

MARCOS SOTOMAYOR

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PERSONAL

Birth: September 6, 1978 (Caracas, Venezuela)
Nationality: Chilean (US permanent resident)
Web Page: <http://research.cbc.osu.edu/sotomayor.8>

POSITIONS & EMPLOYMENT

2019 – Associate Professor with Tenure
2013 – 2019 Assistant Professor
Alfred P. Sloan Fellow (2015-2017)
NIH-R00 Pathway to Independence Award (2013-2016)
Department of Chemistry and Biochemistry, The Ohio State University.
Affiliate, Biophysics, Ohio State Biochemistry, and Chemical Physics Programs.

EDUCATION & TRAINING

2008 – 2013 *Postdoctoral Fellow*
NIH-K99 Pathway to Independence Award (2012 – 2013).
Helen Hay Whitney (2009 – 2012) – Howard Hughes Medical Institute.
Department of Neurobiology, Harvard Medical School, USA.
Department of Molecular and Cellular Biology, Harvard University, USA.
Advisors: Dr. David P. Corey, Dr. Rachelle Gaudet.

2007 *Ph.D., Physics*
2004 *M.S., Physics*
Department of Physics, University of Illinois at Urbana-Champaign, USA.
Advisor: Dr. Klaus Schulten.

2002 *M.S., Physics*
2001 *B.S., Physics*
DFI, FCFM, Universidad de Chile, Chile.
Advisors: Dr. Fernando Lund, Dr. Rodrigo Soto.

RESEARCH INTERESTS

Mechanotransduction; Mechanosensitive Ion Channels; Elasticity of Modular Proteins; Adhesion Molecules in Morphogenesis, Neural Circuits and Cancer; Theoretical Modeling; Molecular Dynamics Simulations; X-ray Crystallography, Cryo-EM & Structural Biology.

HONORS & AWARDS

- 2018 **Geraldine Dietz Fox Young Investigator Award, Association for Research in Otolaryngology.**
- 2017 **Elizabeth L. Gross Award for Faculty Excellence, Biophysics Graduate Program OSU.**
- 2015 – 2017 **Alfred P. Sloan Fellowship in Neuroscience.**
- 2015 **Distinguished Undergraduate Research Mentor Award OSU.**
- 2012 – 2016 **NIH Pathway to Independence Award K99/R00.**
- 2012 Selected to participate in the 62nd Lindau Nobel Laureate Meeting.
- 2009 Helen Hay Whitney Foundation Fellowship (accepted).
- 2009 Damon Runyon Cancer Research Foundation Fellowship (declined).
- 2007 Best Talk Prize, UIUC Cell and Molecular Biology – Molecular Biophysics Symposium.
- 2007 MCC/UIUC travel award to attend the CECAM meeting Ionic Transport: from Nanopores to Biological Channels, Lyon, France.
- 2005 BPS/IUPAB travel fellowship award to attend and participate in the International Biophysics Congress in Montpellier, France.
- 2004 Member of The Honor Society Phi Kappa Phi.
- 2002 Graduated with “Distinción Máxima” (Maximum Distinction), Master in Science, Physics, Universidad de Chile, Chile.
- 2002 Graduate Research Fellowship, CONICYT-Chile (National Commission for Scientific and Technological Research).
- 1997 – 2000 “Beca Presidente de la República” Chilean Government Undergraduate Scholarship.
- 1997 – 2000 “Outstanding Student” (Alumno Destacado). Top 5% of the Mathematical and Physical Sciences Division (FCFM) undergraduate students at Universidad de Chile are selected in this category each year.

PUBLICATIONS

40 peer-reviewed publications. Sum of ISI citations (using all databases): 2715; h-index: 22.¹ Sum of Google Scholar citations: 3860; h-index: 25.

† Corresponding author; * Equal contributions; § Undergraduate students from Sotomayor Laboratory

RESEARCH PAPERS

– Y. Chen, M. Sotomayor, S. Capponi, B. Bariharan, I. Sahu, M. Haase, G. Lorigan, A. Kuhn, S. H. White, R. E. Dalbey†. “The Conserved Positively Charged Residue in YidC Functions to Maintain the Hydrophilic Microenvironment of the Substrate-Binding Groove”. *In preparation*.

– B. L. Neel*, C. R. Nisler*, S. Walujkar*, R. Araya-Secchi, M. Sotomayor†. “Molecular Dynamics Simulations of Cadherin Unbinding and Mechanics”. *In preparation*.

– H. Smith*, D. B. Heisler*, N. Pinkerton, E. Kudryashova, K. R. Karch, V. Wysocki, E. Resiler, M. Sotomayor, D. Vaylonis, D. S. Kudryashov†. “Rounding out the understanding of ACD toxicity with the discovery of cyclic forms of acting oligomers”. *In revision*.

– T. Ahmed, C. R. Nisler, E. C. Fluck III, M. Sotomayor, V. Y. Moiseenkova-Bell†. “Structure of the ancestral TRPY1 channel from *Saccharomyces cerevisiae* reveals mechanisms of modulation by lipids and calcium”. *Submitted*.

¹ Number of citations using all ISI databases – December 2020.

<https://www.biorxiv.org/content/10.1101/2020.10.12.336495v1>

– J. D. Hudson, M. Sotomayor, S. R. Cooper[†]. “A complete Protocadherin-19 ectodomain model for evaluating epilepsy-causing mutations and its protein interaction network”. *Under review*.

– M. E. Gray^{*}, Z. R. Johnson^{§*}, D. Modak^{*}, M. J. Tyska, M. Sotomayor[†]. “Species-Dependent Heterophilic and Homophilic Cadherin Interactions in Intestinal Intermicrovillar Links”. *In revision*. <https://www.biorxiv.org/content/10.1101/2020.09.01.278846v1>

– M. E. Gray, M. Sotomayor[†]. “Crystal structure of the non-classical cadherin-17 N-terminus and implications for its adhesive binding mechanism”. *Under review*.

– B. J. Caldwell, A. Norris, E. Zakhroova, C. E. Smith, C. T. Wheat, D. Choudhary, M. Sotomayor, V. H. Wysocki, C. E. Bell[†]. “Oligomeric complexes formed by Red β single strand annealing protein in its different DNA bound states”. *In revision*.

(32) D. Choudhary^{*}, Y. Narui^{*}, B. L. Neel^{*}, L. N. Wimalasena[§], C. F. Klanseck[§], P. De-la-Torre, C. Chen[§], R. Araya-Secchi, E. Tamilselvan, M. Sotomayor[†]. “Structural Determinants of Protocadherin-15 Mechanics and Function in Hearing and Balance Perception”. *PNAS*, 117:24837-24848, 2020. (<https://www.biorxiv.org/content/10.1101/695502v1>).

(31) D. Modak, M. Sotomayor[†]. “Identification of an Adhesive Interface for the Non-Clustered δ 1 Protocadherin-1”. *Communications Biology*, 2:354, 2019 (ISI 4)¹. (<https://www.biorxiv.org/content/10.1101/498196v1>).

(30) J. W. Slater, S. C. Marguet, M. E. Gray, H. A. Monaco, M. Sotomayor, H. S. Shafaat[†]. “Power of the Secondary Sphere: Modulating Hydrogenase Activity in Nickel-Substituted Rubredoxin”. *ACS Catalysis*, 9:8928-8942, 2019 (ISI 6)¹.

(29) J. M. Nicoludis^{*}, A. G. Green^{*}, S. Walujkar, E. J. May, M. Sotomayor, D. S. Marks[†], R. Gaudet[†]. “Interaction specificity of clustered protocadherins inferred from sequence covariation and structural analysis”. *PNAS*, 116:17825-17830, 2019 (ISI 4)¹. (<https://www.biorxiv.org/content/10.1101/493106v1>).

(28) M. S. Park^{*}, R. Araya-Secchi^{*}, J. A. Brackbill^{*}, H-D. Phan^{*}, A. C. Kehling, E. W. Abd-El-Wahab, D. M. Dayeh, M. Sotomayor, K. Nakanishi[†]. “Multidomain convergence of Argonaute during RISC assembly correlates with the formation of internal water clusters”. *Molecular Cell*, 75:725-740, 2019 (ISI 6)¹.

(27) T-H. Chen, M. Sotomayor, V. Gopalan[†]. “Biochemical studies provide insights into the necessity for multiple *Arabidopsis thaliana* protein-only RNase P isoenzymes”. *Journal of Molecular Biology*, 431:615-624, 2019.

(26) P. De-la-Torre, D. Choudhary, R. Araya-Secchi, Y. Narui, M. Sotomayor[†]. “A Mechanically Weak Extracellular Membrane-Adjacent Domain Induces Parallel Dimerization of Protocadherin-15”. *Biophysical Journal*, 115:2368-2385, 2018 (ISI 2)¹.

(25) A. Jaiganesh, P. De-la-Torre, A. A. Patel[§], D. J. Termine[§], F. Velez-Cortes[§], C. Chen[§], M. Sotomayor[†]. “Zooming in on cadherin-23: Structural diversity and potential mechanisms of inherited deafness”. *Structure*, 25:1210-1225, 2018 (ISI 6)¹.

- (24) B. Pan*, N. Akyuz*, X-P. Liu*, Y. Asai, C. Nist-Lund, K. Kurima, B. H. Derfler, B. György, W. Limapichat, S. Walujkar, L. N. Wimalasena[§], M. Sotomayor, D. P. Corey[†], J. R. Holt[†]. "TMC1 Forms the Pore of Mechanosensory Transduction Channels in Mammalian Inner-Ear Hair Cells". *Neuron*, 99:736-753, 2018 (ISI 69)¹.
- (23) T. Fecker*, P. Galaz-Davison*, F. Engelberger, Y. Narui, M. Sotomayor[†], L. P. Parra[†], C. A. Ramírez-Sarmiento[†]. "Active Site Flexibility as a Hallmark for Efficient PET-Degradation by *I. sakaiensis* PETase". *Biophysical Journal*, 114:1302-1312, 2018 (ISI 39)¹.
- (22) Y. Narui, M. Sotomayor[†]. "Tuning Inner-Ear Tip-Link Affinity Through Alternatively Spliced Variants of Protocadherin-15". *Biochemistry*, 57:1702-1710, 2018 (ISI 4)¹.
- (21) D. Choudhary, A. Kumar, T. J. Magliery, M. Sotomayor[†]. "Using thermal scanning assays to test protein-protein interactions of inner-ear cadherins". *PLoS One*, 12(12):e0189546, 2017 (ISI 4)¹.
- (20) R. E. Powers, R. Gaudet[†], M. Sotomayor[†]. "A partial calcium-free linker confers flexibility to inner-ear protocadherin-15". *Structure*, 25:482-495, 2017 (ISI 12)¹.
- (19) R. Araya-Secchi, B. L. Neel, M. Sotomayor[†]. "An elastic element in the protocadherin-15 tip link of the inner ear". *Nature Communications*, 7:13458, 2016 (ISI 16)¹.
- (18) S. R. Cooper, J. D. Jontes[†], M. Sotomayor[†]. "Structural determinants of adhesion by protocadherin-19 and implications for its role in epilepsy". *eLife*, 5:e18529, 2016 (ISI 33)¹.
- (17) M. A. Koussa, M. Sotomayor, W. Wong[†]. "Protocol for sortase-mediated construction of DNA-protein hybrids and functional nanostructures" *Methods*, 67:134-141, 2014 (ISI 20)¹.
- (16) R. Geng, M. Sotomayor, K. J. Kinder, S. R. Gopal, J. Gerka-Stuyt, D. H.-C. Chen, R. E. Hardisty-Hughes, G. Ball, A. Parker, R. Gaudet, D. Furness, S. D. M. Brown, D. P. Corey, K. N. Alagramam[†]. "Noddy, a mouse harboring a missense mutation in protocadherin-15, reveals the impact of disrupting a critical interaction site between tip-link cadherins in inner-ear hair cells" *The Journal of Neuroscience*, 33:4395-4404, 2013 (ISI 21)¹. *Recommended by F1000Prime*.
- (15) M. Sotomayor, W. A. Weihofen, R. Gaudet[†], and D. P. Corey[†]. "Structure of a Force-Conveying Cadherin Bond Essential for Inner-Ear Mechanotransduction" *Nature*, 492:128-132, 2012 (ISI 82)¹.
- (14) H. Inada, E. Procko, M. Sotomayor, R. Gaudet[†]. "Structural and biochemical consequences of disease-causing mutations in the ankyrin repeat domain of the human TRPV4 channel" *Biochemistry*, 51:6195-6206, 2012 (ISI 47)¹. *Recommended by F1000Prime*.
- (13) J. Gumbart, F. Khalili-Araghi, M. Sotomayor, and B. Roux[†]. "Constant electric field simulations of the membrane potential illustrated with simple systems" *BBA – Biomembranes*, 1818:294-302, 2012 (ISI 87)¹.
- (12) R. Gamini, M. Sotomayor, C. Chipot, and K. Schulten[†]. "Cytoplasmic domain filter function in the mechanosensitive channel of small conductance" *Biophysical Journal*, 101:80-89, 2011 (ISI 20)¹.

- (11) D. Asenjo, F. Lund[†], S. Poblete, R. Soto, and M. Sotomayor. "Characterization of the melting transition in two dimensions at vanishing external pressure using molecular dynamics simulations" *Physical Review B*, 83:174110, 2011 (ISI 1)¹.
- (10) M. Sotomayor*, W. A. Weihofen*, R. Gaudet[†], and D. P. Corey[†]. "Structural Determinants of Cadherin-23 Function in Hearing and Deafness" *Neuron*, 66:85-100, 2010 (ISI 86)¹. *Cover article. Recommended by F1000Prime.*
- (9) V. Vasquez, M. Sotomayor, J. Cordero-Morales, K. Schulten, and E. Perozo[†]. "A structural mechanism for MscS gating in lipid bilayers" *Science*, 321:1210-1214, 2008 (ISI 132)¹.
- (8) M. Sotomayor and K. Schulten[†]. "The Allosteric Role of the Ca²⁺ Switch in Adhesion and Elasticity of C-Cadherin" *Biophysical Journal*, 94:4621-4633, 2008 (ISI 83)¹.
- (7) B. Lim*, E. H. Lee*, M. Sotomayor, and K. Schulten[†]. "Molecular basis of fibrin clot elasticity" *Structure*, 16:449-459, 2008 (ISI 90)¹.
- (6) V. Vasquez, M. Sotomayor, D. M. Cortes, B. Roux, K. Schulten, and E. Perozo[†]. "Three dimensional architecture of membrane-embedded MscS in the closed conformation" *Journal of Molecular Biology*, 378:55-70, 2008 (ISI 64)¹.
- (5) M. Sotomayor*, V. Vasquez*, E. Perozo, and K. Schulten[†]. "Ion Conduction through MscS as Determined by Electrophysiology and Simulation" *Biophysical Journal*, 92:886-902, 2007 (ISI 98)¹.
- (4) M. Sotomayor*, T. A. van der Straaten*, U. Ravaioli, and K. Schulten[†]. "Electrostatic Properties of the Mechanosensitive Channel of Small Conductance MscS" *Biophysical Journal*, 90:3496-3510, 2006 (ISI 44)¹.
- (3) M. Sotomayor, D. P. Corey[†], and K. Schulten[†]. "In Search of the Hair-Cell Gating Spring: Elastic Properties of Ankyrin and Cadherin Repeats" *Structure* 13:669-682, 2005 (ISI 208)¹.
- (2) M. Sotomayor and K. Schulten[†]. "Molecular Dynamics Study of Gating in the Mechanosensitive Channel of Small Conductance MscS" *Biophysical Journal* 87:30503065, 2004 (ISI 135)¹.
- (1) C.J. Clarke[†], A. Gendrin, and M. Sotomayor. "The dispersal of circumstellar discs: the role of the ultraviolet switch" *Monthly Notices of the Royal Astronomical Society* 328:485-491, 2001 (ISI 359)¹.

REVIEWS & BOOK CHAPTERS

- (8) A. Jaiganesh, Y. Narui, R. Araya-Secchi, M. Sotomayor[†]. "Beyond Cell-Cell Adhesion: Sensational Cadherins for Hearing and Balance" *CSH Perspectives in Biology, Cell-Cell Junctions*, 2017 (ISI 13)¹.
- (7) M. Sotomayor[†], R. Gaudet[†], D. P. Corey[†]. "Sorting Out a Promiscuous Superfamily: Towards Cadherin Connectomics" *Trends in Cell Biology*, 24:524-536, 2014 (ISI 41)¹.
- (6) E. H. Lee, J. Hsin, M. Sotomayor, G. Comellas, and K. Schulten[†]. "Discovery through the computational microscope" *Structure*, 17:1295-1306, 2009 (ISI 191)¹.

(5) F. Khalili-Araghi, J. Gumbart, P. Wen, M. Sotomayor, E. Tajkhorshid, and K. Schulten[†]. "Molecular dynamics simulations of membrane channels and transporters" *Current Opinion in Structural Biology*, 19:128-37, 2009 (ISI 163)¹.

(4) M. Sotomayor and K. Schulten[†]. "Single-Molecule Experiments *in Vitro* and *in Silico*" *Science*, 316:1144-1148, 2007 (ISI 420)¹.

(3) M. Gao, M. Sotomayor, E. Villa, E. Lee, and K. Schulten[†]. "Molecular Mechanisms of Cellular Mechanics" *Physical Chemistry-Chemical Physics*, 8:3692-3706, 2006 (ISI 49)¹.

(2) E. Tajkhorshid, J. Cohen, A. Aksimentiev, M. Sotomayor, and K. Schulten[†]. "Towards understanding membrane channels" in *Bacterial ion channels and their eukaryotic homologues*, Boris Martinac and Andrzej Kubalski, editors, pp. 153–190. ASM Press, Washington, DC, 2005 (ISI 14)¹.

(1) D.P. Corey[†] and M. Sotomayor. "Tightrope act" *Nature* 428:901-902, 2004 (ISI 42)¹.

PATENTS

"AAV vectors encoding mini-PCDH15 and uses thereof", WO2020219990-A1

PRESENTATIONS

- "Un Puente de Proteínas para Escuchar y para Aprender de Biofísica". *Charla Plenaria, XXII Simposio Chileno de Física*, 2020, Santiago (Zoom), Chile.
- "Molecular Mechanics of Hearing". *Department of Physics Colloquium, The Ohio State University*, 2020, Columbus (Zoom), USA.
- "Una Vista Molecular de la Percepción del Sonido". *Universidad Nacional Andrés Bello*, 2020, Santiago, Chile.
- **"Structuring Inner-Ear Mechanotransduction". *Biophysical Society, 65th Annual Meeting 2020, San Diego, USA.***
- **"Structuring Inner-Ear Mechanotransduction". *43rd Midwinter Research Meeting, Association for Research in Otolaryngology, 2020, San Jose, USA.***
- "Structuring Inner-Ear Mechanotransduction". *NIDCD – NIH*, 2019, Bethesda, USA.
- "The Molecular Machinery of Hearing". *Arts and Sciences College Science Sundays Series, OSU* 2019, Ohio, USA.
- "Structuring and modeling inner-ear mechanotransduction". *Department of Biochemistry and Molecular Biology seminar series, Michigan State University* 2019, Michigan, USA.
- "Sixty years in the making: A molecular movie of inner-ear mechanotransduction". *OSU Life Sciences Interdisciplinary Graduate Programs Symposium*, 2019, Ohio, USA. *Invited by students.*
- "Revealing the structure and dynamics of cadherin assemblies involved in morphogenesis and hearing". *Department of Molecular Genetics, Biochemistry & Microbiology Seminar Series, University of Cincinnati*, 2018, Cincinnati, USA.
- "Revealing the structure and dynamics of cadherin assemblies involved in morphogenesis and hearing". *Department of Cell and Developmental Biology Seminar Series, Vanderbilt University*, 2018, Nashville, USA.
- "Biochemistry of Hearing". *XLI Annual Meeting of the Chilean Biochemistry and Molecular Biology Society*, 2018, Iquique, Chile.
- "Resolving the structural determinants of cadherin function in morphogenesis and hearing". *CBC Seminar Series, The Ohio State University*, 2018, Ohio, USA.
- "Molecular Mechanics of Hearing". *Bollum Symposium in Chemical and Structural Biology, The University of Minnesota*, 2018, Minneapolis, USA.

- “Inner-Ear Sensory Perception and Brain Wiring Enabled by Exceptional Cadherins”. *Computational Neuroscience Seminar Series, The University of Chicago, 2018, Chicago, USA.*
- “Molecular Mechanics of Hearing”. *Department of Physics and Astronomy Seminar Series, Iowa State University, 2017, Ames, USA.*
- **“Sound Perception and Brain Wiring Enabled by Exceptional Cadherins”. *Society for Neuroscience Annual Meeting, 2017, Washington, DC, USA.***
- “Large-Scale Molecular Dynamics Simulations of Cadherin Complexes” *Klaus Schulten Memorial Symposium, 2017, Urbana, USA.*
- “Structural Biology at Ohio State and the Biochemistry of Hearing” *First OSU/PUC Interdisciplinary Symposium, Pontificia Universidad Católica, 2017, Santiago, Chile.*
- “Strings Attached: Sound Perception and Brain Wiring Enabled by Cadherins”. *Cellular, Molecular & Biochemical Sciences Training Program Annual Symposium, The Ohio State University, 2017, Ohio, USA.*
- **“Strings Attached: Sound Perception and Brain Wiring Enabled by Cadherins”. *American Society for Biochemistry and Molecular Biology Annual Meeting, 2017, Chicago, Illinois, USA.***
- “Strings Attached: Sound Perception, Brain Wiring, and Epithelial Morphogenesis Enabled by Cadherins”. *CBC Seminar Series, The Ohio State University, 2016, Ohio, USA.*
- “Strings Attached: Sound Perception and Brain Wiring Enabled by Cadherins”. *Pharmacology Lecture Series, Case Western Reserve University, 2016, Ohio, USA.*
- “Modeling the Molecular Mechanics of Hearing”. *47th Central Regional Meeting, American Chemical Society, 2016, Kentucky, USA.*
- “Mechanisms and Mechanosensitivity: Exceptional Cadherins for Hearing, Balance & Beyond”. *Department of Biology Seminar Series, University of Toledo, 2016, Ohio, USA.*
- “Mechanisms and Mechanosensitivity: Exceptional Cadherins for Hearing, Balance & Beyond”. *Physiology Seminar Series at the University of Kentucky, 2016, Kentucky, USA.*
- “Molecular Mechanics and Biochemistry of Hearing”. *Indiana State University Department of Chemistry and Physics Seminar Series, 2016, Terre Haute, USA.*
- “Mechanisms and Mechanosensitivity: Exceptional Cadherins for Hearing, Balance & Beyond”. *Ohio State University Pharmacology and Pharmaceuticals Seminar Series, 2016, Columbus, USA.*
- “Modeling the Molecular Mechanics of Hearing”. *Ohio State University Applied Math Seminar, 2015 Columbus, USA.*
- **“Mechanisms and Mechanosensitivity: Exceptional Cadherins for Hearing and Balance”. *Society for Neuroscience’s 45th Annual Meeting, 2015, Chicago, Illinois, USA.***
- “Challenges and Opportunities for Biomolecular Modeling”. *Midwest Computational Biomolecular Modeling Symposium, 2015, Urbana, USA.*
- “Life Under Tension: Exceptional Cadherins for Hearing and Balance”. *OSU Life Sciences Interdisciplinary Graduate Programs Symposium, 2015, Columbus, USA. Invited by students.*
- “Mechanisms and Mechanosensitivity: Inner-Ear Cadherins Gone Wild”. *Georgia Tech Soft Condensed Matter and Biophysics Seminar, 2015, Atlanta, USA.*
- “Life under Tension: Molecular Mechanisms of Mechanosensation”. *Georgia Tech Molecular Biophysics Seminar, 2015, Atlanta, USA. Invited by students.*
- **“Mechanisms and Mechanosensitivity: Exceptional Cadherins for Hearing and Balance”. *Force-Gated Ion Channels, 2015, HHMI Janelia Farm, USA.***
- **“Mechanisms and Mechanosensitivity: Exceptional Cadherins for Hearing and Balance”. *Biophysical Society 59th Annual Meeting, 2015, Maryland, USA.***
- “Life under tension: imaging and stretching a molecular handshake essential for hearing and balance”. *Nexos 2014, Philadelphia, USA.*
- **“Computational Exploration of Single-Protein Mechanics by Steered Molecular Dynamics”. *Mechanics of Hearing, 12th International Workshop, 2014, Cape Suonio, Greece.***
- “Molecular Mechanics of Inner-Ear Tip Links”. *IUPUI Department of Physics Colloquium, 2014, Indianapolis, USA.*
- **“Molecular Mechanics of Hair Cell Tip Links”. *37th Midwinter Research Meeting, Association for Research in Otolaryngology, 2014, San Diego, USA.***

- **“Molecular Mechanisms of deafness mutations disrupting tip-link function in hair-cell mechanotransduction”**. *Biophysical Society, 58th Annual Meeting 2014, San Francisco, USA.*
- “Mechanisms and Mechanosensitivity: A Cadherin Handshake for Hearing and Balance”. *McGill University, Physiology Friday Seminar Series, 2013, Montreal, Canada.*
- “Mechanisms and Mechanosensitivity: Inner-Ear Cadherins Gone Wild”. *UIUC Theoretical and Computational Biophysics Group Seminar Series, 2013, Urbana, USA.*
- “Mechanisms and Mechanosensitivity: A Cadherin Handshake for Hearing and Balance”. *OSU Biophysics Graduate Program Seminar Series, 2013, Columbus, USA.*
- **“Molecular Mechanisms of Deafness Mutations Disrupting Tip-Link Function in Hair Cell Transduction”**. *18th International Symposium on Ca²⁺-Binding Proteins and Ca²⁺ Function in Health and Disease, 2013, Kiruna, Sweden.*
- **“Molecular Mechanisms of Deafness Mutations Disrupting Tip-Link Function in Hair Cell Transduction”**. *36th Midwinter Research Meeting, Association for Research in Otolaryngology, 2013, Baltimore, USA.*
- “Modelos, Estructuras y Dinámica de Proteínas Esenciales para la Audición y el Equilibrio”. *Universidad Adolfo Ibañez, 2013, Santiago, Chile.*
- “De las estrellas a la biofísica de proteínas: haciendo una carrera científica interdisciplinaria al andar”. *Universidad de Talca, 2012, Talca, Chile.*
- “Structures and Simulated Dynamics of a Force-Conveying Cadherin Bond Essential for Inner-Ear Mechanotransduction”. *NIDCD – NIH, 2012, Bethesda, USA.*
- **“A Cadherin Handshake for Hearing and Balance”**. *Exciting Biologies – Forces in Biology, 2012, Dublin, Ireland.*
- “Estructuras y Dinámica de Proteínas Esenciales para la Audición y el Equilibrio”. *Universidad Andrés Bello, 2012, Santiago, Chile.*
- “Estructuras y Dinámica de Proteínas Esenciales para la Audición y el Equilibrio”. *Universidad de Chile, 2012, Santiago, Chile.*
- “A Cadherin Handshake for Hearing and Balance”. *Boston Area Young Chilean Investigators Symposium, 2012, Boston, USA.*
- “Molecular Mechanisms Underlying Function of Mechanosensitive Channels and Mechanical Proteins”. *Georg-August-Universität, 2012, Göttingen, Germany.*
- “Life under Tension: Molecular Mechanics of Sensory Transduction in the Inner Ear”. *Delft University of Technology, 2012, Delft, The Netherlands.*
- “Life under Tension: Molecular Mechanics of Sensory Transduction in the Inner Ear”. *Stanford University, 2012, Stanford, USA.*
- “Life under Tension: Molecular Mechanics of Sensory Transduction in the Inner Ear”. *Johns Hopkins University, 2012, Baltimore, USA.*
- “Life under Tension: Molecular Mechanics of Inner-Ear Cadherins”. *UT Southwestern, 2012, Dallas, USA.*
- “Life under Tension: Molecular Mechanics of Inner-Ear Cadherins”. *The Ohio State University, 2012, Columbus, USA.*
- **“A Cadherin Handshake for Hearing and Balance”**. *Mechanical Forces in Development, 2011, Boston, USA.*
- “Molecular Mechanics of Tip-Link Cadherins”. *Eaton-Peabody Laboratories Seminar, 2011, Boston, USA.*
- **“Structural Determinants of Tip-Link-Cadherin Function in Hearing and Deafness”**. *17th International Symposium on Ca²⁺-Binding Proteins and Ca²⁺ Function in Health and Disease, 2011, Beijing, China.*
- **“Structural Determinants of Tip-Link-Cadherin Function in Hearing and Deafness”**. *Society for Neuroscience’s 40th Annual Meeting, 2010, San Diego, California, USA.*
- **“Structure, Dynamics, and Elasticity of Cadherin-23 Repeats Involved in Hereditary Deafness”**. *49th Annual Meeting of the American Society for Cell Biology, 2009, San Diego, California, USA.*
- **“Conformational Transitions Underlying Tension-dependent Gating in Prokaryotic Mechanosensitive Channels”**. *Gordon Research Conference on Cellular Osmoregulation and Mechanotransduction, 2009, Biddeford, Maine, USA.*
- **“Cadherin Dynamics and Molecular Mechanisms of Hereditary Deafness”**. *32nd Midwinter Research Meeting, Association for Research in Otolaryngology, 2009, Baltimore, Maryland, USA.*

- **“Cadherin Dynamics and Molecular Mechanisms of Hereditary Deafness”. *Force-Gated Ion Channels: From Structure to Sensation*, 2008, HHMI Janelia Farm Research Campus, USA.**
- “The Allosteric Role of the Ca²⁺ Switch in Adhesion and Elasticity of C-Cadherin”. *20th CMB–MB Annual Research Symposium*, 2007, Urbana, USA.
- “Ion conduction through the Mechanosensitive Channel of Small Conductance MscS”. *CECAM meeting Ionic Transport: from Nanopores to Biological Channels*, 2007, Lyon, France.
- “Life under Tension: Molecular Mechanisms of Mechanosensitive Channels and Mechanical Sensors”. *MCTP/ICAM Workshop Mechanics of Life: From Biomolecules to Molecular Machines*, 2007, Ann Arbor, Michigan, USA.
- “Tertiary and Secondary Structure Elasticity of Repeat Proteins”. *87th International Bunsen Discussion Meeting on Mechanically Induced Chemistry —Theory and Experiment—* 2005, Tutzing, Germany.
- **“Mechanisms of Mechanosensitive Channels and Mechanical Sensors Studied by Molecular Dynamics Simulations”. *Gordon Research Conference on Mechanotransduction and Gravity Signaling in Biological Systems*, 2005, Biddeford, Maine, USA.**
- “The Molecular Basis of Hearing”. *4D Nanostructure Lecture Series*, 2005, Beckman Institute, Urbana, Illinois, USA.

SUMMER SCHOOLS & TRAINING WORKSHOPS

2017	SBGrid Workshop on Electron Microscopy Data Processing (RELION 2.0)
2009	Rapid Data Collection & Structure Solving at the NSLS: A Practical Course in Macromolecular X-Ray Diffraction Measurement (April 19-24) <i>Brookhaven National Laboratory</i> , NY, USA.
2007	Biology of the Inner Ear: Experimental and Analytical Approaches (August 19-September 1) <i>Marine Biology Lab</i> , Woods Hole, MA, USA.
2000	Particle Physics and Astronomy International Undergraduate Summer School (IUSS, 24 June to 4 August) <i>University of Cambridge & PPARC</i> , UK. Supervised by Dr. C. J. Clarke.
1998	Astronomy Summer School, Las Campanas Observatory. <i>Fundación Andes-Carnegie Institution of Washington</i> .

TEACHING

- 2018 - 2019 **Instructor. Undergraduate Course “Early Experience in Biochemical Research” OSU, USA.**
- 2016 **Project leader. Ohio Supercomputer Center Summer Institute for High School Students.**
- 2015 – 2019 Instructor. Graduate Course “Quantum Mechanics and Spectroscopy” OSU, USA.
- 2015 Instructor. Graduate Course “Introduction to Electronic Structure” OSU, USA.
- 2014 Instructor & Organizer, Biochemistry Training Day “Hands-on Introduction to Protein Simulations”. London, UK.
- 2014 – 2020 **Instructor. Undergraduate Course “Physical Chemistry – Physical Biochemistry II” OSU, USA.**
- Co-author of NAMD, VMD, Membrane Proteins, and Ion Conduction Tutorials. <http://www.ks.uiuc.edu/Training/TutorialsOverview/index.html>
- Co-author of Water Case Study. <http://www.ks.uiuc.edu/Training/CaseStudies/index.html>
- 2003 – 2007 Instructor. Theoretical and Computational Biophysics School (Urbana, 2003; Boston, 2004; Chicago, 2005; Talca–Chile, 2006; Bethesda, 2007). <http://www.ks.uiuc.edu/Training/>
- 2002 Teaching Assistant (Grader). Undergraduate Course “Quantum Physics I” UIUC.
- 2001 Teaching Assistant. Undergraduate Course “Quantum Mechanics” University of Chile.
- 2000 Teaching Assistant. Undergraduate Course “Electromagnetism” University of Chile.
- 1999 – 2000 Teaching Assistant. Undergraduate Course “Modern Physics” University of Chile.
- 1999 Teaching Assistant. Undergraduate Course “Dynamical Systems” (Mechanics II), University of Chile.

RESEARCH GROUP MEMBERS (current in *italics*)

Nicholas Alcorn (undergraduate student)

Diana Lopez (graduate student)

<i>Janina Anokye</i> (undergraduate student)	Jeffrey Lotthammer (undergraduate student)
Jeshua Avila-Estrada (graduate student)	<i>Harsha Mandayam Bharathi</i> (graduate student)
Pranay Arora (undergraduate student)	Debadrita Modak (graduate student)
Raúl Araya-Secchi (postdoc)	Yoshie Narui (postdoc)
Marissa Boyer (graduate student)	<i>Brandon Neel</i> (graduate student)
Conghui (Claire) Chen (undergraduate student)	<i>Collin Nisler</i> (graduate student)
Deepanshu Choudhary (graduate student)	<i>Jesse Sandhu</i> (undergraduate student)
Sharon Cooper (graduate student)	<i>Serina Smith</i> (undergraduate student)
Pedro De-la-Torre (postdoc)	Joseph Sudar (undergraduate student)
Melvyn Drag (master student)	Leah Pastor (undergraduate student)
Pablo Galaz-Davison (visiting scholar)	Aniket Patel (undergraduate student)
<i>Michelle Gray</i> (graduate student)	<i>Elakkiya Tamilselvan</i> (graduate student)
Avinash Jaiganesh (graduate student)	Domenic Termine (undergraduate student)
Zachary Johnson (undergraduate student)	Adrienne Thornburg (graduate student)
Deryanur Kilic (visiting scholar)	Florencia Velez-Cortes (undergraduate student)
Carissa Klanseck (undergraduate student)	<i>Sanket Walujkar</i> (graduate student)
<i>Colin Klaus</i> (postdoc)	<i>Felix Weng</i> (graduate student)
Michael Leake (undergraduate student)	Lahiru Wimalasena (undergraduate student)

NOTABLE TRAINEES ACCOMPLISHMENTS

2020 Student Research Achievement Award, Biophysical Society – Jeffrey Lotthammer
2020 Presidential Fellowship, OSU – Brandon Neel
2019 Travel Award, Biophysical Society – Collin Nisler
2019 Travel Award, Biophysical Society – Joseph Sudar
2019 Travel Award, Biophysical Society – Jeffrey Lotthammer
2019 Travel Award, American Society for Cell Biology – Debadrita Modak
2019 OSC symposium poster prize – Sanket Walujkar
2019 Fellowship – Molecular Biophysics Training Program – Diana Lopez
2019 Fellowship – Molecular Biophysics Training Program – Marissa Boyer
2019 IGP OSU poster prize – Elakkiya Tamilselvan
2019 MBTP OSU poster prize – Collin Nisler
2019 CMBP/CRB OSU symposium poster prize – Brandon Neel
2019 Mayers summer research scholarship – Joseph Sudar
2019 Mayers summer research scholarship – Jeffrey Lotthammer
2019 Kraska endowed chemistry scholarship fund – Joseph Sudar
2019 Gary Booth scholarship fund – Jeffrey Lotthammer
2019 Undergraduate research scholarship – Jeffrey Lotthammer
2019 Undergraduate research scholarship – Serina Smith
2019 Denman Undergraduate Research Forum, 3rd place – Leah Pastor
2019 Focus symposium poster prize – Debadrita Modak
2019 Travel Award, Biophysical Society – Sanket Walujkar
2018 Fellowship – Molecular Biophysics Training Program – Marissa Boyer
2018 Molecular Biophysics Symposium Best Oral Presentation Award – Collin Nisler
2018 Mayers summer research scholarship – Leah Pastor
2018 Mayers summer research scholarship – Joseph Sudar
2018 Mayers summer research scholarship – Jeffrey Lotthammer
2018 Hayes Forum, Biological Sciences Division, 1st place – Debadrita Modak
2018 Student Research Achievement Award Poster Competition, Biophysical Society – Debadrita Modak
2018 Education Committee Travel Award, Biophysical Society – Debadrita Modak
2017 Devon Walter Meek Lecture Poster Presentation, 3rd place – Deepanshu Choudhary
2017 Fellowship – Molecular Biophysics Training Program – Collin Nisler
2017 Fellowship – Cellular, Biochemical, and Molecular Sciences Training Program – Brandon Neel
2017 Pelotonia postdoctoral fellowship – Pedro De-La-Torre
2017 Pelotonia graduate fellowship – Debadrita Modak
2017 College of Engineering Undergraduate Summer Research Scholarship – Joseph Sudar
2016 Association for Research in Otolaryngology Travel Grant Award – Yoshie Narui

2016 Mayers summer research scholarship – Lahiru Wimalasena
2016 First place and “outstanding oral presentation” OSU IGP Symposium – Avinash Jaiganesh
2016 College of Engineering Undergraduate Summer Research Scholarship – Pranay Arora
2016 Denman Undergraduate Research Forum, 1st place – Lahiru Wimalasena
2016 NSF Graduate Fellowship honorable mention – Collin Nisler
2016 NSF Graduate Fellowship – Florencia Velez-Cortes
2016 Seilhamer Fellowship – Sharon Cooper
2015 Mayers summer research scholarship – Lahiru Wimalasena
2015 Mayers summer research scholarship – Domenic Termine
2015 Denman Undergraduate Research Forum, honorary mention – Aniket Patel
2015 Denman Undergraduate Research Forum, 3rd place – Zachary Johnson
2015 Denman Undergraduate Research Forum, 1st place – Lahiru Wimalasena
2015 Biophysical Society CPOW travel award – Yoshie Narui
2014 Pelotonia postdoctoral fellowship – Raúl Araya-Secchi

SERVICE

Admissions Committee – Chemistry & Biochemistry PhD program 2013-2017. Reviewed files from biological-division applicants and provided evaluations.

Coordinator of research focus group (RFG) seminar series – Chemical and Structural Biology and Biophysics 2014-2020. Organized schedule for RFG seminars and Research in Progress talks (CHEM8896).

Data Analytics Search Committee 2014-2015. Reviewed application material for a junior faculty position in the Department of Chemistry and Biochemistry. Helped host and evaluate candidates visiting during January 2015.

Temporary Advisor – Mentoring and guidance for new Chemistry & Biochemistry Ph.D students (biological and physical chemistry divisions), 2015-2016.

First Year Oral Exam Committee – Physical Chemistry Division 2015, 2017; Biochemistry Division 2017. Evaluated first year student's progress and whether they are ready to proceed with further requirements of PhD program.

Doctoral and Master's Committees – Served in >50 committees in various graduate programs at OSU.

Recruiting Committee – Ohio State Biochemistry Program 2017-2019.

Recruiting Committee – Department of Chemistry and Biochemistry Graduate Program 2018.

Graduate Studies Committee – Biophysics Graduate Program 2018-2019.

Biochemistry Search Committee 2019-2020. Reviewed application material for a junior faculty position in the Department of Chemistry and Biochemistry. Helped host and evaluate candidates visiting during January - February 2020.

Member of the NIH Communication Disorders Review Committee (CDRC), July 1, 2020 to June 30, 2024.

REVIEWER

Biophysical Journal; The European Physical Journal E -Soft Matter; Journal of Molecular Graphics and Modelling; Molecular Cell; Nature Structural and Molecular Biology; The Journal of Physical Chemistry; Structure; Journal of Molecular Biology; Nature Communications; Nature Neuroscience; Science; Biomechanics and Modeling in Mechanobiology; PLOS Computational Biology; PLOS Genetics; BBA Molecular Cell Research; Nature; eLife; PNAS; NSF; Wellcome Trust; Israel Science Foundation; Institut Pasteur; National Institutes of Health.

GRANTS/FUNDING

Principal Investigator

- 2018 – 2021 **"Evolutionary mechanics of adhesion complexes" Human Frontier Science Program RGP0056/2018 with Vincent Lynch at U. at Buffalo - SUNY and Felix Rico at INSERM (\$900,000).**
- 2016 – 2021 **"Nanomechanics of Inner-Ear Hair-Cell Transduction" NIH NIDCD R01 DC015271 (Direct Costs: \$1,062,500).**
- 2016 – 2021 "Molecular Basis of Sound Perception, Brain Wiring, and Gut Morphogenesis" Advanced Photon Source General User Proposal APS-GUP-49774/59251/70086 for beam time access (Argonne National Laboratory).
- 2019 – 2020 **"In-Silico Electrophysiology of the Inner-Ear Hair-Cell Mechnotransduction Channel TMC1" PSC/NRC Award for computing time on Anton 2 (MCB190084P).**
- 2014 – 2020 "Molecular Simulations of Cell Adhesion and Sound Transduction Complexes" National Science Foundation XSEDE grant MCB140226.
- 2014 – 2020 "Molecular Mechanisms of Cadherin Dynamics and Force Transduction" Ohio Supercomputer Center grant OSC PAS1037 and PAA0217.
- 2016 – 2019 "Molecular Dynamics Simulations of Adherens Junctions" GLCPC Award for computing time on Blue Waters.
- 2016 – 2017 "Bending and Refolding of an Atypical Cadherin Fragment Involved in Inner-Ear Mechnotransduction" PSC/NRC Award for computing time on Anton 1 (PSCA15075P).
- 2015 – 2017 **"Stretching and Sorting Life: Structural Determinants of Mechanosensation and Cadherin Connectomics" Alfred P. Sloan Fellowship in Neuroscience FR-2015-65794 (\$50,000).**
- 2012 – 2017 **"Force Spectroscopy and Structural Biology of Hair-Cell Tip Links," NIH Pathway to Independence Award K99/R00 DC012534 (Direct Costs: \$698,744).**
- 2014 – 2016 "Towards a structural model of inner ear tip links" Advanced Photon Source General User Proposal APS-GUP-40277 for beam time access (Argonne National Laboratory).

Co-Principal Investigator / Subawards

- 2020 – 2022 **"Sonogenetic control of neurons in a large volume of the rodent brain" NIH NINDS R01 NS115591, PI Sreekanth H. Chalasani at Salk Institute for Biological Studies, sub award leader – M. Sotomayor (Total Costs OSU: \$355,815).**
- 2018 – 2021 **"Molecular basis of brush border assembly" NIH NIDDK R01 DK095811, PI Matthew J. Tyska at Vanderbilt University, sub award leader – M. Sotomayor (Total Costs OSU: \$521,031).**
- 2010 – 2012 "Resolving the Molecular Mechanisms of Calcium Binding to Cadherins Involved in Hearing and Deafness," 200,000 SUs. NRBS/PSC PSCA00074P & PSCA10100P for Supercomputer time on DEShaw's Anton, with D. P. Corey and R. Gaudet.
- 2008 – 2012 "Molecular Mechanisms of Hereditary Deafness and Pain Sensation," 4,482,000 SUs. NSF TRAC MCB080015 for Supercomputer time with D. P. Corey and R. Gaudet.

Contributed to Grants:

- Molecular Basis of Inherited Deafness (NIH 1 R01 DC002281).
- Mechanisms of Membrane Proteins through In Situ Modeling (NIH 1 R01 GM067887).
- Molecular Mechanisms of Cellular Mechanics (NIH 1 R01 GM073655).
- Simulations of Supramolecular Biological Systems, 2004-2007 (NSF LRA MCA93S028).
- Renewal of NIH Resource for Macromolecular Modeling and Bioinformatics (NIH P41-RR05969).

SOFTWARE

VMD Autoionize GUI; VMD Mutator plugin; VMD DataImport plugin;
Assistance in NAMD implementation and validation of CMAP.