

Gabriel C. Lander

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Education

The Scripps Research Institute's Kellogg School of Science and Technology, 2004-2009

Ph.D. in Biophysics

Thesis: *Structural Architecture of Bacteriophage Described via Streamlined Cryo-Electron Microscopy*

Advisors: John E. Johnson, Bridget Carragher, Clinton S. Potter

Binghamton University, 1997-2002

BS Biochemistry, Distinguished Independent Study, Magna cum Laude

Minor in Computer Science

Thesis: *Structural Relationships to Drug Binding Affinities in Tubulin*

Advisor: Dr. Susan L. Bane

Research/Work Experience

Professor, 2019-present

Associate Professor, 2017-2019

Assistant Professor, 2013-2017

Department of Integrative Structural and Computational Biology, The Scripps Research Institute
High-resolution structural studies of macromolecular machines by cryoEM

Postdoctoral Fellow, 2009-2013

Eva Nogales Lab, Ernest Orlando Lawrence Berkeley National Laboratory (LBNL)
Structural studies of the complex biological assemblies involved in cell division

Scientific Intern, 2003-2004

Jack Johnson Lab, The Scripps Research Institute

Study of the inter-subunit protein-protein interactions within viral capsids

Arabidopsis Genome Annotation Curator Assistant, 2002-2003

The Arabidopsis Genome Project, Stanford University

Automation of Arabidopsis genome annotation.

Awards Received

2019	Protein Science Young Investigator (Protein Society)
2018	Amgen Young Investigator Award
2017	Baxter Young Investigator Award
2014	NIH Director's New Innovator Award
2014	Pew Scholar Award
2014	Searle Scholar Award
2013	Dale F. Frey for Breakthrough Scientists (Damon Runyon Foundation)
2012	Merton R. Bernfield Memorial Award (American Society of Cell Biology)
2012	Director's Award for Exceptional Achievement (LBNL)
2012	George Palade Award (Microscopy Society of America)
2011	Outstanding Achievement Award (Lawrence Berkeley National Lab)
2010	Damon Runyon Cancer Research Foundation Fellowship
2008	ARCS fellowship
2007	Carl Storm Fellowship Award
2006	FASEB Young Investigator Award

Participation in Societies, Conference Organization, and Editorial Boards

2022 – present	Scientific Advisory Board, Structural Cell Biology of DNA Repair Machines Program
2023	Program co-chair, CryoEM Subgroup, Biophysical Society
2021 – present	Board of Reviewing Editors (BoRE), <i>Science</i>
2020 – 2021	Co-Chair, Protein Society 35 th Anniversary Symposium Planning Committee
2019 – present	Editorial Board, <i>Journal of Molecular Biology</i>
2019 – 2020	Chair, Cryo-EM special interest group, American Crystallographic Association
2018 – 2019	Program co-chair, CryoEM Subgroup, Biophysical Society
2019	Chair-elect, Cryo-EM special interest group, American Crystallographic Association
2016	Organizer of the Southern California Cryo-EM Symposium
2019 – present	Member, American Association for Cancer Research
2008 – present	Member, American Society of Cell Biology
2008 – present	Member, Biophysical Society

Service in Federal Agencies Review Panels

2023	NIH ZRG1 MBBC Review Panel
2022	NIH RM1 Review Panel
2018-2022	NIH Biochemistry and Biophysics of Membranes Study Section
2020	NIH U24 Service Centers for Cryoelectron Tomography Review Panel
2017	NIH P01 Program Project Review Panel
2016	NIH Special Emphasis Panel, S10 Evaluation

Teaching Experience

Dec 3 – 15, 2022	Lecturer, EMBO Practical Course on CryoElectron Microscopy and 3D Image Processing, IISER Pune, India
Sep 6-16, 2021	Lecturer, EMBO Practical Course: Image Processing for CryoEM, Birkbeck, UK
2019 – present	Lecturer, Structural Biology Course at Rockefeller University (Biennial)
Apr 14-21, 2018	Course organizer and instructor: <i>Recent advancements in biophysical techniques and virology</i> , IIT Roorkee, Roorkee, India
2018 – present	Lead instructor/organizer of the Cryo-EM course at Cold Spring Harbor Lab (Annual)
2018 – present	Course Director, Biophysics, Skaggs Graduate School at Scripps Research (Annual)
2017 – present	Course Director, Structural Biology, Skaggs Graduate School at Scripps Research (Annual)
2013 – 2017	Lectures and hands-on practicals in the Biophysics and Structural Bio courses at Scripps.
2011	Mentored undergraduate student Elaine Liu, UC Berkeley. Upon graduation Elaine won the 2012 Fimognari Memorial award for outstanding senior studying Biochemistry & Molecular Biology
2007	Graduate Student Teaching Assistant, <i>Biophysical Chemistry</i> , Scripps
2007	Graduate Student Teaching Assistant, <i>Crystallography</i> , Scripps

Pre-prints of manuscripts currently under review:

Yang J, Baron KR, Pride DE, Schneemann A, Guo X, Chen W, Song AS, Aviles G, Kampmann M, Wiseman RL, Lander GC. *DELE1 oligomerization promotes integrated stress response activation*. **bioRxiv** (2022) doi: 10.1101/2022.10.01.510468

Peer-reviewed publications

Watson ER, Novick SJ, Matyskiela ME, Chamberlain PP, de la Pena AH, Zhu J, Tran E, Griffin PR, Wertz IE, Lander GC. *Molecular glue CELMoD compounds are regulators of cereblon conformation*. **Science** 378:549 (2022) PMID: 36378961

de la Peña AT, Sliepen K, Eshun-Wilson L, Newby M, Allen JD, Koekkoek S, Zon I, Chumbe A, Crispin M, Schinkel J, Lander GC, Sanders RW, Ward AB. *Structure of the hepatitis C virus E1E2 glycoprotein complex*. **Science** 378:263 (2022) PMID: 36264808

Swan J, Sandate C, Chavan A, Freeberg A, Etwaru D, Ernst D, Palacios J, Golden S, LiWang A, Lander GC, Partch C. *Coupling of distant ATPase domains in the circadian clock protein KaiC*. **Nat Struct Mol Bio** 29:759 (2022) PMID: 35864165

Opoku-Nsiah K, de la Pena A, Williams SK, Chopra N, Sali A, Lander GC, Gestwicki J. *The YPhi Motif Defines the Structure-Activity Relationships of Human 20S Proteasome Activators*. **Nat Comm** 13:1226 (2022) PMID: 35264557

Sivinski J, Ngo D, Zerio CJ, Ambrose AJ, Watson ER, Kaneko LK, Kostelic MM, Stevens M, Ray AM, Park Y, Wu C, Marty MT, Hoang QQ, Zhang DD, Lander GC, Johnson SM, Chapman E. *Allosteric differences dictate GroEL complementation of E. coli*. **FASEB J** 36:e22198 (2022) PMID: 35143841

Yang J, Song AS, Wiseman RL, Lander GC. *Cryo-EM structure of hexameric yeast Lon (PIM1) highlights importance of conserved structural elements*. **J Biol Chem** 298:101694 (2022) PMID: 35143841

Basanta B, Hirschi M, Grotjahn DA, Lander GC. *A case for glycerol as an acceptable additive to cryoEM samples*. **Acta Cryst D** 78:124-135 (2022) PMID: 34981768

Lander GC, Glaeser RM. *Conquer by cryo-EM without physically dividing*. **Biochem Soc Trans** (2021) PMID: 34709401

Anzelon TA, Chowdhury S, Hughes SM, Xiao Y, Lander GC, MacRae IJ. *Structural basis for piRNA-targeting*. **Nature** (2021) PMID: 34471284

Shin M, Watson ER, Novick SJ, Griffin PR, Wiseman L, Lander GC. *Structures of the Human LONP1 Protease Reveal Regulatory Steps Involved in Protease Activation*. **Nat Commun.** 12:3239 (2021) PMID: 34050165

Basanta B, Chowdhury S, Lander GC, Grotjahn DA. *A guided approach for subtomogram averaging of challenging macromolecular assemblies*. **J Struct Biol X.** 4:100041 (2020) PMID: 33319208

Wu M, Lander GC. *Present and Emerging Methodologies in Cryo-EM Single-Particle Analysis*. **Biophys J.** 119:1281-1289 (2020) PMID: 32919493

Wu M, Lander GC, Herzik MA. *Sub-2 Å Resolution Structure Determination Using Single-Particle Cryo-EM at 200 keV*. **J Struct Biol X.** 4 (2020) PMID: 32647824

Wu M, Lander GC. *How low can we go? Structure determination of small biological complexes using single-particle cryo-EM*. **Curr Opin Struct Biol.** 64:9-16 (2020) PMID: 32599507

Shin M, Puchades C, Asmita A, Puri N, Adjei E, Wiseman RL, Karzai AW, Lander GC. *Structural basis for distinct operational modes and protease activation in AAA+ protease Lon*. **Sci Adv.** 20;6:eaba8404 (2020) PMID: 32490208

Hirschi M, Lu WT, Santiago-Frangos A, Wilkinson R, Golden SM, Davidson AR, Lander GC, Wiedenheft B. *AcrIF9 tethers non-sequence specific dsDNA to the CRISPR RNA-guided surveillance complex*. **Nat Commun.** 11;11:2730 (2020) PMID: 32483187

Fribourgh JL, Srivastava A, Sandate CR, Michael AK, Hsu PL, Rakers C, Nguyen LT, Torggrimson MR, Parico GCG, Tripathi S, Zheng N, Lander GC, Hirota T, Tama F, Partch CL. *Dynamics at the serine loop underlie differential affinity of cryptochromes for CLOCK:BMAL1 to control circadian timing*. **eLife** 9:e55275 (2020) PMID: 3210116

Puchades C, Sandate C, Lander GC. *The molecular principles governing AAA+ activity and functional diversity*. **Nat Rev Mol Cell Biol** 21:43-58 (2020) PMID:31754261

Greene ER, Goodall EA, de la Peña AH, Matyskiela ME, Lander GC, Martin A. *Specific lid-base contacts in the 26S proteasome control the conformational switching required for substrate engagement and degradation*. **eLife** 8:e49806 (2019) PMID:31778111

Carragher B, Cheng Y, Frost A, Glaeser RM, Lander GC, Nogales E, Wang HW. *Current outcomes when optimizing "standard" sample preparation for single-particle cryo-em*. **J Microsc.** 276:39-45 (2019) PMID:31553060

Yin Y, Wu M, Hsu AL, Borschel WF, Borgnia MJ, Lander GC, Lee SY. *Visualizing structural transitions of ligand-dependent gating of the TRPM2 channel*. **Nat Commun** 10:3740 (2019) PMID:31431622

Puchades C, Ding B, Song A, Wiseman RL, Lander GC, Glynn SE. *Unique structural features of the mitochondrial AAA+ protease AFG3L2 reveal the molecular basis for activity in health and disease*. **Mol Cell** 75:1073-1085.e6 (2019) PMID:31327635

Sandate CR, Szyk A, Zehr EA, Lander GC, Roll-Mecak A. *An allosteric network in spastin couples multiple activities required for microtubule severing*. **Nat Struct Mol Biol** 26:671-678 (2019) PMID:31285604

Grotjahn DA, Lander GC. *Setting the dynein motor in motion: New insights from electron tomography*. **J Biol Chem** 294:13202-13217 (2019) PMID:31285262

Rollins MF, Chowdhury S, Carter J, Golden SM, Miettinen HM, Santiago-Frangos A, Faith D, Lawrence CM, Lander GC, Wiedenheft B. *Structure Reveals a Mechanism of CRISPR-RNA-Guided Nuclease Recruitment and Anti-CRISPR Viral Mimicry*. **Mol Cell** 74:132-142.e5 (2019) PMID:30872121

Herzik MA Jr, Wu M, Lander GC. *High-resolution structure determination of sub-100 kDa complexes using conventional cryo-EM*. **Nat Commun**. 10:1032 (2019) PMID:30833564

Herzik MA Jr, Fraser JS, Lander GC. *A Multi-model Approach to Assessing Local and Global Cryo-EM Map Quality*. **Structure** 27:344-358.e3 (2019) PMID:30449687

Otomo T, Chowdhury S, Lander GC. *The rod-shaped ATG2A-WIPI4 complex tethers membranes in vitro*. **Contact** 1 (2019) PMID: 30766969

Zubcevic L, Herzik MA, Wu M, Borschel WF, Hirschi M, Song A, Lander GC, Lee S. *Conformational ensemble of the human TRPV3 ion channel*. **Nat Commun** 9:4773 (2018) PMID:30429472

de la Pena AH, Goodall EA, Gates SN, Lander GC, Martin A. *Substrate-engaged 26S proteasome structures reveal mechanisms for ATP-hydrolysis-driven translocation*. **Science** 362 (2018) PMID:30309908

Chowdhury S, Otomo C, Leitner A, Ohashi K, Aebersold R, Lander GC, Otomo T. *Insights into autophagosome biogenesis from structural and biochemical analyses of the ATG2A-WIPI4 complex*. **Proc Natl Acad Sci U S A** 115:E9792-E9801 (2018) PMID:30185561

Yoo J, Wu M, Yin Y, Herzik MA Jr, Lander GC, Lee SY. *Cryo-EM structure of a mitochondrial calcium uniporter*. **Science** 361:506-511 (2018) PMID:29954988

Bruggemann J, Lander GC, Su AI. *Exploring applications of crowdsourcing to cryo-EM*. **J Struct Biol** 203:37-45 (2018) PMID:29486249

Grotjahn DA, Chowdhury S, Xu Y, McKenney RJ, Schroer TA, Lander GC. *Cryo-electron tomography reveals that dynactin recruits a team of dyneins for processive motility*. **Nat Struct Mol Biol** 25:203-207 (2018) PMID:29416113

Gardner B, Castanzo D, Chowdhury S, Stjepanovic G, Stefely M, Hurley J, Lander GC, Martin A. *The peroxisomal AAA-ATPase Pex1/Pex6 unfolds substrates by processive threading*. **Nat Commun** 9:135 (2018) PMID:2932150

Ying Y, Wu M, Zubcevic L, Borschel WF, Lander GC, Lee S-Y. *Structure of the cold- and menthol-sensing ion channel TRPM8*. **Science** 359:237-241 (2018) PMID:29217583

Puchades C, Rampello AJ, Shin M, Giuliano CJ, Wiseman RL, Glynn SE, Lander GC. *Structure of the mitochondrial inner membrane AAA+ protease YME1 reveals the mechanism of substrate processing*. **Science** 358:6363 (2017) PMID:29097521

Hirschi M, Herzik MA, Wie J, Suo Y, Borschel W, Ren D, Lander GC, Lee SY. *Cryo-EM structure of the lysosomal Ca²⁺-permeable channel TRPML3*. **Nature** 550:411-414 (2017) PMID:29019979

Herzik MA, Wu M, Lander GC. *Achieving Better-Than-3-Å Resolution by Single-Particle Cryo-EM At 200 keV*. **Nat Methods** 14:1075-1078 (2017) PMID:28991891

Chen KC, Qu S, Chowdhury S, Noxon IC, Schonhoft JD, Plate L, Powers ET, Kelly JW, Lander GC, Wiseman RL. *The endoplasmic reticulum HSP40 co-chaperone ERdj3/DNAJB11 assembles and functions as a tetramer*. **EMBO J** 36:2296-2309 (2017) PMID:28655754

Rollins MF, Chowdhury S, Carter J, Golden SM, Wilkinson RA, Bondy-Denomy J, Lander GC, Wiedenheft B. *Cas1 and the Csy complex are opposing regulators of Cas2/3 nuclease activity*. **Proc Natl Acad Sci USA** 36:2296-2309 (2017) PMID:28438998

Chowdhury S, Carter J, Rollins MF, Golden SM, Jackson RN, Hoffmann C, Nosaka L, Bondy-Denomy J, Maxwell KL, Davidson AR, Fischer ER, Lander GC, Wiedenheft B. *Structure Reveals Mechanisms of Viral Suppressors that Intercept a CRISPR RNA-Guided Surveillance Complex*. **Cell** 169:47-57 (2017) PMID:28340349

de la Peña AH, Lander GC. *What's the Key to Unlocking the Proteasome's Gate?* **Structure** 24:2037-2038 (2016) PMID:27926830

Smirnova IA, Sjostrand D, Li F, Bjorck M, Schafer J, Ostbye H, Hogbom M, von Ballmoos C, Lander GC, Adelroth P, Brzezinski P. *Isolation of yeast complex IV in native lipid nanodiscs*. **Biochim Biophys Acta** 1858:2984-2992 (2016) PMID:27620332

Matyskiela M, Lu G, Ito T, Pagarigan B, Lu CC, Miller K, Fang W, Wang NY, Nguyen D, Houston J, Carmel G, Tran T, Riley M, Nosaka L, Lander GC, Gaidarova S, Xu S, Ruchelman AL, Handa H, Carmichael J, Daniel TO, Cathers BE, Lopez-Girona A, Chamberlain PP. *A Novel Cereblon Modulator Directs Recruitment of GSPT1 to the CRL4^{CRBN} Ubiquitin Ligase*. **Nature** 535:252-7 (2016) PMID:27338790

Zubcevic L, Herzik MA Jr, Chung BC, Liu Z, Lander GC, Lee SY. *Cryo-electron microscopy structure of the TRPV2 ion channel*. **Nat Struct Mol Biol** 23:180-6 (2016) PMID:26779611

Dambacher CM, Worden EJ, Herzik MA, Martin A, Lander GC. *Atomic structure of the 26S proteasome lid reveals the mechanism of deubiquitinase inhibition*. **eLife** 5:e13027 (2016) PMID:26744777

Yang TC, Ortiz D, Nosaka L, Lander GC, Catalano CE. *Thermodynamic Interrogation of the Assembly of a Viral Genome Packaging Motor Complex*. **Biophys J** 109:1663-75 (2015) PMID:26488657

Ciferri C, Lander GC, Nogales E. *Protein domain mapping by internal labeling and single particle electron microscopy*. **J Struct Biol** 192:159-62 (2015) PMID:26431894

Dambacher CM, Lander GC. *Site-specific labeling of proteins for electron microscopy*. **J Struct Biol** 192:159-62 (2015) PMID:26409249

Bashore C, Dambacher CM, Matyskiela M, Lander GC, Martin A. *Ubp6 deubiquitinase controls conformational dynamics and substrate degradation of the 26S proteasome*. **Nat Struct Mol Biol** 22:712-9 (2015) PMID:26301997

McNulty R, Lokareddy RK, Roy A, Yang Y, Lander GC, Heck AJ, Johnson JE, Cingolani G. *Architecture of the Complex Formed by Large and Small Terminase Subunits from Bacteriophage P22*. **J Mol Biol** 427:3285-99 (2015) PMID:26301600

Garnham CP, Vemu A, Wilson-Kubalek EM, Yu I, Szyk A, Lander GC, Milligan RA, Roll-Mecak A. *Multivalent Microtubule Recognition by Tubulin Tyrosine Ligase-like Family Glutamylases*. **Cell** 161:1112-23 (2015) PMID:25959773

Chowdhury S, Ketcham SA, Schroer TA, Lander GC. *Structural organization of the dynein-dynactin complex bound to microtubules*. **Nat Struct Mol Biol** 22:345-7 (2015) PMID:25751425

Gardner BM, Chowdhury S, Lander GC, Martin A. *The Pex1/Pex6 complex is a heterohexameric AAA+ motor with alternating and highly coordinated subunits*. **J Mol Biol** 427:1375-88 (2015) PMID:25659908

Liu T, Sae-Ueng U, Li D, Lander GC, Zuo X, Jonsson B, Rau D, Shefer I, Evilevitch A. *Solid-to-fluid-like DNA transition in viruses facilitates infection*. **Proc Natl Acad Sci USA** 111:14675-80 (2014) PMID:25271319

Alushin GM, Lander GC, Kellogg EH, Zhang R, Baker D, Nogales E. *High resolution microtubule structures reveal the structural transitions in $\alpha\beta$ -tubulin upon GTP hydrolysis*. **Cell** 157(5):1117-29 (2014) PMID:24855948

Zhao Q, Potter CS, Carragher B, Lander G, Sworen J, Towne V, Abraham D, Duncan P, Washabaugh MW, Sitrin RD. *Characterization of virus-like particles in GARDASIL(R) by cryo transmission electron microscopy*. **Hum Vaccin Immunother** 10:734-9 (2014) PMID:24299977

- Matyskiela ME, Lander GC, Martin A. Conformational switching of the 26S proteasome enables substrate degradation. **Nat Struct Mol Biol** 20(7): 781-8 (2013) PMID:23770819
- Lander GC, Martin AM, Nogales E. *The proteasome under the microscope: Focusing on the regulatory particle.* **Current Opinion in Structural Biology** 23(2):243-51 (2013) PMID:23498601
- Lander GC, Johnson JE, Rau DC, Potter CS, Carragher B, Evilevitch A. *DNA bending-induced phase transition of encapsidated genome in phage lambda.* **Nucleic Acids Res** 41:4518-4524 (2013) PMID:23449219
- Ciferri C, Lander GC, Maiolica A, Herzog F, Aebersold R, Nogales E. *Molecular architecture of human polycomb repressive complex 2.* **Elife** 1:e00005 (2012). PMID:23110252
- Lander GC, Saibil HR, Nogales E. *Go Hybrid: EM, Crystallography, and Beyond.* **Current Opinion in Structural Biology** 22(5):627-635 (2012) PMID:22835744
- Roy A, Bhardwaj A, Datta P, Lander GC, Cingolani G. *Small terminase couples viral DNA binding to genome-packaging ATPase activity.* **Structure** 20:1403-13 (2012) PMID:22771211
- Lander GC, Baudoux AC, Azam F, Potter CS, Carragher B, Johnson JE. *Capsomer Dynamics and Stabilization in the T = 12 Marine Bacteriophage SIO-2 and Its Procapsid Studied by CryoEM.* **Structure** 20:498-503 (2012) PMID:22405008
- Lander GC, Estrin E, Matyskiela M, Bashore C, Nogales E, Martin A. *Complete subunit architecture of the proteasome regulatory particle.* **Nature**; 482(7384):186-91 (2012). PMID:22237024
- Baudoux AC, Hendrix RW, Lander GC, Bailly X, Podell S, Paillard C, Johnson JE, Potter CS, Carragher B, Azam F. *Genomic and functional analysis of Vibrio phage SIO-2 reveals novel insights into ecology and evolution of marine siphoviruses.* **Environ Microbiol** 14:2071-86 (2012) PMID:22225728
- Wiedenheft B, Lander GC, Zhou K, Jore MM, Brouns SJ, van der Oost J, Doudna JA, Nogales E. *Structures of the RNA-guided surveillance complex from a bacterial immune system.* **Nature** 477(7365):486-9 (2011). PMID:21938068
- Tang J, Lander GC, Olia A, Li R, Casjens S, Prevelige P Jr, Cingolani G, Baker TS, Johnson JE. *Peering down the barrel of a bacteriophage portal: the genome packaging and release valve in p22.* **Structure** 19(4):496-502 (2011) PMID:21439834
- Hornung P, Maier M, Alushin GM, Lander GC, Nogales E, Westermann S. *Molecular architecture and connectivity of the budding yeast Mtw1 kinetochore complex.* **J Mol Biol** 405:548-59 (2011) PMID:21075115
- Huo Y, Hu Z, Zhang K, Wang L, Zhai Y, Zhou Q, Lander G, Zhu J, He Y, Pang X, Xu W, Bartlam M, Dong Z, Sun F. *Crystal structure of group II chaperonin in the open state.* **Structure** 18:1270-9 (2010) PMID:20947016
- Matsui T, Lander GC, Khayat R, Johnson JE. *Subunits fold at position-dependent rates during maturation of a eukaryotic RNA virus.* **Proc Natl Acad Sci USA** 107:14111-5 (2010) PMID:20660783
- Khayat R, Lander GC, Johnson JE. *An automated procedure for detecting protein folds from sub-nanometer resolution electron density.* **J Struct Biol** 170:513-21 (2010) PMID:20026407
- Voss NR, Lyumkis D, Cheng A, Lau PW, Mulder A, Lander GC, Brignole EJ, Fellmann D, Irving C, Jacovetty EL, Leung A, Pulokas J, Quispe JD, Winkler H, Yoshioka C, Carragher B, Potter CS. *A toolbox for ab initio 3-D reconstructions in single-particle electron microscopy.* **J Struct Biol** 169:389-98 (2010) PMID:20018246
- Lander GC, Khayat R, Li R, Prevelige PE, Potter CS, Carragher B, Johnson JE. *The P22 tail machine at sub nanometer resolution reveals the architecture of an infection conduit.* **Structure** 17(6):789-99 (2009) PMID:19523897
- Ambrose RL, Lander GC, Maaty WS, Bothner B, Johnson JE, Johnson KN. *Drosophila A virus is an unusual RNA virus with a T=3 icosahedral core and permuted RNA-dependent RNA polymerase.* **J Gen Virol** 90:2191-200 (2009) PMID:19474243
- Prust CJ, Doerschuk PC, Lander GC, Johnson JE. *Ab initio maximum likelihood reconstruction from cryo electron microscopy images of an infectious virion of the tailed bacteriophage P22 and maximum likelihood versions of Fourier Shell Correlation appropriate for measuring resolution of spherical or cylindrical objects.* **J Struct Biol** 167:185-99 (2009) PMID:19457456

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- Matsui T, Lander G, Johnson JE. *Characterization of large conformational changes and autoproteolysis in the maturation of a T=4 virus capsid*. **J Virol** 83:1126-34 (2009) PMID:18987141
- Lander GC, Evilevitch A, Jeembaeva M, Potter CS, Carragher B, Johnson JE. *Bacteriophage lambda stabilization by auxiliary protein gpD: timing, location and mechanism of attachment determined by cryoEM*. **Structure** 16(9):1399-1406 (2008) PMID:18786402
- Nemecek D, Lander GC, Johnson JE, Casjens SR, Thomas GJ Jr. *Assembly architecture and DNA binding of the bacteriophage P22 terminase small subunit*. **J Mol Biol** 383:494-501 (2008) PMID:18775728
- Stagg SM, Lander GC, Quispe J, Voss NR, Cheng A, Bradlow H, Bradlow S, Carragher B, Potter CS. *A test-bed for optimizing high-resolution single particle reconstructions*. **J Struct Biol** 163:29-39 (2008) PMID:18534866
- Prasuhn DE Jr, Kuzelka J, Strable E, Udit AK, Cho SH, Lander GC, Quispe JD, Diers JR, Bocian DF, Potter C, Carragher B, Finn MG. *Polyvalent display of heme on hepatitis B virus capsid protein through coordination to hexahistidine tags*. **Chem Biol** 15:513-9 (2008) PMID:18482703
- Strable E, Prasuhn DE Jr, Udit AK, Brown S, Link AJ, Ngo JT, Lander G, Quispe J, Potter CS, Carragher B, Tirrell DA, Finn MG. *Unnatural amino acid incorporation into virus-like particles*. **Bioconjug Chem** 19:866-75 (2008) PMID:18318461
- Kang S, Lander GC, Johnson JE, Prevelige PE. *Development of bacteriophage p22 as a platform for molecular display: genetic and chemical modifications of the procapsid exterior surface*. **Chembiochem** 9:514-8 (2008) PMID:18213564
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- Shepherd CM, Borelli IA, Lander G, Natarajan P, Siddavanahalli V, Bajaj C, Johnson JE, Brooks CL 3rd, Reddy VS. *VIPERdb: a relational database for structural virology*. **Nucleic Acids Res** 34:D386-9 (2006) PMID:16381893
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Invited Lectures

- Jan 23-26, 2023 *Co-Chair, Panel Discussion Leader*, Molecular Glue Summit, Boston, MA
Oct 26, 2022 California Institute of Technology, Pasadena, CA
Oct 14, 2022 Research Institute of Molecular Pathology, Vienna, Austria
Sep 29, 2022 *Dana Farber Targeted Protein Degradation webinar series*, Virtual
Jul 24-29, 2022 Enzymes, Coenzymes, and Metabolic Pathways Gordon Research Conference, Waterville Valley, NH
Jun 19-24, 2022 *Session Chair/Discussion Leader*, 3DEM Gordon Research Conference, Barcelona, Spain
Jun 14-17, 2022 *Cryo-EM Course*, Brookhaven National Laboratory, Upton, NY
Jun 8-11, 2022 *Dubochet Centre for Imaging Symposium*, Geneva, Switzerland
Apr 26, 2022 Pasteur Institute, Paris, France
Apr 18-21, 2022 *Plenary Keynote* – Drug Discovery Chemistry, San Diego, CA
Apr 2-5, 2022 American Society for Biochemistry and Molecular Biology, Philadelphia, PA
Mar 30, 2022 Cryo-Electron Microscopy Symposium, University of Southern California, CA
Feb 18, 2020 College of Pharmacy Graduate Program, University of Arizona, AZ
Feb 12, 2020 Graduate School of Medicine, University of Tokyo, Tokyo, Japan
Feb 10, 2020 High Energy Accelerator Research Organization (KEK), Tsukuba, Japan
Jan 22-23, 2019 *wwPDB Single Particle EM Data Management Workshop*, EMBL-EBI, Hinxton, UK
Jan 15-18, 2020 *Gumpoldskirchen Meeting: “Mechanisms of intracellular proteolysis and their potential for therapeutic applications”*, Vienna, Austria
Jan 14, 2020 Research Institute of Molecular Pathology, Vienna, Austria
Dec 7-11, 2019 American Society for Cell Biology Annual Meeting, Washington DC
Dec 5, 2019 Molecular Biology Institute, Univ. California at Los Angeles, Los Angeles, CA
Oct 23, 2019 *Postdoc-invited Seminar* – Dept. of Biophys and Biophys Chem, Johns Hopkins Univ., Baltimore, MD
Oct 8, 2019 Dept of Biochemistry & Biophysics Seminar, Univ. of North Carolina, Chapel Hill, NC
Oct 2-3, 2019 American Chemical Society - Pharma Leader’s Symposium, San Diego, CA
Sep 30, 2019 Institute for Bioscience and Biotechnology Research, Univ. of Maryland, Rockville, MD
Sep 11, 2019 Dept. of Structural Biology, Tsinghua Univ., Beijing, China
Sep 10, 2019 Institute of Biophysics, Chinese Academy of Sciences, Beijing, China
Aug 23, 2019 Molecular Biosciences Symposium, University of Texas, Austin, TX
Jul 29-31, 2019 2nd Conference on Biomotors, Virus Assembly, and Nanobiotechnology Applications, Columbus, OH
Jul 18-21, 2019 Biophysical Society Thematic Meeting: Revisiting the Central Dogma of Molecular Biology at the Single-Molecule Level, Lima, Peru
Jun 30-Jul 3, 2019 Protein Society Annual Symposium, Seattle, WA
Jun 9-14, 2019 *Session Chair/Discussion Leader*, 3DEM Gordon Research Conference, Hong Kong, China
Jun 5-6, 2019 High Risk High Reward Symposium, National Institutes of Health, Bethesda, MD
May 22, 2019 Seminar – Department of Structural Bio., National Cancer Institute, Frederick, MD
May 4-7, 2018 29th Annual World Molecular Engineering Network, Cabo San Lucas, Mexico
Apr 9-10, 2019 WIS EM Facility Inaugural Symposium, Weizmann Institute of Science, Rehovot, Israel
Feb 21, 2019 Evinin Chemical and Structural Bio. Seminar, Rockefeller Univ., New York City, NY
Feb 5, 2019 College of Pharmacy, Pharmacology and Toxicology Graduate Seminar, Univ of Arizona, Tuscon, AZ
Jan 14-15, 2019 Frontiers in cryo-EM Validation workshop, EMBL-EBI, Hinxton, UK
Dec 14, 2018 Dept. of Structural Bio., St. Jude Children’s Research Hospital, Memphis, TN
Nov 28, 2018 Anatomy and Cell Biology Seminary Series, McGill University, Montreal, Canada
Oct 18, 2018 Amgen Young Investigator Symposium, Boston, MA
Oct 7-10, 2018 Fragment-Based Lead Discovery Conference, San Diego, CA
Sep 9-14, 2018 19th Annual International Microscopy Congress, Sydney, Australia

Aug 26-29, 2018 Kuo Symposium on 3D-EM of Macromolecules and Cells, Zhejiang University, Hangzhou, China

Aug 24, 2018 Department of Biological Sciences Colloquium, National University of Singapore, Singapore

Jul 20-24, 2018 American Crystallographic Association, Toronto, Canada

Jun 26-29, 2018 50 years of Synchrotron Radiation in the UK and its global impact, University of Liverpool, Liverpool, UK

Jun 25, 2018 Birkbeck, University of London, London, UK

Jun 22, 2018 Structural Biology Interest Group Seminar Series, Francis Crick Institute, London, UK

Jun 13-15, 2018 NovAliX Conference – Biophysics in Drug Discovery, Boston, MA

May 19, 2018 The Third Coast Workshop on Biological Cryo-EM, University of Chicago, Chicago, IL

May 5-8, 2018 28th Annual World Molecular Engineering Network, Cabo San Lucas, Mexico

Apr 27-28, 2018 Symposium on Frontiers and Careers in Cryo EM, UCLA, Los Angeles, CA

Apr 18, 2018 University Lecture, IIT Roorkee, Roorkee, India

Feb 17-21, 2018 Biophysical Society 62st Annual Meeting, San Francisco, CA

Feb 4-8, 2018 Keystone Symposium: Cryo-EM from Cells to Molecules: Multi-Scale Visualization of Biological Systems, Granlibakken Tahoe, Tahoe City, CA

Jan 19, 2018 University of Missouri, Columbia, MO

Jan 26, 2018 Illinois University, Urbana-Champaign, IL

Nov 2, 2017 University of California, San Diego, CA

Oct 20, 2017 Massachusetts Institute of Technology, Boston, MA

Oct 19, 2017 University of Massachusetts, Amherst, MA

Oct 18, 2017 University of Massachusetts, Worcester, MA

Aug 7-11, 2017 Microscopy & Microanalysis Meeting, St. Louis, MO

May 6-9, 2017 27th Annual World Molecular Engineering Network, Cabo San Lucas, Mexico

May 2, 2017 CryoEM Symposium, Washington University, St. Louis, MO

Apr 28, 2017 Duke University, Raleigh, NC

Jan 23, 2017 Yale University, New Haven, CT

Nov 29, 2016 Institute of Molecular Biology (IMB), University of Oregon, Eugene, OR

Jun 19-24, 2016 3DEM Gordon Research Conference, Chinese Univ. of Hong Kong, Hong Kong, China

May 26, 2016 University of California, Davis, CA

May 8-11, 2016 26th Annual World Molecular Engineering Network, Cabo San Lucas, Mexico

Dec 1, 2015 Genentech, San Francisco, CA

Nov 16, 2015 Univ. of Texas Medical School, Houston, TX

Oct 22, 2015 Michigan State University, East Lansing, MI

Oct 15, 2015 NIH Departmental Seminar, NIH, Bethesda, MD

Jul 6-10, 2015 3D solutions in CryoEM, Maastricht University, Maastricht, Netherlands

Jun 21-26, 2015 3DEM Gordon Research Conference, New London, NH

Apr 25, 2015 Science Saturday, Scripps, La Jolla, CA

Nov 9-14, 2013 Workshop on Advanced Topics in EM Structure Determination, Scripps, La Jolla, CA

Oct 8-12, 2014 110th International Titisee Conference: Structure, forces, and dynamics of macromolecular complexes, Titisee, Black Forest, Germany

Sep 15-18, 2014 Horizons in Molecular Biology, International Max Planck Research School for Mol Bio, Göttingen, Germany

Jun 4-6, 2014 Bioimaging at the Nanoscale Symposium, Oregon Health & Science Univ, Portland, OR

Oct 1-4, 2013 3D solutions in CryoEM, University of Barcelona, Barcelona, Spain

Dec 15-19, 2012 American Society for Cell Biology Annual Meeting, San Francisco, CA

Nov 11-16, 2012 Workshop on Advanced Topics in EM Structure Determination, Scripps, La Jolla, CA

March 1, 2012 Automated Molecular Imaging Forum, Scripps, La Jolla, CA

Jan 27, 2012 Bay Area CryoEM Symposium, UC Davis, CA

Aug 11, 2011 Automated Molecular Imaging Forum, Scripps, La Jolla, CA

Nov 9-12, 2008 39th NIPS International Symposium, Frontiers of Biological Imaging: Synergy of Advanced Techniques, Okazaki, Japan

June 15-20, 2008 3DEM Gordon Research Conference, Lucca (Barga), Italy

May 25-29, 2007 Biennial Conference of Phage/Virus Assembly, Toronto, Canada

Mar 3-7, 2007 Biophysical Society 51st Annual Meeting, Baltimore, Maryland

Jun 17-22, 2006 FASEB Virus Assembly Meeting, Saxtons River, VT

Present trainees

Wenqian Chen

PhD student, Mar 2022 – present

Previous Training: BA, University of California Berkeley, CA

Funding: National Science Foundation Predoctoral Fellowship

Lisa Eshun-Wilson, PhD

Postdoc, Mar 2020 – present

Previous Training: BA, Grinnell College, Grinnell, IA

Postbac, NIH, Bethesda, MD

PhD, UC Berkeley, Berkeley, CA

Funding: National Science Foundation Postdoctoral Fellowship

Jeff Mindrebo, PhD

Postdoc, Jan 2021 – present

Previous Training: BS, University of Houston, Houston, TX

MS, UC San Diego, San Diego, CA

PhD, UC San Diego, San Diego, CA

Funding: Ruth L. Kirschstein Postdoctoral Fellow (NIH F32)

Maria Rafiq

Postdoc, Jan 1, 2023 – present

Previous Training: MS, University of Punjab, Punjab, India

M.Phil, Bahauddin Zakariya University, Punjab, India

PhD, Københavns Universitet - University of Copenhagen, Copenhagen, Denmark

Funding: Hewitt Fellowship

Alexandra Salazar

PhD Student, Apr 2022- present

Previous Training: BS, San Jose State University, San Jose, CA

Funding: Scripps training grant

Jie Yang, PhD

Postdoc, Aug 2019 – present

Previous Training: BS, College of Life Sciences, Wuhan University, Hubei, China

PhD, Case Western Reserve University, Cleveland, OH

Funding: NIH R01 grant to Lander

Chris Zerio, PhD

Postdoc, Feb 2022 – present

Previous Training: BS, University of Puget Sound, WA

PhD, University of Arizona, AZ

Funding: MOMA Therapeutics Fellowship

Past trainees

Edmond Watson, PhD

Postdoc, Oct 2018 – Oct 2022

Previous Training: BS, Lambuth University, Jackson, TN

PhD, St. Jude Children's Research Hospital, Memphis, TN

Funding: Bristol Myers Squibb Fellowship

Subsequent Position: Senior Scientist, Bristol Myers Squibb, San Diego, CA

Benjamin Basanta, PhD

Postdoc, Jan 2020 – Sep 2022

Previous Training: BS, Universidad de Buenos Aires, Buenos Aires, Argentina

PhD, University of Washington, Seattle, WA

Funding: Hewitt Foundation Fellowship
Subsequent Position: Scientist II, Arzeda, Seattle, WA

Albert Song

MD-PhD Student, Aug 2018- present

Previous Training: BA, Northwestern University, Evanston, IL

Funding: Ruth L. Kirschstein Predoctoral Fellow (NIH F31)

Subsequent Position: Clinical rotations, UCSD Medical School, San Diego, CA

Mia Shin

PhD Student, Jan 2017- May 2021

Previous Training: BA, University of Berkeley, Berkeley, CA

Funding: National Science Foundation Fellowship

Subsequent Position: Research Scientist, Sanofi, Boston, MA

Marsha Hirschi, PhD

Postdoc, Sep 2017 – Nov 2020

Previous Training: MSc & BS, Delft University of Technology and Leiden University, the Netherlands
PhD, Duke University, Durham, NC

Funding: Damon Runyon Cancer Research Foundation Fellowship

Subsequent Position: Senior Scientist, Pfizer, San Diego, CA

Colby Sandate

PhD Student, Aug 2015- Oct 2020

Previous Training: BS, University of California, Santa Cruz, CA

Funding: National Science Foundation Fellowship

Subsequent Position: Postdoc, Nicolas Thomä lab, Friedrich Miescher Inst, Basel, Switzerland

Mengyu Wu

PhD Student, Nov 2016 – Aug 2020

Previous Training: BS, Wellesley College, Wellesley, MA

Funding: National Science Foundation Fellowship

Subsequent Position: Head of Electron Microscopy, Institute for Protein Design, University of Washington, Seattle, WA

Cristina Puchades

PhD Student, May 2015 – Sep 2019

Previous Training: MSc & BSc, Polytechnic University of Valencia, Valencia, Spain

Funding: American Heart Association Fellowship

Subsequent Position: Postdoc, Yifan Cheng lab, University of San Francisco, San Francisco, CA

Andres Hernandez, PhD

Postdoc, June 2016 – April 2019

Previous Training: BS, University of Houston, Houston, TX

PhD, Johns Hopkins University, Baltimore, MD

Funding: American Cancer Society Fellowship

Subsequent Position: Director of Cryo-EM Studies, Celgene, San Diego, CA

Mark Herzik, PhD

Postdoc, October 2014-December 2018

Previous Training: BS, University of Houston, Houston, TX

PhD, University of California, Berkeley, CA

Funding: Helen Hay Whitney Foundation Fellowship

Subsequent Position: Assistant Professor at University of California, San Diego, CA

Saikat Chowdhury, PhD

Postdoc, March 2013 – June 2018

Previous Training: BENG, Vellore Institute of Technology, Vellore, Tamil Nadu, India

PhD, Pennsylvania State University, University Park, PA

Subsequent Position: Assistant Professor at Stony Brook University

Corey M. Dambacher, PhD

Postdoc, Oct 2013 - Sept 2015

Previous Training: BS, San Diego State University, San Diego, CA
PhD, The Scripps Research Institute, La Jolla, CA

Subsequent Position: Lead Scientist, Research & Development, Omniome Inc.

Fei Li, PhD

Postdoc (8 month sabbatical), May 2015 - Dec 2015

Previous Training: BS, Xiamen University, China
PhD, Michigan State University, East Lansing, MI

Subsequent Position: Postdoc in Dr. Robert Edwards and Dr. Bob Stroud's labs at UCSF

Danielle Grotjahn, PhD

PhD Student, May 2014- April 2018

Previous Training: BS, University of Wisconsin-Madison, Madison, WI
PhD, The Scripps Research Institute

Funding: National Science Foundation Fellowship

Subsequent Position: Fellow at The Scripps Research Institute