 2009
2009	Intramural NIAID Research Opportunities (INRO) Program – Participant; NIH
2009	Alliances for Graduate Education and the Professoriate (AGEP) Summer Research Experience (SRE) Scholarship; NSF ($4,000)
2007	Puerto Rico - Louis Stokes Alliances for Minority Participation (LSAMP) Scholarship ($1,580)

TEACHING AND MENTORING EXPERIENCE

I. Research Mentoring

- **Kayla Hiura**, Junior Specialist at University of California, Davis. November 2018 – August 2019
- **Ethan J. Fritch**, Microbiology Senior at NC State University. Summer 2015 – Spring 2016 (currently: Ph.D. candidate at the University of North Carolina at Chapel Hill)
- **Rachel Garris**, Biochemistry Junior at NC State University. Spring 2011 (currently: Clinical Research Associate at PAREXEL International, Durham, NC)
- **Wanda M. Figueroa-Cuilan**, Natural Sciences Junior at University of Puerto Rico at Cayey. Summer 2010 (currently: Postdoc at John Hopkins University, Baltimore, MD)

II. Classroom Teaching Experience

Fall 2018	Laboratory Instructor – Introduction to Biochemistry (UNC-CH-BIOC107L)
Spring 2015	Guest Lecturer – "Immunity and Disease" at Clayton High School, NC
Fall 2013 – 2014	Guest Lecturer - Academic Writing and Research (NCSU-ENG101)
Spring 2012	Laboratory Instructor - Plant Life (NCSU-PB200)

III. Participation in Teaching Workshops and Conferences (†attendance requires invitation)

11/2015	22nd Annual Compact for Faculty Diversity Institute on Teaching and Mentoring (4 days) – Attendee; Arlington, VA†
2014 – 2015	College of Veterinary Medicine Teaching Workshops Series – Participant; NC State University *Dynamic Lecturing: Facilitating Critical Thinking in the Classroom; Negotiating Authority in the Classroom; Strategies for Facilitating Effective Tutoring and Review Sessions.*
11/2013	20th Annual Compact for Faculty Diversity Institute on Teaching and Mentoring (4 days) – Attendee; Arlington, VA†
8/2012	19th Annual Compact for Faculty Diversity Institute on Teaching and Mentoring (4 days) – Attendee; Tampa, FL†
8/2011	18th Annual Compact for Faculty Diversity Institute on Teaching and Mentoring (4 days) – Attendee; Atlanta, GA†
2011 – 2013	Fundamentals in Teaching (FIT) Workshops – Participant; NC State University *Introduction to Teaching; Learning Styles; Active Learning; Motivating Students: Creating a Healthy Learning Environment; Establishing Credibility and Authority in the Classroom; Evaluation and Grading; Effective Questioning Techniques; Responding to Student Writing; Designing an Effective Syllabus; and Intercultural Communication in the U.S. Classroom*

LEADERSHIP & PROFESSIONAL DEVELOPMENT

2015 – 2016	*Student Representative*, Comparative Biomedical Sciences Governance Committee, NCSU
2014 – 2015	*President*, College of Veterinary Medicine Graduate Student Association (CVM-GSA), NCSU
2014	*Member*, College of Veterinary Medicine Diversity Strategic Planning Committee, NCSU
2013 – 2014	*Vice-President of Academic Affairs*, University Graduate Student Association (UGSA), NCSU
2013 – 2014	*Vice-President*, College of Veterinary Medicine Graduate Student Association, NCSU
2013 – 2014	*Executive Liaison*, UGSA Research Recognition Committee, NCSU
2013	*Participant*, NIH NIAID Bridging the Career Gap for Underrepresented Minority Scientists Workshop (three-day workshop on grant writing and professional development), NIH
2013	*Participant*, 1st Annual UGSA Leadership Training Workshop, NCSU
2012 – 2013	*Member*, UGSA Community Service Committee, NCSU
2012 – 2013	*Graduate Representative*, College of Veterinary Medicine Graduate Student Association, NCSU
2012	*Awardee*, Preparing Future Leaders (PFL) Season Pass Certificate, NCSU
2011	*Participant*, Graduate Student Professional Development Workshop (GSPDW) 3-day workshop (nominated by the Department of Plant Biology to attend this three-day workshop), NCSU
2010 – 2012	*Treasurer*, Plant Biology Graduate Student Association, NCSU
2008 – 2009	*President*, Zeta Delta Chapter for the βββ Biological Honor Society, PUCPR

AFFILIATIONS, SERVICE, & MEMBERSHIPS

2019 –	Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) Professional Membership (gifted for my contributions towards Science Communication)
2018 –	American Association for the Advancement of Science (Member through the AAAS/Science Program for Excellence in Science)
2017 –	Ad Hoc Reviewer for: *Virology, Biochimica et Biophysica Acta, Cells*
2016 –	NC State University Comparative Medicine Institute (CMI) Associate Member
2012 –	American Society for Virology (ASV)
2009 –	American Society for Cell Biology (ASCB)
2007 –	βββ Biological Honor Society

MISCELLANEOUS

- Bilingual – English and Spanish
- National Academy of Sports Medicine (NASM), Certified Personal Trainer (2019 – current)